



The State of the Port Environment

By T.L. Garrett

December 2009

For many years now ports have been the target of extensive criticism regarding their environmental impacts. They were generally characterized as the largest and least regulated sources of pollution. In many ways the criticism was accurate, but it was a reflection of the lack of regulatory focus on Port sources. Let's be honest, it took the International Maritime Organization (IMO) well over a decade to develop the first air quality standards for vessels. Those standards were limited to reflect the emission levels of existing vessels and marine fuels, hardly technology forcing. EPA took even longer to regulate vessels and when they did they adopted the same international standards and then limited them to US flagged vessels.

States, on the other hand, generally took the position that regulating vessels was outside their jurisdiction and relied on federal and international regulation to control those sources. Meanwhile Ports were experiencing incredible levels of growth, a doubling and tripling of "throughput" amidst these modest regulatory developments. Ocean-carriers were responding to that growth by ordering and deploying larger, faster vessels to serve the ever-increasing global demand for goods without any meaningful air quality requirements. In short, something had to give and the stage was set for dramatic changes.

Initially, pushing for change was incredibly difficult because of several factors: The lack of regulations, and more importantly, the lack of available technology to reduce emissions. Reliability, durability, efficiency, and economies of scale were the primary drivers for vessel engine design, not emission control. These goals are not exclusive of each other; indeed the platform, the diesel engine, was already meeting the major objectives by being the most efficient engine available resulting in lower energy consumption compared to any other form of transportation engine. But that is not enough if public health and green house gas goals are to be achieved.

Enter the era of voluntary measures. Recognizing that change was coming and having a desire to minimize the need for regulations terminal operators and ocean-carriers initiated voluntary programs and participated in those created by port authorities. Tugboat repowers and purchase of alternative fuel yard tractors began in the late 1990's under the Carl Moyer diesel replacement incentive program in California. This was quickly followed by the Voluntary Ship Speed Reduction Program in Southern California that began in 2001. The Port of Los Angeles then initiated a voluntary retrofit program in 2002 that resulted in more than 1,200 cargo handling equipment pieces being equipped with diesel oxidation catalysts. The first contracts were signed only days after the California Air Resources Board (CARB) certified the equipment. Meanwhile, the Pacific Northwest ports worked with customers and others to produce a comprehensive emissions inventory and strategy that targeted goals and voluntary efforts including many of the same things (retrofits, cleaner fuel use, shore power, etc.). Combined with the innovative use of emulsified diesel fuel, a technology that has now been left behind, these initial steps ensured that growth at the ports could continue while actually reducing overall emissions.

As early as 2002, ships began using low-sulfur distillate fuel in auxiliary generators. And the first shore-power project to shut down auxiliary generators and connect to the electrical grid was a voluntary industry effort. Other ocean-carriers began experimenting with advanced injector technologies, electronically controlled engines, on-board fuel emulsification systems, waste heat recovery systems, on-board emission scrubbers, exhaust gas recirculation, selective catalytic reduction, alternative fuels, and renewable biofuels. The list continues to grow. These new engine technologies, combined with existing highly efficient engines are combined in larger vessels resulting in greater economies of scale to move increasing volumes of cargo even more efficiently.

These developments have not gone unnoticed by the regulators. Beginning in 2005, frustrated with the lack of national and international regulations to reduce emissions from goods movement sources, CARB initiated the first of a series of regulations to reduce emissions from cargo handling equipment, workboats, trucks, and vessels. All of these state regulations took the examples of successful voluntary incentive programs and made them mandatory requirements. For the most part these regulations have gone forward without

opposition, and in some cases with the support of the sectors being regulated. These included the use of ultra-low sulfur fuel in advance of federal requirements, the retrofit and replacement of cargo handling equipment, the accelerated turnover of the drayage truck fleet, the repowering of workboats, and the requirement to connect vessels to grid-based shore power.

Where the industry has been in opposition has not been about the goals or even the methods to reduce emissions, it has been about the perceived abuse of authority or the avocation of specified technologies or fuels based on politics rather than science. The Pacific Merchant Shipping Association successfully challenged the CARB Auxiliary Fuel regulation on the basis that the state did not have authority to regulate vessels under the Clean Air Act without first getting authorization from the US EPA – which if CARB had pursued, would have created a defacto uniform national standard once the waiver was approved. Our current challenge to the Low-Sulfur Fuel regulation is about the authority to regulate vessels beyond the traditional three nautical mile limit under federal law. At the same time the industry has fully supported the approved and recently amended stringent regulations of the International Maritime Organization (IMO) and the establishment of a US/Canada Emission Control Area. The IMO regulations require the use of the same low-sulfur marine fuels as the CARB regulation, at a much greater distance from shore, 200 nautical miles (nm) versus 24 nm, and the requirement for future vessel engines to be 80 percent cleaner than those in use today. Not only will the implementation of these international requirements result in greater emission reductions than the CARB regulation, although three years later, they will also provide a much needed uniform regulatory scheme for all ports without placing a specific port at a competitive disadvantage.

With the increasing recognition of climate change the industry is already responding to the need to further reduce their carbon footprint. Although vessels are already by far the most efficient way to move the world's goods, ocean-carriers have already recognized that the highly efficient engines and economies of scale are not enough. They have begun using better hull coatings to reduce drag, advanced propeller designs to improve efficiency, and futuristic hull designs. Technology is also being used to improve voyage planning to avoid adverse weather conditions and allow for optimized speed management that balances just-in-time delivery with minimal use of energy. Some companies are now deploying vessels with solar panel arrays, wind assist, hybrid diesel-electric propulsion, and even fuel cells. Dockside there is development of alternative fuel generators and stack-gas emission treatment systems that could be used where grid-based infrastructure does not exist.

This is just the beginning of the innovations to reduce the carbon and emission footprint of the industry. All of this development has occurred within the last decade and regulations are only now going into effect. Nonetheless, the ports of Los Angeles and Long Beach already have seen dramatic improvements as a result of these initial efforts. The most recent inventory completed for 2008 showed greater than a 30 percent reduction in diesel particulates and for sulfur oxides compared with the 2005 inventory. These emission reductions occurred even though cargo volume increased. Looking towards the future the same inventories showed even greater reductions in emissions per TEU between 23 to 35 percent for criteria pollutants when compared to 2005, demonstrating that efficiencies in cargo movement continue to improve. Further evidence of this was a decrease in green house gases from the previous levels. In the Pacific Northwest the ports are working with their customers to implement low sulfur fuel use at the dock, retrofits and cleaner fuel use for cargo handling equipment, shore power for cruise and more rapid phase out of older trucks and terminal equipment.

With all of the effort that is being expended and the new regulatory era on the horizon it seems clear that the maritime industry will continue to improve as the most efficient mode of transportation that is also increasingly environmentally friendly. Maybe it is time for a little more praise and a little less criticism.

PMSA represents the shipping lines and terminal operators that move approximately ninety percent of the containerized cargo on the West Coast of the United States. Mr. Garrett's focus is primarily on air quality regulatory and legislative issues at all levels of government. He has extensive experience in reviewing air quality technical reports, regulations, and legislation, and providing input on behalf of PMSA members. Prior to PMSA he was an Environmental Supervisor for the Port of Los Angeles in charge of the Air Resources Section.