

Port of Los Angeles / Long Beach

The Proof It Works: How California's At-Berth Regulation Is Saving Lives

~3,200 t

criteria pollutants emitted at berth annually (pre-regulation baseline)

1.5M+

below-median-income residents in surrounding communities

90%+

reduction in diesel particulate matter since 2005

CARB

mandatory at-berth emissions controls since 2014

Sources: ICCT Port Emissions Screening (2024); Port of LA 2024 Air Emissions Inventory; Port of Long Beach 2024 Air Emissions Inventory; CARB At-Berth Regulation compliance data; U.S. Census ACS

Port Overview

The San Pedro Bay port complex — comprising the Port of Los Angeles and the Port of Long Beach — is the largest port complex in the Western Hemisphere and the busiest in the United States. Together, the two ports handled nearly 20 million TEUs in 2024, representing approximately 40% of all containerized cargo entering the United States. The Port of LA alone recorded 10.3 million TEUs in 2024, a 19% year-over-year increase and the largest annual percentage gain in port history.

This page is different from every other port assessment on this site. Los Angeles / Long Beach is the **benchmark** — the proof that at-berth emissions regulation works. Every other port page asks "what if we did what California did?" This page answers: **here's what happened when California did it.**

Since the CARB At-Berth Regulation took effect in 2014 and was strengthened in 2020, the LA/LB port complex has achieved transformative reductions: DPM down 90%, SOx down

98%, NOx down 73% from 2005 baselines. In 2024, the port's share of regional mobile source emissions fell to just 6.4%, down from 12.7% in 2005 — even as cargo volumes grew 38%.¹

Who Is Affected

Despite dramatic regulatory progress, the communities surrounding the San Pedro Bay complex continue to face elevated pollution burdens from cumulative industrial exposure. These neighborhoods are among the most environmentally burdened in California.

Community	Population	Key Health Burden
Wilmington	54,000+	90% Latino; cancer risk 664 per million (98% above LA basin average); 6th-lowest life expectancy in LA
Carson	95,000+	39% Hispanic, 27% Asian, 22% Black; AB 617 environmental justice community
San Pedro	57,000+	Adjacent to cruise and container terminals; port truck corridor exposure
West Long Beach	50,000+	AB 617 designated community; surrounded by port terminals, oil refineries, rail yards
Long Beach (citywide)	444,000+	9.6 million TEUs in 2024; shore power and capture infrastructure expanding

Environmental Justice

Wilmington, Carson, and West Long Beach were designated as an AB 617 environmental justice community by CalEPA — California's landmark program targeting the state's most pollution-burdened neighborhoods. The combined 48 square miles are impacted by 2 major ports, 5 oil refineries, 9 rail yards, and 4 major freeways. Industries in the area emitted 1.7 million pounds of toxic air contaminants in 2020, including benzene, ammonia, and hydrogen cyanide. Cancer risk in Wilmington ranks in the top 2% of the entire South Coast basin.²

Health Impact Analysis

The CARB At-Berth Regulation has delivered measurable health benefits. Using the EPA's concentration-response methodology and CARB compliance data, we model both the remaining health burden from port emissions and the additional benefits achievable through next-generation carbon capture technology.

The current regulatory framework achieves over 95% compliance. The scenario below models the additional benefits of deploying CARB-certified barge-mounted capture with integrated carbon capture (99% PM2.5, 95% NOx, up to 95% CO2 removal — independently verified by Yorke Engineering LLC) on remaining uncontrolled vessel calls and as a complement to shore power.

Health Outcome	Pre-Regulation Burden	Current (With CARB Regulation)
PM2.5 emissions at port (tonnes/yr)	~900 t (2005 baseline)	~90 t (90% reduction achieved)
NOx emissions at port (tonnes/yr)	~1,800 t (2005 baseline)	~490 t (73% reduction achieved)
Premature deaths from port PM2.5	Estimated 60–150/year	Estimated 6–15/year (remaining)
Cardiovascular & respiratory hospitalizations	Estimated 240–600/year	Estimated 25–60/year (remaining)
Childhood asthma ED visits	Estimated 360–900/year	Estimated 35–90/year (remaining)
Monetized health benefit of regulation (EPA VSL)	\$180M+/year (baseline burden)	\$160M+ saved annually by regulation

Methodology Note

Pre-regulation estimates use EPA's concentration-response function for PM2.5 (Krewski et al. 2009, ACS CPS-II) and EPA Value of Statistical Life (\$11.8M, 2024-adjusted). Reduction percentages from Port of LA and Port of Long Beach 2024 Annual Emissions Inventories. Remaining burden estimates reflect post-regulation emissions levels. All estimates are conservative — they exclude SOx and secondary PM2.5 formation, which would increase totals. The 2024 inventories showed year-over-year emissions increases (DPM +8% at LA, +23% at LB) driven by record cargo volumes, demonstrating that ongoing vigilance and technology deployment remain essential.

The STAX Revolution

In July 2025, STAX Engineering was named the **first official on-call provider** for at-berth emissions control at the Port of Los Angeles — a milestone that marks the transition from regulatory compliance to operational infrastructure. STAX operates CARB-certified barge-mounted capture systems that remove 99% of PM2.5 and 95% of NOx from vessel exhaust while docked.

Since early 2024, STAX has treated over 1,190 vessels across five California ports, accumulating 25,000 hours of operation and capturing 190 tonnes of pollutants. The technology serves vessel classes that cannot use shore power — including tankers and auto carriers — making it essential for achieving complete at-berth emissions control.³

In April 2025, STAX and Seabound successfully demonstrated the **first integrated emissions and carbon capture solution** at the Port of Long Beach. The system captures PM2.5, NOx, and CO2 from a single exhaust stream — with CO2 captured at approximately 80% efficiency and permanently mineralized as calcium carbonate. The demonstration, conducted on the Wallenius Wilhelmsen ro-ro carrier *Talisman* and verified by Yorke Engineering, was funded by CARB and South Coast AQMD.⁴

In August 2025, STAX secured CARB Executive Orders for four barges to service tanker vessels — becoming the first and only emissions control provider approved for all three major vessel classes (container ships, auto carriers, and tankers) in California.

The Road to 2028

The 2028 Los Angeles Olympics present a singular opportunity to demonstrate what clean port operations look like at global scale. Edward Norton, Chief Sustainability Officer of STAX Engineering, framed the ambition at the LACI Road to 2028 Summit in December 2025: *"Olympic athletes should arrive in Los Angeles and not breathe a single iota of NOx or particulate matter from ships at the Port of LA."*

The summit generated \$125 million in new public and private commitments toward clean energy and transportation infrastructure. STAX's grid-independent barge technology — which captures emissions without drawing shore power — complements the broader electrification agenda by freeing grid capacity for other zero-emission infrastructure.

LACI's Clean Energy 2028 Roadmap targets a 15% reduction in greenhouse gas emissions across Greater Los Angeles by the Games. At-berth emissions capture is a visible, measurable component of that goal — and a proof point that the world can see.

The Regulatory Gap — What LA/LB Proves for Every Other Port

California's CARB At-Berth Regulation has been in effect since 2014, was strengthened in 2020, and reaches full implementation in 2027 when tanker coverage expands to all California ports. The results are unambiguous: 90%+ reductions in diesel particulate matter, 98% reductions in SOx, and over 95% compliance — while cargo volumes grew 38%.

In October 2023, the EPA authorized California's regulation under the Clean Air Act, legally enabling other states to adopt the identical standard. **No state has done so.** The technology is proven, the regulatory framework exists, and the health benefits are quantified. The only missing piece outside California is the political will to act.

What LA/LB Demonstrates

The LA/LB experience proves several critical points for every other port in this assessment portfolio:

- **Regulation works:** 90%+ DPM reduction, 98% SOx reduction, even as cargo volumes grew 38%
- **Compliance is achievable:** Over 95% compliance rate across the port complex
- **Technology is commercially deployed:** STAX operates 8 barges across 5 ports, treating 3 vessel classes
- **Carbon capture is next:** Integrated emissions + CO2 capture demonstrated and verified at Long Beach
- **Economic growth is compatible:** Record cargo volumes coexist with record emissions reductions
- **The model is exportable:** EPA authorization means any state can adopt this standard today

What Comes Next

The LA/LB port complex is the global benchmark for at-berth emissions control. But the work is not done. Year-over-year emissions increases in 2024 — driven by record cargo volumes — demonstrate that sustained investment in technology and enforcement is essential.

Port Health Watch is developing frameworks to extend the LA/LB model nationally:

- **Air Quality Health Units (AQHUs):** The first tradable health benefit asset class for port pollution reduction, under development for submission to Verra's SD VISTA program. [Learn more →](#)
- **Carbon credit methodology:** A Verra VCS methodology for at-berth maritime carbon capture, targeting July 2026 submission. [Learn more →](#)

The Benchmark

The Port of Los Angeles / Long Beach proves that at-berth emissions regulation saves lives, protects communities, and is compatible with record-breaking economic growth. Since 2005, diesel particulate matter is down 90%, SO_x is down 98%, and the port complex handles 38% more cargo. With CARB-certified capture technology now treating three vessel classes and integrated carbon capture verified at Long Beach, the question for every other U.S. port is no longer *whether* this works — it's *when* they will start.

1. Port of Los Angeles, "2024 Air Emissions Inventory" (October 2025); Port of Long Beach, "2024 Air Emissions Inventory"; ICCT, "Nationwide port emissions screening for berthed vessels" (September 2024). [↔](#)
2. CalEPA, AB 617 Community Air Protection Program — Wilmington, Carson, West Long Beach; South Coast AQMD Community Emissions Reduction Plan; CalMatters, "Environmental Justice by the Numbers" (2022). [↔](#)
3. STAX Engineering, "Named First Official Provider for At-Berth Emissions Control Services at the Port of Los Angeles" (July 2025); STAX Engineering, "Secures CARB Executive Order to Service Tanker Vessels throughout California" (August 2025). [↔](#)
4. STAX Engineering and Seabound, "Successfully Demonstrate First-Of-Its-Kind Integrated Emissions and Carbon Capture Solution" (April 2025); Yorke Engineering LLC, independent verification. [↔](#)

This assessment was produced by Port Health Watch, a research initiative of Civil Ledger Lab, operated by EcoAsset Lab LLC. For site-specific assessments with higher-resolution modeling, contact research@porthealthwatch.org.