Title: Explaining Participation in Voluntary Vessel Emission Reduction Programs at the Ports of Los Angeles and Long Beach

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Abstract

Ports are under increasing pressures to increase sustainability and reduce the emissions impacts associated with their operations. However, most ports are landlords rather than operators and have limited jurisdictional authority to require emissions reductions. One potential solution where regulatory control is limited is a voluntary program. This paper investigates the success of the Vessel Speed Reduction Program at the Ports of Los Angeles and Long Beach and analyzes the factors that contributed to the success of the program. In particular, why did individual private firms participate in a non-required, voluntary effort? This research found that external pressures such as community concern about emissions and regulatory threats are important to motivating voluntary behavior and may even be more important than financial incentives. Furthermore, simplicity of program design, clear goals and presence of a monitoring mechanism are important. While the VSR program led to significant emission reductions, voluntary programs must continue to evolve to strive for continuous improvement.
INTRODUCTION

This paper analyzes the Vessel Speed Reduction (VSR) program, a voluntary program designed to improve air quality surrounding the Ports of Los Angeles (POLA) and Long Beach (POLB). The health impacts of port related emissions are an increasing concern and this program represents an early effort to curb emissions before regulatory measures could be put in place. The program began in May 2001 as the result of an MOU signed by 9 parties including both ports, three regulatory agencies and the Pacific Merchant Shipping Association (PMSA), a trade organization representing the shipping companies. As vessel emissions are proportional to speed, the program established a voluntary 20 nautical mile speed reduction zone on approach and departure from each port and set a threshold of compliance at 12 knots. In 2005 and 2006 the POLB added publicity and financial incentives to increase participation in the program. All parties agreed that the MOU did not prevent additional measures from being passed to reduce vessel emissions, and they also agree that this MOU did not create a regulatory mandate.

Participation in the VSR program differed slightly between the two ports, but increased greatly over time. Participation rates, measured as the percent of compliant vessel calls, began at 61.7% at POLA and 60.1% at POLB in 2001 then rose to 86.0% at POLA and 90.0% at POLB in 2007. The average compliance rate for operators changed from just over 60% in 2001 to 84.5% at POLB and 75.2% at POLA in 2007. Emissions reductions due to the program are estimated at 43% for SOx, 42% for NOx and 49% for PM as compared to a no-program scenario (1).

This paper will use qualitative methods to analyze the reasons for participation in this program. As described below, these participation rates are explained primarily by increasing external pressures to reduce emissions and effective changes in program design. The literature described below was used to find previously tested explanations for voluntary behavior that might apply to this program. These explanations were then systematically compared using qualitative methods including interviews and a survey. The VSR program achieved significant emissions outcomes much sooner than regulation would have allowed, and the program strategically evolved over time to further improve outcomes.

LITERATURE REVIEW

As centers of economic activity, urban ports play an important function in supporting both global and local economies. Nevertheless, growing freight volumes have led to a variety of quality of life issues such as pollution and congestion. Many policies and programs have begun to address these problems, and this is reflected in the literature as various studies have begun to evaluate the effectiveness of these policies and associated regulation. Such studies document programs to reduce freight impacts, examine their outcomes, and explain the policies and actions taken (2). This literature review was adapted from previous work; see (1,2,3).

The growing body of work on urban freight policy includes studies of vehicle certification programs (4) or operational changes such as extended gate hours, alternative delivery schedules or appointment systems (5,6,7,8), or the adoption of environmental innovations (9). These studies have provided a greater understanding of the institutional factors governing ports and have helped identify key players in the global supply chain.

Program and policy outcomes have been previously explained through institutional and governance structures. For instance, in a comparison of programs to reduce congestion at Port of
LA/Port of LB and the ports of Seattle-Tacoma, Giuliano (10) found that institutional factors, such as regional leadership and a history of collaboration and contextual factors such as the scale of the congestion problem led to better outcomes in Seattle-Tacoma. In examinations of both PierPass and a mandated gate appointment system, it was found that institutional relationships and market power played a significant role (11,6). Institutional and governance structures are also used to explain larger port actions such as their growth and expansion and trends of infrastructure investment (12,13,14).

While previous literature has largely described program outcomes as a result of institutional and contextual factors, this has largely been done at the macro-level incorporating the larger context of the port environment. While this can’t be ignored, this paper enhances our understanding of motivations for participation in a voluntary environmental effort on a micro-level, and the associated emission reduction outcomes. As the outcome of the VSR program was dependent on participation of the shipping companies, literature on motivations for firms to exhibit environmentally responsible behavior is briefly described.

**Motivations for Environmentally Responsible Behavior**

Voluntary environmental efforts are becoming more common. In the literature the classification of a voluntary effort differs based on the extent of government involvement in the program. For instance, unilateral commitments are initiated by firms, public voluntary programs are designed by regulators, and negotiated agreements, or government challenge programs are decided between a firm and a regulator (15,16). The Vessel Speed Reduction Program would likely fit the description of a public voluntary program (15) where the terms of the program were negotiated between industry and regulatory agencies with no commitment to participate. The discussion below will briefly review social pressures, regulatory pressures and financial motivations for participation in a voluntary environmental effort.

**Social Pressures**

Social pressures for environmental responsibility can come from various stakeholders including consumers, investors or other businesses. Consumer demands may drive change as their business is easy to lose. Citizen groups, NGOs and other agencies can also influence change, primarily through law suits and local activism. Business parties and competitors such as suppliers and business to business consumers may also directly influence the behavior of firms (17) and shareholders may exert influence via voting rights leading to greater publicity and education of other shareholders (18).

These pressures can impact a firms “license to operate” as explained by the theory of social legitimacy. In order to achieve and maintain social legitimacy, a firm must act within an established set of regulations, norms, values or beliefs (19) and conform to “institutionalized norms of acceptability” (20, p 202). By deviating from what is socially excepted, a firms risks losing customers, business and profits. However, firms may take proactive steps to gain legitimacy, including communication and social and environmental initiatives (19). Gains in social legitimacy can help a firm acquire a metaphorical “social license to operate,” or adequate approval to allow a company to stay in business (21). Perceptions of social legitimacy evolve with changing public beliefs.
Regulatory Drivers for Participation in Environmental Programs

The desire to preempt or shape regulations (16) or to improve relationships with regulators can be a strong motivator of environmental responsibility as a strategy. Environmental actions may preempt stricter regulations, weaken their requirements, reduce the extent of monitoring by agencies or allow for regulations to be manipulated such that they raise costs more for competitors and thus reduce competition (16).

Preemptive moves on the part of industry can take several forms. Generally, the threat of regulatory action leads to voluntary actions that can be accomplished in an attempt to be preemptive or increase competitive advantage (22, 23, 24). Being proactive with new technology can avoid delays and higher costs (23). Thus, firms that don’t track dynamic regulatory developments will be disadvantaged (17). Going beyond compliance can also be a strategy to obtain benefits including recognition from government and communities, improving working relationships with regulators, gaining access to technical assistance and resources, and reducing regulatory transaction costs (25). Increased trust with regulators may also increase leniency (26).

The perception of the threat of future regulation may also become a factor in the firm’s decision and often makes programs more effective (25). Governments can facilitate or require change by creating new regulations, supplying assistance, providing funding and information, or creating incentives that lead to competitive advantage or requiring information disclosure.

Financial Motivations, the Business Case, and Eco-efficiencies

The existence of a business case for environmental responsibility is widely debated in the literature (27). Evidence indicates that a relationship exists between a proactive environmental strategy that exceeds regulations and greater profits, yet causation has been difficult to prove. Environmental behavior may reduce costs by leading to eco-efficiencies; however, it might also increase costs because environmental improvements require a high upfront investment and environmental challenges are quite complex.

Eco-efficiency describes a specific example of how environmental improvements can contribute to economic goals and improve a license to operate by making processes more environmentally acceptable. Eco-efficiency considers a life-cycle analysis in product design, reduces the material and energy intensity of goods and services enhances recyclability, product durability and sustainable use of renewables (23). However, skeptics question eco-efficiency, asking why these opportunities are just now being acted on and why all firms aren’t chasing the same profits (28).

On the other hand, many critique the business case for environmental responsibility. Either an environmental expense will lead to greater profits or it will divert resources away from other uses (29) and by going too far, firms may “price themselves out of the market” (30). Although opportunities exist, not all firms take advantage of them, and there is also the potential for laggard firms to free-ride on others investments (31). Businesses often operate with imperfect information and routine operating procedures that go unquestioned (28). Bounded rationality, or the difficulty a firm has in understanding all aspects of a decision, and a need to cater to stakeholder desires can explain why its operation isn’t always efficient (32). Vogel examines this profitability question and concludes that environmental responsibility does not increase or decrease competitive advantage, rather “it makes business sense for some firms in some areas
under some circumstances.” (33, p. 3) Nevertheless, firms may take proactive action to benefit from an eco-efficiency, seize new opportunities, create new technologies, get ahead of the competition, reduce waste, or attract new customers.

METHODS

As described above, previous studies on port responses to environmental impacts focus on the external context, however this study seeks to understand the motivations of independent firms in response to external pressures. In order to better understand firm motivations, this study was structured with respect to the three primary explanations discovered in the literature review. Examples of how these pressures might manifest in the port environment were brainstormed and then tested for in interviews and surveys and review of other data collected. Table 1 shows potential evidence for each theory. Program characteristics and ease of participation was also investigated.

<table>
<thead>
<tr>
<th>Explanation for Participation</th>
<th>Examples of Evidence to Support Explanation</th>
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<tr>
<td>Social Pressure</td>
<td>Growing public perceptions that the goods movement industry should take more responsibility to address environmental externalities; Increasing actions taken by the community to demand cleaner air such as greater advocacy group engagement, negative press, legal challenges to Environmental Impact Reviews</td>
</tr>
<tr>
<td>Regulatory Pressure</td>
<td>Growing attempts to regulate vessel emissions; working groups, surveys, regulatory proposals</td>
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<tr>
<td>Economic Motivations/Eco-efficiency</td>
<td>Participation would reduce costs for operators or attract new business</td>
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Data included: seven interviews with vessel operators, regulatory agencies, and the ports; a survey of vessel operators (N=41); an events history; and a review of related documents. Program compliance rates were calculated from program records obtained from each port covering 2001 thru 2007. The events history was a detailed timeline of key events compiled by the USC Metrans Center. Events included related legislative and regulatory efforts, releases of major studies, events that raise public visibility of the ports, changes in port operations and policies, and advocacy actions and lawsuits. Documents surrounding the VSR program were reviewed including the MOU, portions of the tariff implementing the program, and public relations materials.
Interviewees included employees of two vessel operators, a representative from each port, two CARB employees and a representative from the PMSA. Questions differed slightly based on the interviewee but the program’s creation, implementation and surrounding regulatory and social context were covered.

The survey was distributed to vessel operators who called at the ports in 2007 via e-mail with follow-up calls made. Forty-one respondents completed the survey in its entirety and were included in the survey sample. This represents 14% of the 299 operators who called at the ports in 2007. Frequent callers are overrepresented in the survey and respondents represent 47.4% of the total fleet calls for 2007. Because frequent callers impact air quality more than operators who call sporadically, this result allows for a greater understanding of the behavior of those with the largest impact on air quality improvements. The surveys and interviews were completed between 2008 and 2009.

PROGRAM RESULTS AND EXPLANATION

Figures Ia and Ib below show the change in participation rate at the two ports over time. Figure Ia shows participation of the entire vessel fleet at each port, while Figure Ib shows the average of percent of participation per operator at each port. Because frequent callers have higher operator participation rates, the fleet wide participation rate is higher.

FIGURE I Program compliance at each port by fleet and operator
Both ports experienced an increase in participation beginning in 2004, with Long Beach outperforming Los Angeles ever so slightly. In 2005, the Green Flag program began at the POLB which may have contributed to its higher participation rate. This program offered a publicity incentive to vessels with outstanding compliance rates. Any vessel with 100% compliance in the program received a green flag and was invited to a recognition ceremony. In 2006, a financial incentive program went into effect where any vessel operator who had 90% or higher compliance rate for all trips made to the port in a calendar year would receive a 15% rebate on their dockage fees. Given the availability of quantitative data on operator performance, future research may investigate the importance of these program incentives. Preliminary results suggest that the incentives were less influential than other external factors in influencing participation (1).

Events history
As trade volumes at the POLA and POLB continued to grow up until the 2008 recession, several events occurred that raised the visibility of port externalities and also demonstrated increasing public intolerance of port related pollution. In response to public concern, regulatory agencies, local politicians and the ports took steps to reduce port related pollution. The extent that the vessel operators were aware of and responding to these pressures is more clearly illustrated through survey and interview results that follow. For more detail on the events described below, please see (1,2,3,6,11).

The SCAQMD released its Multiple Air Toxics Exposure Study II (MATES) in 2000, showing diesel exhaust as a factor for increased cancer risk. The report contained a highly publicized map showing areas with high diesel emission concentrations that became referred to as the “diesel death zone.” Additional studies documented the emissions related health impacts and attracted extensive media attention and greatly raised the visibility of the air pollution problem (3).

Public perceptions of port operations continued to worsen when the Alameda Corridor opened in 2002 and failed to meet public expectations for congestion reduction (3). Congestion impacts were further demonstrated to the public when both ports were shut down for nine days as a result of a longshore labor contract dispute (34). While the vessels idled, waiting to be serviced, researchers conducted air quality studies that quantified the high contribution of emissions from vessels in the harbor (35).

The growing visibility of port related pollution and congestion led to greater community mobilization against port expansion. During the time period of the VSR program, several terminal development projects were challenged by community groups through legal means. For instance, the China Shipping terminal expansion was challenged in 2001 then settled in 2004. A lawsuit was initiated by a local homeowners group and joined by several non-profits, including the Natural Resources Defense Council (NRDC). The basis of the lawsuit was that the expansion would cause undisclosed and unmitigated harm to local residents and that impacts were not sufficiently analyzed in the initial EIR. A settlement was reached that included $60 million in environmental mitigations for emission reduction. Following this settlement, few EIRs were certified and when they were they often included extensive community mitigations.

For instance, the TRAPAC EIR was certified in 2007 but was finalized four months later after a negotiated settlement preempted a lawsuit. The settlement created the Port Community Mitigation Trust Fund where funds would be used to pay for school air filtration systems, health care clinics, job training centers, and other mitigation projects in the surrounding communities of Wilmington and San Pedro. The fund was created with $12.04 million in startup funding with additional funding tied to future growth at the port as projected in the EIRs for terminal expansion projects. Similarly, the Middle Harbor Redevelopment Project was certified in 2009 by the POLB Board of Harbor Commissioners. The EIR included $15 million to mitigate emission impacts at schools, health care and senior facilities and to reduce greenhouse gases.

As a result of these community pressures, both ports directed more attention to reducing emissions. In October 2001, the Board of Harbor Commissioners at the POLA announced a goal of a no net increase in emissions over a 2001 baseline (36). This activity intensified in 2004, when the Port of LA announced an Air Quality Mitigation Incentive Program, providing money for emission reducing demonstration projects and also released their measured 2001 emissions baseline. In 2005, the POLB announced its Green Port Policy and approved 33$ million dollars for Green Port projects included in a budget of 474$ million (37). On May 1, 2006, the POLB...
signed their first green lease with Matson terminals and shortly after this signed a second green lease with ITS. In November 2006, The Clean Air Action Plan was jointly released by both ports and included ambitious goals of cutting pollution port wide. The plan included five specific goals for ocean going vessels, including vessel speed reduction in the 20 nautical mile zone of the existing program and an expanded zone of 40 nautical miles. As landlords, the ports are unable to regulate air quality directly but do have some control over terminal operations through lease negotiations.

In addition to community pressures and greening actions taken by the ports, regulatory pressure on the vessel operator industry to reduce emissions also increased during the length of this program. Vessels have traditionally been primarily regulated by the IMO, with EPA having some jurisdiction over US vessels. However, throughout the course of this program, the CARB became increasingly involved in regulating vessel emissions. Shortly after the VSR program started, a kick-off meeting was held for the CARB Maritime Air Quality Technical Working Group in December 2001. While several meetings of this group were held in 2002, it appears to have taken an 18 month hiatus from July 2, 2002 through December 3, 2003. During this time, CARB focused more on smaller local vessels called harbor craft.

Regulatory action increased again at the end of 2004 when a series of public meetings were held to announce draft regulations for ship auxiliary engines, a ship demonstration project, and the intention to conduct a feasibility study for shore power. Throughout the year, CARB continued to work on these regulations, providing opportunities for public meetings and periods of public comment. On December 8, 2005, the Board approved a regulation to reduce emissions from auxiliary engines to become effective on Jan 1, 2007. This would require that within 24 nautical miles of the coast, vessels would only use cleaner burning distillate fuel or an equivalent emissions control technology. Although the PMSA sued the state claiming that it was preempted by federal regulation from passing the regulation to reduce auxiliary engine emissions, the state persisted and has since released new (more litigation-proof) regulations for auxiliary engines.

Additionally, a feasibility study for the use of shore power was released with plans moving forward to produce a regulation. The CARB Board voted to approve a regulation requiring that vessels turn off their auxiliary engines while at berth and plug into a source of shore side power in December 2007, to become effective as of January 2, 2009. Additional efforts were being made by the state to better measure and quantify emission from OGVs and several methodological reports were released during this time period. Despite resistance from the industry, persistence of the CARB in passing these regulations demonstrates the increasing pressures on OGVs to reduce emissions.

Participation Explained by Interviews and Surveys

As described above, the events history shows that community awareness of port related air pollution was increasing. The local community, the ports, and the regulatory agencies all began taking actions to address port emissions. The interview and survey responses described below help explain how vessel operators perceived these changes, and how these external pressures may have led to participation in the VSR program. The following section will discuss survey and interview results with respect to the 3 explanations for participation described in Table 1 above.
Public Pressures and Social Legitimacy

It appears from the survey and interviews that operators do believe that the local community has the ability to restrict their operations, and in fact, a clear mechanism for doing so exists. Over 90% of operators surveyed felt that local public opinion on air quality issues affects their operations and over 80% of respondents perceived the importance of their company’s environmental performance to local residents, as “very important.”

Public image was important, with one operator saying they participated because they “want to be recognized as an environmental frontrunner in clean transportation.” At least two operators specifically mentioned the local community. One respondent wrote that his company’s interests “are best served if the public at large are well aware of such environmental programs and that the oil tanker industry is not all bad news.” Another reported that “speed reduction costs more fuel and time for operator but to maintain the positive attitudes toward our communities, it is line’s social responsibility to participate in this program.” This last quote is interesting because rather than reporting that they have a social responsibility to reduce pollution, they may view participation as fulfilling their responsibility to the larger port community so that they can maintain a positive image.

In 2008, one operator went so far as to donate a portion of their rebates from the VSR program to the City of Long Beach for recreational and education improvements. In explaining their motivations for the donation, a company representative acknowledged the community support of their operations and also reminded the community of the contribution the shipping industry and the port make to the local economy (38). From a publicity perspective, the company’s generosity was doubled by donating money that was earned due to their participation in a voluntary environmental effort.

Respondents ranking of community perception as important might be explained by the public’s ability to delay or even prevent projects through the environmental review process. Operators want their associated terminals to obtain improvements and expansions, all of which require an environmental review to be done prior to construction.

Regulatory Pressures

Interview and survey data indicate that regulatory pressures were a factor in program participation. Several terminal leases were signed that required participation in this program, and at the state level, two regulations were passed, one for fuel type and one requiring the use of shore-side power. In an environment where regulatory pressures to reduce emissions were high, operators felt that several regulatory agencies had control over their operations and that their environmental performance was important. Operators report that they participated in the program to maintain some control over their regulatory destiny and to increase trust with regulators. In fact, one respondent reported that as a result of previous environmental efforts, CARB consulted them, allowed them to contribute greater input into future regulations and trusted them more. Additionally, a dip in participation between 2002 and 2003 corresponds with a shift in focus of the California Air Resources Board from ocean going vessels to commercial harbor craft and when regulatory activity picks up again in 2004, so do the rates of participation.
Economic Motivations

Economic motivations from stakeholders for participation in this program appear to be minimal. While operators believed that environmental performance was important to their customers and clients, less than half felt that it impacted their customers’ choice to use them over their competitors. Companies were concerned about their environmental image, but acknowledged that price and service primarily drive customer decisions. Similarly, eco-efficiencies did not occur as part of this program. Some operators reported a fuel savings in the reduced speed zone, however, this was minimal and likely made up for by increasing speed on other parts of the voyage. Additionally, only 3 respondents mentioned the incentive as a reason for participation. While participation in this program may have improved operators overall image this did not lead to financial benefits.

Program Characteristics

The fact that the program was easy, and got easier and even more enticing over time is likely to be the second most important factor influencing participation. Some operators expressed concern about meeting schedules, engine inefficiencies in the reduced speed zone, extra costs for standby labor and the lack of flexibility in determining that 12k was the cutoff speed. On the other hand, respondents have said that the costs are minimal, that advance preparation is possible, and that the time lost in the reduced speed zone is such a small part of the overall voyage that it is possible to compensate. The largest reported program cost was the cost of the time delay and associated schedule constraints. However, other operators reported this was easy to avoid if prior planning was done.

Misinformation was reported as an initial problem and understanding of the program increased with time. It was reported that it took some time to communicate goals and operating procedures of the program. Although survey results indicate that the program was clear and easy to understand, they also indicate that internal training was more difficult and local agents and changing crews needed reminders.

An important obstacle that was addressed was the reassignment of labor from arrival at berth to 20nm from the port, the point where the reduced speed zone begins. The ports made this change based on feedback from vessel operators. Prior to this change, labor was assigned upon arrival, so to prevent waiting for available labor, vessels would often race to dock. This change created a more even playing field for receiving favorable labor assignments and reduced costly vessel wait times.

Monitoring and reporting on program results was also a feature of the program that improved over time. While the MOU required that each port provide $3000 to the Marine Exchange for start-up costs of software to monitor vessel speeds, over time, at least $80,000 was spent by the ports to automate the system and improve the accuracy of data collection. As of 2005, the POLB began reporting operator participation rates on its website. The evolution of the program overtime was also a likely contributor to its success as the ports devoted greater resources to it.
EMISSION REDUCTION OUTCOMES

As described above, the high participation rates of the VSR program led to emission reductions of 43% for SOx, 42% for NOx and 49% for PM as compared to a no program scenario (1). These reductions are significant and can be put into context by comparison to other possible reduction measures. For instance, use of a cleaner fuel in vessel main and auxiliary engines could reduce emissions from vessel transit. If a vessel switched from a fuel of 2.5% sulfur content to a fuel of .1% sulfur content, it would produce 96% less SOx, 83% less PM and 6% less NOx emissions (calculated by author using fuel correction factors described in 39).

The VSR program has several advantages over a fuel switch. First is the larger NOx reduction. Even with the lowest sulfur fuel, the NOx reduction would only be 6%. Second, the VSR program has a monitoring mechanism in place. Monitoring each vessel to ensure that a fuel switch was done would require more resources on behalf of the regulator. Third, the cost to operators of the VSR program is just the time cost of slowing down, but in order to participate in a fuel switch, operators must purchase the more expensive fuel.

In evaluating the emission outcomes of this program, it is worth considering if reductions would be greater if the program had been more stringent. A simple prediction would be that as the difficulty level of the program increases, a greater environmental benefit would result because of the stringency of the program. However, there is likely to be a point where the tradeoff of many program participants making a small effort is matched by the environmental benefit of fewer participants making a larger effort.

In the VSR program the main option to increase the difficulty level of the program and therefore the environmental benefits was to increase the distance of the reduced speed zone. When the program began, the ports did not have the ability to monitor speeds beyond 20nm. With a longer distance, emissions benefits could have increased, yet it is not possible to know how much participation would have been deterred by the longer distance.

Following this research, however, the VSR program was in fact expanded to 40 nm and more financial incentives were added to the program. These changes were likely made possible by an increased understanding of program implementation among operators as well as continued external pressures for cleaner air. Successful voluntary programs are able to encourage a cycle of continuous improvements and respond to external content. As of December 2012 participation rates in the VSR program are over 95% (POLA) and 96%(POLB) for the original 20nm zone yet only 79% (POLA) and 85% (POLB) for the expanded zone (40).

Future research could be done to reevaluate participation rates given these additional years of program data. A quantitative analysis may be useful to measure the impact of program ease, financial incentives and external events in predicting program participation.

CONCLUSION

This research found that high compliance rates in the VSR program are explained primarily by increasing social pressures and the ease of the program, and secondly as a response to regulatory pressures. In evaluating the importance of stakeholder pressures vs. economic motivations, stakeholder pressures, particularly those from the ports, the community and
regulatory agencies, were more directly responsible for the increase in participation. This shows the important role of community action in generating environmental behavior. There is a great cynicism that corporations respond primarily to costs and financial gains, however the case of the VSR program shows that public perception is important to firms. In the port context, the public has a direct mechanism to impact a company’s “social license to operate” through the EIR process. Additional mechanisms exist for the public to influence a firm such as demonstrations, bad press, or law suits. If regulators are limited in their ability to require environmental changes, they still have the option to educate and mobilize the public about environmental problems. They can also make it easier for the public to get involved by disclosing information about environmental performance.

This research offers several lessons for voluntary programs. It shows that voluntary programs can effectively address transportation externalities where the emissions source is not under the control of local authorities. Voluntary programs can also lead to improved relationships between a firm and a regulator which could lead to more information sharing and eventually better regulations that are guided by this input. In this program, regulatory agencies had the opportunity to see the pros and cons of vessel speed reduction which would be useful in their consideration of a VSR requirement. All costs of monitoring and enforcing the program went to the ports rather than to the CARB. Industry had the opportunity to improve their public image at minimal cost, and to improve their relationship with the regulators, earning them input into future regulations. The ports spent money on the program for monitoring equipment, publicity and incentives, but have also enjoyed publicity benefits associated with this program. Voluntary programs could be useful and have even begun to be implemented in other ports. The Ports of Los Angeles and Long Beach are unique however due to their large size and their desired location. The size of the ports is important as it is the volume of freight traffic that lead to the scale of the air pollution problem and the public awareness surrounding this issue. In smaller ports, the public and regulatory pressures may not be present to a large enough extent to influence firm behavior. Additionally, the favored location of these ports creates a great incentive for the firms to continue to do business here and therefore participate in a voluntary effort to maintain favor with the port officials, regulatory and local communities. However, as global trade increases, more ports are struggling to reduce emissions and well designed, low cost, easy programs will likely play a role. The VSR program is an example of a simple program that resulted in significant emissions reductions.

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\(^1\) Other parties included Steamship Association, the Marine Exchange of Southern California, Environmental Protection Agency (EPA) - Region 9, the California Air Resources Board (CARB), and the South Coast Air Quality Management District (SCAQMD)

\(^2\) The timeline is an ongoing project of the METRANS Transportation Center. See

http://www.metrans.org/timeline/