



March 8, 2013

Mary Nichols, Chair
California Air Resources Board
1001 Street, Po Box 2815
Sacramento, CA 95812

**RE: Use of Cap-and-Trade Auction Funds to Reduce GHG Emissions
from Ships: Vessel Speed Reduction Incentive Program**

Submitted electronically via the [CARB Comment Submittal Form](#)

Dear Ms. Nichols and Board Members:

The Environmental Defense Center (EDC) supports the proposal by the Santa Barbara County Air Pollution Control District (SBCAPCD) to use some of the Cap-and-Trade auction revenue to develop an incentive program that will voluntarily reduce the speeds of large marine ships traveling along the California coast. This proposal, known as the *Vessel Speed Reduction Incentive (VSR) Initiative*, fulfills multiple objectives of AB 32 (Global Warming Solutions Act of 2006), AB 1532 and SB 535 (Greenhouse Gas Reduction Fund) while also meeting California's clean-transportation goals and sustainable freight strategies. By supporting this initiative the California Air Resources Board (CARB) would be investing in low-carbon freight transportation, a priority identified in the Cap-and-Trade Auction Proceeds Investment Plan Draft Concept Paper (Investment Plan).¹

EDC is a non-profit, public interest law firm and environmental organization which represents environmental and other community groups within Santa Barbara, Ventura, and San Luis Obispo Counties. Our mission is to protect and enhance the local environment through education, advocacy, and legal action. We are pleased to provide input on the use of Cap-and-Trade auction proceeds to reduce greenhouse gases (GHG) contributing to climate change and to register our support for the VSR Initiative.

¹ California Air Resources Board and California Environmental Protection Agency 2013. Cap-and-Trade-Auction Proceeds Investment Plan. Draft Concept Paper Accessed at: http://www.arb.ca.gov/cc/capandtrade/auctionproceeds/workshops/concept_paper.pdf

It is rare when a single policy mechanism can have so many positive benefits. Incentivizing marine vessels greater than 300 gross tons to voluntarily travel at speeds 12 knots/hour or slower would reduce GHG emissions, reduce air pollution along the coast and in disadvantaged communities, protect whales from collisions with vessel and noise pollution, and provide other benefits associated with reduced speed.

The SBCAPCD letter of support is attached as an appendix and provides additional details including a Fact Sheet and Implementation Plan on the VSR Initiative program. The following EDC letter highlights the benefits from this VSR program including:

- 1. Significant GHG Reductions**
- 2. Co-Benefit: Significant Air Pollutant Reductions Complimenting Existing Air Quality Efforts**
- 3. Co-Benefit: Directing Investments to Disadvantage Communities**
- 4. Co-Benefit: Improving Whale Protection**
- 5. Supporting the State's Economy and Maximizing Economic Benefits**
- 6. Creating Opportunities for Collaboration Between Businesses, Public Agencies, Non-profits and Others**
- 7. Measurable and Verifiable Reductions**

Each of these benefits is described in more detail below.

1. Significant GHG Reductions

Large ships traveling along the California Coast produce significant air emissions. For Santa Barbara County alone the marine shipping sector contributes approximately 25% to the total Statewide GHG emissions inventory. Research shows that GHG emissions from large marine shipping vessels are directly proportional to fuel consumption, and the amount of fuel ships consume is directly and exponentially related to vessel speed. Studies have demonstrated that the most cost effective, feasible method to reduce emissions from ships is to slow them down.² The International Maritime Organization (IMO) reports that a 10% reduction in speed would result in a 23.3% decrease in GHG emissions.³ At low speeds, ships are one order of magnitude more efficient than land transport and two orders more efficient than air transport.⁴ However,

² Friends of the Earth International. 2007. Prevention of Air Pollution from Ships: Recent Findings on Global Warming Justifying the Need for Speedy Reductions of Greenhouse Gas Emissions from Shipping. Submitted to the Marine Environment Protection Committee, IMO (May 4, 2007). (pg 6)

³ International Maritime Organization. 2000. Study of Greenhouse Gas Emissions from Ships: Final Report to the International Maritime Organization. Issue no. 2-31 (March 2000). Available at: http://unfccc.int/files/methods_and_science/emissions_from_intl_transport/application/pdf/imoghmain.pdf (accessed June 19, 2012). (at pg 17, Table 1-5)

⁴ Isensee and Bertram 2004. Quantifying external costs of emissions due to ship operation. Proceedings of the Institution of Mechanical Engineers, Part M: Journal of Engineering of the Maritime Environment 218: 41.

as ship speeds increase much of these efficiencies are lost and very fast ships have been found to have similar energy demands to airplanes.⁵

Estimates by the SBCAPCD have shown that reducing ship speeds to 12 knots/hour along the entire California coast would reduce GHGs by 50%, resulting in 2.5 million tonnes/year of GHG reduction.⁶ This is equivalent to removing over 480,000 vehicles from the roads or planting over 60 million trees.⁷ Thus, reducing ship speeds could substantially contribute to California's GHG emission reduction goals.

2. Co-Benefit: Significant Air Pollutant Reductions Complimenting Existing Air Quality Efforts

In addition to significantly contributing to GHG emissions, ship emissions contain toxic air pollution that puts people at risk of cancer, asthma and premature death. Health risk pollutants from ships include nitrogen oxides (NO_x), sulfur oxides (SO_x), and particulate matter (PM). Locally in Santa Barbara County, marine shipping contributes over 54% of the total daily NO_x emissions. This is more than all other sources combined, including: stationary sources, on-road motor vehicles, other mobile sources, and area-wide sources. The SBCAPCD has estimated substantial emissions reductions over 50% for NO_x, SO_x, and PM pollutants if ships travel at 12 knots/hour within the Santa Barbara Channel. Extending the VSR Initiative along the California coast would result in even greater air quality improvements. An incentive based program to slow down ships would lead to measurable improvements to air quality and the long-term co-benefit of improving public health. This compliments clean air efforts at coastal Air Pollution Control Districts and aligns with clean transpiration and sustainable freight strategies.

3. Co-Benefit: Directing Investments to Disadvantage Communities

Emissions from ships in the Central and South Coast waters are typically transported downwind by prevailing winds and can impact disadvantaged communities⁸ including: Oxnard, Port Hueneme, Long Beach, and Chula Vista. Clean air benefits from slowing ships down will reduce onshore impacts along the coast. The VSR Incentive program helps meet requirements under SB 535 (Greenhouse Gas Reduction Fund) by directing funds to a program that reduces GHGs and has a direct health benefit for some of the most impacted and disadvantaged communities in California.

⁵ Oceana (July 2008) Shipping Impacts on Climate: A Source with Solutions. By Ellycia Harrould-Kolieb. Page 9.

http://oceana.org/sites/default/files/o/fileadmin/oceana/uploads/Climate_Change/Oceana_Shipping_Report.pdf

⁶ Santa Barbara Air Pollution Control District Letter, Submitted March 7, 2013. Re: Use of Cap-and-Trade Auction Funds for a Ship Speed Reduction Incentive Program along CA Coast to Reduce GHG Emissions.

⁷ EPAs Greenhouse Gas Equivalencies Calculator <http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results>

⁸ Disadvantaged communities were identified using CalEnvironScreen more info can be found at <http://oehha.ca.gov/ej/index.html>

4. Co-Benefit: Improving Whale Protection

For more than five years the EDC has been actively working to pursue proactive mechanisms to reduce the incidence of ship collisions with large whales.⁹ The urgent need to address ship strikes was tragically illustrated in 2007 when four blue whales were stuck and killed by large cargo ships within the Santa Barbara Channel during a three-week period. In the last four months, two fin whales have been struck and killed in Southern California. EDC has been seeking a comprehensive approach to this issue including advocating for the reduction in ship speeds (among other measures).

California hosts some of the busiest ports in the world and large commercial vessels regularly speed through our waters on their way to port. California waters also host some of the highest densities of marine wildlife including a wide variety of whales such as: blue, humpback, gray, fin, sperm, and killer whales. The Santa Barbara Channel is home to the largest seasonal population of endangered blue whales on the planet, while also hosting one of the busiest shipping corridors in the country. Scientific research has shown that there is a direct correlation between vessel speed and ship strikes resulting in whale mortality. Vessels traveling at 14 knots/hour or faster resulted in 89% of lethal or severe injuries to whales.¹⁰ This research also shows that none of the whales hit at a speed of 10 knots/hour or less were killed. Studies show that when vessel speeds fall below 15 knots/hour, there is a substantial decrease in the probability that a vessel strike to a large whale will prove lethal.¹¹

In addition to collisions, shipping also results in ocean noise pollution that may have a range of impacts on marine life and whale species. There is increasing awareness that the potential for chronic exposure from shipping noise can have harmful impacts on marine ecosystems and wildlife. Noise-related stress can lead to disruptions in feeding, mating, migration, predator avoidance, navigation, or may trigger an abandonment of habitat.¹² Speed restrictions have been identified as a possible mitigation measure to reduce the potential impacts from shipping noise.¹³ An incentive based program reducing ship speeds would accomplish both a reduction in the likelihood and lethality of ship strikes and reduction in underwater noise pollution.

⁹ See "Whale of an Opportunity: Coast Guard Study of Los Angeles/Long Beach Port Access Routes Holds Great Potential for Reducing Ship Strikes within Santa Barbara Channel," 37 *Ecology Law Currents* 58 <http://elq.typepad.com/currents/2010/08/currents37-07-segee-2010-0816.html> (2010).

¹⁰ Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S. and Podesta, M. 2001. Collisions between ships and whales. *Marine Mammal Science* 17(1): 35-75.

¹¹ Vanderlaan, A.S.M. and Taggart, C.T. 2007. Vessel Collisions with Whales: The probability of lethal injury based on vessel speed. *Marine Mammal Science* 23(1): 144-156.

¹² Popper, A.N. 2003. Effects of anthropogenic sounds on fishes. *Fisheries* 28(10): 24-3

¹³ Merchant N.D., Witt M.J., Blondel P., Godley B.J., Smith G.H., Assessing sound exposure from shipping in coastal waters using a single hydrophone and Automatic Identification System (AIS) data. *Marine Pollution Bulletin* (2012), <http://dx.doi.org/10.1016/j.marpolbul.2012.05.004>

Managers,¹⁴ scientists,¹⁵ and National Marine Sanctuary Advisory Councils^{16,17} have all supported policies that support slowing ships down to better protect whales and other marine life. The VSR Initiative provides the clear co-benefit of protecting important natural resources off our coast like endangered whales.

5. Supporting the State's Economy and Maximizing Economic Benefits

The VSR Initiative would assist with offsetting the cost to the shipping industry for reducing ship speeds. Initial upfront cost to the industry could include (but are not limited to): scheduling adjustments, additional ships, and/or additional crew.¹⁸ However, reducing vessel speed reduces the emissions of pollutants per ton of cargo carried, which has the benefit of improving fuel efficiency (and cost) for ships.

By slowing ships down, the industry will experience annual fuel cost savings. The industry has increasingly recognized the economic value of reducing vessel speed.¹⁹ In order to lower costs and environmental impacts, some within the shipping industry have voluntarily implemented "super slow steaming," the practice of operating a ship at a greatly reduced speed in order to burn less bunker fuel. In 2007, Maersk, a major international shipping company, initiated a comprehensive study of 110 vessels that proved, contrary to the traditional policy of running vessels with no less than a 40-60% engine load (a measure of how hard the engine is working), that its container ships can run safely with as little as a 10% engine load. In other words, Maersk found that its vessels could travel safely and efficiently at lower speeds. This makes it possible for vessels to travel at half-speed while realizing a 10-30% savings in fuel costs. By implementing slow steaming, Maersk experienced significant overall saving even after the costs of adding another container ship to their fleet was taken into account.²⁰ The economic benefits of a VSR include offsetting up-front costs to the industry and fuel cost savings. These savings could be passed through to the global, state, and/or local economy.

¹⁴ National Marine Fisheries Service (NMFS). 2008. FEIS to Implement Operational Measures to Reduce Ship Strikes to North Atlantic Right Whales (August 2008).

¹⁵ Berman-Kowalewski, Michelle et al. 2010. Association Between Blue Whale (*Balaenoptera musculus*) Mortality and Ship Strikes Along the California Coast. *Aquatic Mammals* 2010, 36(1), 59-66, DOI 10.1578/AM.36.1.2010.59.

¹⁶ Abramson, L., Polefka, S., Hastings, S., Bor, K. 2009. Reducing the Threat of Ship Strikes on Large Cetaceans in the Santa Barbara Channel Region and Channel Islands National Marine Sanctuary. Prepared and adopted by the Channel Islands National Marine Sanctuary Advisory Council. September 17, 2009. 73 pgs. Online at <http://channelislands.noaa.gov/sac/pdf/sscs10-2-09.pdf>.

¹⁷ Abramson L. 2012. Vessel Strikes and Acoustic Impacts- Report of a Joint Working Group of the Gulf of the Farallones and Cordell Banks National Marine Sanctuary Advisory Councils.

¹⁸ SBCAPCD Marine Shipping Solutions Group Meeting Presentation. February, 2012. Lee Kindberg, Director of Environment and Sustainability Maersk Shipping Company.

¹⁹ Rosenthal, E. Feb. 17, 2010. "Slow Trip Across Sea Aids Profit and Environment." *New York Times*. Vidal, John. July 25, 2010. Modern cargo ships show to the speed of the sailing clippers. *The Guardian*.

White, Ronald D.. July 31, 2010. Ocean shipping lines cut speed to save fuel costs. *Los Angeles Times*.

²⁰ See footnote 17 above

6. Creating Opportunities for Collaboration Between Businesses, Public Agencies, Non-profits and Others

The VSR Initiative is a unique program that finds common ground and pursues diverse partnership. Staff at the SBCAPCD, Channel Islands National Marine Sanctuary (CINMS), and EDC has been working in partnership to develop and implement the VSR Initiative.

This proposal also has the support and backing of a number of stakeholders, including members of a Marine Shipping Solutions Group that has participation from federal agencies (National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS), CINMS, U.S. Coast Guard, and CINMS Advisory Council), NGO groups (EDC, Ocean Conservancy (OC), and Community Environmental Council (CEC)), leading scientists, and local elected leaders. We have also made efforts to reach out to the Ports and the shipping industry which are aware and supportive of the VSR Initiative concept.

Additionally, the VSR Initiative would build upon the existing successful Ports of Los Angeles and Long Beach VSR program. The Ports program provides incentives for ships to remain at or below a speed of 12 knots/hour up to 40 nautical miles from the Ports. Participation rates are over 90%, and have resulted in significant reductions in ship emissions.²¹ In 2007, the Ports estimated that the vessel speed reduction program resulted in the following reductions: 1,345 tons of nitrogen oxides, 832 tons of sulfur oxides, 112 tons of particulate matter, and 55,502 tons of carbon dioxide.²² This data only further illustrates the point that reducing vessel speed has many co-benefits beyond GHG reductions. Thus, this initiative supports the Ports' current clean-air goals while extending the benefits further along the California coast.

7. Measurable and Verifiable Reductions

Currently there is an existing network of monitors along the coast of California known as the Automated Identification System (AIS) that is used to track ship position and speed. Ships over 300 gross tons are required to carry AIS, so data on vessel speeds can be obtained. The existing state wide AIS system can serve as a platform for data collection on a daily basis to track compliance with the incentive program. Furthermore, ship fuel consumption data could also be reviewed to verify AIS data and track GHG and other emission reductions.

Locally, the CINMS monitors ship traffic around the Channel Islands and Santa Barbara Channel using the AIS system to track ships' compliance and behavior with a

²¹ Port of Long Beach.2008. Green Flag Incentive Program Monthly Report, (1/1/10 to 12/31/10), Operator Compliance at 20 nm. Available www.polb.com/civica/filebank/blobload.asp?BlobID=8182 (accessed June 19, 2012). (page 6)

²² See <http://www.cleanairactionplan.org/strategies/vessels/vsr.asp>

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voluntary seasonal speed limit of 10-knots/hour. Unfortunately, compliance is very low; hence the potential role for an effective incentive based program.

Conclusion

The Cap-and-Trade auction revenue stream provides a unique opportunity to develop a VSR incentive program to reduce the speed of large marine cargo ships along the California coast. It is rare when one policy can address multiple environmental concerns. The VSR Initiative fulfills multiple objectives identified in the Implementation Plan, AB 32, AB 1532 and SB 535. Slowing down large marine ships significantly reduces GHG emissions but also has the co-benefits of reducing air pollutants, improving air quality for human health specifically in disadvantage communities, and providing better protection for marine wildlife like blue, gray, humpback, and other whales.

A diverse partnership of stakeholders has been established, and there is a concerted effort to reach out to all affected parties, including the shipping industry, ports, and decision makers. We know that if this program is funded there will be significant resources and effort to ensure its success. Thank you for your consideration of these comments. Please do not hesitate to contact me at (805) 963-1622 should you have further questions or concerns.

Sincerely,



Kristi Birney
Marine Conservation Analyst

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Appendix- Fact Sheet & Implementation Plan

Vessel Speed Reduction Initiative Fact Sheet

GOAL

Advance California's clean-transportation goals and sustainable freight strategy by implementing a voluntary vessel speed reduction incentive program to cut greenhouse gas (GHG) emissions and other air pollutants, with the ancillary benefit of potentially protecting endangered whale species along the California coast.

APPROACH

The initiative would use California Cap-and-Trade auction funds to expand the existing vessel speed reduction incentive programs at the Ports of Los Angeles and Long Beach. The Ports of Los Angeles and Long Beach speed reduction incentive programs have been successfully implemented with participation rates over 90%, and have achieved significant air pollutant reductions by limiting vessel speeds to 12 knots or less.

Participation in an expanded program using Cap-and-Trade funds would be contingent on participation in the existing Ports programs, so the initiative would support the Ports' current clean-air goals while extending the benefits through the Santa Barbara Channel and possibly along the California coast.



Photo courtesy of John Calambokidis, Cascadia Research Collective

PHASE ONE: DEVELOPMENT AND PILOT (1-2 years)

Working with the Ports, stakeholders, and shipping companies the Santa Barbara County Air Pollution Control District (SBCAPCD) will take the lead, determining incentive structure, costs, emission reductions, and emissions verification systems, and implement a pilot program from the slow speed zone boundary at the Los Angeles ports through the Santa Barbara Channel.

PHASE TWO: PROGRAM ROLL-OUT (2nd-3rd year out)

Program roll-out to larger portion of California coast, or entire coast.

BENEFITS

This is a prime and unique opportunity to fulfill multiple objectives of AB 32 (Global Warming Solutions Act of 2006) and AB 1532 (Greenhouse Gas Reduction Fund). Through a single policy mechanism, the project can cut shipping emissions of greenhouse gases, nitrogen oxides, and other air pollutants by up to 50 percent. The initiative supports the existing Port programs and helps ensure ships reduce speeds even during favorable economic conditions when it has been shown that they increase speeds. The

initiative would complement clean-air efforts, and is in line with clean-transportation and sustainable-freight strategies. In addition, reduced ship speeds could reduce the severity of injury to whales should a ship-whale collision occur.

MEASURABLE BENEFITS

- **Reduces GHG Air Pollution:** Reducing vessel speed to 12 knots will reduce shipping GHG emissions by 50%.
 - In California up to 2,580,000 tonnes/year¹
 - In the Santa Barbara Channel up to 369,762 tonnes/year¹
- **Reduces Nitrogen Oxides Air Pollution (NOx is a precursor to ozone):** Reducing vessel speeds to 12 knots will reduce NOx by 56%.
 - In California up to 43,108 tons/year¹
 - In the Santa Barbara Channel up to 6,760 tons/year¹
- **Improving Air Quality for Human Health:** Additional particulate matter reductions beyond CARB marine vessel fuel regulation²
- **Improving Whale Protection:** Ships traveling 12 knots or less could help reduce the chance of a lethal ship strike of a whale.³



Photo courtesy of NOAA

COORDINATED SOLUTION STRATEGY

The SBCAPCD proposes this unique program that finds common ground and pursues diverse partnership. The District and its Board, which is made up the five Santa Barbara County Supervisors and representatives from each incorporated city in the County, have been pursuing reducing emissions from cargo ships since 1994.

This proposal also has the support and backing of a number of stakeholders, including members of a *Marine Shipping Solutions Group* that has been meeting regularly. This group includes federal agencies (National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS), Channel Islands National Marine Sanctuary (CINMS), U.S. Coast Guard, and CINMS Advisory Council), NGO groups (Environmental Defense Center (EDC), Ocean Conservancy (OC), and Community Environmental Council (CEC), leading scientists (John Calambokidis, Cascadia Research Collective, Inc.), and local elected leaders.

CONCLUSION

This innovative program expands a successful program already in place and offers a unique opportunity to reduce GHG and other air pollution emissions. It also protects human health and marine wildlife, complies with the requirements of AB 32 and AB 1532, and can achieve shared goals across a broad range of stakeholders.

¹ Santa Barbara County Air Pollution Control District calculations.

² Yusuf Khan et al. 2012. Greenhouse Gas and Criteria Emission Benefits through Reduction of Vessel Speed at Sea. *Environmental Science & Technology*. 46 (22) pp 12600-12607.

³ Vanderlaan, A.S.M. and Taggart, C.T. 2007. Vessel Collisions with Whales: The probability of lethal injury based on vessel speed. *Marine Mammal Science* 23(1): 144-156.

Vessel Speed Reduction (VSR) Initiative Compatibility with AB 1532

The VSR initiative builds on and expands the existing Ports of Long Beach and Los Angeles vessel speed reduction incentive programs. It fulfills funding requirements for investing in “low-carbon transportation” as outlined in newly-enacted statutory requirements⁴ directing how AB 32 Cap-and-Trade auction funds are allocated while furthering the California Air Resources Board’s Sustainable Freight Strategy.⁵ In addition to reducing GHG emissions, the proposal fulfills funding goals required by legislation including: (1) maximizing economic, environmental, and public health benefits; (2) complementing efforts to improve air quality, (3) providing opportunities for businesses, public agencies, nonprofits, and others to participate in efforts to reduce GHG emissions, and (4) lessening impacts and effects of climate change. The following table outlines how the VSR initiative meets specific legal requirements outlined in AB 1532.

AB 1532	Vessel Speed Reduction Initiative
<p>(b) Moneys shall be used to facilitate the achievement of reductions of greenhouse gas emissions in this state consistent with this division and, where applicable and to the extent feasible:</p> <p>(1) Maximize economic, environmental, and public health benefits to the state.</p>	<p>GHG reductions up to 50% from shipping</p> <p><u>Economic:</u> supports ports by avoiding regulatory approach that could discourage ships from CA port calls; enhances ability of coastal areas to meet air standards</p> <p><u>Environmental:</u> whale and other species protection</p> <p><u>Public health:</u> reductions in criteria pollutants, particulate and air toxics</p>
<p>(3) Complement efforts to improve air quality.</p>	<p>Reductions in criteria pollutants, particulate and air toxics.</p>
<p>(5) Provide opportunities for businesses, public agencies, nonprofits, and other community institutions to participate in and benefit from statewide efforts to reduce greenhouse gas emissions.</p>	<p>Public agencies: SBCAPCD, NOAA, potentially other air districts, County and City of Santa Barbara</p> <p>Nonprofits: stakeholder organizations (EDC, CEC,OC)</p> <p>Other community (CINMS Advisory Council)</p> <p>Shipping Representatives: Marine Exchange, PMSA</p> <p>Ports: Ports of Long Beach and Los Angeles</p>
<p>(6) Lessen the impacts and effects of climate change on the state’s communities, economy, and environment.</p>	<p>Reducing GHG emissions</p>

⁴ AB 1532, SB 535, and SB 1018

⁵ California Environmental Protection Agency - Air Resources Board, January 2013. Annual Report to the Joint Legislative Budget Committee on Assembly Bill 32 (Chapter 488, Statutes of 2006) The California Global Warming Solutions Act of 2006. This report can be viewed at: <http://www.arb.ca.gov/mandrpts/mandrpts.htm>.

<p>(c) Moneys appropriated from the fund may be allocated, consistent with subdivision (a), for the purpose of reducing greenhouse gas emissions in this state through investments that may include, but are not limited to, any of the following: (2) Funding to reduce greenhouse gas emissions through the development of state-of-the-art systems to move goods and freight...</p>	<p>Improving efficiencies of moving goods and freight and consistent with ARB’s Sustainable Freight Strategy</p>
<p>(6) Funding to reduce greenhouse gas emissions through investments in programs implemented by local and regional agencies, local and regional collaboratives, and nonprofit organizations coordinating with local governments...</p>	<p>Regional collaborative; partnership with nonprofits and government</p>
<p>(7) Funding in research, development, and deployment of innovative technologies, measures, and practices related to programs and projects funded pursuant to this part.</p>	<p>Research and development of innovative measures and practices to reduce ship speeds.</p>
<p>The investment plan, consistent with the requirements of Section 39712, shall do all of the following: (1) Identify the state’s short-term and long-term greenhouse gas emissions reduction goals and targets by sector. (2) Analyze gaps, where applicable, in current state strategies to meeting the state’s greenhouse gas emissions reduction goals by sector.</p>	<p>CARB identified that it would assess a ship speed reduction rule as part of GHG measures in AB 32 scoping plan: http://www.arb.ca.gov/ports/marinevess/vsr/vsr.htm This assessment has yet to be completed, and regulatory measure uncertain, so this approach could fill gap.</p>



Implementation Plan

Vessel Speed Reduction Incentive Program

Proposal

To implement a Vessel Speed Reduction Incentive Program along the California coast to reduce emissions of greenhouse gases, and realize additional public health, economic, and environmental benefits.

Our Vessel Speed Reduction Incentive (VSR) program will be modeled after the successful VSR programs operated since 2001 by the Port of Los Angeles (POLA) and Port of Long Beach (POLB).

Implementation will occur in two phases. Phase 1 will be development of the program structure, and implementation of a demonstration program from the POLA and POLB through the Santa Barbara Channel. Phase 2 will be roll-out of the program to a larger portion of the California coast, or the entire California coast. Since Phase 2 will be based on the foundation of information and practices developed in Phase 1, this Plan will focus on Phase 1. The duration of Phase 1 is expected to be one to two years.

Phase 1

Working with shipping companies, ports, shipping industry experts, and stakeholders, in Phase 1 we will complete the following tasks.

- 1) Conduct data analysis and work with shipping companies, ports and other stakeholders to identify optimal program structure, participation rate, incentive pricing. Develop the incentive approach and overall costs for VSR, including a tracking mechanism to ensure emission reductions are real and verifiable. Prepare report with detailed findings.
- 2) Prepare implementation plan for demonstration project based on the findings of the report.
- 3) Implement demonstration program to identify any adjustments needed for larger scale program. Ensure tracking mechanisms are effective. Prepare implementation plan for expanded program, making recommendations for Phase 2.

Task 1

A contractor with shipping industry experience and expertise will assist in data analysis and design of the program. The primary data set we will utilize for the analysis is the marine vessel Automated Identification System (AIS)¹. This data coupled with Marine Exchange of Southern California port

¹ Along the entire California coast line the AIS collects dynamic (real time) information, such as vessel's position, speed, current status and course and static information, including vessel's name, International Maritime Organization number, dimensions and voyage-specific information (destination and Estimate Time of Arrival).

call data will allow us to identify existing average speeds by vessel type, shipping operator, and routes, and research best candidates for early adoption in the demonstration program. Data could also be obtained from the Lloyd's Registry to determine vessel specific engine power ratings and thus further refine emissions calculations. California Air Resources Board shipping inventory forecasts and the Port of Los Angeles and the Port of Long Beach port call forecasts will be used to estimate future year potential emission reductions from VSR.

Discussions with shipping operators, ports, and other agencies in California will be conducted to assist in designing program structure, and identifying key elements, for example whether the incentive should be fleet-based or individual ship-based; or whether there should be different considerations for northbound or southbound transits.

As mentioned above, our VSR program will be modeled after the successful Ports' VSR programs. These programs were initially configured to span a distance of 20 nautical miles (nm) from the Point Fermin Light. In 2009 the areal extent was expanded to include a 40 nm zone. To increase program participation, POLB (in 2005) and POLA (in 2008) began offering financial incentives to vessel operators.

Using the information gathered in data analysis and stakeholder discussions, we will adapt the Ports' programs to a larger scale program. Our initial focus will be on a 12 knot target, as used at the POLA and POLB. Our initial calculations for a 12 knot California-wide VSR program indicate in 2020 up to 2.5 million tonnes of CO₂e could be eliminated with a 90% participation rate of ocean-going vessels traversing within 100 nm of the coastline (see the section "Potential Emission Reductions" for a more detailed discussion).

The Ports' programs are fleet-based, and operators who achieve 90% compliance in a calendar year (in the applicable VSR zone) are either eligible for a future dockage rate reduction, or receive a rebate. Operators are eligible for either the 20nm or the 40nm incentive, but not both. Compliance is based on actual vessel speeds (AIS data) as collected by the Marine Exchange of Southern California (Marine Exchange) and includes both arrivals and departures to/from the two ports. The Ports have developed an automated vessel registration and tracking system that uses AIS data to verify vessel compliance. This system could potentially be used in an expanded program. AIS data identify individual vessels and their speeds on a continuous basis and are available up and down the California coast. As part of this task, we will review the data available for tracking compliance over the areal extent of the proposed VSR program, and identify gaps and needed additional AIS receivers. Appropriate AIS datasets will be selected and tested. We will evaluate which existing elements of the port VSR program structure can be directly adapted for an extended VSR program, and identify additional provisions for consideration.

The Environmental Shipping Index (ESI) and Energy Efficiency Operational Indicator (EEOI) will be evaluated to determine how they can be integrated into the VSR incentive program structure. The ESI is a separate incentive program currently in effect at POLA and various ports around the world. The ESI awards points to the score for a particular ship when steps have been taken to reduce emissions in advance of regulations, for example by using cleaner engines before required to. Ships registered in the POLA ESI program are rewarded per port call based on their ESI scores.

Currently ships receive GHG points as carbon dioxide (CO₂) points under the ESI for having a Ship Energy Efficiency Management Plan (SEEMP) in place. In July 2011, the International Maritime

Organization (IMO) made a SEEMP mandatory for all ships². To receive CO2 points under the ESI in the future, shipping operators will have to go beyond simply having an energy efficiency plan in place to demonstrating operational fuel efficiency. The EEOI is a monitoring tool that enables operators to measure the fuel efficiency of the ship in operation and to gauge the effect of changes in operation. The EEOI will provide additional data to track GHG emissions and supplement compliance tracking based on speed. Linking these indices to a VSR program could make the program more attractive to shippers since the monetary rewards compound as rewards are obtained at each successive port for an index oriented program.

Task 1 will culminate in preparation of a report detailing the optimal VSR approach and tracking mechanisms. The report will include the projected participation rate, updated estimates of yearly costs for incentive pay-outs, and the resulting GHG and criteria pollutant reductions.

Task 2

Using the foundation of the report, a detailed plan will be developed for implementing the demonstration project. The plan will address:

- Geographic bounds of program
- Number of expected participants
- Alternative time periods for speed reduction (full year, half year, etc.)
- Payment structure (trip basis, fleet basis, etc.)
- Registration Procedures
- Ship speed tracking
- Fuel use tracking
- Logging requirements
- Data averaging procedures
- Incentive payment procedures

Task 3

A VSR incentive demonstration program will be implemented from the Ports of Los Angeles and Long Beach northern boundary through the Santa Barbara Channel. Incentive payments will be paid out to VSR participants in accordance with the procedures specified in the implementation plan. Changes to the implementation strategy will be made if necessary to ensure the program is operating smoothly and desired outcomes are met. As this demonstration program continues, recommendations will be made about expansion of the program, and optimal timing for the expansion. Phase 1 will culminate in development of an implementation plan for Phase 2.

Phase 2

In Phase 2, we would implement a program for a much larger portion of the California coast, or the entire California coast. The elements and parameters would be similar to those identified in Phase 1, adjusted with the information that would be developed in Phase 1.

² See IMO website at (<http://www.imo.org/ourwork/environment/pollutionprevention/airpollution/pages/technical-and-operational-measures.aspx>) for additional information.

Potential Emission Reductions

We have estimated the CO₂e and NO_x emission reductions that could be achieved in 2020 should a 12 knot VSR program be instituted for the Santa Barbara Channel as well as for entire state coastline. The 2020 statewide and Santa Barbara County marine shipping NO_x and CO₂e emission estimates were generated utilizing the California Air Resources Board Marine Emissions Model and their California Emissions Projection Analysis Model (CEPAMS). The emissions are associated with shipping activity from the shoreline out to 100 nautical miles.

Emission projections take into account both anticipated shipping growth and federal and international fuel and engine control standards. ARB projected growth is based on trends in net registered tonnage (NRT). Controls include IMO fuel and engine standards that are expected to yield significant particulate matter and NO_x reductions in the future.

The reductions estimates are based on assuming ships operate at an engine load of 50 percent in the open waters off California. This is a conservative estimate as a starting point for computing reductions as some ships cruise at 80% to 90% of rated load. This load translates to a cruise speed of 18 knots for container ships. The engine load at 12 knots for each ship type was calculated using the propeller law with the average maximum speed by ship type obtained from the ARB. The ratio of the engine load calculated at 12 knots to a 50 percent load was then applied to CO₂e and NO_x emissions to yield the reductions

Potential 2020 VSR emission reductions with and without a 12 knot VSR were calculated for participation rates of 90 percent. Statewide and Santa Barbara County emission estimates are displayed in Tables 1 and 2 respectively.

Table 1: 2020 Statewide Emission Estimates with and without a 12 knot VSR

Statewide	Emissions with No VSR	Emissions with VSR (90% participation)	Percent Reduction in Emissions
CO ₂ e (tonnes)	5,104,917	2,521,345	51%
NO _x (tons)	84,586	41,478	51%

Table 2: 2020 Santa Barbara County Emission Estimates with and without a 12 knot VSR

Santa Barbara County	Emissions with No VSR	Emissions with VSR (90% participation)	Percent Reduction in Emissions
CO ₂ e (tonnes)	1,315,113	649,541	51%
NO _x (tons)	24,044	11,875	51%

At a 90 percent participation rate, it is estimated that CO₂e emissions on a statewide basis could be reduced by over 2,580,000 tonnes. Projected statewide NO_x reductions would be 43,108 tons. For

Santa Barbara County CO2e emission decreases would be 665,000 tonnes at 90 percent participation. NOx emissions could be reduced by 12,169 tons at 90 percent participation.

Costs

Phase 1

Phase 1 program development and demonstration will be performed by a contractor selected and managed by the District. This contractor will be required to have prior experience in calculating marine shipping emissions, working with ports, and designing vessel speed reduction programs.

We estimate Phase 1 costs to be:

First Year – Program Development Estimated Costs

Contractor	\$ 380,000
District labor and other direct costs (e.g. AIS upgrades, etc.)	\$ 110,000
TOTAL	\$ 490,000

Second Year – Demonstration Estimated Costs

Incentives	\$4,000,000-\$6,000,000
Ongoing – contractor	\$ 120,000
District program implementation	100,000
TOTAL	\$4,220,000-\$6,220,000

Note: For reference, in its 2012/2013 budget, POLA dedicated \$2 million to its incentive program. For fiscal year 2013, POLB anticipates that its incentive program will cost \$2.4 million

Phase 2

The majority of the Phase 2 costs will be for the incentives awarded. This depends on the incentive price for the extended program area, the number of participants, and additional factors that will be identified in Phase 1. It is expected that the annual cost would be greater than \$6 million annually to expand the program along the entire California coast.