In 2006, the U.S. Ports of Long Beach and Los Angeles took an unprecedented joint action to improve air quality in the South Coast Air Basin by adopting the San Pedro Bay Ports Clean Air Action Plan (CAAP). Details of the action plan are outlined below.
The Ports of Long Beach and Los Angeles are the two busiest container ports in the Western Hemisphere, and combined are the tenth busiest ports complex in the world. The two ports handle approximately 40 percent of the nation’s containerized imports and 25 percent of its exports. Trade that flows through the San Pedro Bay ports complex generates more than 3 million jobs nationwide. The ports are capable of handling the largest container ships on the planet.

The economic engines that are the Ports of Long Beach and Los Angeles create more than just jobs. Like any large engine, they also produce significant air emissions. In order to deal with these emissions, in 2006, the ports took an unprecedented joint action to improve air quality in the South Coast Air Basin by adopting the San Pedro Bay Ports Clean Air Action Plan (CAAP, http://www.cleanairactionplan.org/about-the-plan/), a sweeping plan aimed at significantly reducing the health risks posed by air pollution from port-related ships, trucks, trains, cargo-handling equipment, and harbor craft.

The CAAP identifies strategies to reduce pollution from every source: ships, trucks, trains, harbor craft (e.g., tugs and workboats), and cargo-handling equipment (e.g., cranes and yard tractors).

**Ships**
Ships are the largest source of emissions at the ports. Cutting-edge programs have been adopted to target this pollution including financial incentives for ships with the newest engines, which are up to 80-percent cleaner than their predecessors. When ships slow down, they burn less fuel per mile traveled, which results in fewer emissions. Both ports provide financial incentives under their Vessel Speed Reduction programs for ships to reduce speeds to 12 knots when approaching the harbor. More than 95 percent of ships now reduce speed starting at 20 nautical miles (nm) from land, and more than 80 percent reduce speed at the 40-nm mark.

Ships require electrical power while at berth, which is typically generated using large onboard diesel generators. California’s new shore power regulation requires certain ships to plug into the electrical grid while loading and unloading cargo rather than using their auxiliary engines. Shore power nearly eliminates emissions from ships at berth. The two ports led the way through early infrastructure funding and installation and in requiring shore power through leases long before the regulation took effect.

**Trucks**
The ground-breaking Clean Trucks Program reduced carcinogenic diesel particulate air pollution from harbor trucks by more than 90 percent in a little over three years—ahead of schedule. Beginning in 2008, the ports banned pre-1989 model-year trucks followed by a progressive ban on all trucks that did not meet 2007 emission standards. This progressive ban used the following milestone dates and was accompanied by grants to help defray the cost of these newer trucks:

- **October 1, 2008:** All pre-1989 trucks were banned from entering the ports. Pre-2007 trucks were charged a clean truck fee to access port terminals.
- **January 1, 2010:** All 1989–1993 trucks were banned in addition to 1994–2003 trucks that had not been retrofitted.
- **January 1, 2012:** All trucks that did not meet the 2007 U.S. Federal Clean Truck Emissions Standards were banned from the ports.

**Trains**
The San Pedro Bay ports complex is home to the cleanest locomotive fleet in the country, operated by the Pacific Harbor Line (PHL), a “switching” railroad that helps assemble and disassemble trains destined for nearby railyards. The CAAP also requires “line-haul” locomotives, which move cargo over long distances, to meet the aggressive replacement schedules under the state’s memorandum of understanding with the railroads and the U.S. Environmental Protection Agency’s tough new locomotive engine standards.

**Cargo-Handling Fleet**
The ports are home to one of the cleanest cargo-handling fleets in the country, thanks to state regulations and grant
funds for equipment replacement. The ports have also secured millions of dollars in federal funding to replace and upgrade older diesel equipment ahead of state regulations, and their terminals are among the first to test out the latest zero-emissions yard tractors and cranes.

**Harbor Craft**
The Port of Long Beach makes sure harbor craft, like tug boats, work boats, and crew boats, meet California's stringent engine requirements, which require them to plug into shore power while not in use. In addition, the port is proud to have the world's first hybrid tugboat, which demonstrates a commitment to reducing harbor craft emissions and to developing innovative technologies.

**The Future**
The shift to zero-emissions electric cargo movement will boost the demand for energy. That's why both ports are looking at ways to meet future energy demand in a more sustainable and resilient way. The Port of Long Beach's Energy Island initiative calls for renewable energy sources, alternative fuels, self-reliance, and energy-related operational efficiencies.

The ports are committed to encouraging the development of cutting-edge emission-reduction technologies and have set aside money each year for the Technology Advancement Program (TAP), which provides funding, guidance, and staff support to test promising air technologies in a real-world port environment. The goal is to introduce successful technologies to the port market as quickly as possible, accelerating these technologies from testing to commercialization and—ultimately—widespread adoption.

Looking toward the future, the ports have released a technology inquiry to obtain information about hybrid, near-zero, and zero-emission cargo handling equipment technologies in preparation for grant opportunities anticipated in fiscal-year 2017. The ports intend to apply for grants as appropriate, working with technology manufacturers and terminal operators as partners. In order to identify potential technology partners, the ports are collecting information about applicable technologies and the associated technology company experience. This information may also be used to connect interested terminal operators to technology companies for future demonstrations. The goal is for the ports to maintain up-to-date information on potential demonstration partners so that as new grant funding programs are released the ports will be able to respond in an effective and timely manner.

It's not enough to just set aggressive emission-reduction goals. The goals must be met. That's why the ports track progress on a regular basis through detailed emissions inventories, real-time air monitoring, and extensive reports on our technology demonstrations. Since 2005, port-related emissions have dropped 85 percent for diesel particulate matter, 50 percent for nitrogen oxides, and 97 percent for sulfur oxides—far exceeding the 2014 CAAP goals, well on the way to meeting the 2023 goals.
CAAP 2017

The ports envisioned the CAAP as a “living document,” and have periodically reviewed and updated it. A recently-released draft update, referred to as “CAAP 2017,” includes enhanced emissions reduction strategies in all areas of port operations and is now under review.²

Recently, the ports have obtained the necessary federal agency approval and executed a joint-port agreement that allows a CAAP-style joint-port stakeholder-involved program to improve the efficiency of goods movement through the ports. Over 50 working group sessions have been held towards this end, and a number of Supply Chain Optimization initiatives have been launched. Efficiency improvements in port operations not only increase cargo velocity and enhance schedule reliability, they also reduce environmental impact. Fewer truck movements mean less fuel burned, lower emissions, and reduced carbon footprint. California resource agencies are counting on freight efficiency improvements resulting in a 25-percent improvement in goods moved per unit of greenhouse gas emitted.³

Furthermore, information technology applications are showing great promise in making intermodal transfers much more efficient, less polluting, and more profitable with minimal investment, so much so that three federal agencies have convened working groups to explore these options.

The Clean Air Action Plan and Supply Chain Optimization initiatives promise to promote green and sustainable freight systems at the ports for years to come, benefiting all stakeholders ranging from local communities to national consumers and all those in between. em

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References
1. The California At-Berth Regulation is intended to reduce fine diesel particulates and thereby covers auxiliary diesel engine emissions, but not emissions from ships’ boilers (where so-equipped). Therefore, not all emissions are eliminated with the use of short power. See also https://www.arb.ca.gov/ports/shorepower/finalregulation.pdf.