

October 21, 2020

California Air Resources Board  
1001 I Street,  
Sacramento, California 95814  
Via Electronic submittal

**Re: DECREASING THE CARBON EQUIVALENT INTENSITY OF OCEAN-GOING VESSELS IN ARB'S 2020 MOBILE SOURCE STRATEGY**

The undersigned organizations submit these comments to urge the California Air Resources Board to include in its 2020 Mobile Source Strategy a more aggressive focus on reducing climate and air pollution from Ocean-Going Vessels ("OGVs"). Specifically, we urge California Air Resources Board ("ARB") to add to its off-road strategy a focus on decreasing the carbon equivalent ("CO<sub>2e</sub>") intensity of OGVs and increasing the range of low/zero-carbon and renewable OGV fuel alternatives. ARB should require linear CO<sub>2e</sub> improvements per ship of at least 80% by 2030 based on ships' 2008 baseline reported to the International Maritime Organization ("IMO") or an equivalent California baseline. Improvements should be implemented using the AER metric (gCO<sub>2e</sub>/DWT-nm and gCO<sub>2e</sub>/GT-nm), and compliance should be measured in three-year cycles, with annual audits.

According to the 2017 San Pedro Bay Ports Clean Air Action Plan, ships are the primary source of emissions at California ports. (LA/LB, 2017) Fossil fueled OGVs are massive climate polluters that cause significant air pollution globally and acutely in port communities. Of climate crisis concern, OGVs emit large amounts of climate-warming carbon dioxide ("CO<sub>2</sub>"), methane ("CH<sub>4</sub>"), and black carbon. Of public health crisis concern, fossil fueled OGVs produce nitrogen oxide ("NO<sub>x</sub>"), sulfur oxides ("SO<sub>x</sub>"), and particulate matter ("PM") emissions, all of which cause grave health impacts.

The Governor of California has asked all regulatory agencies to accelerate their climate mitigation strategies. In addition, many of California's port communities remain in non-attainment of NO<sub>x</sub> reduction goals under the federal Clean Air Act. Air Districts across the state are working to reduce NO<sub>x</sub> and other criteria pollutants from mobile sources.

The strategies listed to curb OGV pollution in ARB's draft 2020 Mobile Source Strategy are currently insufficient. While ARB has in place an emissions control measure for OGVs "At Berth" and a sulfur fuel standard, ARB does not have in place rules to decrease the CO<sub>2</sub> or CO<sub>2e</sub> of OGV fuels or eliminate emissions from OGVs all together, like it now has in place for heavy duty trucks and automobiles. To put OGVs on a pathway towards zero-emissions in California waters, ARB must decrease the CO<sub>2e</sub> of OGVs in addition to requiring OGV engine upgrades. Decreasing CO<sub>2e</sub> of OGV fuels will reduce climate emissions and other smog-forming and toxic air pollutants, and will set a technology-forcing standard to accelerate the development of low-carbon and renewable fuel alternatives to the industry. Regulating the CO<sub>2e</sub> of OGV fuels will build on California's global climate and marine leadership.

Below are explanations of expected benefits and compliance pathways.

## **I. Public Health and Environment Justice Benefits Would Be Significant**

Decreasing the CO<sub>2</sub>e intensity of OGVs in California waters will reduce all species of air pollutants. Practically, at least in the early years of compliance, we expect the majority of ships to use “slow steaming” methods to comply with a CO<sub>2</sub>e intensity regulation in California waters. California’s two largest ports, Los Angeles and Long Beach, already provide voluntary slow steaming initiatives at their ports as a way to curb pollution. An ARB rule would build on the success of these voluntary initiatives to generate greater climate mitigation and public health benefits for the entire state.

According to leading global analysis on the relationship between “slow steaming” of OGVs and environmental impacts, SO<sub>x</sub> and NO<sub>x</sub>, the precursors to PM, reduce linearly with reductions in ship speed or CO<sub>2</sub> intensity. (CE Delft, 2012)

NO<sub>x</sub> Benefits: NO<sub>x</sub> emissions generally follow fuel consumption, as NO<sub>x</sub> emissions and fuel consumption are related to power. A fleet wide reduction in vessel speed of 10% and 20% would reduce NO<sub>x</sub> emissions by an expected 13% and 24% respectively. The specific NO<sub>x</sub> benefits to California will need to be assessed by ARB but should follow these findings.

SO<sub>x</sub> Benefits: For SO<sub>x</sub>, since emissions are formed from the reaction between Sulphur in fuel and oxygen in the combustion air, a direct relationship between SO<sub>x</sub> emissions and fuel consumption exists. A fleet wide reduction in vessel speed of 10% and 20% would reduce SO<sub>x</sub> emissions by an expected 13% and 24% respectively. The specific NO<sub>x</sub> benefits to California will need to be assessed by ARB but should follow these findings.

It is critical that ARB protect public health in areas near ports, most of which are considered “disadvantaged communities” by the state of California and have suffered environmental injustices for years or even decades. These areas tend to be comprised of the working poor and people of color who contend daily with the various and cumulative pollution burdens of goods movement, such as proximity to OGVs, heavy duty trucks, locomotives, and cargo handling equipment. (ARB, 2019).

One of the main pollutants from OGVs in California’s port communities is NO<sub>x</sub>. Exposure to NO<sub>x</sub> can cause respiratory irritation, aggravation of respiratory diseases, especially asthma, causing coughing, wheezing and difficulty breathing, all of which can lead to emergency room visits and hospital admissions for those people affected.

Another harmful emission from OGVs is particulate matter (“PM”) that can be inhaled into upper airways and lungs, creating respiratory ailments leading to still more public health concerns. Exposure to PM 2.5 can increase premature mortality, hospital admissions for cardiopulmonary causes, acute and chronic bronchitis, asthma attacks, and respiratory symptoms. The health effects are of particular concern for sensitive groups such as infants, children, the elderly, and those with preexisting heart or lung disease. The current COVID-19 pandemic provides a sobering demonstration of the need to protect respiratory health: experts have found that exposure to particulate matter increases COVID-19 mortality. (Xiao Wu MS et. al, 2020)

## II. Climate Mitigation Benefits Would Be Material and Aligned with ARB's Accelerated Climate Mitigation Mandate

The global shipping sector emits over 1 billion tons of CO<sub>2</sub> each year. (O'Leary, 2019) The primary source of these emissions is the carbon-intensive nature of the fossil fuels that power large ships across the world's oceans. At current levels, GHG emissions from international maritime transport account for roughly 3 percent of total global GHG emissions. If the shipping sector were a country, it would rank sixth in emission in the world. The impact to California is not insignificant, with shipping accounting for almost 1% (.8% as of 2016) of the state's climate emissions.

Of concern, ocean-going trade volumes are projected to grow between 50% and 250% by 2050, which will lead to a significant increase of associated GHG and air pollution emissions if mitigation measures are not urgently put in place. (O'Leary, 2019) Containerships and other cargo ships, which call California ports at high frequency, are the worst polluting segments within the industry.

In Executive Order N\_79\_20, signed on September 23, 2020, California Governor Newsom affirmed that:

- “the climate change crisis is happening now, impacting California in unprecedented ways, and affected the health and safety of too many Californians;”
- “[Californians] must accelerate our actions to mitigate and adapt to climate change, and more quickly move toward our low-carbon, sustainable and resilient future;”
- “California’s long-term economic resilience requires bold action to eliminate emissions from transportation, which is the largest source of emissions in the State;”
- “[California] must prioritize clean transportation solutions that are accessible to all Californians, particularly those who are low-income or experience a disproportionate share of pollution;”
- “zero emissions technologies, especially trucks and equipment, reduce both greenhouse gas emissions and toxic air pollutants that disproportionately burden our disadvantaged communities of color[.]”

Decreasing the CO<sub>2e</sub> intensity of OGVs is one important way California can accelerate its climate mitigation approach. A ship's CO<sub>2e</sub> emissions depend on its operational carbon intensity performance and the amount of transport work it carries out. Setting a “goal-based” CO<sub>2e</sub> reduction standard is the best way to incentivize the broadest range of both technical and operational options for improved efficiency and maximize the potential for each ship to find the most affordable way to reach a CO<sub>2e</sub> reduction target, and is ambitious enough to ensure the deep emission reductions that are necessary to put shipping on an emissions pathway compatible with keeping warming below 1.5oC.

Again, according to leading global analysis mentioned above, CO<sub>2</sub> and CO<sub>2e</sub> can be reduced simply from slow steaming. (CE Delft, 2012)

CO<sub>2</sub> Benefits: CO<sub>2</sub> emissions from ships are generated by the combustion of hydrocarbon fuel in main engines, auxiliary engines and boilers with the main engine consuming the majority of fuel and generating the major proportion of CO<sub>2</sub>. Decreasing the CO<sub>2</sub> intensity of ships can lead to significant reduction in fuel consumption by the main engine, and by

association CO<sub>2</sub> emissions. Generally, CO<sub>2</sub> could be reduced by 13%, 24%, and 33% per ship if ships reduced their speed by 10%, 20%, and 30%, respectively. (CE Delft, 2012 and GL Reynolds, 2019). The specific CO<sub>2</sub> benefits for California will need to be assessed by ARB but should follow these findings.

CH<sub>4</sub> Benefits: Methane (CH<sub>4</sub>) emissions from ships are on the rise due to an increase in use of liquefied natural gas (LNG) fuel. This is why California should put in place a CO<sub>2</sub>e standard, rather than just a CO<sub>2</sub> standard.

Black Carbon Benefits: There is general agreement within the shipping industry that at full engine load, black carbon emissions are directly proportional to fuel consumption. Therefore, a reduction in CO<sub>2</sub> intensity should reduce black carbon emissions. (GL Reynolds, 2019)

### **III. Compliance Is Possible and the Commercial Zero-Emission Vessel Market Is Maturing**

As presented above, the logical first mode of compliance will be “slow steaming.” We reiterate that California’s two largest ports, Los Angeles and Long Beach, already provide voluntary slow steaming initiatives at their ports as a way to curb pollution. A state-wide regulation would build on the success of these voluntary initiatives to generate broader climate mitigation and public health benefits for the entire state.

In addition, requiring a decrease in the CO<sub>2</sub>e intensity of OGV fuels will help accelerate the commercial zero-emission OGV market. This market is maturing commensurate with the pace of regulation we have proposed. Within a number of years, ARB will be in position to follow up on a GHG efficiency OGV rule with a zero-emissions OGV rule.

The adoption in 2018 by the IMO of an Initial GHG Strategy from shipping of at least 50% by 2050 as compared to 2008 shipping emissions, and pursue efforts to phase out emissions entirely, set an overdue climate target for the shipping industry. Shortly after, a coalition of industry leaders launched “the Getting to Zero Coalition,” with a mandate to bring commercially viable ZEVs operating along deep sea trade routes by 2030, supported by the necessary infrastructure for scalable zero-carbon energy sources including production, distribution, storage and bunkering. (GMF, 2019) The goal of this coalition is to make it that at least by the end of 2030, the first commercially viable ZEVs are operating on key trade corridors, and additional corridors are being added to the network through investments in infrastructure.

Already, low-and-zero emissions models exist for small cargo vessels, including battery powered vessels, hydrogen fuel cell vessels, and hybrid battery-fuel cell vessels. Many other prototypes are currently in development. Earlier this month, Daewoo Shipbuilding and Marine Engineering (DSME), one of world’s top 3 ship builders, announced its preparations to offer ammonia-ready zero-carbon ships to clients by 2025 with a capacity to carry 23,000 TEU. (Pico, 2020) Odfjell, one of the world’s largest chemical and bulk carrier companies, plans to launch its first ship with a climate-friendly 1.2 MW fuel cell auxiliary power unit in 2023. Its’ goal is to achieve a full-scale fuel cell solution with engine power of 10 MW, which would reduce voyage-based and fleet-wide CO<sub>2</sub> emissions between 40-100%. (Pierce, 2019)

#### **IV. Conclusion**

For all the reasons stated above, we urge ARB to add to its 2020 Mobile Strategy a focus on decreasing the carbon equivalent intensity of Ocean Going Vessels and increasing the range of low/zero-carbon and renewable OGV fuel alternatives in a timeline consistent with the International Paris Climate Agreement.

Thank you for your time and consideration.

Respectfully submitted,

**Madeline Rose**

Climate Campaign Director  
Pacific Environment

**Bill Magavern**

Policy Director  
Coalition for Clean Air

**Jonathan Lewis**

Senior Counsel  
Clean Air Task Force

**Dan Hubbell**

Shipping Emissions Campaign Manager  
Ocean Conservancy

## References

LA/LB (2017). *2017 Clean Air Action Plan Update*. The Port of Long Beach and The Port of Los Angeles. <https://cleanairactionplan.org/documents/final-2017-clean-air-action-plan-update.pdf/>

ARB (2019). *Staff Report: Initial Statement of Reasons*. California Air Resources Board. <https://ww3.arb.ca.gov/regact/2019/ogvatberth2019/isor.pdf>

O'Leary, A. (2019). *Legal Pathways to Deep Decarbonization in the United States*. Environmental Law Institute. <https://www.eli.org/eli-press-books/legal-pathways-deep-decarbonization-united-states>

CE Delft, the ICCT, Mikis Tsimplis. (2012). *Regulated Slow Steaming in Maritime Transport: An Assessment of Options, Costs and Benefits*. Available at: [www.cedelft.eu](http://www.cedelft.eu).

GL Reynolds (2019). The multi-issue mitigation potential of reducing ship speeds. [https://seas-at-risk.org/images/pdf/publications/Multi\\_issue\\_speed\\_report.pdf](https://seas-at-risk.org/images/pdf/publications/Multi_issue_speed_report.pdf)

Xiao Wu MS, Rachel C. Nethery PhD, M. Benjamin Sabath MA, Danielle Braun PhD, Francesca Dominici PhD. (2020). *Exposure to air pollution and COVID-19 mortality in the United States*. Harvard T.H. Chan School of Public Health, Updated April 5, 2020.

Global Maritime Forum (2019). *Getting to Zero 2030 Coalition Ambition Statement*. Global Maritime Forum. <https://www.globalmaritimeforum.org/getting-to-zero-coalition/ambition-statement>

Pico, Soren (2020). *MAN and DSME get approval for ammonia-powered mega-ship design*. ShippingWatch. <https://shippingwatch.com/carriers/Container/article12468683.ece>