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Someone Else's Ocean

Dockworkers, Foreign Shippers and Economic Outcomes

June 2022



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June 2022

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Coast Longshore Division

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1. Executive Summary

Ports and the Economy

Ports should be two-way gates – goods enter and they leave. But in the San Pedro Bay, foreign shippers kicked the gate until it broke – goods are coming in but not going out, harming the environment in port cities, eliminating jobs of California residents and causing long-term harm to local economies and businesses.

The policies of the San Pedro Bay Ports need to align with U.S. “super preferences” to support domestic technology and the recently invoked Defense Production Act to accelerate clean energy manufacturing.

Seaports are capital-intensive facilities owned by the public. Basic standards of equity call for the *direct-port labor force* to be paid sustaining wages and for *port-related* jobs to benefit as many California residents as possible.

The anchor that draws imports to the San Pedro Bay is the large local consumer market that buys over one-third (35 percent) of imports. The scale of the Los Angeles region’s goods movement infrastructure and the size of the local market give the ports first-mover-advantage and resilience as a shipping hub.

The challenge for the ports is that most cargo comes through major shipping lanes that have been custom-built by shipping alliances to connect Asian manufacturers with North American consumers. Within this framework, more cargo volume, lower shipping costs and larger vessels are considered better. The negative costs from this model are offloaded onto California communities and businesses.

The ports have a responsibility to recognize that they can contribute to building the economy as well as moving cargo.

Cargo Movement

The San Pedro Bay ports are legally mandated to provide economic and environmental benefits for Californians. In recent times the American factories and jobs that were supported by the ports have closed and been replaced by warehouses and trucking companies that often pay low wages. Jobs on the docks are the remaining economic benefit for the host communities of San Pedro, Wilmington and Long Beach.

Foreign shipping companies that have consolidated into three international shipping alliances control 83 percent of all global container movement. These companies own nine of the 11 container terminal companies at the two ports. These foreign-owned terminal companies handled 81 percent of the containers transported through the ports in 2021.

The global shipping industry responded to Covid-19 by increasing cargo rates 1000 percent and reported profits of over \$190 billion in 2021. This vastly increased cost to ship cargo containers has caused and accelerated inflation and penalized U.S. exports.

Port revenue is based primarily on the number of containers that move through the ports. The fee for each container moved through terminals decreases as the number of containers increases. The lease agreements between the ports and terminal operators offer this sliding scale reduction as an incentive to shippers to utilize the ports more. The result is that the ports' revenue interests align with the terminal operators' business interests in maximizing revenue by increasing container traffic.

Balance of Trade

The value of exported cargo peaked in 2011 at Port of Long Beach and in 2013 at the Port of Los Angeles. Since then, exports have declined 38 percent from Long Beach and 52 percent from Los Angeles. The decline in exports represents a loss of manufacturing jobs for California residents.

In 2021, 72 percent of the outbound containers from the combined Ports of Long Beach and Los Angeles and Long Beach were empty. Shippers paid less to return the containers empty than they would have if the containers held American cargo.

The Ports of Long Beach and Los Angeles import \$8.42 worth of goods for every \$1.00 worth of goods that they export. This trade imbalance is more than five times worse at the Ports of Long Beach and Los Angeles than at the rest of the nation's seaports.

China sent 48 percent of the goods that were imported through the San Pedro Bay Ports in 2021, and was the buyer of 26 percent of the goods exported from the ports. Because imports are much larger than exports and because China's share of exports is smaller than its share of imports, China winds up sending \$12 of goods to the San Pedro Bay Ports for every \$1 of exports that they receive.

The ports are bystanders in the trade conflict with China. Growing imported cargo has offset declining exported cargo. This neutrality accommodates consumer needs but it is not responsive to the economic and employment needs of California residents and businesses.

Despite American technological excellence, the dominance of imports at the San Pedro Bay Ports is especially true for high-value-added industries that provide good blue-collar jobs. The value of imports is 25 times greater than the value of exports for industrial machinery and electrical equipment, and 32 times greater for instruments.

The strongest candidates for export growth are high-skill, capital-intensive and technology-intensive industries where labor costs for skilled workers are offset by high productivity, high quality and cutting-edge technology.

Despite the trade imbalance in manufactured goods, California and the Los Angeles region still have significant manufacturing strengths both because of the large domestic market and because of specialized technology niches.

Opportunities for reshoring critical manufacturing activities are being created by recent supply chain disruptions that make just-in-time manufacturing more vulnerable and by trade conflict with China.

The San Pedro Bay Ports can offer more support to California exporters through informed and responsive access to the ports' logistics advantages. This requires the ports to reach out to specific industries and listen to their needs rather than their current *laisse faire* export practices.

This is likely to be just a light thumb on the right side of the scale, but for some companies that will be a large enough margin of difference to make reshoring the right decision. The balance of trade will not be corrected overnight, but purposeful and judicious policies that support California businesses can help reduce the imbalance.

Public Costs

The San Pedro Bay Ports are transporting goods that American residents want; however, there are significant public costs that shippers do not pay. The level of port traffic provides the basis for estimating long-term economic and environmental costs from port operations.

There were an estimated \$279 million in uncompensated public costs in 2021 from 6.7 billion ton-miles travelled by trucks leaving the San Pedro Bay Ports carrying imported containers. In addition, negative impacts on port communities include emissions of harmful criteria pollutants and significant cancer risks.

The challenge for the ports is to ensure that transportation logistics create as much benefit as possible and as little loss as possible for California residents.

The ports can increase the benefits they provide for California residents by becoming stronger economic allies for California industries and workers rather than turntables for foreign supply chains.

Automation

Four percent of global container terminal capacity has been automated. This includes Long Beach Container Terminal (LBCT) at the Port of Long

Beach and Trans Pacific Container Service Corporation (TraPac) at the Port of Los Angeles. A conservative analysis of job loss shows that automation eliminated 572 full-time-equivalent jobs annually at LBCT and TraPac in 2020 and 2021.

Some shipping industry executives advocate for automating terminals to achieve greater efficiency, despite the findings of multiple independent studies that automated terminals often fail to be more productive. The capital costs of automation are often greater than the savings in labor costs.

There are significant operational challenges for automated terminals including a shortage of needed capabilities in the labor force, poor data, siloed operations, and difficulty handling exceptions to routine cargo flows. In practice, automated ports are generally less productive than their conventional counterparts.

Studies of actual outcomes from port automation by Moody's Investors Service, McKinsey & Company and the International Transportation Forum have found that cost savings are doubtful. In practice, automated ports are generally *less* productive than their conventional counterparts. The productivity of automated ports is 7-15 percent lower than for non-automated ports. Even if cost savings materialize, the profits leave the United States and go to foreign owners.

Despite the doubtful financial outcome, automation brings one advantage for shipping companies: elimination of the inconvenience of dealing with American workers and, more specifically, the union that protects dockworkers.

The narrow interest of foreign shippers appears to focus on minimizing their reliance on American labor while still delivering their products to American consumers. Their perspective fails to consider the interests of port cities or California's workers. Automation eliminates dockwork jobs, which are the largest remaining benefit that ports provide to port cities.

Dockworkers' Wages in Local Communities

In a typical year, 13,000 workers are employed on the San Pedro Bay docks, some full-time, others part-time. There are roughly 19.5 million hours of work moving cargo through the ports, with wages of roughly \$1.2 billion for this work.

The *average* hourly wage for all hours worked in the ports in 2021 was \$62.44, and the *median* wage was \$59.95.

Dockworkers perform high-value-added work and a strong union represents them. As a result, they are well compensated and bring significant economic benefits to local communities.

The homes of dockworkers are tightly clustered near the ports in San Pedro and Long Beach, and radiate out throughout Los Angeles and Orange Counties.

An estimated 3.1 million persons in 981,000 households, and 1.5 million employed workers live in communities where there is a strong presence of dockworkers, and where they make an important imprint on the local economy.

Thirty-six percent of dockworkers live in the City of Los Angeles, 13 percent live in the City of Long Beach and 84 percent live in Los Angeles County. This region captures most of the economic multipliers stimulated by dockworker wages.

The *median* annual earnings in 2019 of workers represented by the International Longshore and Warehouse Union (ILWU) was \$89,560, compared to *median* earnings of \$34,345 for all of the other workers living in the same communities. (2019 is the most recent year for which we have earnings data for both dockworkers and their neighbors.)

The *median* earnings of dockworkers are 161 percent higher than their non-port neighbors. The *average* earnings of dockworkers are 83 percent higher than their non-port neighbors. (The *median* reflects the typical worker, the one in the middle, the *average* reflects all workers.)

Regional Economic Costs of Automation

Non-port businesses and their workers in Southern California benefit from the household spending of dockworkers, which supports the equivalent of 7,065 year-round jobs and \$1.376 billion in sales by businesses.

These sales generate an additional \$452.6 million in wages for other workers who provide the goods and services purchased by dockworker households and \$860.2 million of value added in California's economy.

The share of purchases by dockworkers at local businesses as a share of all purchases by all wage earners amounts to 13 percent in San Pedro, 9.4 percent in Wilmington-Harbor City, and 1.3 percent in the City of Long Beach

Automation at LBCT and TraPac eliminated 535,848 annual person-hours of dockwork and resulted in \$41.8 million in annual wages not earned.

This automation shrank the economy, eliminating 254 year-round *linked* jobs and \$49.5 million in sales at California businesses that provide goods and services to dockworkers, and \$30.9 million of value added in the state's economy from these *linked* sales.

If future automation eliminates 50 percent of dockside work hours, 6.8 million dockwork hours and \$401.8 million in wages would be lost.

The follow-on effects would eliminate an additional 2,445 year-round, non-port jobs that are currently supported by the consumer spending of dockworkers. This would be the result of \$476.3 million in lost purchases in California's economy.

If future automation eliminates 75 percent of dockside work hours, 10.7 million dockwork hours and \$627.6 million in wages would be lost.

The follow-on effects from automation would eliminate 3,818 year-round, non-port jobs that are currently supported by the consumer spending of dockworkers. This would be the result of \$743.9 million in lost purchases in California's economy.

Responsibility to California Residents

The benefits that ports offer to port cities have been decimated because of relocation of former port-related industries, shifts from local to international inputs and increases in negative environmental impacts. Economic benefits often spill over to other regions, whereas negative impacts are localized in the port city. Growing costs for port communities include traffic congestion and pollution.

Ports must provide public benefits that offset their negative impacts on port cities in order to be true to their public trust. Jobs are the most fundamental benefit, beginning with dockwork jobs and extending to manufacturing industries with export capabilities.

Ports need to be community managers acting in the public interest, and able to bridge the demands of parties beyond the port by providing innovative transport solutions for California firms and by protecting jobs linked to the ports.

The ports are a key hub in an extraordinary international transportation infrastructure for distributing goods. This valuable locational advantage should be used to stimulate manufacturing growth in California and safeguard jobs in port communities.

Recommendations

These eight recommended actions build on data analyzed and presented in this report. The recommendations align the policies of the San Pedro Bay Ports with their legal mandate to serve the interests of California residents.

1. The Cities of Long Beach and Los Angeles should enact a displaced worker impact fee on any new automated equipment to offset public costs resulting from job loss caused by automation.

2. The State of California should enact a tax on automated terminal equipment that generates public revenue equivalent to the revenue from income and payroll taxes when containers are moved by dockworkers without automated equipment.
3. The San Pedro Bay Ports should eliminate all fee discounts for exporting empty cargo containers and enact a surcharge for empty containers that are exported to offset public costs that result from under-utilization of California's export capacity.
4. The San Pedro Bay Ports should provide discounts in shipping fees for exported containers that contain cargo.
5. The San Pedro Bay Ports should require minimum compensation equivalent to the prevailing wage rates for construction truck drivers for trucker drivers moving containers to and from the ports.
6. The ILWU should play an active role in reviewing and providing public comment on terminal lease agreements.
7. The San Pedro Ports should withhold approval of plans to automate terminals unless it can be demonstrated that the automation will produce net benefits for California workers.
8. The San Pedro Bay Ports should reach out to California export industries through surveys and industry meetings to identify ways in which the ports can more effectively support exporting California products.



*Photo credit:
ILWU Local 13*

2. Profiles of Dockworkers



Jaime Hipsher

Utility Tractor Rig Driver

Jaime Hipsher drives utility tractor rigs (UTRs) at terminals in both San Pedro Bay ports. UTRs are small, compact trucks that haul containers around the docks. She shows up at the longshore dispatch hall at four o'clock every afternoon for a night shift assignment in the rail operation at one of the terminals, loading and unloading containers from freight trains. "There is lots of hustle," Jaime says, "it keeps me engaged."

Jaime was living in Waterman Canyon in San Bernardino County and taking business management classes at Cypress Community College when she heard about the lottery for longshore workers in 2004. She applied and was one of 3,000 people who were selected to be casual workers. This meant getting part-time dock work when it is available, so like most casuals, Jaime juggled several jobs to make ends meet. She worked as a cosmetologist, tended bar, and ran a business with her mom, selling clothes that they bought in the Los Angeles garment district at their booth at the Orange County flea market.

Dock work became scarce during the 2008 recession, so it took 11 years of casual work before Jaime had enough hours to become a registered longshore worker in 2015.

The economy recovered, more ships came to the ports, and Jaime got more hours of dock work. She moved to Anaheim and then to Long Beach to be closer to the docks. Now, as a registered longshore worker, she owns her own home and has a pension plan and good health care. Two friends who she cut hair with did not have good health care. One died of cancer, in poverty, the other is struggling with health issues caused by years of not being able to take care of herself.

"The first time I parked a container, it took me 40 minutes. Now I can do it in two minutes. My union colleagues have taken me aside and showed me how to do the job." Jaime went on to say, "I feel powerful and capable handling big machinery. It's empowering for me as a woman. This has carried over into my personal life and made me feel more confident."

Her future plans include driving a transtainer, a vehicle that straddles and stacks shipping containers; this is a higher-skilled job. And she volunteers to help the ILWU keep her fellow dockworkers informed and engaged.

Outside of the job, Jaime still cuts hair for her family and friends and is a dedicated distance runner. She has run in over 70 endurance events in the past seven years. She says, "I love staying fit."

"I feel powerful and capable handling big machinery. It's empowering for me as a woman."

Sal Di Costanzo

Dockworker and Longshore Executive Board Member

Sal DiCostanzo was born and raised in San Pedro, the son of a fishing boat mechanic who emigrated from Italy. “You can’t escape the importance of the ports, growing up in San Pedro,” Sal said.

He was able to attend USC on a scholarship and graduated with a degree in business administration. He began working in banking and later as a claims specialist for an insurance company. But the company expected travel for advancement and Sal needed to live locally with his wife, children and aging parents.



Sal got a card for casual dock work in 1998 and worked weekends and nights. His new day job was teaching math to middle school students. He explained, “in middle school the students *think* they know everything, but in high school they’re *sure* that they know everything. Teachers have more chances to make positive impacts at the middle school level.” Sal became a master teacher, coaching other teachers and planning the math curriculum.

In 2006, Sal became a registered longshore worker. His jobs have included driving utility tractor rigs, operating combination lifts and heavy lifts, lashing containers, and working onboard ships. He is on the dock board now, working in tandem with a crane operator by radio, lining up utility rig drivers to have containers loaded or unloaded.

“There’s a lot happening all at once. It’s hard for new people to understand it all. A big part of my job today is training other workers not to be in the bight.” Bight means the loop in a line, a dangerous spot if the line suddenly tightens, and refers more broadly to hazards to avoid on the dock.

The cargo coming through the ports “gives consumers today what kings couldn’t have in the past. There’s a sense of pride from providing this,” Sal said. At the same time, “the global shipping entities that dockworkers are up against are huge and very powerful— for a local with just over 8,000 workers. Preserving wages and good benefits is a constant struggle for us.”

Sal serves on the Executive Board of ILWU Local 13 and recently the California Secretary of Labor asked him to serve on a panel that will study the job impacts of automation and climate change.

“Corporate power is too concentrated,” Sal said. “I’d like to see workers treated with respect and dignity and truly valued. Not just longshore workers, but all workers.”

“I’d like to see workers treated with respect and dignity and truly valued. Not just longshore workers, but all workers.”



*Photo credit:
Economic Roundtable*

3. Cargo Movement

Introduction

Each vessel at dock in the San Pedro Bay has ended one journey, most often bringing goods made in another country and then unloaded by American hands. Then the vessel begins a new journey, with American hands loading cargo from our shores. The American public's interest is in equity between goods entering and leaving the Ports of Long Beach and Los Angeles, and in how goods are handled within the ports.

California has granted public lands in trust to the Ports of Long Beach and Los Angeles for them to manage for the benefit of California residents. The San Pedro Bay ports are publicly-funded infrastructure that is mandated to provide economic and environmental benefits for Californians.¹

In reality, much of what we use in our lives is made in other countries, with four-fifths of imports arriving by sea. In 2021, \$392 billion worth of goods moved in and out of the San Pedro Ports, with 12 percent of the value in outbound goods and 88 percent in inbound goods.² The balance of trade in the Los Angeles region is heavily tilted toward foreign products.

For most of their history the Long Beach and Los Angeles Ports have supported good jobs both on the docks and in nearby factories. But in recent times the factories have closed and been replaced by warehouses and trucking companies that often pay low wages. Longshore jobs on the docks are the most tangible remaining economic benefit that the ports provide for the host communities of San Pedro, Wilmington and Long Beach.

Cargo Volume and Employment at West Coast Ports

The San Pedro Bay ports dominate West Coast cargo movement, handling 64% of total tonnage.

Tonnage

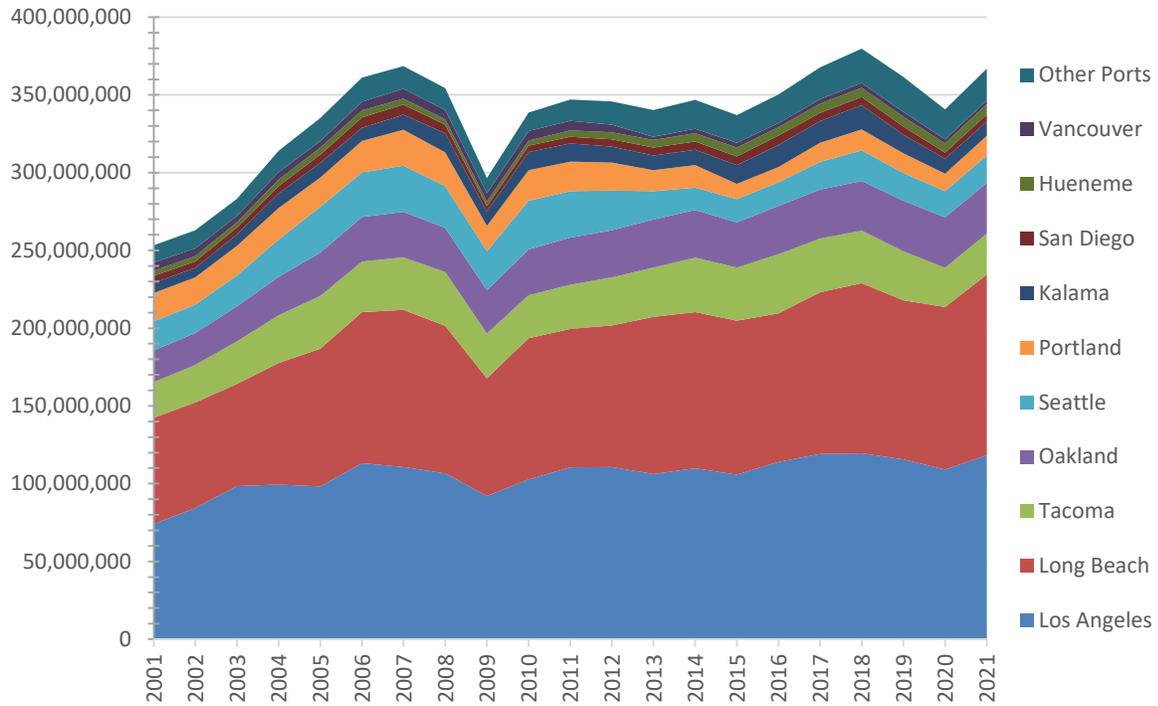
The San Pedro Bay Ports dominate West Coast cargo movement. In 2021, the 29 West Coast ports moved 367 million tons of cargo. Sixty-four percent of this cargo moved through the two San Pedro Bay ports (*Figure 1*). These two ports also stand out for growth in cargo volume.

The tonnage of vessel-borne cargo handled by West Coast ports increased 45 percent from 2001 to 2021. This included a 70 percent increase in tonnage at the Port of Long Beach, a 60 percent increase at the Port of Los Angeles, and a 19 percent increase at the other 24 West Coast ports.

Containers

Most vessel cargo is transported in containers, especially more valuable cargo. Container cargo accounts for 62 percent of all cargo weight and 90 percent of cargo value at the San Pedro Bay Ports.³

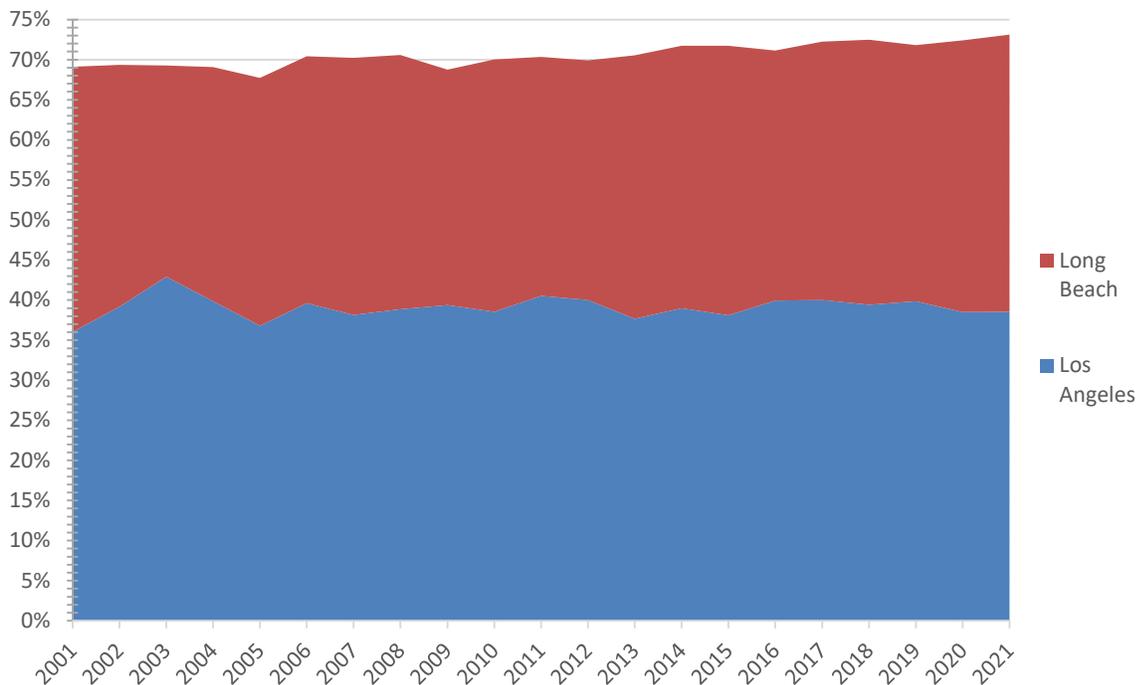
Figure 1: Tons of Cargo Moved Annually at West Coast Ports



Source: Pacific Maritime Association Annual Reports.

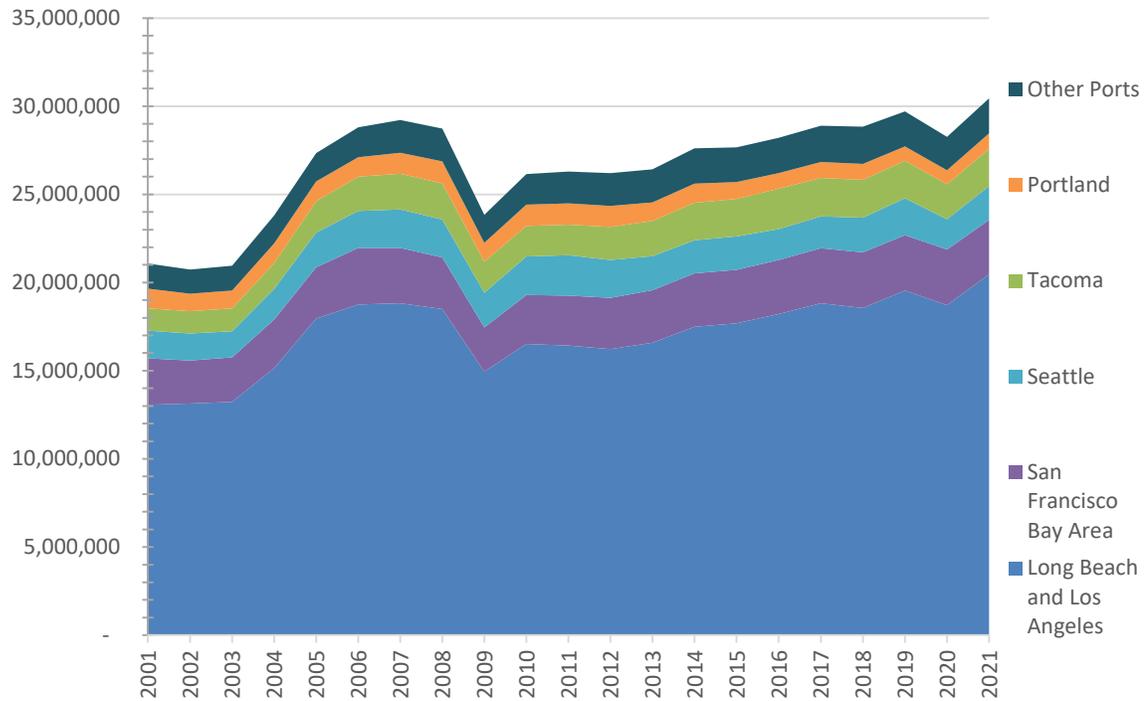
The volume of container shipments is sometimes standardized for 20-foot lengths (that are 8 feet wide and 8.5 feet high), although most containers are 40 feet long and the lengths range from 20 to 53 feet.

Figure 2: Percent of West Coast Containers Handled by the Ports of Long Beach and Los Angeles



Source: Pacific Maritime Association Annual Reports.

Figure 3: Annual Hours of Dock Work at West Coast Ports



Source: Pacific Maritime Association Annual Reports.

There is no evidence of any competitive threat to the dominant role of the Ports of Long Beach and Los Angeles.

The Ports of Long Beach and Los Angeles have been the hub of West Coast container shipping since 2001 (Figure 2). Even as total container traffic has increased on the West Coast, the share moved through these two ports has increased from 69 percent in 2001 to 73 percent in 2021. There is no evidence of any competitive threat to the dominant role of these ports.

Hours of Dock Work

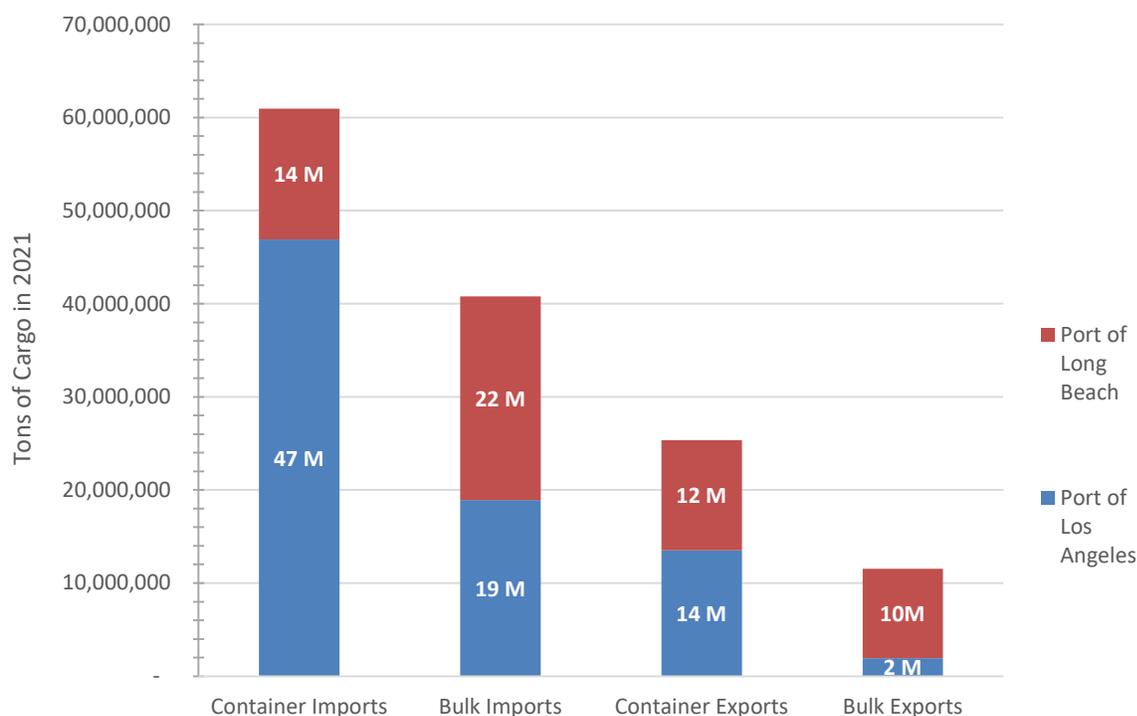
The number of hours that workers were employed on West Coast docks grew 44 percent from 2001 to 2021 (Figure 3). Tacoma had the greatest job growth, increasing 68 percent. The combined Long Beach and Los Angeles Ports had 57 percent growth (they are reported together, as are San Francisco Bay Area ports, in the Pacific Maritime Association - PMA data).

Hours of work at the San Pedro Bay Ports increased only 87 percent as much as revenue tonnage increased, compared to an increase of 127 percent at other West Coast ports. One of the likely causes for this lag is that automated cargo-handling equipment that was introduced at some San Pedro Bay terminals, reducing the number of boots on the docks.

San Pedro Bay Cargo and Terminals

In addition to cargo packed inside steel containers, a variety of bulk cargo moves through the ports. This includes “break bulk” such as automobiles

Figure 4: Tons of Container and Bulk Cargo Transported through the Ports of Los Angeles and Long Beach in 2021



Source: U.S. Census Bureau, Economic Indicators Division.

or lumber, “dry bulk” such as petroleum coke, salt or gypsum, and “liquid bulk” that is most often petroleum. The tonnage of container and bulk cargo transported through the two ports in 2021 is shown in *Figure 4*.

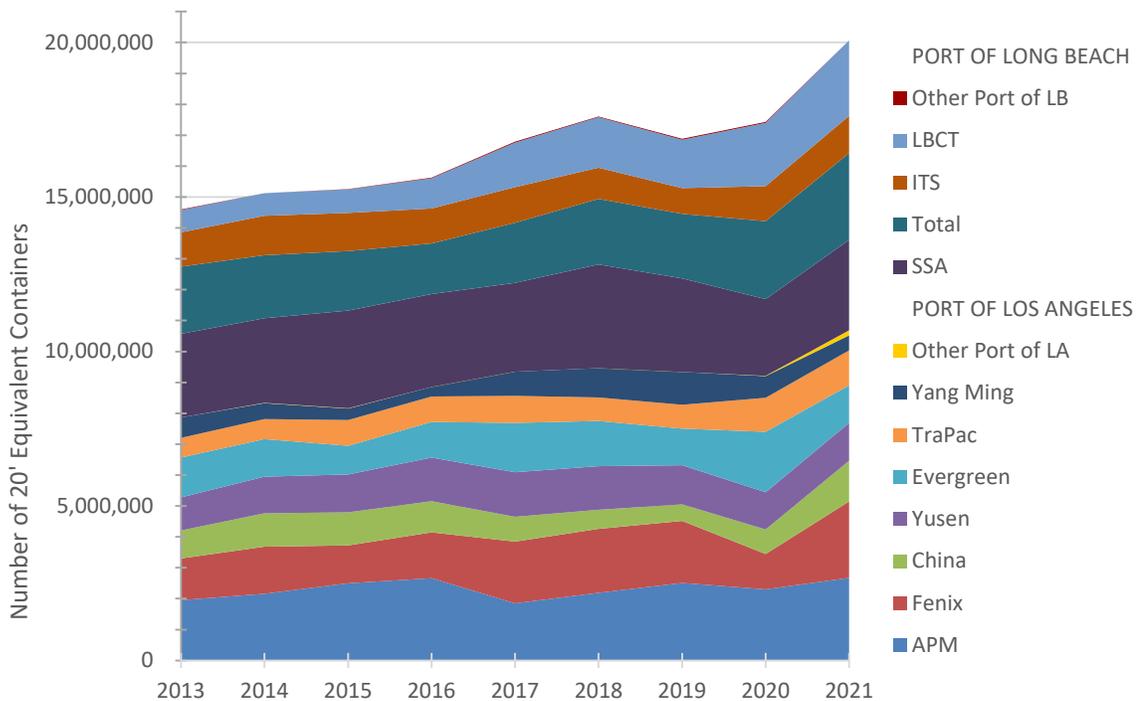
In 2021, the Port Los Angeles handled 70 percent of all container cargo that moved through the San Pedro Bay, based on weight, and the Port of Long Beach handled 60 percent of all bulk cargo. This amounted to 138 million tons of cargo, with 86 million tons held in containers and 52 million tons was in bulk form.

Nearly three quarters of the cargo (73 percent), based on weight, was imported and a quarter (27 percent) was exported.

Containerized Cargo

Cargo containers are very sturdy, made of welded steel with a corrugated exterior and brackets on each corner for lifting and for holding the cone locks that connect containers. Because they are built in a standard shape and a limited number of sizes, it is possible to move them with automated equipment, however, the results have been mixed. The International Transportation Forum, an intergovernmental organization with 63 member countries, found that in most cases port automation has not delivered the promised improvements in productivity and cost savings.⁴

Figure 5: 20-Foot Equivalent Inbound and Outbound Container Movement by Terminals in the Ports of Long Beach and Los Angeles



Source: Ports of Long Beach and Los Angeles. Terminal operating companies holding terminal leases in 2021 are shown.

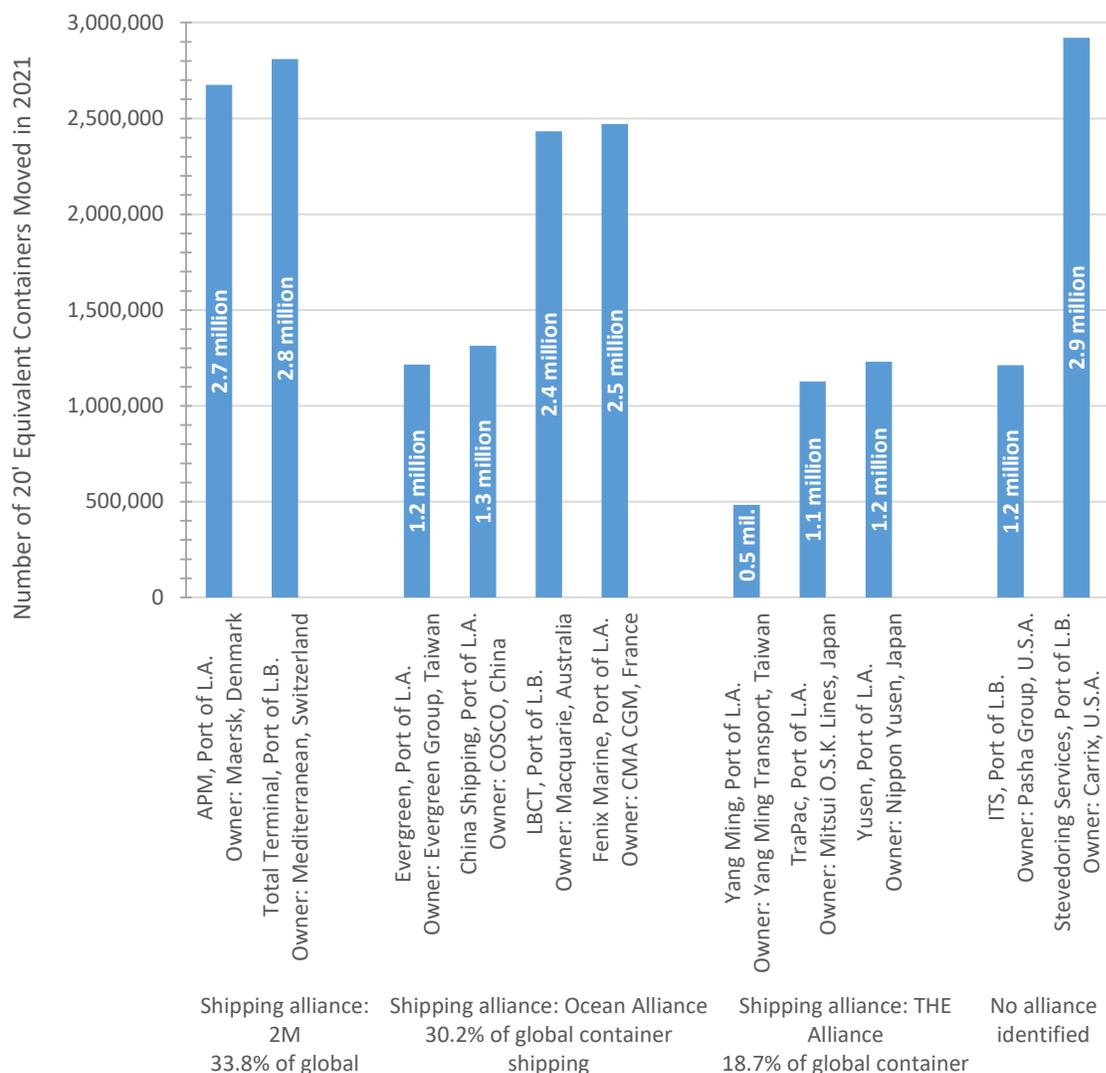
The share of containers moving through the ports that are handled each year by the 11 primary container terminal companies is shown in *Figure 5*. The port terminals are public property, owned by the cities of Long Beach and Los Angeles, which lease the terminals to companies that are owned by large international corporations. Owners of the 11 San Pedro Bay container terminals are shown in *Figure 6*.

Nine of the 11 owners are foreign shipping companies that are part of three global alliances that coordinate their shipping routes and rates and control 83 percent of all global container movement. Two of the three shipping alliances have members that own terminal companies in both the Long Beach and Los Angeles ports, giving them strong leverage in negotiating with the ports.

The shipping alliances are reported to share information about stowage plans, vessel assignment, and scheduling as well as to work together to solve shipping problems. They also discuss how to regulate fuel types, environmental issues, operational efficiencies, and engine failures.⁵

Additional elements in each shipping alliance include capacity planning, the contribution of each individual carrier, and their compensation. The cooperation in shipping alliances covers the utilization of shared resources and covers full integration of service capabilities.⁶

Figure 6: Ownership and Alliances of San Pedro Bay Container Terminal Companies in 2021



The nine foreign-owned terminal operators in the San Pedro Bay Ports that are part of shipping alliances handled 81 percent of the containers transported through the Ports of Los Angeles and Long Beach in 2021.

The ports and shipping administrator for the Organization for Economic Co-operation and Development (OECD) described the wave of mergers in container shipping this way: “The dominant business strategy in container shipping is economies of scale. Or: big is beautiful. The average capacity of a containership has quadrupled in two decades. Over more or less the same period, container shipping has developed from a fragmented industry into an oligopoly.”⁷

Port of Los Angeles

There are seven container terminals in the Port of Los Angeles. Their owners, shipping alliances and container traffic in 2021 are as follows.

APM Terminals Pacific (APM) handled 25 percent of container traffic in the Port of Los Angeles in 2021. APM is a subsidiary of Maersk, a Danish shipping company with 729 vessels and a 16.7 percent market share of shipping. Maersk is part of the 2M shipping alliance, which coordinates 33.8 percent of global shipping.

Fenix Marine Services handled 23 percent of the port's container traffic. Fenix is a subsidiary of CMA CGM Group, a French shipping conglomerate with 578 vessels and a 12.8 percent market share. CMA CGA is part of the Ocean Alliance, which coordinates 30.2 percent of shipping.

China Shipping Holding Company handled 12 percent of the port's containers. China Shipping is a subsidiary of COSCO, a Chinese state-owned multinational conglomerate headquartered in Shanghai with 474 vessels and an 11.5 percent market share. COSCO is part of the Ocean Alliance.

Yusen Terminals handled 12 percent of the port's containers. Yusen is a subsidiary of Nippon Yusen Kabushiki Kaisha and Macquarie Infrastructure Partners III (joint owners). Nippon Yusen Kaisha and two other Japanese shipping lines, Mitsui O.S.K. Lines and K Line, jointly own Ocean Network Express (ONE), with 207 vessels and a 6.0 percent market share. ONE is part of THE Alliance, which coordinates 18.7 percent of shipping.

Evergreen Shipping handled 11 percent of the port's container traffic. Evergreen is a subsidiary of Evergreen Marine Corporation, a Taiwan shipping company with 200 vessels and a 5.9 percent market share. Evergreen is part of the Ocean Alliance.

Trans Pacific Container Service Corporation (TraPac) handled 11 percent of the port's containers. TraPac is a subsidiary of Mitsui O.S.K. Lines, another of the Japanese shipping companies that jointly own OCEAN, with 207 vessels and a 6.0 percent market share that is part of THE Alliance (THE is an imperfect acronym for Hapag-Lloyd, Yang Ming, and Ocean Express Network).

TraPac is an automated terminal that received a *\$265.2-million-dollar subsidy from the Port of Los Angeles*. In 2010, the port negotiated a new lease with TraPac that included \$270.4 million in port-funded improvements to the terminal to be offset by future lease payments. Subsequently, the Port agreed to additional improvements that increased costs by 110 percent without revising the lease and thereby prevented itself from recovering the additional costs to which it was committed. The improvements funded by the \$265.2 million gift to TraPac included rail-mounted gantry crane operations and an automated transtainer operation.⁸

Yang Ming handled 5 percent of the port's containers. Yang Ming is a subsidiary of Yang Ming Marine Transport Corporation, a Taiwan

TraPac received a \$265.2-million-dollar subsidy from the Port of Los Angeles that helped pay for automating the terminal.

shipping company with 93 vessels and a 2.6 percent market share that is part of THE Alliance.

Port of Long Beach

There are four container terminals in the Port of Long Beach. Their owners, shipping alliances and container traffic in 2021 include:

Stevedoring Services of America (SSA) handled 31 percent of the port's containers. SSA is a subsidiary of Carrix, a U.S.-based transportation and logistics company that is the country's largest marine terminal operator and not known to be part of a shipping alliance. Blackstone Infrastructure Partners is one of the principal investors in Carrix.

Total Terminals International handled 30 percent of the Port of Long Beach containers. Total is a subsidiary of Mediterranean Shipping Company, based in Switzerland, which is privately owned and the world's largest shipping company with 663 vessels and a 17.1 percent market share. Mediterranean is part of the 2M shipping alliance.

Long Beach Container Terminal (LBCT) handled 26 percent of the port's containers. LBCT is a subsidiary of Macquarie Infrastructure Partners, based in Australia. LBCT is an automated terminal with 4,200 feet of wharf line leased by the Port of Long Beach. The port describes LBCT as "a global model of efficiency and sustainability."⁹ Macquarie purchased LBCT from Orient Overseas Container Line (OOCL) in 2019, and the agreement specified that OOCL, now part of COSCO, would continue to have its ships call at LBCT for 20 years.¹⁰ This links LBCT to the Ocean Alliance.

International Transportation Service (ITS) handled 13 percent of the port's containers. ITS is a subsidiary of the Pasha Group, a U.S.-based shipping and logistics company with automobile shipping terminals at multiple ports and stevedoring operations at the Port of Long Beach. Pasha is not known to be part of a shipping alliance.

Shipping Company Profit and Taxes

Profit

Profits of the global shipping industry have grown extraordinarily in the past two years. Profits in 2021 were over \$190 billion, as shown in *Figure 7*. This represents a profit of \$861 for each twenty-foot-equivalent container.¹¹

"The ocean carriers' 'cash machine' is now working at an exceptional level," according to Drewry Maritime Research.¹² The reason is record-high freight rates. The rate to ship a 40-foot container increased tenfold, from less than \$2,000 in 2019 to as much as \$20,000 in 2021.¹³

The rate to ship a 40-foot container rose from less than \$2,000 in 2019 to as much as \$20,000 in 2021, making ocean carriers a cash machine.

The publicly-owned ports of Long Beach and Los Angeles have been portals for massive private profits over the past two years.

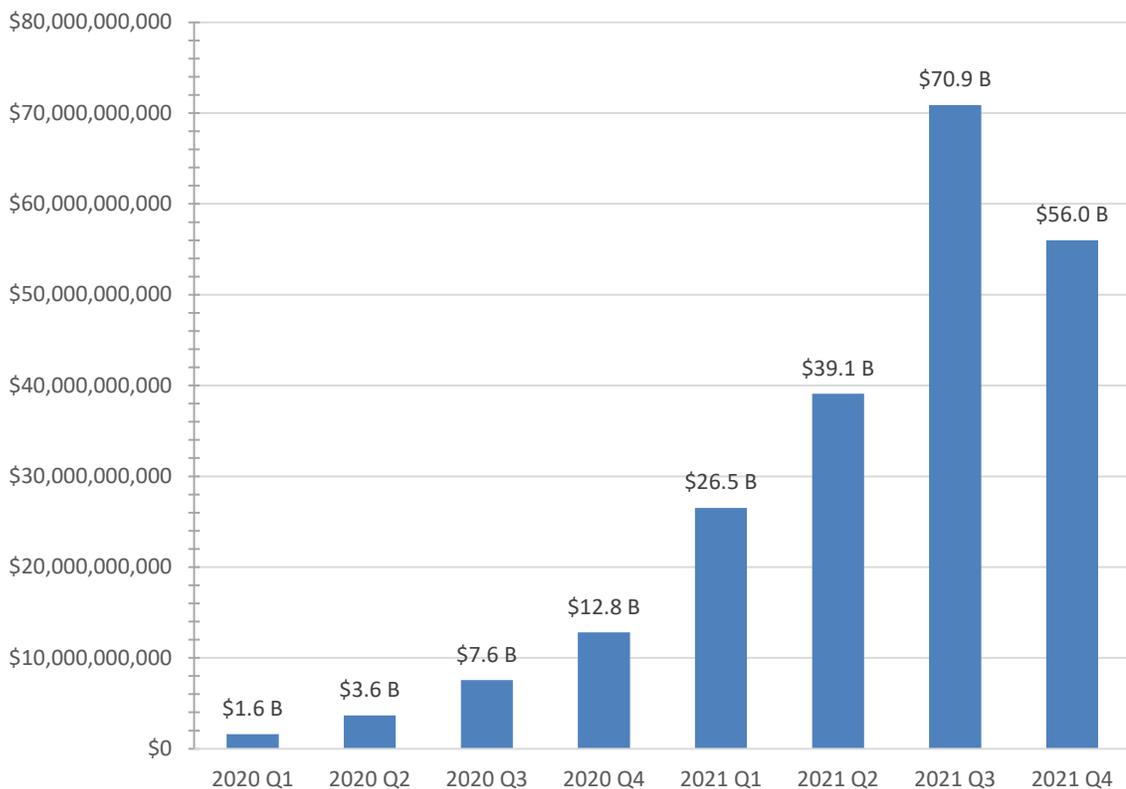
The vastly increased cost of bringing goods to the San Pedro Bay and exporting goods from the ports has caused and accelerated inflation in the United States and around the world. The International Monetary fund reported that the impact of shocks to global shipping costs has caused significant increases in import prices and core inflation.¹⁴

Tax Rate

“The shipping industry suffers from a moral hazard problem. The assurance that operators will be bailed out in combination with tax exemptions enables shipping firms to offload their risks to the public sector,” according to an analysis by OECD’s International Transport Forum.¹⁵

The effective tax rate for container shipping is currently around 19 percent and the average tax rate for terminal operators that are vertically integrated with shipping companies is 14 percent.¹⁶ This suggests that global shipping companies are able to retain 81 percent of their profits, and the terminal operating companies that they own are able to retain 86 percent of their profits.

Figure 7: Quarterly Profits of Shipping Companies



Source: Drewry Maritime Research.

The publicly-owned Ports of Long Beach and Los Angeles have been portals for massive private profits over the past two years, given the high profits and low taxes of shipping companies and terminal operators.

Port Revenue

The two ports levy slightly different charges on container terminal operators, but revenue received by the ports is based primarily on the volume of containers that move through the ports.

Port of Long Beach

The Port of Long Beach specifies the fees charged to vessels that use the port in a document titled, *Port of Long Beach - Tariff No. 4*,¹⁷ which is augmented by lease agreements with each terminal company.

Charges include dockage fees based on the length of vessels and the amount of time that they berth at a dock, and wharfage fees for the volume or weight of goods that move between vessels and the dock.

Dockage and wharfage fees are split between the port and the terminal company provided that the port's share reaches at least the guaranteed minimum annual compensation for each acre of land in the terminal. For example, the minimum amount that the Long Beach Container Terminal was required to pay for each acre in 2021 was \$270,000.

The Long Beach Container Terminal splits wharfage fees evenly with the port for the first 2,776,000 tons of cargo handled each year. After that breakpoint is reached the terminal company is able to keep three-quarters of wharfage fees, creating an incentive for the company to maximize cargo volume.

Importantly, the Port of Long Beach's wharfage fees for containers being exported are 27 percent less than for containers being imported. The wharfage fee for a 40-foot container being exported is \$238, whereas the fee for the same container being imported is \$327.

This fee structure supports U.S. manufacturers that export their products. This policy is a step in the right direction, however, since most exported containers are empty, this discount is primarily subsidizing outward movement of empty containers.

Port of Los Angeles

The Port of Los Angeles has a different version of *Tariff No. 4*,¹⁸ but unless a terminal has unexpectedly low container traffic, dockage and wharfage

The Port of Los Angeles provides incentives for increasing container traffic and for exporting empty containers.

fees are waived in favor of a fee for each 20-foot-equivalent (TEU) container that moves through a terminal.

The fee for each TEU decreases as the volume of TEUs increases. For example, in 2021, TraPac was obligated to pay a minimum of \$39,788,159 for the 226 acres and facilities in the terminal it is leasing. This represents a cost of \$44.86 for each of the first 886,940 TEU containers moved through the terminal.

TraPac's fee dropped to \$25.50 for each of the next 212,940 TEU containers that it moved. After that, the fee dropped to \$18.36 for each TEU container. The high-volume fee is 59 percent less than the base fee.

Because the port's revenue increases as container volume increases, the port's revenue interests align with the terminal operators' business interest in maximizing revenue from container traffic while also reducing the average cost per container.

The TEU charge is discounted more if a container is empty. For example, the lease with TraPac anticipates that 20 percent of the containers will be empty. If more containers are empty, the fee for the additional empty containers drops to \$9.33 per TEU.

Given that almost all empty containers are being exported rather than imported, the incentive created by this friendly treatment of empty containers is a disservice to California companies that need to have their goods fill containers that often are exported to other countries with nothing in them except California air. This incentive also undermines the national need to improve the U.S. balance of trade.

Summary

The San Pedro Bay ports are public infrastructure mandated to provide economic and environmental benefits for Californians. In recent times the American factories that were supported by the ports have closed and been replaced by warehouses and trucking companies that often pay low wages. Longshore jobs on the docks are the most tangible remaining economic benefit for the host communities of San Pedro, Wilmington and Long Beach.

The San Pedro Bay ports dominate West Coast cargo movement. In 2021, 64 percent of West Coast cargo moved through the two ports.

Hours of work at the San Pedro Bay Ports increased only 87 percent as much as revenue tonnage increased, compared to an increase of 127 percent at other West Coast ports. One of the likely causes for this lag is that automated cargo-handling equipment reduced the number of jobs.

Foreign shipping companies that are part of shipping alliances control 83 percent of all global container movement and own 9 of the 11 container terminals at the two ports. These terminals handled 81 percent of the containers transported through the ports in 2021.

The global shipping industry reported profits of over \$190 billion in 2021. The vastly increased cost of bringing goods to the San Pedro Bay and exporting goods from the ports has caused and accelerated inflation in the United States and around the world.

Port revenue is based primarily on the volume of containers that move through the ports. The fee for each container moved through terminals decreases as the volume of containers increases. The ports' revenue interests meld with the terminal operators' business interest in maximizing revenue from container traffic while also reducing the average cost per container.

Importantly, the Port of Long Beach's wharfage fees for containers being exported are 27 percent less than for containers being imported. This fee structure supports U.S. manufacturers that export their products. However, as it stands now, most exported containers are empty, so while it is a step in the right direction, this discount is primarily subsidizing outward movement of empty containers.

The Port of Los Angeles discounts its fees if containers are empty. Given that almost all empty containers are being exported rather than imported, this is a disservice to California companies that need to have their goods fill those containers, and it undermines the national need to improve the U.S. balance of trade.



*Photo credit:
Fernando Casillas*

4. Balance of Trade

Exports vs Imports

The value of exports sent out by ship peaked in 2011 at the Port of Long Beach and in 2013 at the Port of Los Angeles. There was growth in exports from 2004 until the Great Recession between 2007 and 2009, then recovery and more growth until exports peaked and then began declining as a result of off-shored manufacturing.

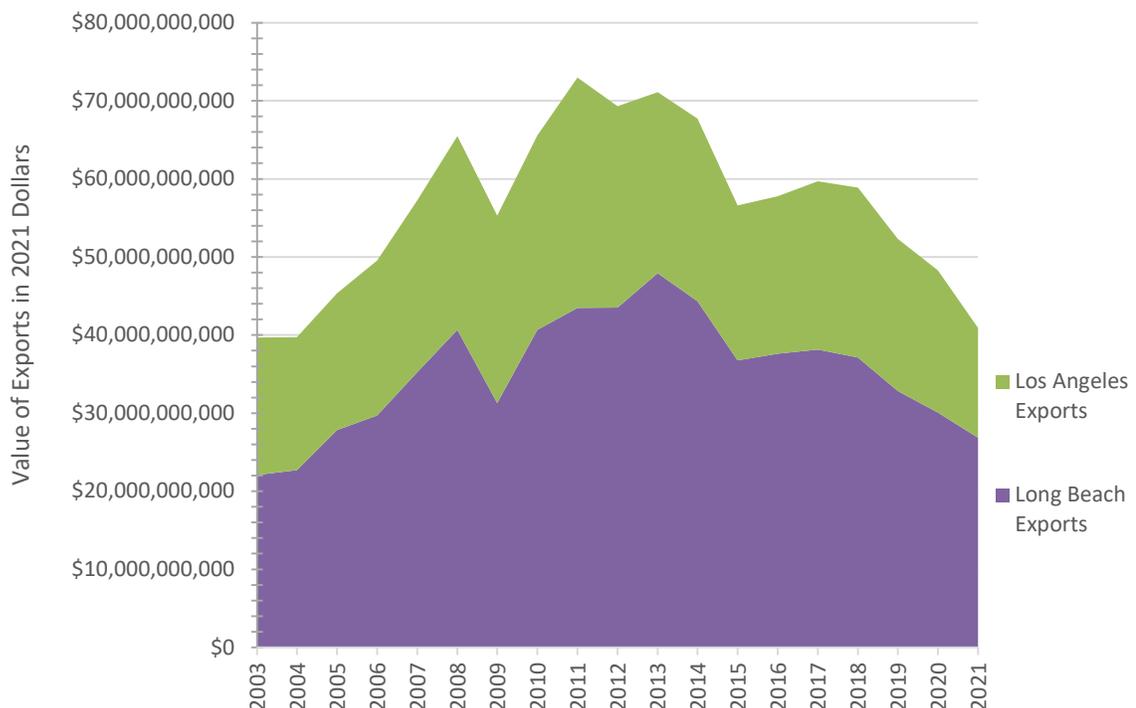
Exports declined 38% in Long Beach and 52% in Los Angeles.

By 2021, the value of exports from Long Beach declined 38 percent and the value from Los Angeles had declined 52 percent (*Figure 8*). The connection between the ports and California's goods-producing industries has steadily diminished over the past decade. Goods-producing industries include agriculture, forestry, mining, and manufacturing.

This decline in exports represents loss of jobs for California residents in these industry sectors. The productive work that has been displaced from California is being done in other countries and the ports are the gateway for sending displaced production back to California.

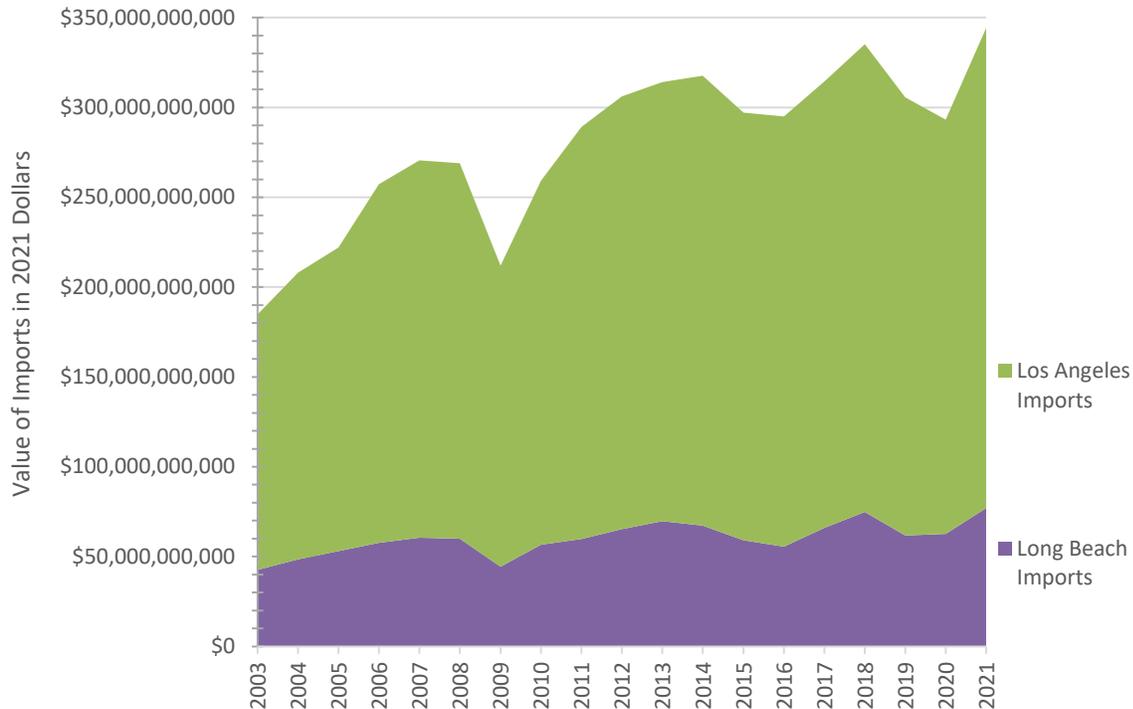
The growth in imports is another indicator of work done in other countries to produce the goods used in the American economy. The value of imports through the San Pedro Bay (in constant dollars) grew 20 percent from 2003 to 2021 (*Figure 9*). This combines the 20 percent increase in the Port of Long Beach with the 22 percent increase in the Port of Los Angeles.

Figure 8: Annual Value of Exports from the Ports of Long Beach and Los Angeles



Source: U.S. Census Bureau, Economic Indicators Division.

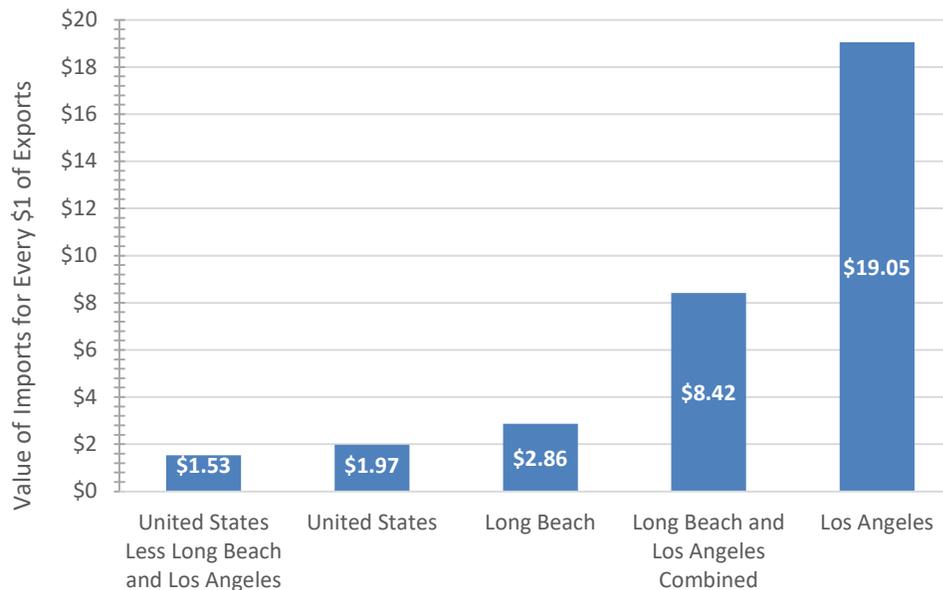
Figure 9: Annual Value of Imports through the Ports of Long Beach and Los Angeles



Source: U.S. Census Bureau, Economic Indicators Division.

The Ports of Long Beach and Los Angeles import \$8.42 worth of goods for every \$1.00 worth of goods that they export (Figure 10). Much of this imbalance occurs at the Port of Los Angeles, where there are \$19.05 of imports for every \$1.00 of exports, compared to \$2.86 of imports for \$1.00 of exports at the Port of Long Beach.

Figure 10: Value of Imports by Sea for Every \$1.00 Exported by Sea in 2021



Source: U.S. Census Bureau, Economic Indicators Division.

For the entire United States, there are \$1.97 in imports for every \$1.00 of exports. When Long Beach and Los Angeles are removed, the trade balance for the rest of the nation's seaports is \$1.53 of imports for every \$1.00 of exports.

The trade imbalance is more than five times worse at the Ports of Long Beach and Los Angeles than in the rest of the nation. The ports are underperforming the rest of the United States as transportation gateways for domestic goods-producing industries.

Empty Containers

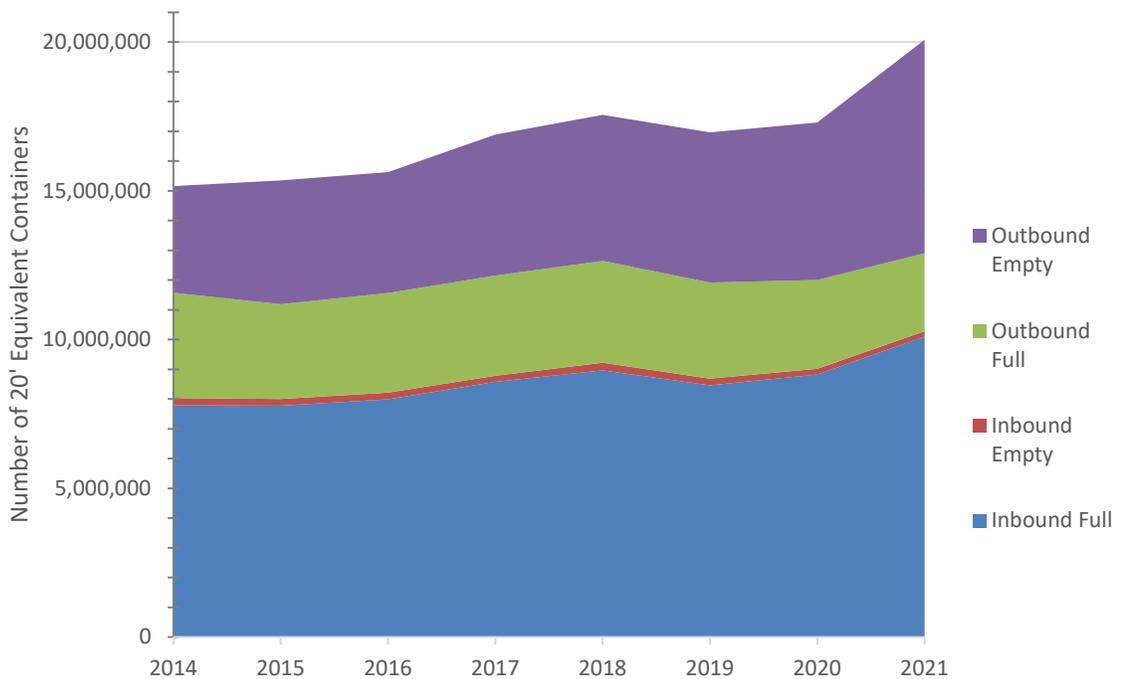
72% of outbound containers were empty in 2021.

In 2021, 72 percent of the outbound containers from the combined Ports of Long Beach and Los Angeles and Long Beach were empty (*Figure 11.*) This shrinkage of exports is in stark contrast to fully loaded incoming containers. Ninety-eight percent of inbound containers were full and only two-percent were empty.

Comparing the two ports, 69 percent of outbound containers from Long Beach were empty and 77 percent of from Los Angeles were empty. The financial incentive for exports provided by the Port of Long Beach may account for the larger share of loaded containers that it sends out.

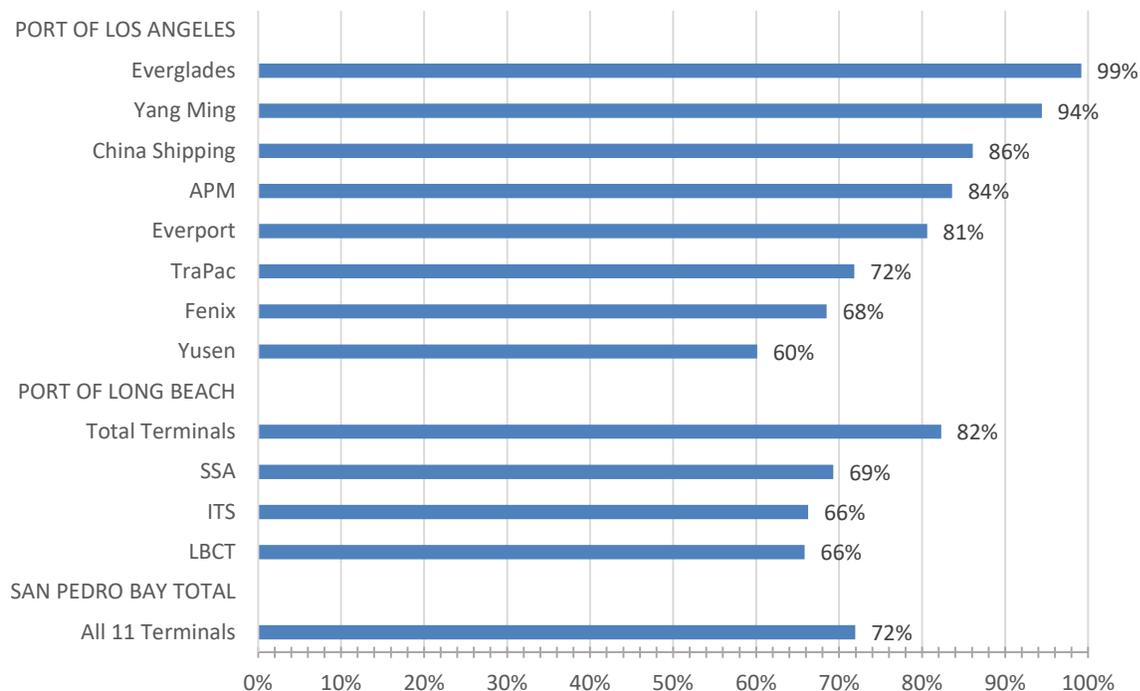
None of the terminals have a strong export presence, however there is variation in the share of empty containers that they send out. The share of

Figure 11: Ports of Long Beach and Los Angeles TEU Containers by Direction and Load Status



Source: Ports of Long Beach and Los Angeles.

Figure 12: Percent of Outbound Containers from each Terminal that were Empty in 2021



Source: Ports of Long Beach and Los Angeles.

empty outbound containers ranges from 60 percent at the Yusen terminal in the Port of Los Angeles to 99 percent at the Everglades terminal, also at the Port of Los Angeles (*Figure 12*).

Everglades operates out of the West Basin Container Terminal at the Port of Los Angeles. Its largest customer is Mediterranean Shipping Company,¹⁹ which is the world’s largest shipping company.

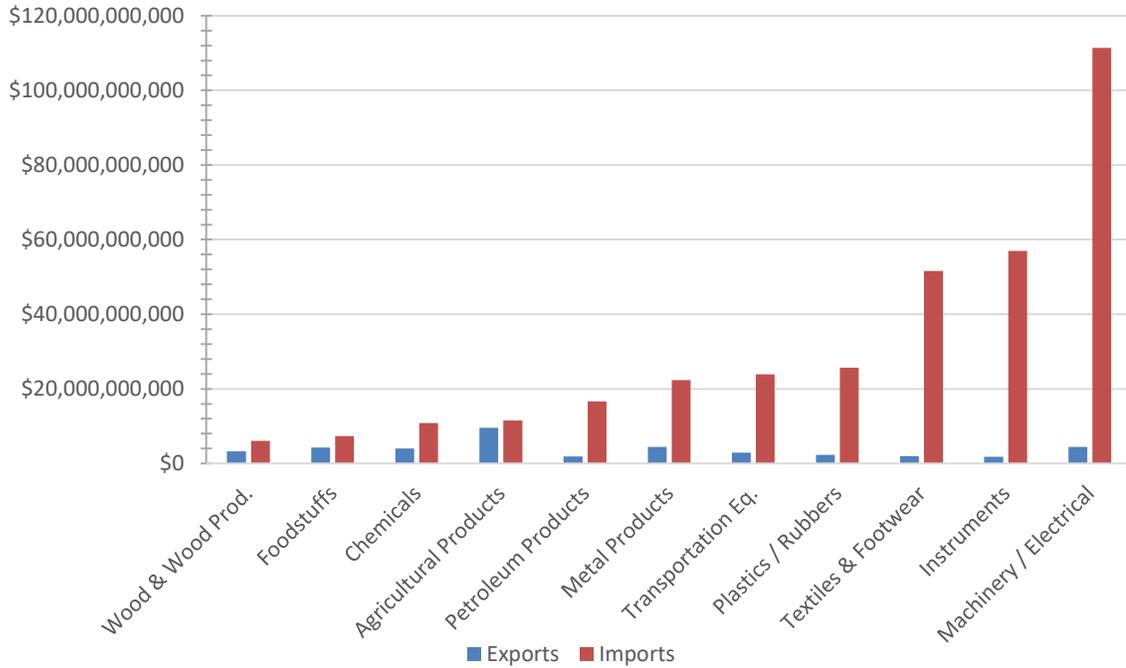
Imports and Exports in Manufacturing Sectors

Imports are much larger than exports in the San Pedro Bay Ports in high-value-added industries that provide good blue-collar jobs, as shown in *Figure 13*. Exports are almost at parity with imports in basic resource industries, including *wood, foodstuffs* and *agricultural products*. However, there is an extremely wide spread in high-value manufactured goods.

The value of imports is 25 times greater than the value of exports for *industrial machinery* and *electrical equipment*, and 32 times greater for *instruments*.

Imports are much larger than exports in high-value-added industries that provide good blue-collar jobs.

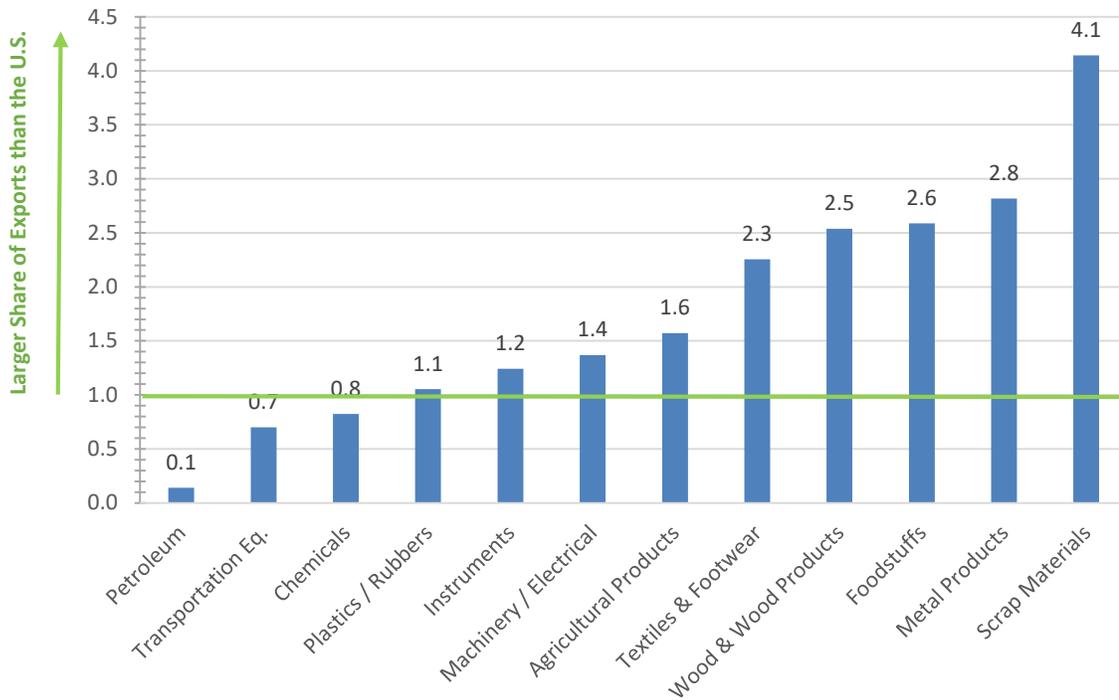
Figure 13: Value of Imports and Exports at the Ports of Los Angeles and Long Beach in 2021



Source: U.S. Census Bureau, Economic Indicators Division.

Despite the trade imbalance in manufactured goods, California and the Los Angeles region still have significant manufacturing strengths both because of the large domestic market and because of specialized technology niches.

Figure 14: Concentration of Commodities Exported by the San Pedro Bay Ports Compared to All United States Ports (Location Quotient) in 2021



Source: U.S. Census Bureau, Economic Indicators Division.

One way of identifying export strengths is to compare the concentration of different commodities in exports from the San Pedro Bay Ports to the concentration of the same commodities in total U.S. exports. This ratio is called a *location quotient* and is shown in *Figure 14*. Location quotients greater than one indicate an above-average concentration of exported commodities and possible areas of competitive strength.

Scrap material sent to other countries for recycling accounts for a share of exports from the San Pedro Bay Ports that is more than 4 times greater the share from all U.S. ports. This is not a strength to build on.

Strengths of the San Pedro Bay Ports compared to the overall U.S. export profile are in *metal products, machinery, electrical equipment, and instruments*. These high-value durable-manufacturing industries provide good jobs.

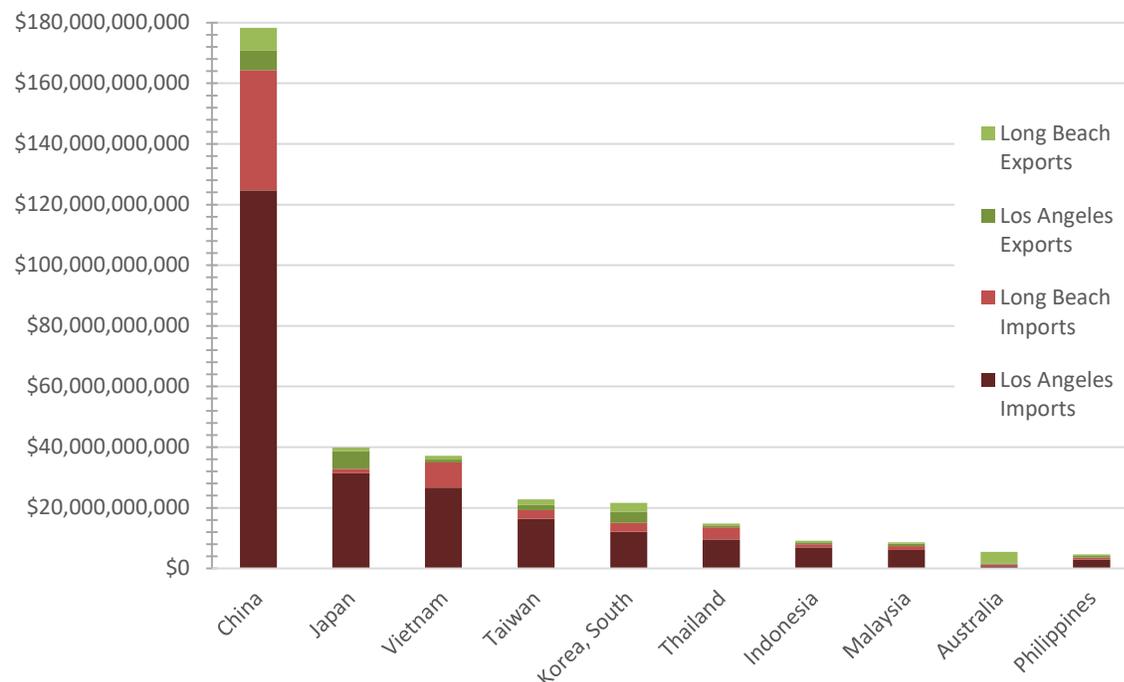
The ports have export opportunities in metal products, machinery, electrical equipment, and instruments.

Trade Partners

There is a positive trade balance in the flow of goods between the San Pedro Bay Ports and Australia. However, this trade accounted for only one percent of the value of goods moving through the ports in 2021. The ports had an export deficit with the other nine largest trade partners (*Figure 15*).

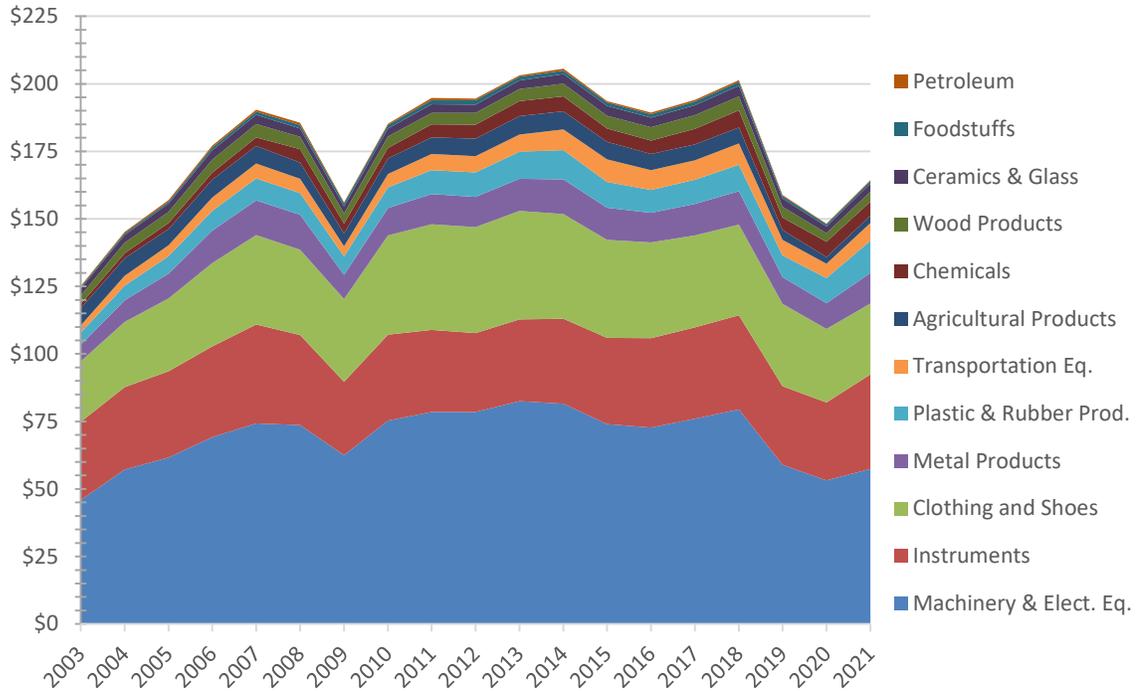
China shipped out 48 percent of the goods imported through the San Pedro Bay Ports in 2021, and was the buyer of 26 percent of the goods exported from the ports. Altogether, trade with China accounted for 45 of

Figure 15: 10 Largest San Pedro Bay Trade Partners in 2021



Source: U.S. Census Bureau, Economic Indicators Division.

Figure 16: Value of San Pedro Bay Imports from China in Billions of 2021 Dollars



Source: U.S. Census Bureau, Economic Indicators Division.

China sends \$12 of goods to the San Pedro Bay Ports for every \$1 of U.S. exports that they receive.

the goods that passed through the ports. China is by far the largest trading partner with the ports, with 12 times greater imports than exports.

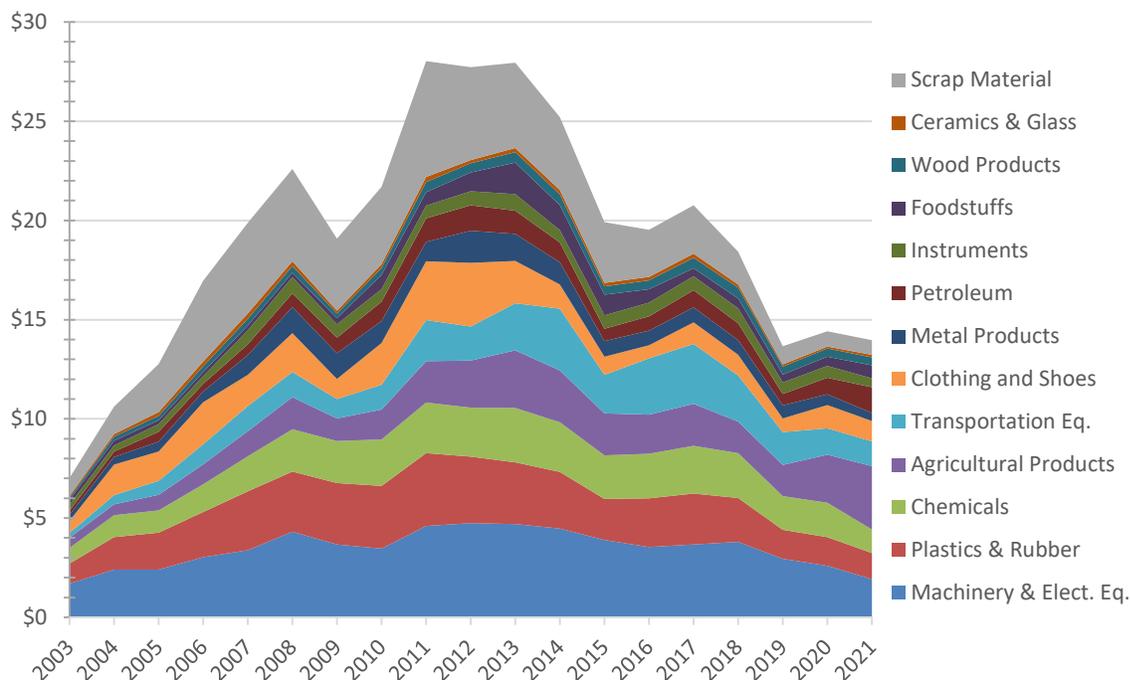
China has become a vast factory floor for producing the things that Americans buy. China sends \$12 of goods to the San Pedro Bay Ports for every \$1 of U.S. exports that they receive. The ratio of imports to exports is least adverse at the Port of Long Beach (\$5 to \$1), and most adverse at the Port of Los Angeles (\$20 to \$1).

The flow of goods from China into the San Pedro Bay Ports declined after 2018, when the U.S. tariffs on Chinese goods increased six-fold, covering 66 percent of U.S. imports from China.²⁰ However, imports increased in 2021 with more purchases of consumer goods during the Covid pandemic. *Figure 16* shows the value of imports from China unloaded in the San Pedro Bay Ports from 2003 to 2021, broken out by commodity sector.

Two durable-manufacturing commodity sectors have accounted for over half of imports from China to the San Pedro Bay Ports. *Machinery and electrical equipment* account for 39 percent of imports. This includes household appliances, industrial machines, construction equipment and batteries. *Instruments* account for another 18 percent of imports. This includes medical and optical equipment as well as a variety of consumer goods.

Exports to China through the Ports of Long Beach and Los Angeles declined 50 percent from 2011 to 2021 (*Figure 17*). Exports of *machinery*

Figure 17: Value of San Pedro Bay Exports to China in Billions of 2021 Dollars



Source: U.S. Census Bureau, Economic Indicators Division.

and electrical equipment and metal products each declined 58 percent, and instruments declined 28 percent.

In 2011, scrap material accounted for 21 percent of the value, and 54 percent of the weight, of things sent from the ports to China. This includes wood, textile, plastic, metal, glass, and electrical scrap. However, in 2012, China began shifting from directly importing waste recycling material to importing recycled materials from third-party countries, primarily from Southeast Asia.²¹ As a result, by 2021, scrap exports to China declined 87 percent.

Agricultural products had the greatest export growth, increasing 52 percent over the decade from 2011 to 2021.

China’s state-driven trade policies blur state and corporate interests to the advantage of its firms but at the expense of its trade partners.²² The ports have been largely neutral in this trade conflict, with growing imported cargo offsetting declining exported cargo. This neutrality accommodates consumer needs but it is not responsive to the economic and employment needs of California residents.

Ports should be two-way gates – goods enter and they leave. But in the San Pedro Bay, foreign shippers kicked the gate until it broke – goods are coming in but not going out.

It is important for the ports to recognize that they can contribute to building things as well as moving things. This is likely to be just a light

It is important for the ports to recognize that they can contribute to building things as well as moving things.

thumb on the right side of the scale, but for some companies that will be a large enough margin of difference to make reshoring the right decision. The balance of trade will not be corrected overnight, but purposeful and judicious policies can help reduce the imbalance.

U.S. Trade Policies

The U.S. has adopted “super preferences” for domestic technology and activated the Defense Production Act to accelerate clean energy technologies.

Some shipping industry representatives assert that expediting the movement of imported cargo is a good and necessary business practice.²³ The fundamental questions are: Whose businesses is this good for? And, are those businesses located in the United States?

Port policies that maximize imports at the expense of California workers are out of alignment with national trade policies and industrial priorities.

The United States has established goals to triple domestic solar manufacturing capacity and is using the Defense Production Act to accelerate domestic production of clean energy technologies, including electric vehicles, batteries and clean-electricity generating equipment.²⁴

These industrial goals include “super preferences” for domestic content and call for strong labor standards, including project labor agreements and community benefits agreements that offer wages at or above the prevailing rate and include local hire provisions.²⁵

Policies of the San Pedro Bay Ports should be aligned with these national goals.

Summary

The value of exports shipped out peaked in 2011 at the Port of Long Beach and in 2013 at the Port of Los Angeles. Since then, exports have declined 38 percent from Long Beach and 52 percent from Los Angeles. The decline in exports represents a loss of jobs for California residents.

In 2011, scrap material accounted for 21 percent of the value, and 54 percent of the weight, of things sent from the ports to China. However, in 2012, China began shifting away from directly importing waste recycling material to importing recycled materials from third-party countries, primarily from Southeast Asia. By 2021, scrap exports to China declined 87 percent. This is one of the reasons for the increasing number of empty outbound containers.

The Ports of Long Beach and Los Angeles import \$8.42 worth of goods for every \$1.00 worth of goods that they export. This trade imbalance is more than five times worse at the Ports of Long Beach and Los Angeles than in the rest of the nation.

In 2021, 72 percent of the outbound containers from the combined Ports of Long Beach and Los Angeles and Long Beach were empty.

Imports are much larger than exports in the San Pedro Bay Ports for high-value-added industries that provide good blue-collar jobs. The value of imports is 25 times greater than the value of exports for industrial machinery and electrical equipment, and 32 times greater for instruments.

Despite the trade imbalance in manufactured goods, California and the Los Angeles region still have significant manufacturing strengths both because of the large domestic market and because of specialized technology niches.

China sent 48 percent of the goods that were imported through the San Pedro Bay Ports in 2021, and was the buyer of 26 percent of the goods exported from the ports. Because imports are much larger than exports and because China's share of exports is smaller than its share of imports, China winds up sending \$12 of goods to the San Pedro Bay Ports for every \$1 of exports that they receive.

Agricultural exports have grown, with exports to China increasing 52 percent over the decade from 2011 to 2021.

The San Pedro Bay Ports have been largely neutral in the U.S. trade conflict with China. Growing imported cargo has offset declining exported cargo and port revenue has increased. This neutrality accommodates consumer needs but it is not responsive to the economic and employment needs of California residents.

Ports should be two-way gates - goods enter and they leave. But in the San Pedro Bay, foreign shippers kicked the gate until it broke - goods are coming in but not going out.

The U.S. has adopted "super preferences" for domestic technology and activated the Defense Production Act to accelerate clean energy technologies. Policies of the San Pedro Bay Ports should be aligned with these national goals.

It is important for the ports to recognize that they can contribute to building things as well as moving things. This is likely to be just a light thumb on the right side of the scale, but for some companies that will be a large enough margin of difference to make reshoring the right decision. The balance of trade will not be corrected overnight, but purposeful and judicious policies can help reduce the imbalance.

Port neutrality in the trade war is not responsive to the economic and employment needs of California residents.



*Photo credit:
Tony Paiz*

5. Ports and the Economy

A Thumb on the Right Side of the Scale

Responsibility

The San Pedro Bay Ports cannot solve the trade imbalance by themselves but they do have relevant tools for taking action. This gives the ports the responsibility to search for what they plausibly can do to support California's industries and workers.

Sea ports are capital-intensive facilities that are owned and subsidized by the public. They are transfer points for billions of dollars in goods that touch the hands of most California residents, and they create wealth for the logistics industry. Basic standards of equity call for port-linked workers to be paid sustaining wages and for port-linked jobs to benefit as many California residents as possible.

Workers Linked to the Ports

California's *direct* port labor force that sets foot in the ports includes dockworkers, truck drivers, railroad workers, suppliers to the shipping industry, construction workers, and public employees.

California's *port-related* labor force produces goods exported through the ports and is concentrated in durable-manufacturing industries. The strongest candidates for export growth are high-skill, capital-intensive and technology-intensive industries where high labor costs for skilled workers are offset by high productivity, high quality and cutting-edge technology.

Tools

One of the main challenges for *port-related* industrial development is creation of value-added linkages with the regional economic tissue.²⁶ After building these linkages the ports can offer California exporters a modest nudge in the right direction through informed and responsive access to the logistics advantages offered by the San Pedro Bay Ports.

The ports can help industries take full advantage of the port-linked logistics hub.²⁷ This includes:

1. *Reduced transportation costs*: reducing travel distance and the cost to distribute goods.
2. *Reduced delivery times*: shorter times in transit make the supply chain more responsive to demand for faster, cheaper delivery.
3. *Fewer touch points*: reducing the number of gatekeepers and bottlenecks can create efficiency savings and reduce risk to operations.

The strongest candidates for export growth are high-skill, capital-intensive and technology-intensive industries.

4. *Single, integrated business hub*: the opportunity to integrate manufacturing, inventory rotation and intermodal distribution at a single location.
5. *Reduced environmental footprint*: shorter, more efficient port connections reduce emissions and make businesses more environmentally sustainable.

The cumulative impact of these advantages can be a thumb on the side of the scale that benefits California manufacturers, who deserve at least the same attentiveness and support that is provided to foreign manufacturers and shipping companies.

Outreach and attentiveness to durable-manufacturing industries with high export potential is required to make these locational advantages responsive to the needs of each industry. This requires reaching out to specific industries and listening to their needs rather than *laisse faire* export practices.

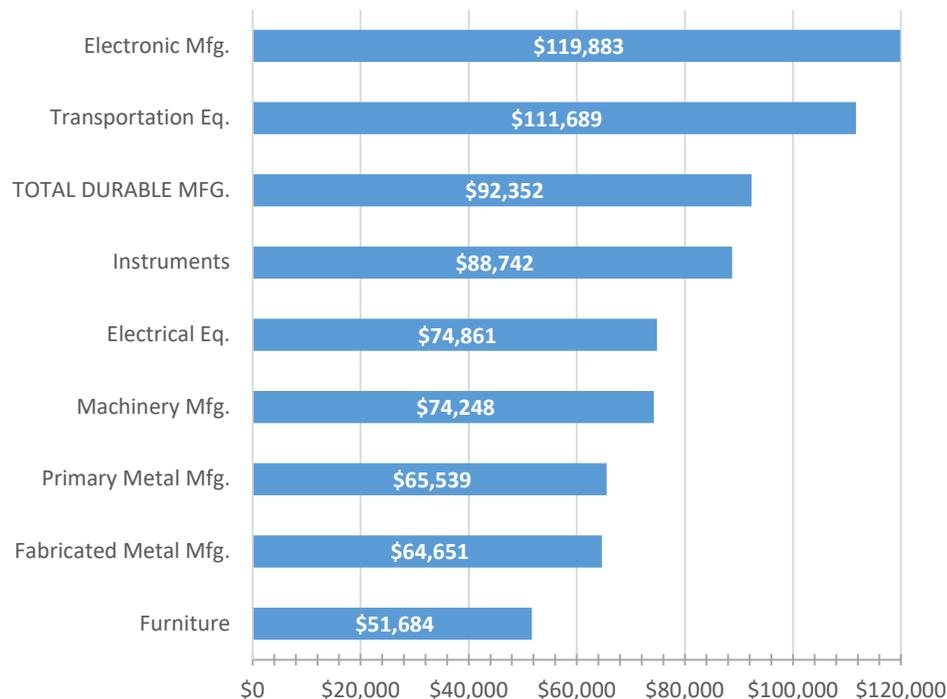
The ports can provide a light thumb on the side of the scale that benefits California manufacturers.

Durable-Manufacturing Industries

Wages

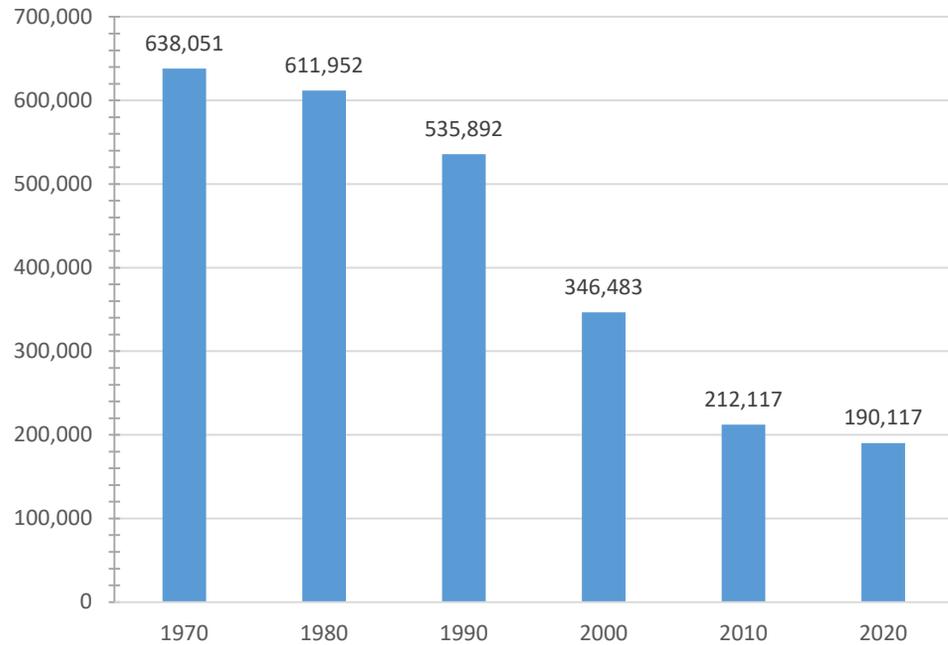
Durable-manufacturing jobs pay living wages. The average annual pay in Los Angeles County in 2021 was \$92,352. The low end of the range was \$51,684 in furniture manufacturing, a lower-skill industry. The high end

Figure 18: Annual Wages in Los Angeles County Durable-Manufacturing Industries, 2021



Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW).

Figure 19: Durable-Manufacturing Employment in Los Angeles County 1970-2020



Source: U.S. Census Bureau, *County Business Patterns* and California Employment Development Department, *Labor Market Information Division*.

was \$119,883 in electronic manufacturing, a higher-skill, more capital-intensive industry (*Figure 18*).

Industry Employment

Seventy percent of Los Angeles County’s durable-manufacturing jobs have been lost over the past 40 years, even though total employment grew 43 percent (*Figure 19*). This long-term decline is the result of the collapse of aerospace manufacturing in the early 1990s as well as ongoing offshoring of manufacturing, with much of this work now being done in China.

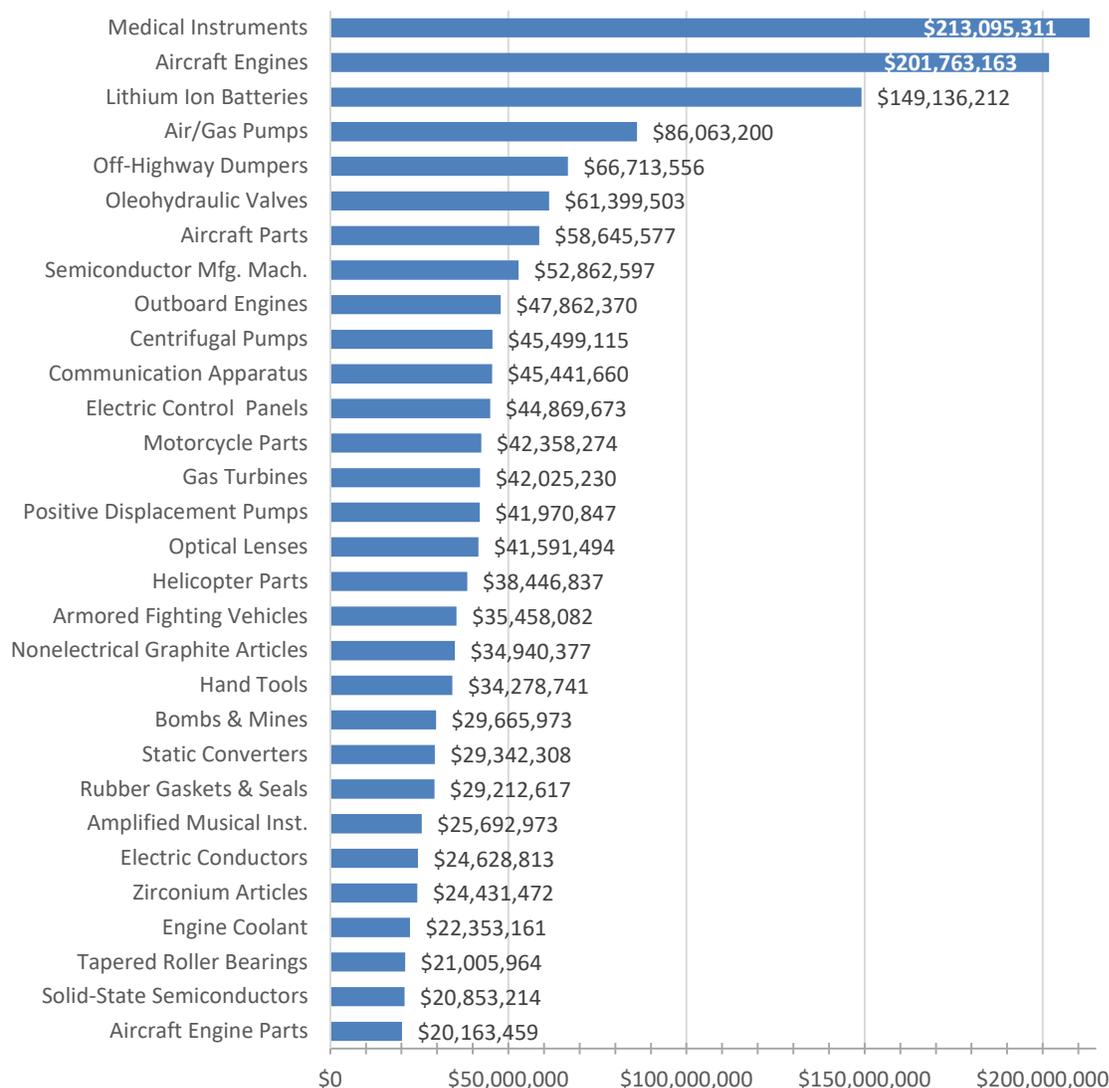
Supply chain disruptions that have made just-in-time manufacturing more vulnerable and tariffs from trade conflict with China are opening opportunities for reshoring critical manufacturing activities.

Export Industries

The Los Angeles region is home to many durable-manufacturing industries that export their products. The 30 durable-manufacturing industries with the *greatest value* in their exports by sea from the San Pedro Bay are shown in *Figure 20*. The value of these exports ranges from \$213 million for *medical instruments* to \$20 million for *aircraft engine parts*. Growth in these industries will create more well-paid jobs in the region.

Supply chain disruptions are opening opportunities for reshoring critical manufacturing.

Figure 20: 30 Durable Manufacturing Commodities with the Greatest Value Exported from the San Pedro Bay in 2021



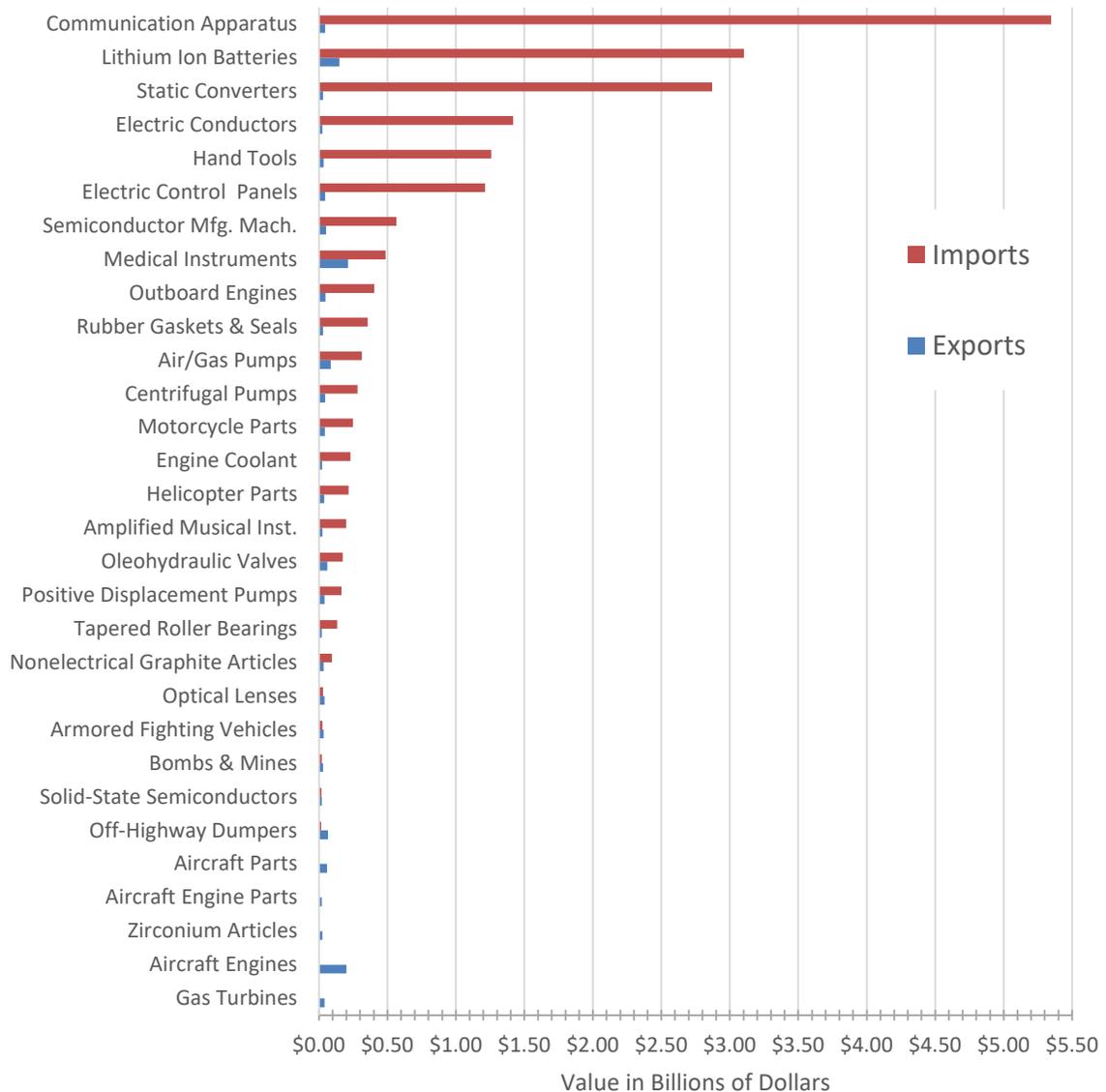
Source: U.S. Census Bureau, Economic Indicators Division.

The criteria used here to identify Los Angeles County durable-manufacturing industries with potential for export growth is that they should have at least \$20 million in annual exports and they should export high-value goods worth at least \$18,000 a ton, compared to the average value of \$1,109 for all exports from the ports. This includes commodities ranging from \$18,193 for *centrifugal pumps* to \$937,078 per ton for *solid-state semiconductors*.

Imports are 12 times as large as exports in the Los Angeles region’s high-value manufacturing industries. There is extensive room for *import substitution* in meeting the needs of the market served by the Ports of Long Beach and Los Angeles for durable manufactured products.

The value of both imports and exports through the San Pedro Bay of the 30 durable manufactured commodities here is shown in *Figure 21*. Even

Figure 21: Value of Durable Manufacturing Commodities Imported and Exporting through the San Pedro Bay in 2021



Source: Source: U.S. Census Bureau, Economic Indicators Division.

though California still has a foothold in manufacturing these products, imports are swamping domestically produced goods. This can change. As these industries expand in the export market they will be better positioned to displace imported products with their own products in the American market, also known as import substitution.

In 2021, \$5.3 billion of *machines for the reception, conversion and transmission or regeneration of voice, images or other data, including switching and routing apparatus* was imported (shown in graph as *Communication Apparatus*). This is the equipment used by for the telephone and internet networks, which is critical national infrastructure.

There was \$3.1 billion in imports of *lithium ion batteries*, which are crucial for clean energy and energy independence.

Helping these industries build export strength will also contribute to the resilience and security of critical national infrastructure.

Regional Market

The anchor for imports to the San Pedro Bay is the large local consumer market that buys over one-third (35 percent) of imports.²⁸ The size of the market served by the ports has led to publicly funded, incremental expansion and improvement of port facilities as well as the inland logistics infrastructure for moving goods. The scale of this infrastructure and the size of the local market give the ports first-mover-advantage and resilience as a shipping hub.

Much port cargo comes through major shipping lanes that have been custom built by shipping alliances to connect Asian manufacturers with California consumers. However, the San Pedro Bay Ports were established before the shipping alliances were formed and have independent standing.

Shipping has contributed to hyper-globalization through low-cost cargo movement. Within this framework more cargo volume, lower shipping costs and larger vessels are always considered to be better. The negative externalities from this model are offloaded to the public.

Ports can move outside of this *public funding of foreign profit* paradigm by supporting growth of regional production capabilities to meet the needs provided by imports. Outside of the vast shipping lanes created by the very large shipping companies, there are opportunities for new trade relationships.²⁹

Land-based Costs of Shipping

The inland truck transportation network that moves containers from the ports creates multiple negative impacts and public costs while also providing consumer goods for the region.



Photo credit: Los Angeles Public Library, horses from Argentina arrive at Port of Los Angeles, 1940



Image credit: Los Angeles Public Library, plan for the Gerald Desmond Bridge, 1964

There were \$279 million in uncompensated public costs in 2021 from trucks carrying imported containers out of the San Pedro Bay Ports.

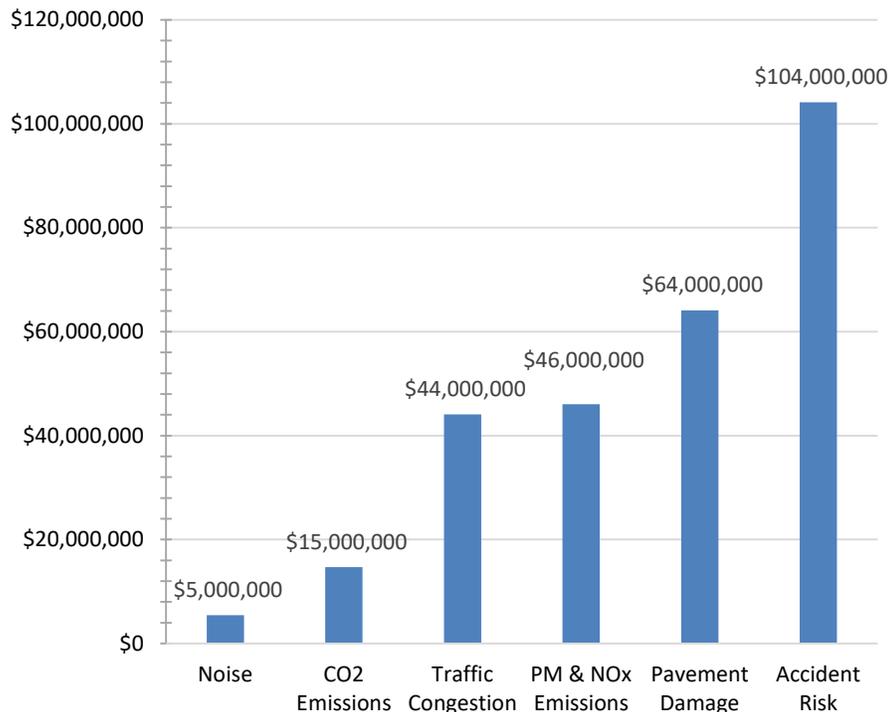
An estimated 70.5 percent of containers are transported out of the ports on trucks. The remaining 29.5 percent leave by rail.³⁰ This represents roughly 3,624,000 truck trips out of the ports in 2021.³¹ The average distance from the San Pedro Bay Ports to a warehouse in the Inland Empire is 49.4 miles.³² This represents an estimated 179 million truck miles for imported containers leaving the ports in 2021.

The U.S. Congressional Budget Office has produced estimates of the costs to the public that are not covered by taxes or fees based on ton-miles of truck travel.³³ For example, a 74,000 pound truck carrying a container traveling one mile represents 37 ton-miles.³⁴ The estimated uncompensated public costs per ton-mile are:

- Pavement Damage \$0.0096
- Traffic Congestion \$0.0066
- Accident Risk \$0.0156
- PM & NOx Emissions \$0.0069
- CO₂ Emissions \$0.0022
- Noise (cost per mile) \$0.0304

There was an estimated \$279 million in uncompensated public costs in 2021 from 6.7 billion ton miles travelled by trucks leaving the San Pedro Bay Ports carrying imported containers (Figure 22). Significant costs to local

Figure 22: Uncompensated Public Costs from Imported Containers Leaving the San Pedro Bay on Trucks in 2021



Source: Congressional Budget Office; U.S. Census Bureau, Economic Indicators Division; Economic Roundtable.

cities and residents include: pavement damage, traffic congestion, risk of accidents, noxious emissions, and noise.

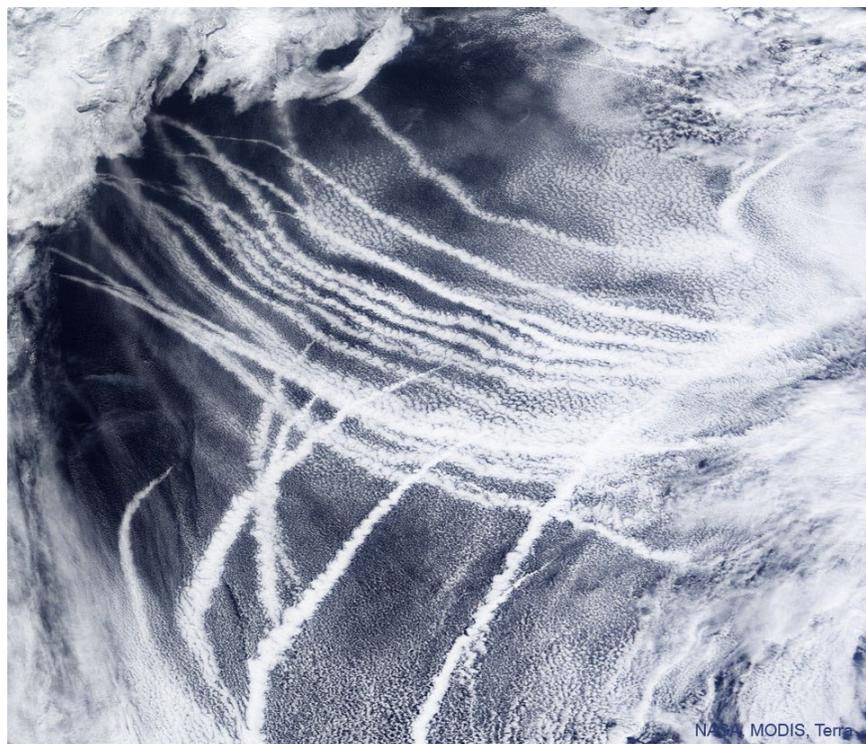
The 2018 environmental impact report for the China Shipping Container Terminal Project in the Port of Los Angeles identified negative impacts on port communities that include:³⁵

1. Emissions of criteria pollutants, specifically, emissions of CO, NO_x, PM₁₀, and VOCs that exceed South Coast Air Quality Management District criteria.
2. Significant cancer risk impacts for residents, workers and sensitive individuals. The maximum predicted health impacts for individual cancer risk, chronic noncancer hazard risk, and acute noncancer risk, including risks faced by infants and children who have greater sensitivity to toxic substances and carcinogens, are in San Pedro, on Knoll Hill, west of Front Street.
3. A significant and unavoidable impact relative to greenhouse gas emissions and climate change.
4. Significant impacts on traffic delay. The traffic setting for terminal-related traffic is the network of regional transportation infrastructure, including more than 3,520 miles of freeways and over 18,650 miles of major, primary, and secondary arterials.

The South Coast Air Quality Management District has found that the ports of Los Angeles and Long Beach are the largest fixed source of air pollution in Southern California. The ports are responsible for more than 100 tons per day of nitrogen oxides — more than the daily emissions from all 6 million cars in the region.³⁶

Container vessels burn molasses-thick bunker fuel made from the dregs of refined petroleum products. Ships release about 1 billion metric tons of carbon dioxide into the atmosphere each year, streaking the ocean sky with tracking clouds. Emissions from ship engines increased five-percent in 2021.³⁷

*Image credit: NASA, Terra, MODIS
Ship track clouds from engine exhaust over the Pacific Ocean, 2009*



The San Pedro Bay Ports are transporting goods that American residents want; however, there are significant public costs that shippers do not pay. The challenge for the ports is to ensure that transportation logistics create as much benefit as possible and as little loss as possible for California residents.

The ports can increase the benefits they provide for California residents by becoming stronger economic allies for California industries and workers rather than turntables for foreign supply chains, production networks and shipping companies.

Summary

Sea ports are capital-intensive facilities that are owned and subsidized by the public. Basic standards of equity call for the *direct-port labor force* to be paid sustaining wages and for *port-related* jobs to benefit as many California residents as possible.

The strongest candidates for export growth are high-skill, capital-intensive and technology-intensive industries where high labor costs for skilled workers are offset by high productivity, high quality and cutting-edge technology.

The help that ports can offer to California exporters represent a nudge in the right direction through informed and responsive access to the logistics advantages offered by the San Pedro Bay Ports. This requires the ports to reach out to specific industries and listen to their needs rather than *laisse faire* export practices.

Supply chain disruptions that make just-in-time manufacturing more vulnerable and tariffs from trade conflict with China are opening opportunities for reshoring critical manufacturing activities.

Imports are 12 times as large as exports in the Los Angeles region's high-value manufacturing industries. There is extensive room for *import substitution*. Helping these industries build export strength will also contribute to the resilience and security of critical national infrastructure.

The anchor that draws imports to the San Pedro Bay is the large local consumer market that buys over one-third (35 percent) of imports. The scale of the Los Angeles region's goods movement infrastructure and the size of the local market give the ports first-mover-advantage and resilience as a shipping hub.

Much port cargo comes through major shipping lanes that have been custom built by shipping alliances to connect Asian manufacturers with North American consumers. Within this framework more cargo volume, lower shipping costs and larger vessels are always considered to be better. The negative costs from this model are offloaded to society.

There were an estimated \$279 million in uncompensated public costs in 2021 from 6.7 billion ton miles travelled by trucks leaving the San Pedro Bay Ports carrying imported containers.

In addition, negative impacts on port communities include emissions of harmful criteria pollutants and significant cancer risks.

The San Pedro Bay Ports are transporting goods that American residents want, however there are significant public costs that shippers did not pay. The challenge for the ports is to ensure that transportation logistics create as much benefit as possible and as little loss as possible for California residents.

The ports can increase the benefits they provide for California residents by becoming stronger economic allies for California industries and workers rather than turntables for foreign supply chains, production networks and shipping companies.



*Photo credit: TraPac,
Economic Roundtable*

6. Automation

Introduction

Port automation means human workers are replaced by machines that operate autonomously. Because cargo containers come in standardized sizes, it is technically feasible to carry out many loading and unloading processes with automated cargo handling equipment.

Four percent of global container terminal capacity is automated.³⁸ This includes Long Beach Container Terminal (LBCT) at the Port of Long Beach and Trans Pacific Container Service Corporation (TraPac) at the Port of Los Angeles.

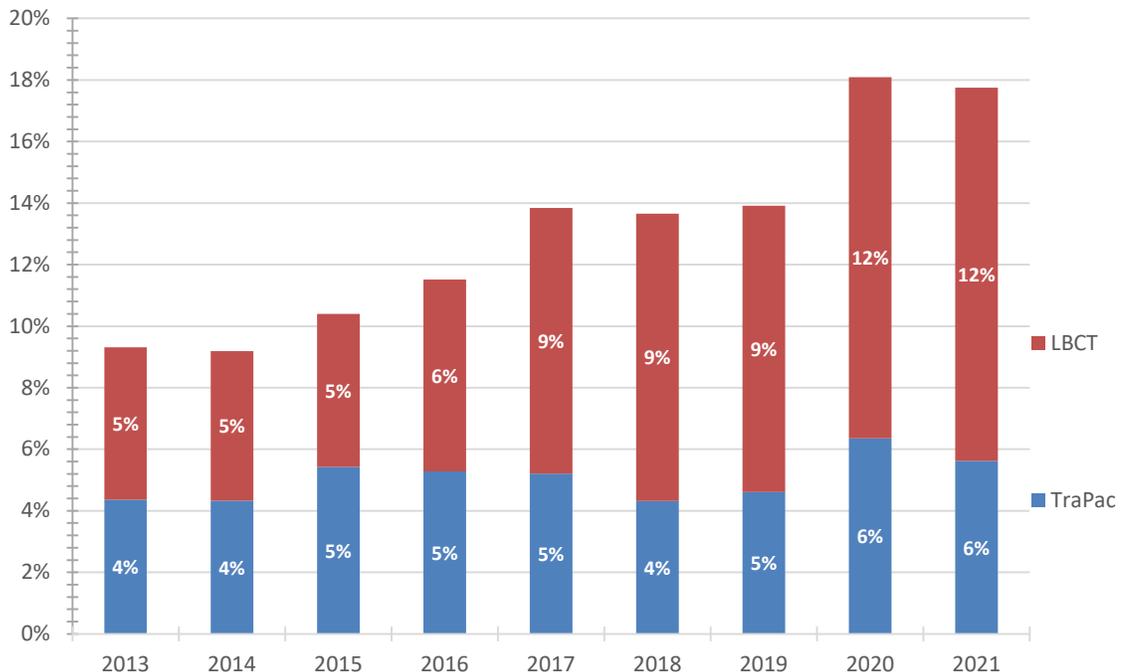
TraPac automated container stacking operations in its yard using automated straddle carriers. These pick up and carry containers while straddling their load and are capable of stacking containers up to several levels high.

LBCT installed automated ship-to-shore cranes, automated guided vehicles that transport containers between the docks and the yard, and automated stacking cranes in the terminal yard.

Some terminal operators advocate for automation as a method for increasing port efficiency. This issue is important for port communities because automation reduces the number of jobs on the docks and the economic benefits that port cities receive from port operations.

Data showing cargo movement and employment at LBCT and TraPac beginning in 2013, before they automated, and continuing through 2021,

Figure 23: Percent of Total San Pedro Bay Containers (TEUs) Handled by LBCT and TraPac



Source: Ports of Long Beach and Los Angeles.

after they automated, provides a case study of automation's impact on employment. In addition, studies of automation in the United States and abroad show outcomes of automation on terminal efficiency.

Share of Containers Handled by Automated Terminals

The number of jobs on the docks fluctuates with the business cycle, as cargo volume increases or decreases in response to changes in the amount of consumer goods that are purchased. Consumers buy less during recessions and more during economic upswings when earnings and confidence increase. These economy-driven fluctuations in cargo volume at West Coast and San Pedro are shown in earlier charts.

Within these fluctuations in cargo volume, the first evidence about the effect of automation on the number of dock work jobs can be seen in the share of total container volume that moves through automated terminals.

The share of San Pedro Bay containers that are handled by the two automated terminals, LBCT and TraPac, has doubled since they were automated, as shown in *Figure 23*. In 2013 and 2014, nine percent of 20-foot equivalent containers moved through these two terminals. In 2020 and 2021, their combined share of container traffic moving through the San Pedro Bay doubled to 18 percent. This increase was largely the result of diverting cargo from other terminals.

The share of containers from the two ports that TraPac handles has increased 50 percent, from four percent to six percent of total containers. The share that LBCT handles has increased 240 percent, from 5 percent to 12 percent.

A caveat about the increase at LBCT is that as part of the redevelopment project in which it became automated, two older facilities with a combined area of 294 acres were consolidated and 51 additional acres was created by filling in part of the bay, increasing the size of the terminal to 345 acres.³⁹ Part of the increase in container volume at LBCT can be attributed to the increase in the size of the terminal.

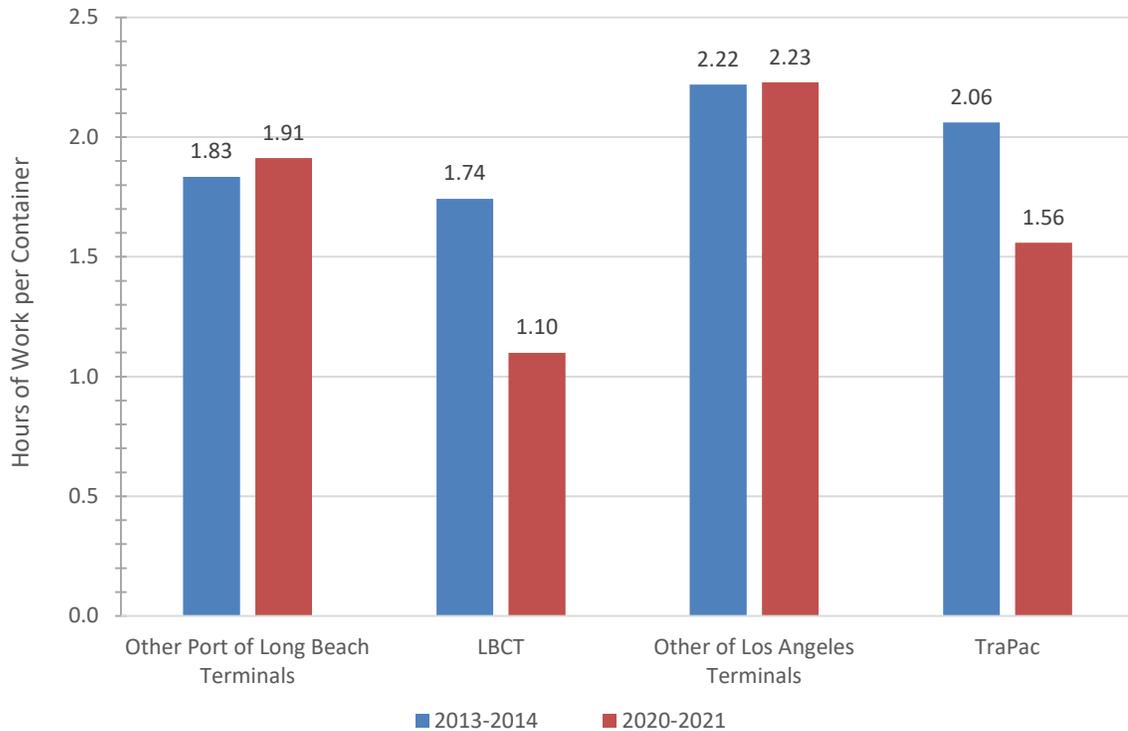
Amount of Work Moving Each Container

The amount of time that dockworkers are employed to move each container is a way of gauging the impact of automation on employment. This ratio of work-to-containers is a reliable benchmark throughout all phases of the business cycle and fluctuations in cargo volume. It also serves as a reliable metric for LBCT before and after it was reconfigured.

Because a similar amount of work is required to move a container, regardless of its size, we used the count of containers rather than the TEU

The share of containers handled by automated terminals has doubled.

Figure 24: Hours of Dockwork per Container (all sizes)



Source: Ports of Long Beach and Los Angeles and the Pacific Maritime Association.

statistic to compute the pre- and post-automation ratio of work-to-containers shown in *Figure 24*.

LBCT

Before automation, in 2013 to 2014, a total of 1.74 hours of longshore work went into moving a container through the terminal. This includes unloading an imported container from a ship, stacking it in the yard until it is ready to be picked up, and then moving it onto a truck or rail car. If the container is being exported, the same steps are involved, but in reverse.

After automation, in 2020 to 2021, a total of 1.10 hours of longshore work was required to move a container through the terminal. Based on a pre-post-automation comparison at LBCT, there was a 37 percent decrease in the amount of work required to move a container.

An alternative approach for assessing the impact of automation on employment at LBCT is to compare its post-automation labor requirements for moving a container in 2020 to 2021 to the labor requirements in the same time period for other terminals at the Port of Long Beach that are not automated.

In 2020 to 2021, the unautomated terminals at the Port of Long Beach required 1.91 of longshore labor to move a container, compared to 1.10

Automation reduced dockwork employment at LBCT by 37 to 42 percent.

hours at LBCT. LBCT used 42 percent fewer worker per container than the unautomated terminals at the port.

Based on these two alternative approaches for calculating change in hours of work per container, automation reduced longshore employment at LBCT by 37 to 42 percent.

TraPac

Two of TraPac's four berths for ships are automated and the other two are operated manually. Anecdotal reports indicate that the automated berths are used first, and the unautomated berths are used if there are additional ships to unload. This means that pre- and post-automation data for TraPac is comparing labor requirements before any of the berths were automated to labor requirements after half of the berths were automated, with the automated berths being used more than the unautomated berths.

Before automation, in 2013 to 2014, a total of 2.06 hours of longshore work went into moving a container through the terminal. After automation, in 2020 to 2021, a total of 1.56 hours of longshore work was required to move a container through the terminal.

Based on this pre- post-automation comparison at the TraPac terminal, there was a 24 percent decrease in the amount of work required to move a container through the terminal after it was automated.

An alternative approach for assessing the impact of automation on employment at TraPac is to compare its post-automation labor requirements to the labor requirements of other terminals at the Port of Los Angeles that are not automated.

In 2020 to 2021, the unautomated terminals at the Port of Los Angeles required 2.23 of longshore labor to move a container, compared to 1.56 hours at TraPac. TraPac provided 30 percent less employment per container than the unautomated terminals at the port.

Based on these two alternative approaches, automation reduced longshore employment at TraPac by 24 to 30 percent.

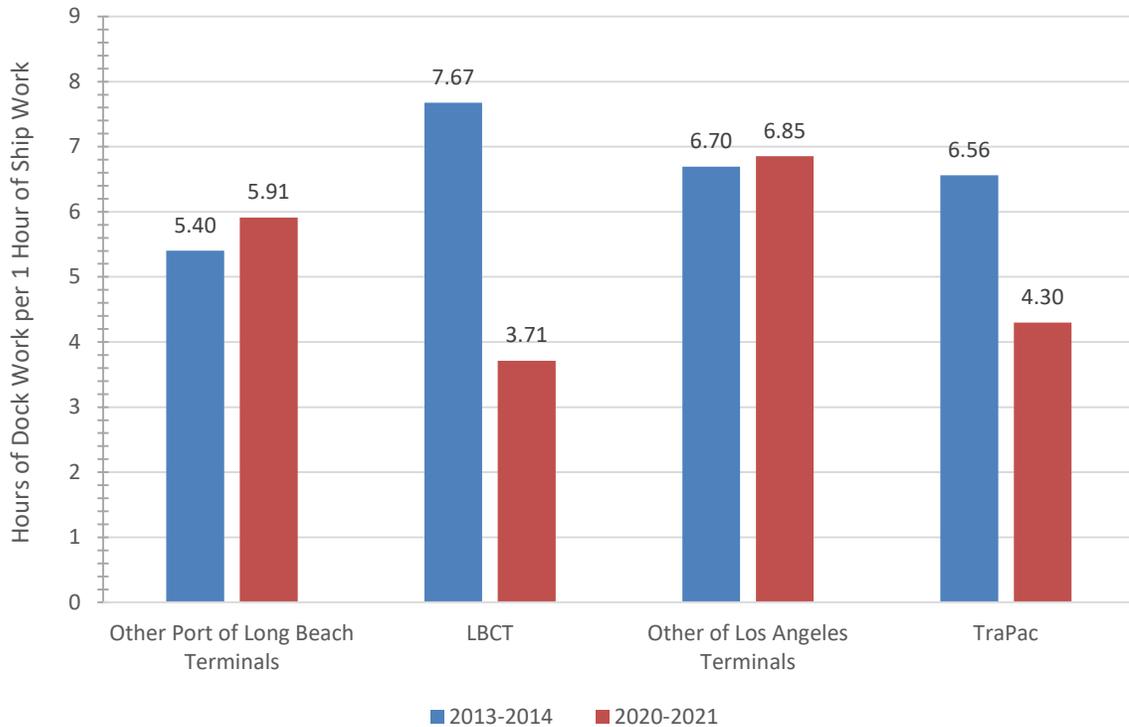
Automation
reduced dockwork
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Ratio of Dock Work Hours to Ship Work Hours

The movement of containers on land can be automated more readily than the work that is done on ships. The ratio of dockside hours of work to shipside hours at a terminal is another benchmark for assessing how automation has affected the requirement for dockside labor.

Ship work includes *lashing*, which involves connecting or disconnecting lashing bars between the individual container layers on a ship; *twist-lock*

Figure 25: Ratio of Dockside-to-Shipside Hours at TraPac and LBCT Before and After Automation



Source: Pacific Maritime Association and the Ports of Long Beach and Los Angeles.

handling, which involves manually locking or unlock the twist locks that connect the corners of stacked containers; and operation of *ship-to-shore cranes*, which transfer containers between the ship and the dock.

Shipside work varies from one ship to the next because ships differ in size and design, and some of the work is done in holds beneath a ship’s deck. This variability and the confined space for lashing and twist-lock handling make it difficult to automate shipside work.

We use the ratio of dockside-to-shipside hours as an additional way to identify changes in the amount of dock work required at LBCT and TraPac after they automated (*Figure 25*).

LBCT

Before automation, in 2013–2014, there were 7.67 hours of dockside work for every one hour of shipside work at LBCT. After automation, in 2020–2021, this dropped to 3.71 dockside hours, a 52 percent decrease. However, the pre-automation statistic for LBCT may be unreliable because the Middle Harbor Redevelopment Project was underway and may have impeded dockside operations.

An alternative approach for assessing the impact of automation on employment at LBCT is to compare its post-automation labor

Automation reduced dockside employment at LBCT by 37 to 52 percent.

requirements to the labor requirements of other terminals at the Port of Long Beach that are not automated. In 2020 and 2021, unautomated terminals at the port used 5.91 hours of dock work for every one hour of ship work, compared to 3.71 hours at LBCT. This is 37 percent less dockside work at LBCT than at other terminals at the Port of Long Beach.

Based on these two alternative approaches to computing change in the ratio of dockside-hours-to-shipside hours, automation reduced dockside employment at LBCT by 37 to 52 percent.

TraPac

Before automation, in 2013–2014, there were 6.56 hours of dockside work for every one hour of shipside work at TraPac. After automation, in 2020–2021, this dropped to 4.30 dockside hours, a 34 percent decrease.

An alternative approach for assessing the impact of automation on dockside employment at TraPac is to compare its post-automation labor requirements to requirements of other terminals at the Port of Los Angeles that are not automated. In 2020 and 2021, unautomated terminals at the port had 6.85 hours of dock work for every one hour of ship work, compared to 4.30 hours at TraPac. This is 37 percent less dockside work at TraPac than at other terminals at the Port of Los Angeles.

Based on these two alternative approaches, automation reduced dockside employment at TraPac by 34 to 37 percent.

Automation
reduced *dockside*
employment at
TraPac by 34 to
37 percent.

Total Job Loss from Automation

We use the most conservative, that is lowest, estimates of job loss from each of the two benchmarks – ratio of *all-longshore-jobs-to-containers* and ratio of *dockside-jobs-to-shipside-jobs* – to estimate the number of full-time jobs that were lost annually in 2020 and 2021 because of automation at LBCT and TraPac. These estimates are shown in *Table 1*.

An estimated 627 jobs were lost annually in 2020 and 2021 at LBCT and TraPac when job loss is estimated based on the ratio of dockworkers to the number of containers moved annually at LBCT and TraPac. This includes workers both on the docks and on ships.

An estimated 517 jobs were lost annually in 2020 and 2021 at LBCT and TraPac because of automation when job loss is estimated based on the ratio of dockside workers to shipside workers at LBCT and TraPac.

The most conservative factors were used to produce each of these estimates. Based on the average of these two estimates, automation eliminated 572 jobs annually at LBCT and TraPac in 2020 and 2021.

Automation has
eliminated 572
jobs at LBCT and
TraPac.

Table 1: Estimated Annual Number of Jobs Lost at LBCT and TraPac because of Automation **Result**

		Result
Job Loss Based on Number of Containers Moved		
LBCT		
Hours of work lost per container based on pre- post-automation comparison at LBCT		0.64
Hours of work lost per container based on comparison to unautomated terminals in 2020-2021		0.81
Average annual number of containers of all sizes moved by LBCT in 2020-2021		1,225,605
Annual hours of work lost in 2020-2021 based on 0.64 hours of work lost per container		784,387
Annual job loss based on a 2,000-hour work year		392
TraPac		
Hours of work lost per container based on pre- post-automation comparison		0.50
Hours of work lost per container based on comparison to unautomated terminals in 2020-2021		0.67
Average annual number of containers of all sizes moved by TraPac in 2020-2021		940,819
Annual hours of work lost in 2020-2021 based on 0.50 hours of work lost per container		470,410
Annual job loss based on a 2,000-hour work year		235
Annual job loss at both LBCT and TraPac in 2020-2021 based on jobs-per-container benchmark		627
Job Loss Based on Ratio of Dockside-Hours-to-Shipside-Hours		
LBCT		
Dockside hours lost per hour of shipside work based on pre- post-automation comparison at LBCT		3.96
Dockside hours lost based on comparison to unautomated terminals in 2020-2021		2.20
Average annual number of hours of shipside work at LBCT in 2020-2021		287,480
Annual hours of dockside work lost in 2020-2021 based on 2.20 hours of work lost per shipside hour		632,456
Annual job loss based on a 2,000-hour work year		316
TraPac		
Dockside hours lost per hour of shipside work based on pre- post-automation comparison at TraPac		2.26
Dockside hours lost based on comparison to unautomated terminals in 2020-2021		2.55
Average annual number of hours of shipside work at TraPac in 2020-2021		177,478
Annual hours of dockside work lost in 2020-2021 based on 2.26 hours of work lost per shipside hour		401,100
Annual job loss based on a 2,000-hour work year		201
Annual job loss at both LBCT and TraPac in 2020-2021 based ratio of dockside-to-shipside hours		517
Annual job loss based on average of jobs-per-container ratio and shipside-to-dockside work ratio		572

Sources: Ports of Long Beach and Los Angeles and the Pacific Maritime Association.

Findings from Studies of Automation

Automation reduces employment and labor costs, but the most credible independent research shows that it is expensive and does not necessarily increase productivity. Highlights from key studies are shown below.

Moody's Investors Service⁴⁰

There are significant costs and challenges associated with transitioning to automated systems. These include large capital costs, commercial service disruption/capacity reduction during implementation, execution of design and political risks. There is also an unresolved question as to whether or not automation can consistently deliver the full range of benefits — particularly with regard to productivity — that operators expect or require to justify the investment.

McKinsey & Company⁴¹

The up-front capital expenditures are quite high, and the operational challenges—a shortage of capabilities, poor data, siloed operations, and difficulty handling exceptions—are very significant. A McKinsey survey indicates that while operating expenses decline, so does productivity, and the returns on invested capital are currently lower than the industry norm.

PRISM Economics and Analysis⁴²

Job loss arising from automation of marine terminal operations places a significant portion of middle-class and high-income employment at risk in communities where marine terminal operations are concentrated. In the case of semi-automation of existing terminal facilities, there is evidence that as much as 50 percent of longshore jobs may be at risk. In the case of fully automated newly built facilities, there is evidence that as much as 90 percent of longshore employment may be at risk. The jobs created from automated equipment are unable to offset the high number of longshore jobs lost as a result of automation.

Federal Reserve Bank of St. Louis⁴³

While ports represent key nodes in the international logistic chain, several factors have led to decline in port-induced benefits at the local level, including the relocation of former port-related industries, shifts from local to international inputs, and an increase in negative environmental externalities.

International Transportation Forum (2021)⁴⁴

In practice, automated ports are generally less productive than their conventional counterparts. The productivity of automated ports is 7-15 percent lower than nonautomated ports.

Automated container terminals have witnessed challenges with malfunctioning automated equipment, resulting in breakdowns, accidents or irrational routing that slowed down operations. Automation provides less flexibility to deal with unexpected circumstances, such as peaks and troughs related to ever-larger container ships.

The automation of container terminals generally results in lower labor costs and higher capital costs, as automated equipment is more expensive than equipment that is manually operated. Reduction of labor costs only takes place insofar as automation actually reduces the workforce. This might seem trivial, but automation projects can be overly optimistic about this. Automated processes need to be designed, supervised and managed, for which staff is still needed, often at the same cost as dockworkers.

Automated ports are generally less productive than manually operated ports.

It is often assumed that the safety and health of terminal workers have been improved by automation. However, there is little robust empirical data to support this assumption. Automation in container terminals could reduce human errors, but automation is also likely to require greater operation competencies and unlearning of old routines and may even lead to new kinds of human errors.

International Transportation Forum (2020)⁴⁵

The dominant idea of container shipping is more economies of scale. The way to achieve it: cost reductions, ever larger ships and industry consolidation. The result: the large majority of the goods we consume are now moved by a handful of very large global shipping companies that source their workforce from developing countries and register their ships in tax havens. These companies have accumulated as much debt as a mid-size country, they emit as much CO₂ as a big country and have difficulties to be profitable except in the most bullish of times. Completely sealed off from their surrounding communities, highly specialized, continuously trying to catch up with ever-larger ships, today's container terminals leave no room for the intermingling that once gave port cities their charm.

OECD⁴⁶

The link between port and city growth has become weaker. Economic benefits often spill over to other regions, whereas negative impacts are localized in the port-city. The support of a local population is essential for ports in order to keep their “license to operate” and remain legitimate economic actors. Local support will evidently be facilitated if there are local benefits and if negative impacts are limited or mitigated.

University of Lisbon⁴⁷

The mathematical analysis of the automation has a clear conclusion. The automation process is not profitable for the operators, nor the state, and it is catastrophic for each local country as a whole. Automation is very profitable for the corporations producing the automated systems and detrimental for all the other agents.

University of Piraeus⁴⁸

The innovations demanded by shipping companies and freight forwarders from the ports lead eventually to a more and more capital intensity and labor saving production, reducing further employment. Significant external costs for the port community have emerged as the level of congestion and pollution becomes more and more augmented. As cargoes transformed at

It is essential for ports to remain legitimate economic actors.

an increasing pace from non-containerized to containerized, ports lost their traditional role to cause a concentration of industry near them.

University of South Hampton⁴⁹

As the adverse impacts of ports' and the awareness of these impacts have grown, the activities of ports have increasingly been a source of concern. While the importance of ports for national economies and global trade is clear, there has been a decline in port-related benefits at a local level. This has occurred due to increasing adverse environmental impacts, awareness of these impacts, relocation of port-related activity, decreasing employment and the casualization of that employment, and the increasing use of international (rather than local) inputs.

Port Economics, Management and Policy⁵⁰

Many port areas have seen the relocation of port industries to new sites, either within the region or to another country altogether. These changes have been associated with a dislocation of the relationships of many ports with their localities and regions; this has been labeled as port regionalization. While the port remains a strategically important infrastructure, its economic benefits are less directly apparent within the community, with weaker but more complex relations at the regional versus global levels.

Economic benefits are less directly apparent within the community.

United Nations⁵¹

Cybersecurity risks are likely to continue to grow significantly as a result of greater reliance on electronic trading and an increasing shift to virtual interactions at all levels. This deepens vulnerabilities across the globe, with a potential to produce crippling effects on critical supply chains and services.

Goals for Automation

Advocacy of automation has included broadly speculative reports based on inaccurate information, such as a report recently commissioned by the Pacific Maritime Association,⁵² and a more detailed statement by the Pacific Merchant Shipping Association (PMSA), which represents ocean carriers and marine terminal operators on the West Coast.

In 2019, the U.S. Maritime Administration requested public comments about “*Opportunities, Challenges and Impacts of Automated Transportation in a Port Environment.*” and posed specific questions. The PMSA submitted these responses.⁵³

How can port stakeholders, including port equipment and infrastructure suppliers, manufacturers, and maintainers, better support ports' automation efforts?

The optimization of cargo throughput is predicated on uniformity and standardization, on a global scale. . . . Port authorities and federal, state and local agencies should focus on improving the infrastructure necessary to support automation, including electrical supply, communications infrastructure and permit streamlining.

How could further integration of autonomous/automated systems and transport impact freight flows?

Automation should provide more reliable and efficient supply chains. This will naturally improve efficiencies and provide for a lower cost to the end user. It can also help level the playing field between ports with disparate work rules and labor costs. As an example, an automated terminal in California will compare more favorable with an automated terminal in Mexico as compared to manually operated terminals in both locations.

What societal benefits if any, could be expected to result from the adoption of these technologies (e.g., environmental, safety, efficiency, or noise reduction)? What societal disadvantages could occur?

There are multiple societal benefits to be expected through the adoption of automation. These include safer, quieter, darker and more environmentally friendly operations, along with a reduced footprint for marine terminal operations. The ability to provide 24 x 365 day operations will also reduce congestion, both in the ports and on public roads. As for environmental benefits, especially air quality, fully automated terminals may be the only cost-effective option available to achieve zero-emission goals that have been established for California ports.

What is the potential impact of the adoption of automation technologies on the existing port industry workforce?

We believe that ports will continue to be large employers of labor, with little or no reduction to the overall workforce. As trade and cargo volumes grow there will be a continued demand for associated labor, which will be providing more cargo throughput with a similar sized workforce.

The benefits from automation put forward by PMSA are:

1. Reliability
2. Efficiency resulting in lower cost
3. Reduced environmental impacts
4. Reduced traffic congestion
5. Continuity of workforce size

A framework for assessing the goals for automation identified by PMSA is provided by the data about LBCT and TraPac in this report and findings from research summarized earlier that examined outcomes from automation as well as the role of shipping in the overall economic fabric of port cities.

Reliability

PMSA does not appear to be claiming that manually operated terminals are unreliable in moving cargo. In fact, there are anecdotal reports that manually operated terminals in the San Pedro Bay have been more adaptable and productive than automated terminals in responding to the surge in cargo volume during the Covid pandemic.

PMSA appears to mean *consistency* rather than *reliability*. PMSA envisions increasing what it calls reliability by eliminating “disparate work rules and labor costs” and leveling the playing field between California and Mexico. This happens when robotic machines replace workers.

Reliability is code for avoiding the inconvenience of dealing with American workers and, more specifically, the union that protects dockworkers.

This perspective is driven by the interest of some foreign manufacturers and shippers to minimize reliance on American labor while still delivering their products to American consumers. Their perspective fails to consider the interests of port cities or California’s workers. Automation eliminates longshore jobs, which are the largest remaining benefit that port operations provide to port cities.

Cost Savings

Automation reduces labor costs, but requires capital investments that often exceed the wages that are not paid. The cost to automate LBCT was \$1.5 billion,⁵⁴ and the cost to automate TraPac was \$510,412,388 in 2012 dollars,⁵⁵ or \$617,179,768 in 2021 dollars. As mentioned earlier, the Port of Los Angeles subsidized 40 percent of the costs to automate TraPac.

Studies of actual outcomes from port automation by Moody’s Investors Service, McKinsey & Company and the International Transportation Forum have found that cost savings are doubtful. Surges in container traffic, unexpected events, and downstream bottlenecks in trucking, railroads and warehouses undercut the assumptions about the consistent, unbroken rhythm of container traffic that underlie projected cost savings from automation.

Furthermore, if cost savings materialize, the profits enrich foreign owners, not American workers or the public.

If cost savings materialize, the profits enrich foreign owners, not American workers or the public.

Environmental Benefits

PMSA asserts that “fully automated terminals may be the only cost-effective option available to achieve zero-emission goals.” However, reduced emissions are achieved through electrification of equipment, and manually operated equipment can be electrified as readily as robotic equipment.

Ships, petroleum-powered terminal equipment, trucks, and trains create port emissions. Electrification of terminal equipment is part of the solution and is equally effective for either manual or automated terminal equipment.

Reduced Traffic Congestion

The reduction in traffic congestion suggested by PMSA fails to consider the actual impacts of moving 20 million TEUs a year through a major metropolitan region. Container movement is constrained by the availability and working hours of both truckers and warehouses. During the cargo surge in 2021, the Port of Long Beach shifted to 24-hour operations but trucks did not materialize during the night hours.⁵⁶

Jobs

Contrary to claims by PMSA that automation causes “little or no reduction to the overall workforce,” automation has eliminated 37 to 52 percent of the work at LBCT and 34 to 37 percent of the jobs at TraPac. There were 572 fewer full-time jobs at these terminals in 2020 and 2021 than there would have been if they were unautomated.

Ports as Economic Engines for California

Automation means that ports can disengage from U.S. workers and be less connected to California’s economy.

Container shipping creates public costs from traffic congestion, road accidents, noise, greenhouse gas emissions, emission of criteria pollutants that create health risks for residents of port communities, and uncompensated road wear. Increasingly large cargo loads on increasing large ships mean more intense peaks of truck traffic on highways, greater congestion on residential roads and more air pollution.

Ports must provide public benefits that offset their negative impacts on port cities in order to be true to their public trust. The most fundamental benefit is jobs, beginning with longshore jobs and extending to manufacturing industries with export capabilities.

Automation means that ports can disengage from U.S. workers and be less as connected to California's economy.

The import-intensive role of the San Pedro Bay Ports facilitates global trade imbalance, the deindustrialization of California, and the loss of middle class blue collar jobs in durable-manufacturing industries. Cargo containers full of manufactured goods come into the ports, and go back to China empty, to be refilled again with another load of foreign manufactured goods.

The world is full of ports that operate as efficient landlords within their own strict boundaries without considering the larger impact their operations have on trade and employment. Foreign owners have already realigned terminal operations in the San Pedro Bay to serve the interests of foreign manufacturing and shipping corporations. The costs and benefits of their operations need to be rebalanced.

Profit leaves the U.S. and builds foreign wealth in the countries that manufacture and transport goods imported into the U.S. The previous and current U.S. administrations have identified the trade imbalance with China as a threat to national economic interests that is in part the result of unfair trade practices.

To the extent that the ports are managed to maximize the efficient movement of foreign imports rather than to create value in California, they are not making full use of their tools for supporting jobs in port communities and the entire state.

Ports need to be community managers acting in the public interest and able to bridge the demands of parties beyond the port by providing innovative transport solutions for California firms and by protecting jobs linked to the ports.

The ports are a key hub in an extraordinary international transportation infrastructure for distributing goods. This valuable locational advantage should be used to stimulate manufacturing growth and safeguard jobs in port communities.

Ports' locational advantages should be used to stimulate manufacturing growth and safeguard jobs in port communities.

Summary

Four percent of global container terminal capacity has been automated. This includes Long Beach Container Terminal (LBCT) at the Port of Long Beach and Trans Pacific Container Service Corporation (TraPac) at the Port of Los Angeles.

The share of San Pedro Bay containers that are handled by the two automated terminals, LBCT and TraPac, has doubled since they were automated, largely because cargo has been diverted from other terminals. In 2013 and 2014, nine percent of 20-foot equivalent containers moved through these two terminals. In 2020 and 2021, their combined share of

container traffic moving through the San Pedro Bay increased to 18 percent.

The amount of time that dockworkers are employed to move each container is one way of measuring the effect of automation on employment. This ratio of work-to-containers is a reliable benchmark throughout all phases of the business cycle and fluctuations in cargo volume.

Based on the declining hours of work required to move a container after automation compared to before automation, automation reduced longshore employment at LBCT by 37 to 42 percent. Based on the same benchmark, automation reduced longshore employment at TraPac by 24 to 30 percent.

A second benchmark for determining the amount of job loss caused by automation is the reduction in the number of hours of dock work at a terminal for each hour of ship work. This benchmark is valuable because dock work is subject to automation but automation is not feasible for work done on ships.

Based on changes in the ratio of dockside-hours-to-shipside-hours after automation compared to after automation, automation reduced dockside employment at LBCT by 37 to 52 percent. Based on the same benchmark, automation reduced dockside employment at TraPac by 34 to 37 percent.

The most conservative interpretation of this job loss evidence shows that automation eliminated 572 full-time-equivalent jobs annually at LBCT and TraPac in 2020 and 2021.

It is very expensive to automate port terminals. Multiple studies have found that automated terminals often fail to be more productive and the reduction of labor costs may not offset the capital costs of automation. There are significant operational challenges for automated terminals including a shortage of needed capabilities in the labor force, poor data, siloed operations, and difficulty handling exceptions to routine cargo flows. In practice, automated ports are generally less productive than their conventional counterparts.

The benefits that ports offer to port cities have been decimated because of relocation of former port-related industries, shifts from local to international inputs and increases in negative environmental externalities. Economic benefits often spill over to other regions, whereas negative impacts are localized in the port city. Growing costs for port communities include congestion and pollution.

The goals for automations identified by the Pacific Merchant Shipping Association (PMSA) include: reliability, lower cost, reduced environmental impacts, reduced traffic congestion, and continuity of workforce size.

PMSA envisions increasing what it calls reliability by eliminating “disparate work rules and labor costs” and leveling the playing field between California and Mexico. This happens when robotic machines replace longshore jobs, which are the largest remaining benefit that port operations provide to port cities.

Reliability is code for avoiding the inconvenience of dealing with American workers and, more specifically, the union that protects dockworkers.

Studies of actual outcomes from port automation by Moody’s Investors Service, McKinsey & Company and the International Transportation Forum have found that cost savings are doubtful. If cost savings materialize, the profits leave the United States and go to foreign owners.

Contrary to PMSA’s claim that automation offers unique environmental benefits, ships, petroleum-powered terminal equipment, trucks, and trains create port emissions. Electrification of terminal equipment is part of the solution and is equally effective for either manual or automated terminal equipment.

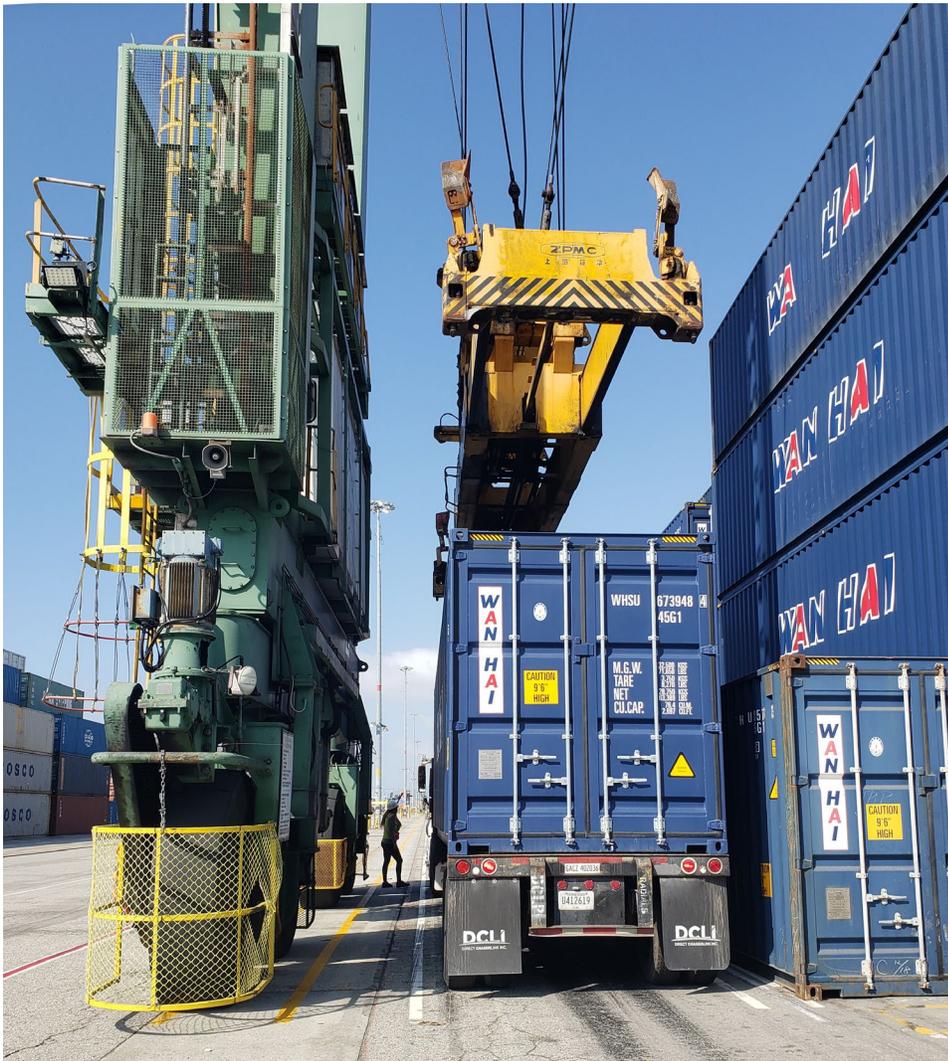
The reduction in traffic congestion suggested by PMSA is disconnected from the actual impacts of moving 20 million TEUs a year through a major metropolitan region. Container movement out of ports is constrained by the availability and working hours of both truckers and warehouses.

Contrary to claims by PMSA that automation causes “little or no reduction to the overall workforce,” automation has eliminated 572 full-time jobs at LBCT and TraPac.

Ports must provide public benefits that offset their negative impacts on port cities in order to be true to their public trust. Jobs are the most fundamental benefit, beginning with longshore jobs and extending to manufacturing industries with export capabilities.

Ports need to be community managers acting in the public interest, and able to bridge the demands of parties beyond the port by providing innovative transport solutions for California firms and by protecting jobs linked to the ports.

The ports are a key hub in an extraordinary international transportation infrastructure for distributing goods. This valuable locational advantage should be used to stimulate manufacturing growth and safeguard jobs in port communities.



*Photo credit:
Economic Roundtable*

7. Dockworker Profile

Dock Work Jobs

Number of Workers

In a typical year, 13,000 workers are employed on the San Pedro Bay docks, some full-time, others part-time (Figure 26). The number of workers on the docks increased to over 14,000 in 2021 because of the cargo surge driven by consumer purchases during the Covid pandemic.

Twenty-five percent of dockworkers obtained *casual* jobs through a lottery. *Casuals* are part-time workers who take longshore and marine clerk jobs when such work is available. When *casuals* accumulate sufficient hours of work, demonstrate that they can work safely and pass entry-level tests, they become eligible to register as longshore workers.

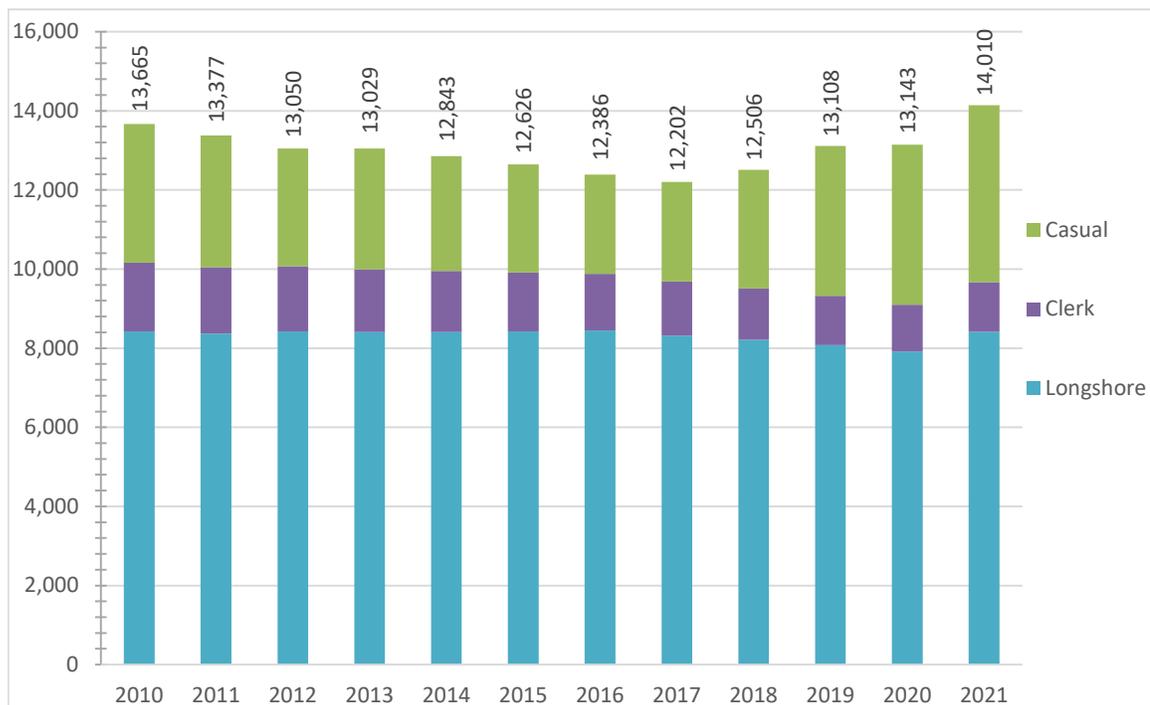
Sixty-four percent of workers are in *longshore* job classifications. They load and unload ships, trucks and rail cars, and they perform the maintenance and repair work associated with cargo handling equipment.

Eleven percent of workers are employed as *marine clerks* (or *clerks*), who perform the clerical work associated with the movement of cargo.

Longshore and marine clerk workers are collectively referred to as dockworkers.

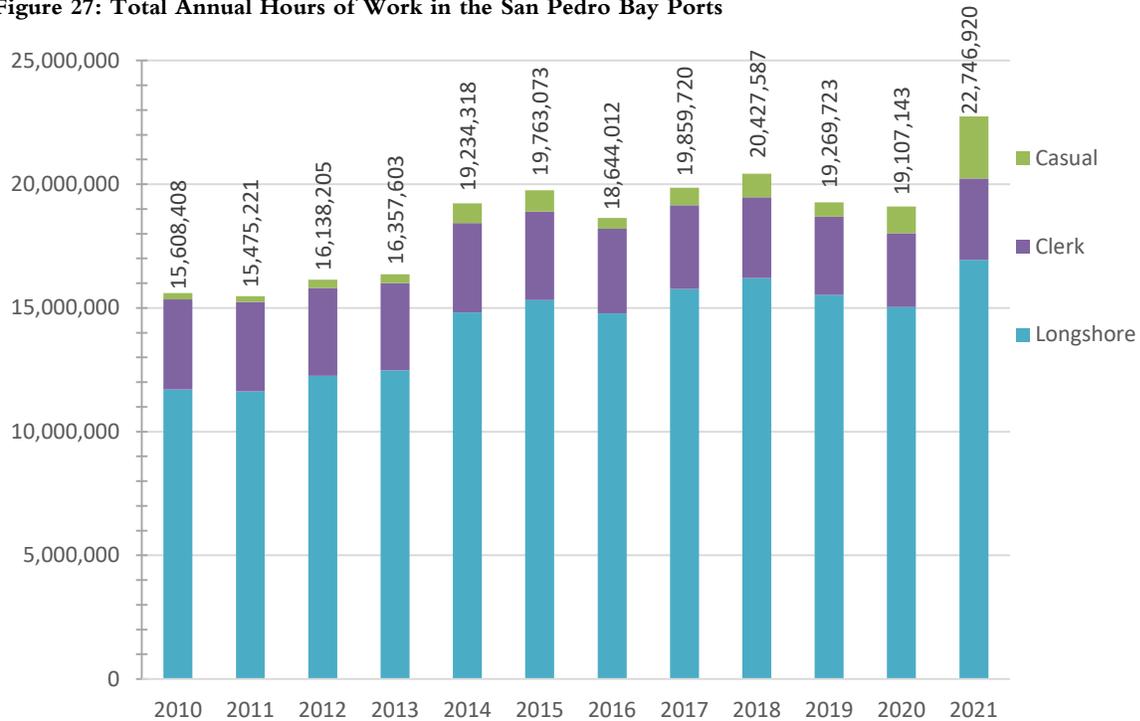
Dockworkers on the West Coast, including in the San Pedro Bay Ports, are represented by the International Longshore and Warehouse Union (ILWU).

Figure 26: Number of Dockworkers Employed in the San Pedro Bay Ports



Source: Pacific Maritime Association.

Figure 27: Total Annual Hours of Work in the San Pedro Bay Ports

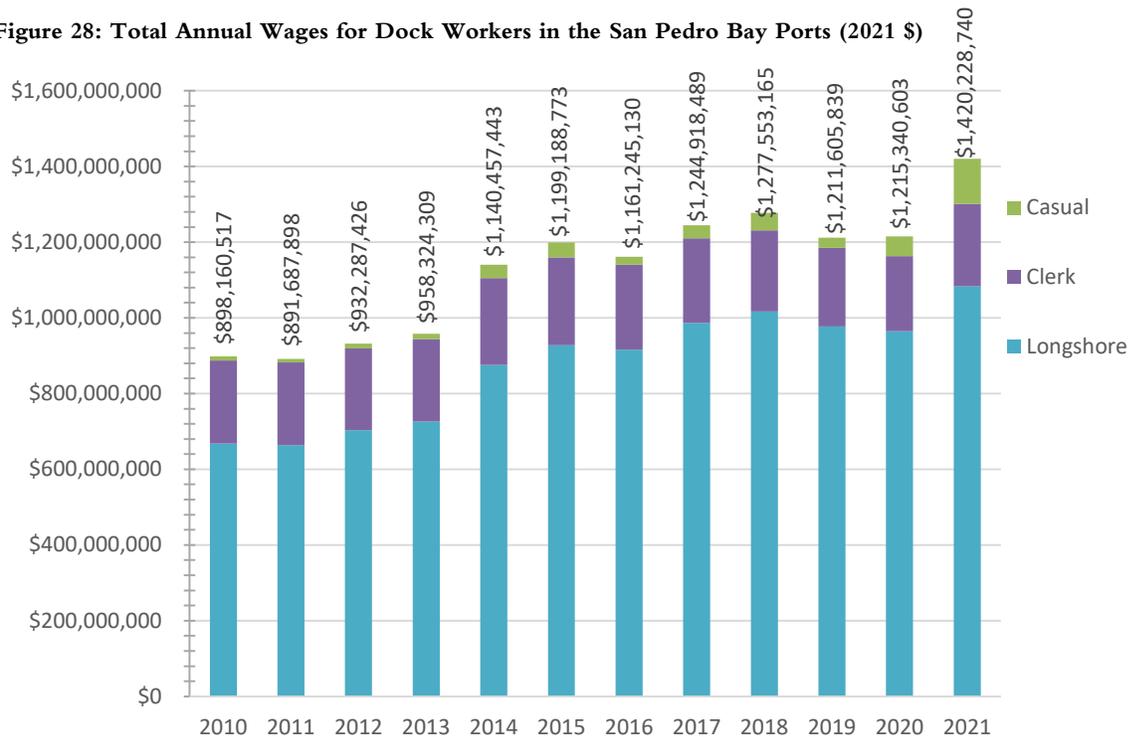


Source: Pacific Maritime Association.

Annual Hours of Work

From 2010 to 2013, there was an annual average of 15.9 million hours of dock work in the San Pedro Bay. This increased to an average of 19.5

Figure 28: Total Annual Wages for Dock Workers in the San Pedro Bay Ports (2021 \$)



Source: Pacific Maritime Association.

million annual hours of work from 2014 to 2020, and because of the shipping surge increased again in 2021 to 22.7 million hours (Figure 27). Typically, *longshore* workers provide 77 percent of the work hours, *clerks* provide 18 percent, and *casuals* provide 5 percent. However, during the 2021 shipping surge, *casuals* carried out 11 percent of the work.

Annual Payroll

The annual wages paid to dockworkers in the San Pedro Bay, adjusted to 2021 dollars, averaged \$920 million from 2010 to 2013, increased to an average of \$1.2 billion from 2014 to 2020, and then increased to \$1.4 billion with the shipping surge in 2021 (Figure 28).

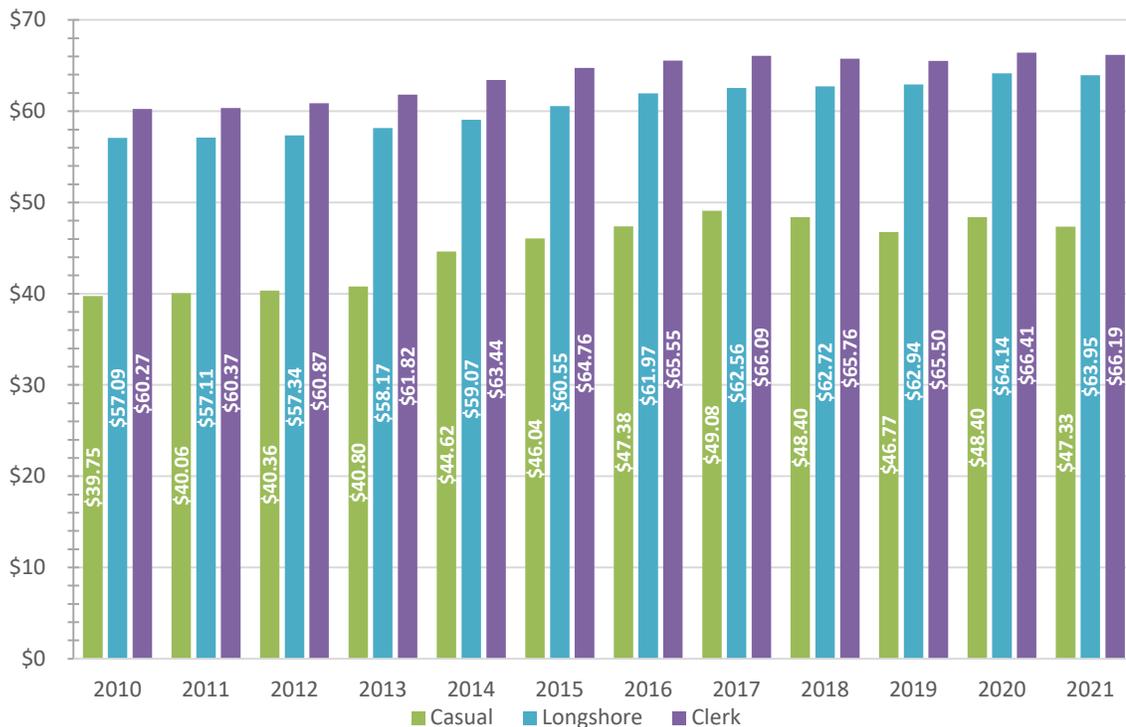
The distribution of wages is similar to the distribution of hours worked. *Longshore* workers typically receive 77 percent of wages, *clerks* receive 19 percent, and *casuals* receive 4 percent.

Hourly Wages

The hourly wages that dockworkers receive, adjusted to 2021 dollars, increased slightly from 2010 to 2021 (Figure 29). *Casual* workers had the largest increase, from an average hourly wage of \$39.75 in 2010 to \$47.33 in 2021. The average wage of *longshore* workers increased from \$57.09 to \$63.95. The average wage of *clerks*, the highest paid group, increased from \$57.09 to \$66.19.

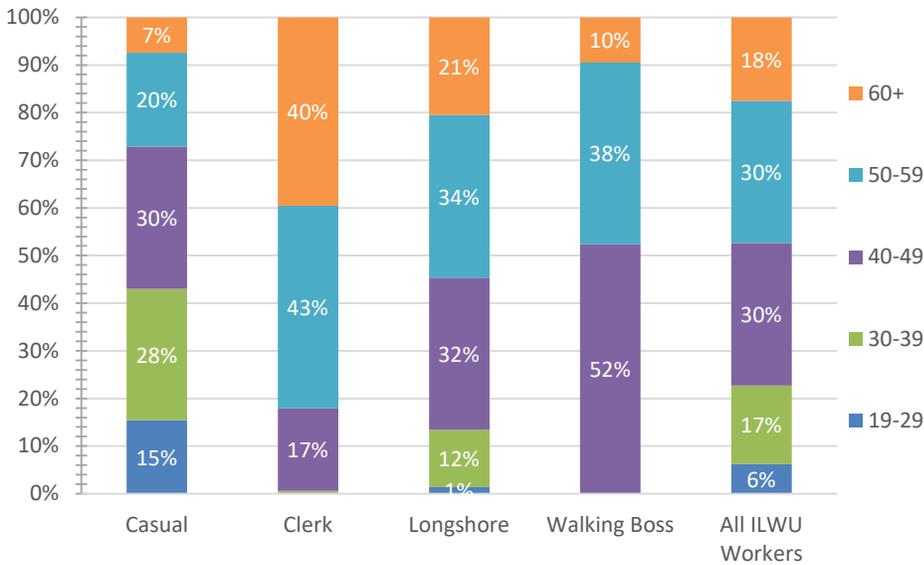
The annual payroll for dockworkers is \$1.2 billion.

Figure 29: Average Hourly Wage in the San Pedro Bay Ports (2021 \$)



Source: Pacific Maritime Association.

Figure 30: Age Distribution for ILWU Workers by Job Category



Source: Pacific Maritime Association.

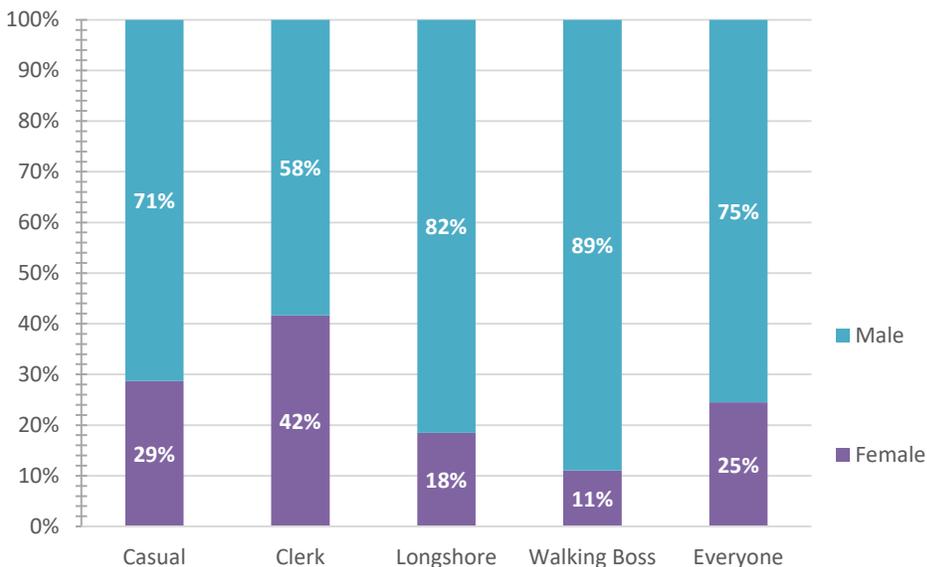
The *average* hourly wage for all hours worked in the ports in 2021 was \$62.44, and the *median* wage was \$59.95

Attributes of Dockworkers

Age

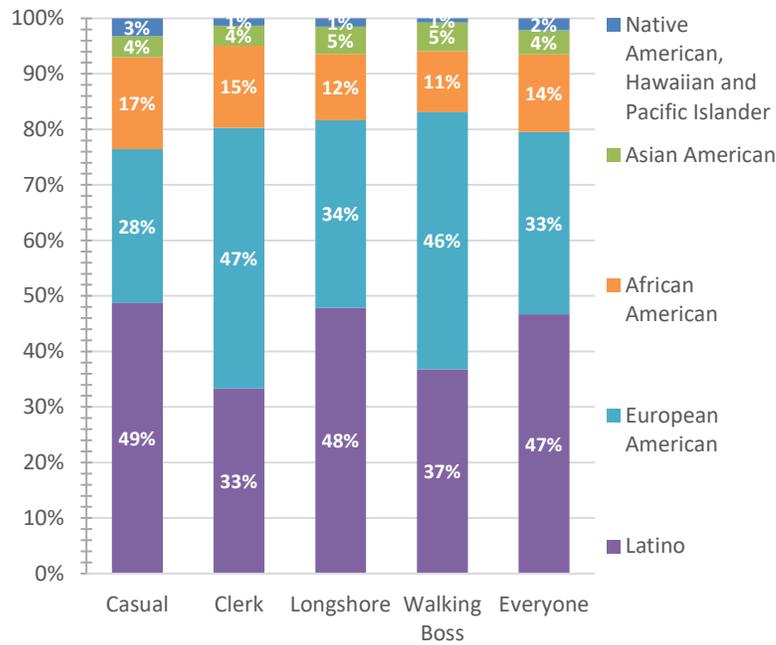
Dockworkers are a mature workforce. The average dockworker in the San Pedro Bay Ports is 50 years old (Figure 30). *Casual* workers are youngest, with an average age of 44. *Walking bosses*, or supervisory employees, are

Figure 31: Gender Distribution of ILWU Workers by Job Category



Source: Pacific Maritime Association.

Figure 32: Ethnic Distribution of ILWU Workers by Job Category



Source: Pacific Maritime Association.

next youngest; the average age is 49. *Longshore* workers are second oldest; the average age is 52. *Clerks* are oldest; the average age is 60.

Gender

One-quarter of dockworkers are female and three-quarters are male (*Figure 31*). *Clerks* have the highest share of female workers – 42 percent, and *walking bosses* have the lowest share – 11 percent. The share of females among *casual* workers – 29 percent – is well above the average for *longshore* workers – 18 percent. The primary career goal for casual workers is to become registered as longshore workers, so the share of females among longshore workers appears to be growing.

The share of females among dockworkers is at parity with the overall transportation sector (also 25 percent), and much higher than other heavy-lifting industries such as construction, with seven percent female workers.⁵⁷

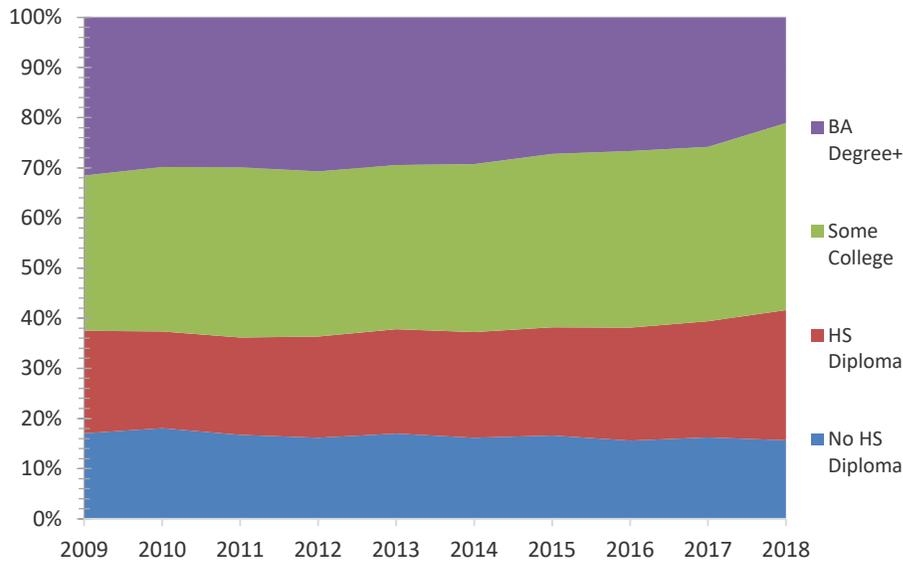
Ethnicity

The ethnic make-up of dockworkers is similar to Los Angeles County’s total labor force, with some over-representation of *European Americans* and *African Americans*, and under-representation of *Asian Americans* (*Figure 32*).

Forty-seven percent of dockworkers are *Latino* (versus 48 percent of Los Angeles County workers), 33 percent are *European American* (versus 29 percent), 14 percent are *African American* (versus 8 percent), 4 percent are *Asian American* (vs 16 percent), and 2 percent are *Native American, Native Hawaiian or Pacific Islander* (versus 1 percent).⁵⁸

The ethnic make-up of dockworkers is similar to Los Angeles County’s total labor force.

Figure 33: Level of Education of Workers in the Los Angeles and Long Beach Ports

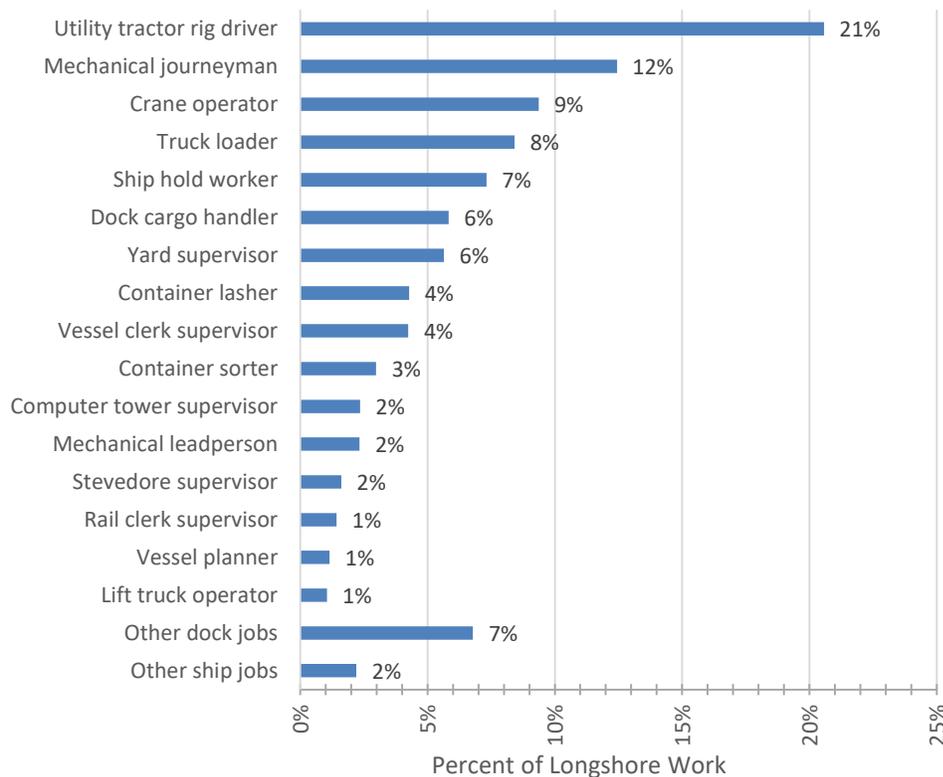


Source: U.S. Census Bureau Longitudinal Employer-Household Dynamics.

Education

Dockworkers are a well-educated labor force. Close to two-thirds (62 percent) of the workers in the Ports of Los Angeles and Long Beach have some college education (Figure 33).

Figure 34: Occupations of Workers in the Los Angeles and Long Beach Ports



Source: Pacific Maritime Association.

Over the most recent 10 years for which this data is available, an average of 34 percent of workers have had some level of college education but not a B.A. degree, and another 28 percent have had a B.A. or graduate degree. Another 21 percent have had high school diplomas, and 17 percent have not been high school graduates.

Occupations of Dockworkers

The most frequent job on the docks is driving a *utility tractor rig (UTR)*, moving containers between ships and stacking areas, and between stacking areas and trucks or rails. This accounts for 21 percent of dockwork jobs (*Figure 34*).

The next most frequent job is *mechanics*, who repair containers, truck chassis, and container handling equipment on the docks. They account for 12 percent of dockworkers.

The third most frequent job is *crane operator*, lifting containers off or onto ships. This accounts for 9 percent of dock work jobs.

Fifteen percent of dockwork is done on ships and 85 percent is done on the dock.

Summary

In a typical year, 13,000 workers are employed on the San Pedro Bay docks, some full-time, others part-time. The number of workers on the docks increased to over 14,000 in 2021 because of the cargo surge driven by consumer purchases during the Covid pandemic.

Twenty-five percent of workers employed on the docks have casual, part-time jobs 11 percent are employed as clerks, and 64 percent are in longshore job classifications.

In a typical year there is roughly 19.5 million hours of work moving cargo through the ports, with wages of roughly \$1.2 billion for this work. In 2021, casual workers earned an *average* of \$47.33 an hour, longshore workers earned an *average* of \$63.95 an hour, and clerks earned an *average* of \$66.19 an hour.

The *average* hourly wage for all hours worked in the ports in 2021 was \$62.44, and the *median* wage was \$59.95.

Dockworkers are a mature workforce with an average age of 50 years. One quarter of workers are female, which is at parity with the transportation sector and much higher than in other heavy-lifting industries such as construction.

The ethnic make-up of dockworkers is similar to Los Angeles County's total labor force, with some over-representation of European Americans and African Americans, and under-representation of Asian Americans.

Dockworkers are a well-educated labor force. Close to two-thirds (62 percent) of the workers in the Ports of Los Angeles and Long Beach have some college education.

The most frequent job on the docks is driving a utility tractor rig (UTR), followed mechanics and crane operators. These three occupations account for 42 percent of dock work jobs. Altogether, there are 90 occupational classifications for dockworkers.

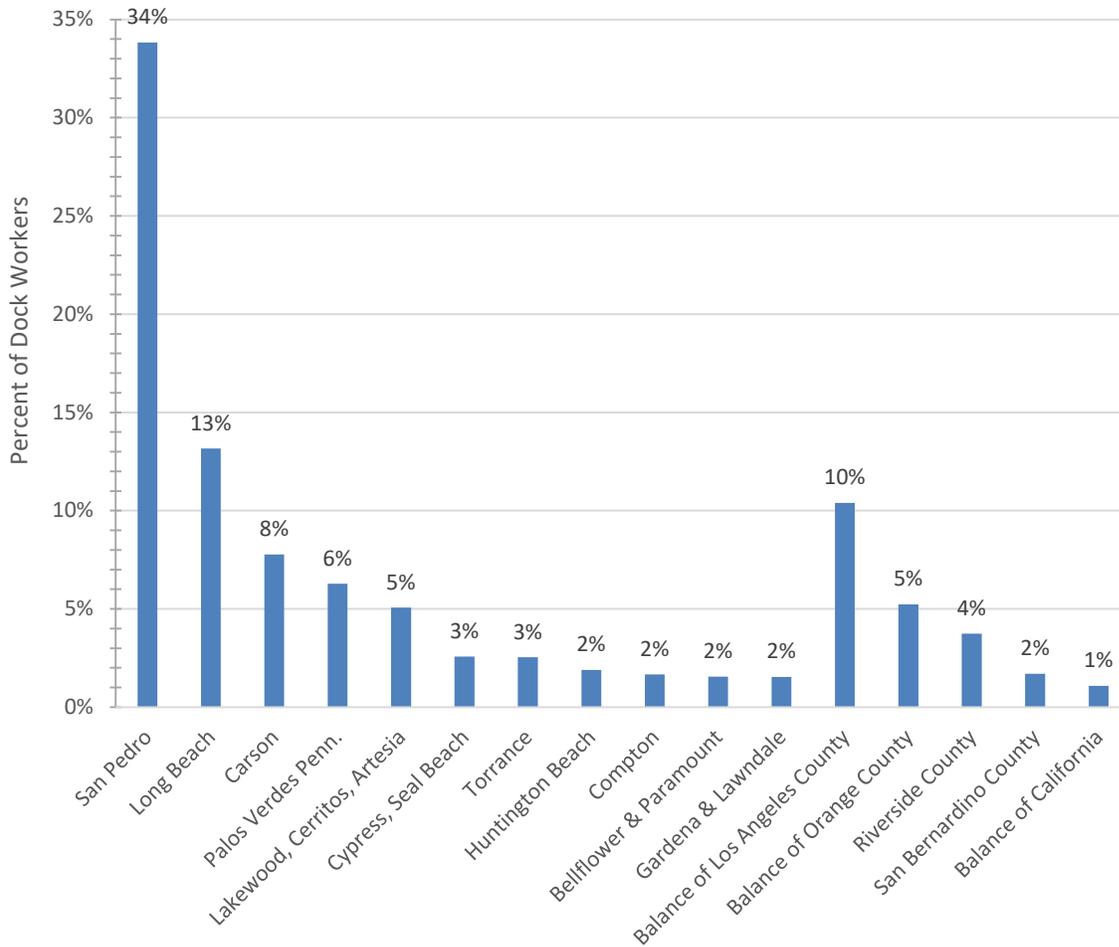
Fifteen percent of longshore work is done on ships and 85 percent is done on the dock.



*Photo credit:
Paige Aguirre*

8. Dockworkers' Homes

Figure 35: Communities where San Pedro Bay Dock Workers Live



Source: Pacific Maritime Association.

Communities where the Most Dockworkers Live

Over one-third (34 percent) of dockworkers live in San Pedro. Altogether, 36 percent of dockworkers live in the City of Los Angeles. Another 13 percent of dockworkers live in the City of Long Beach (Figure 35).

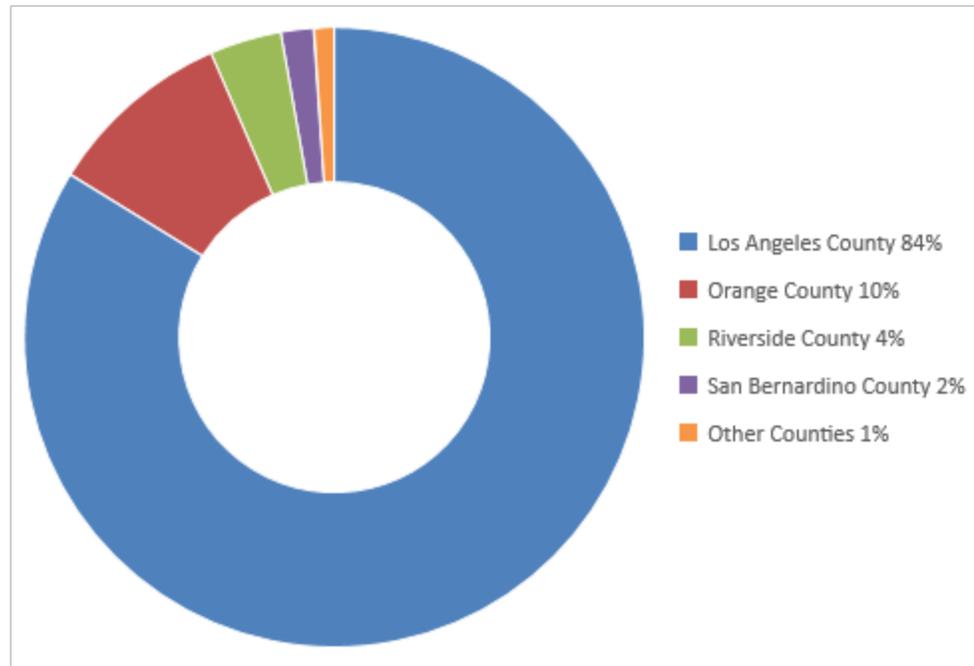
Counties where Dockworkers Live

Most dockworkers live in Los Angeles County – 84 percent (Figure 36). This means that Los Angeles County captures most of the economic multipliers stimulated by dockworker wages.

Another 10 percent of workers live in Orange County, 4 percent in San Bernardino County, 2 percent in Riverside County, and 1 percent in other California counties.

The cities of Los Angeles and Long Beach capture 49% of the economic stimulus from dockworker wages.

Figure 36: Counties where San Pedro Bay Dock Workers Live



Source: Pacific Maritime Association.

Summary

The homes of dockworkers are tightly clustered near the ports in San Pedro, Wilmington and Long Beach, and radiate out throughout Los Angeles and Orange Counties.

An estimated 3.1 million persons in 981,000 households, and 1.5 million employed workers live in communities where there is a strong presence of dockworkers, and where they make an important imprint on the local economy.

Over one-third (34 percent) of dockworkers live in San Pedro. Altogether, 36 percent of dockworkers live in the City of Los Angeles. Another 13 percent of dockworkers live in the City of Long Beach.

Most dockworkers live in Los Angeles County – 84 percent. This means that Los Angeles County captures most of the economic multipliers stimulated by dockworker wages.



*Photo credit:
Matthew Garcia*

9. Dockworkers Compared to their Neighbors

Dockworkers Compared to their Employed Neighbors

In a typical year the two ports employ 13,000 workers, some full-time and others part-time. These workers perform high-value-added work and a strong union represents them. As a result, they are well compensated.

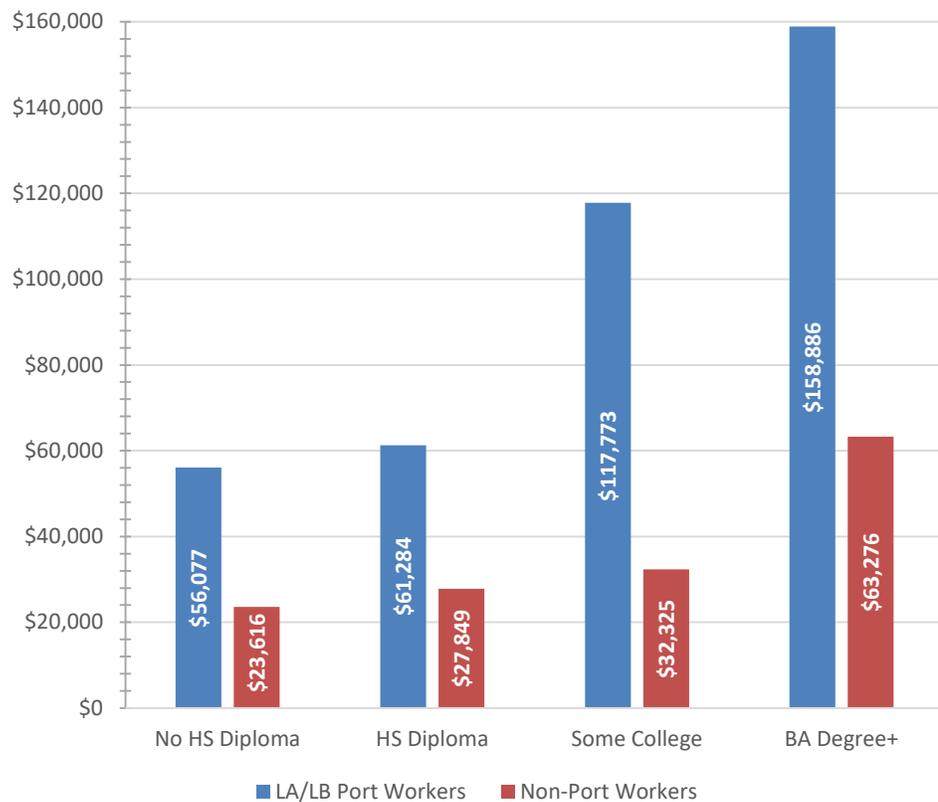
We can compare the earnings of dockworkers in 2019 with earnings of Los Angeles County's total labor in the same year, using records from the ports and from the U.S. Census Bureau. This comparison is for the communities highlighted in yellow in the map in *Figure 34*, where the homes of dockworkers are concentrated.

The *median* annual earnings in 2019 of workers represented by the ILWU was \$89,560, compared to *median* earnings of \$34,345³ for all of the other workers living in the same communities. The *median* earnings of dockworkers are 161 percent higher than their neighbors.

Earnings by Educational Attainment

Compared to their neighbors in communities surrounding the harbor, ILWU dockworkers' median earned incomes are higher at every level of

Figure 37: Median Annual Wages for Los Angeles / Long Beach Dockworkers compared to Workers in the Surrounding Community, by Educational Attainment



ILWU workers advantage in wages is true across all levels of educational attainment.

Source: Pacific Maritime Association; U.S. Census Bureau. 2021. American Community Survey, 5-Year Public Use Microdata Sample (PUMS), 2015-2019; Wages or salary income past 12 months (WAGP) adjusted to 2019 dollars (using ADJINC), by Educational Attainment (SCHL) for workers in PUMAs with high numbers of ILWU workers.

educational attainment, as shown in *Figure 37*. ILWU dockworkers with less than a high school degree earn 137 percent more than their employed neighbors with the same level of education - more than double.

Among workers living in communities highlighted in the map in *Figure 34*, and with at least some college education, with ILWU dockworkers earn 120 percent more than their neighbors not employed at the ports.

ILWU dockworkers with at least some college education earn 264 percent more, and those with a Bachelor's Degree or higher earn 151 percent more, than their neighbors with the same level of education.

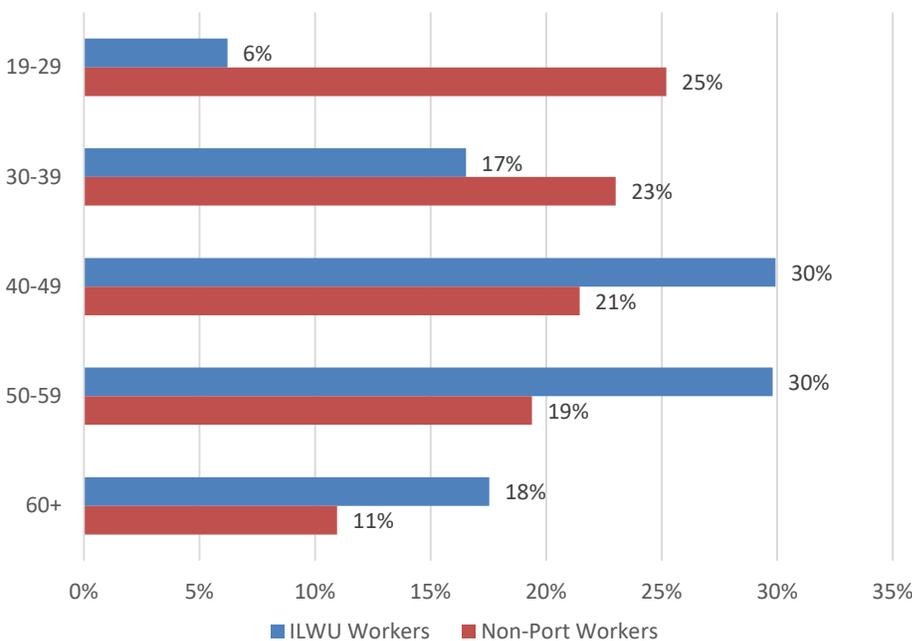
Age and Earnings by Age

ILWU workers at the Los Angeles and Long Beach Ports are typically older than their neighbors employed in other industries, as show in *Figure 38*. Almost half of dockworkers (48 percent) are age 50 or older compared to just 30 percent of their employed neighbors. And almost half of their working neighbors (48 percent) are under age 40 compared to just 23 percent of dockworkers.

Compared to their neighbors in communities surrounding the harbor, ILWU dockworkers have higher *average* earned incomes at every age, as shown in *Figure 39*. Overall, their *average* earnings are 83 percent higher than their non-port neighbors. (The *median*, mentioned earlier, reflects the typical worker, the one in the middle, whereas the *average* reflects all workers.)

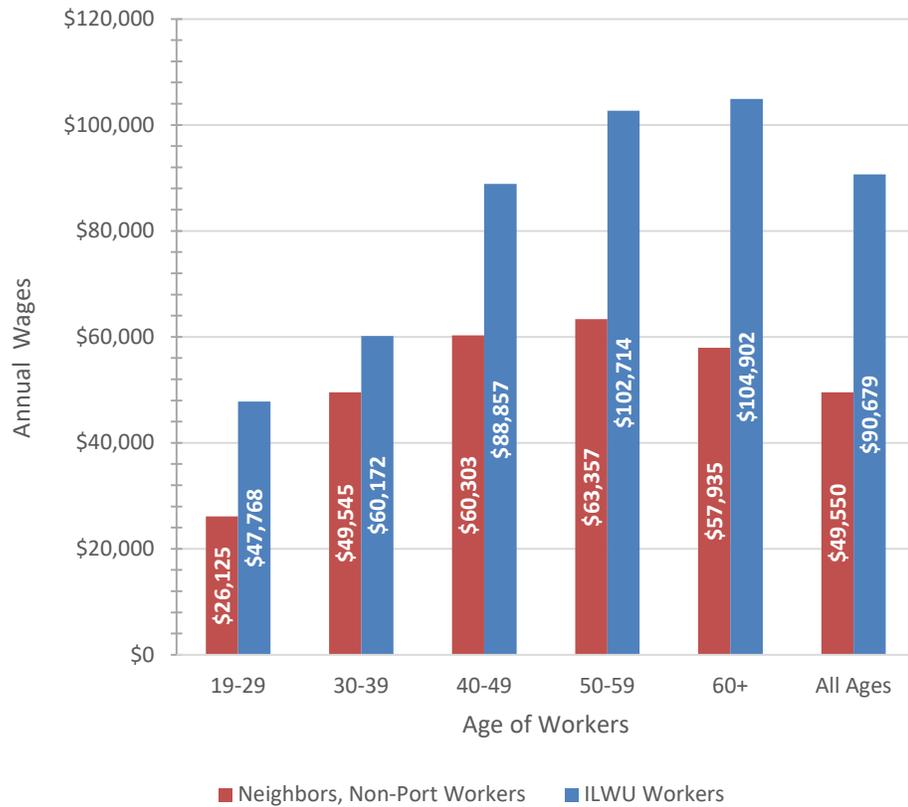
Dockworkers earn 83% more than their neighbors employed in other industries.

Figure 38: Age Distribution for ILWU Workers compared to their Employed Neighbors in the Communities Surrounding the Ports of Los Angeles and Long Beach



Source: Pacific Maritime Association; U.S. Census Bureau. 2021. American Community Survey, 5-Year Public Use Microdata Sample, 2015-2019; Recode of Age (AGEP) for workers in PUMAs with high numbers of ILWU workers.

Figure 39: Average Annual Wages by Age for ILWU Workers compared to their Employed Neighbors in the Communities Surrounding the San Pedro Bay Ports



Source: Pacific Maritime Association; U.S. Census Bureau. 2021. American Community Survey, 5-Year Public Use Microdata Sample, 2015-2019 for workers in PUMAs with high numbers of ILWU workers.

Broken out into age groups, ILWU dockworkers age 19 to 29 earn 83 percent more, age 30 to 39 earn 21 percent more, age 40 to 49 earn 47 percent more, age 50 to 59 earn 62 percent more, and those age 60 or older earn 81 percent more.

Male dockworkers in all age groups earn 76% more than their employed male neighbors who do not work at the ports.

Earnings by Sex and Age

The average wages of men and women working at the Ports of Los Angeles and Long Beach substantially exceed those of their neighbors in the same age and gender group who are employed in other industries, as shown in Figure 40.

Male dockworkers in all age groups earn 76 percent more than their employed male neighbors who do not work at the ports. This amounts to average annual wages of \$97,411, compared to \$55,305 for non-dockworkers.

The biggest wage differential is for male ILWU dockworkers age 19 to 29, who earned 87 percent more than their male neighbors in the same age group. Older male workers in the 50 to 59 and 60 or older age groups also

Figure 40: Average Annual Wages of ILWU Workers and their Neighbors, by Sex and Age



Source: Pacific Maritime Association, U.S. Census Bureau. 2021. American Community Survey, 5-Year Public Use Microdata Sample (PUMS), 2015-2019; Recoded sex (SEX) and Age (AGEP) for workers in PUMAs with high numbers of ILWU workers.

have significantly higher average annual wages than their same-aged neighbors, 52 percent and 63 percent higher, respectively.

Female dockworkers in all age groups earn 61 percent more than their employed female neighbors not working in the ports, also shown in *Figure 40*. That equates to \$69,260 average annual earnings for female dockworkers, compared to \$43,124 for their non-port female peers.

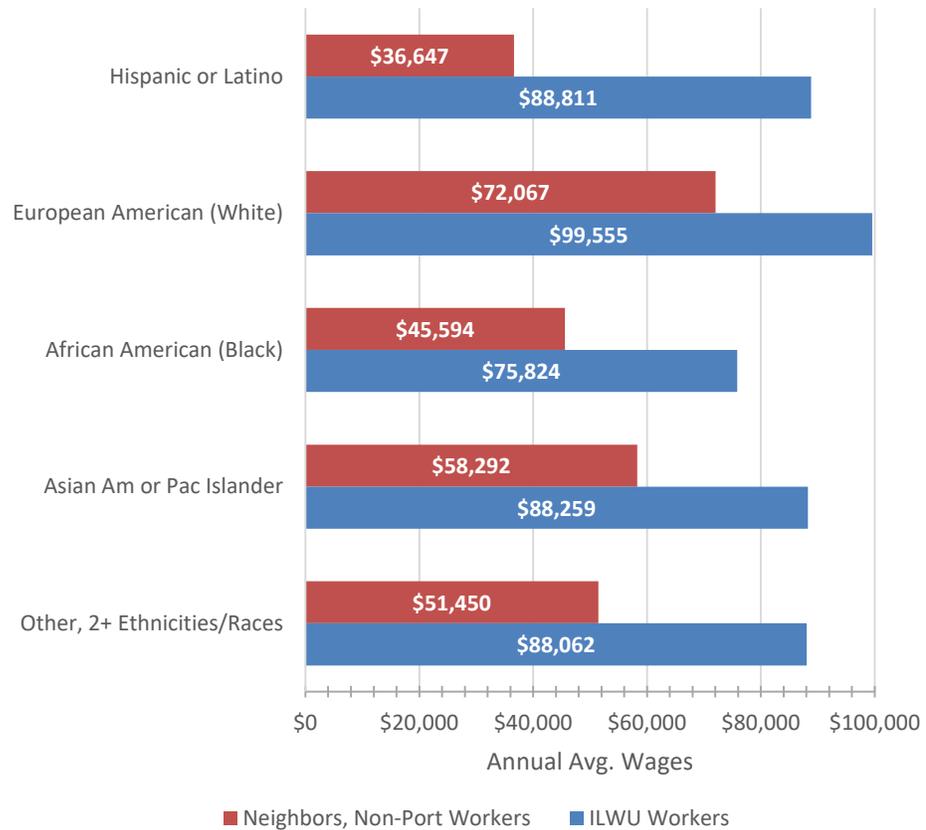
Older female dockworkers see the biggest differential in average annual wages – 59 percent higher for those age 40 to 49, 72 percent higher for those age 50 to 59, and 90 percent higher for those 60 or older.

Only one group – female dockworkers age 30 to 39 – earn less than their non-port peers.

Earnings by Ethnicity

Dockworkers represented by the ILWU in every ethnic group earn more than their ethnic counterparts who are not employed at the ports, as shown in *Figure 41*.

Figure 41: Average Annual Wages of ILWU Workers and their Co-Ethnic Neighbors



Source: Pacific Maritime Association; U.S. Census Bureau. American Community Survey, Public Use Microdata Sample, 2015-2019.

Latino dockworkers earn 142% more than their employed Latino neighbors not working at the ports.

Latino dockworkers have the largest average annual wage advantage, earning 142 percent more than their co-ethnic neighbors – more than double.

African-American dockworkers have a 66 percent average annual earnings advantage over their co-ethnic neighbors, and Asian American dockworkers earn 51 percent more than their co-ethnic neighbors.

Rent Burden

ILWU dockworkers are much less likely to be rent burdened than their neighbors, in the communities surrounding the Ports of Los Angeles and Long Beach (Figures 42 and 43).

Only 19 percent of ILWU dockworkers are rent burdened, compared to 56 percent of neighboring non-dockworker households. Rent burden is defined as spending more than 30 percent of household income on rent.

The map in Figure 43 shows that many ILWU dockworkers live in communities where a high percentage of their neighbors are rent burdened. The higher wages of ILWU workers enable them to avoid being precariously housed.

For comparison purposes, 56 percent of all Los Angeles County renter households are rent burdened.⁴

Figure 42: Rent Burden in Communities Surrounding the San Pedro Bay Ports

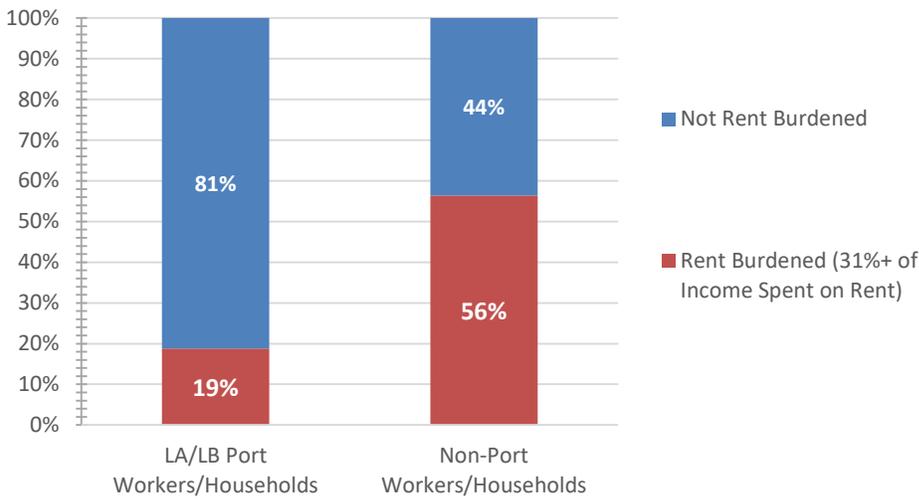
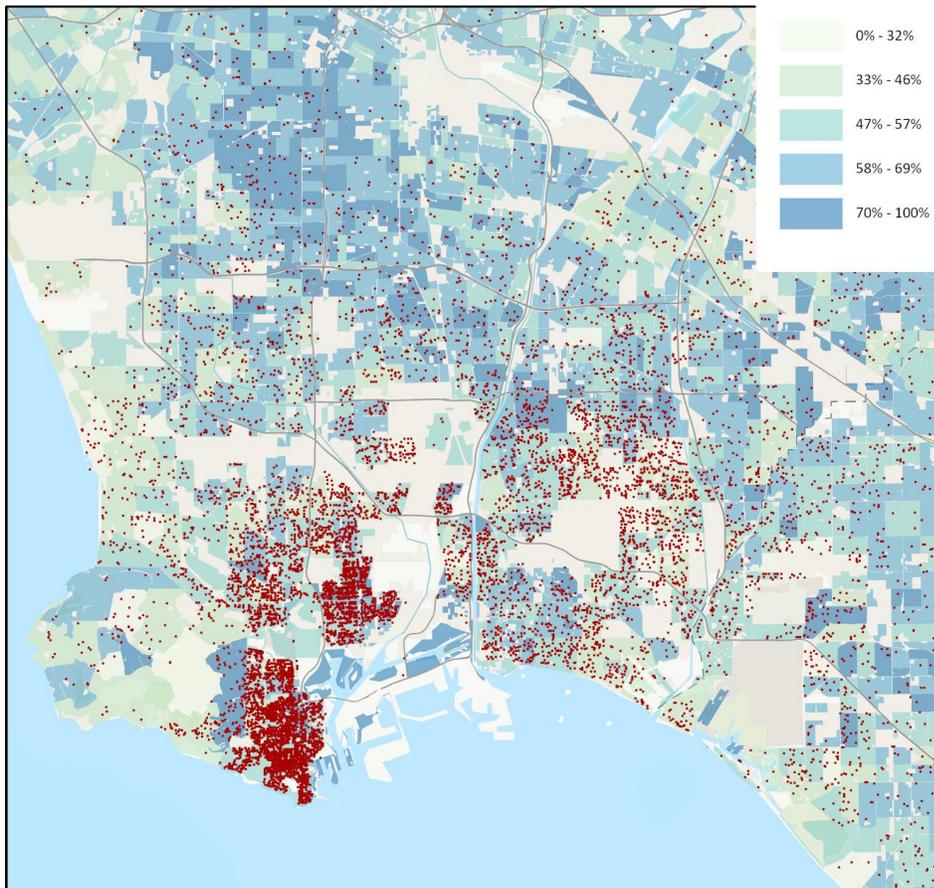


Figure 43: Map of Rent Burden in Communities Surrounding the Ports of Los Angeles and Long Beach, with ILWU Worker Households (in red)

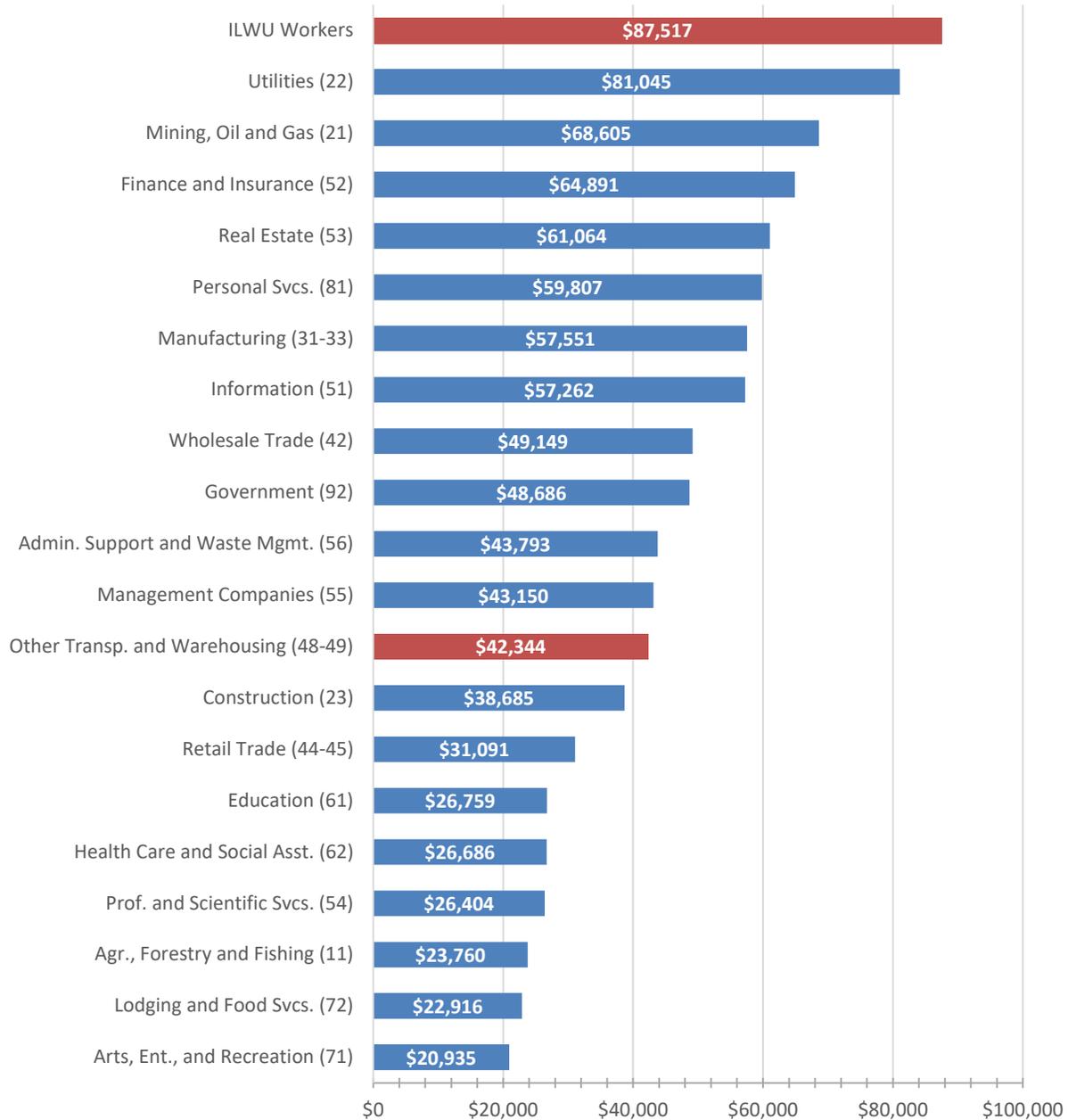


Source: Pacific Maritime Association; U.S. Census Bureau. 2021. American Community Survey, 5-Year Public Use Microdata Sample (PUMS), 2015-2019; Gross rent as a percentage of household income past 12 months (GRPIP) for workers in PUMAs with high numbers of ILWU workers. Geographic units displayed are census tracts.

Wages in Other Industries

Average annual earnings in the industry sectors that employ the most residents living in the communities surrounding the Ports of Los Angeles and Long Beach are show in *Figure 44*. ILWU workers' average wages of over \$87,000 in 2019 are higher than any of the other industry sectors that employ other workers in their neighborhoods.

Figure 44: Average Annual Wages of Residents Living in Communities Surrounding the Ports of Los Angeles and Long Beach, by Industry Sector, in 2019 dollars



Source: Source: Pacific Maritime Association; U.S. Census Bureau. 2021. American Community Survey, 5-Year Public Use Microdata Sample (PUMS), 2015-2019; Wages or salary income past 12 months, adjusted to 2019 dollars (WAGP) for workers in PUMAs with high numbers of ILWU workers. Numbers in parentheses along the vertical axis are NAICS Sector Codes.

Summary

The *median* annual earnings in 2019 of workers represented by the ILWU was \$89,560, compared to *median* earnings of \$34,345 for all of the other workers living in the same communities. The *median* earnings of dockworkers are 161 percent higher than their non-port neighbors. The *average* earnings of dockworkers are 83 percent higher than their non-port neighbors. (The *median* reflects the typical worker, the one in the middle, whereas the *average* reflects all workers.)

Compared to their neighbors in communities surrounding the harbor, ILWU dockworkers' median earned incomes are higher at every level of educational attainment.

Male dockworkers in all age groups earn 76 percent more than their employed male neighbors not working in the ports do.

Female dockworkers in all age groups earn 61 percent more than their employed female neighbors not working in the ports do.

Dockworkers represented by the ILWU in every ethnic group earn more than their ethnic counterparts who are not employed at the ports.

Latino dockworkers have the largest average annual wage advantage, earning 142 percent more than their co-ethnic neighbors do.

Only 19 percent of ILWU dockworkers are rent burdened, compared to 56 percent of neighboring non-dockworker households. The higher wages of ILWU workers enable them to avoid being precariously housed.

ILWU workers' average wages of over \$87,517 in 2019 were higher than any of the other industry sectors that employ other workers in their neighborhoods.

Dockworkers perform high-value-added work and a strong union represents them. As a result, they are well compensated.



*Photo credit:
Louie Gonzalez*

10. Economic Impacts of Automation

Dockworkers put in just under 20 million hours per year in the Ports, and earn \$1.16 billion in take-home pay

Analyzing Economic Impacts of Spending by Dockworkers

Jobs and wages lost due to automation directly impact workers and their families, but also cause economic ripple effects in the communities where they live. Wages paid in the San Pedro Bay Ports are an economic engine for California, supporting sales and jobs at businesses where dockworker households spend their paychecks, including restaurants, doctors' offices, repair shops, retail and grocery stores, and local home improvement contractors. This economic activity also generates tax revenue for local and state government.

In this chapter, we start by using the earnings of dockworkers in 2018 to 2019 as the baseline for estimating their current economic impacts on the region. Next, we estimate the economic impacts of automation already completed at LBCT and TraPac. Then we model two scenarios of hours and wages lost if there is more future automation of port terminals.

Current Economic impacts of Dockworkers Household Spending

Dockworkers were on the job an average of 19.8 million hours a year in 2018 and 2019, on ship and dock job assignments in the combined Ports of Los Angeles and Long Beach.⁵ Dockworkers – in longshore, clerk and casual job positions – earned an average of \$1.2 billion annually (adjusted to 2021 dollars) from these working hours.

The wages support dockworkers and their families directly, helping them put food on the table, maintain their health, pay for clothes, school supplies and other basic needs. Families also must pay for their housing – either a mortgage or rent – and hopefully spend some money on recreation and put some income into savings.

Non-port businesses and their workers in Southern California have benefitted from the ongoing household spending of dockworkers, which supports the equivalent of 7,065 year-round jobs and \$1.376 billion in sales at local (and online) businesses (*Table 2*).

These sales generate \$452.6 million in wages for other workers who provide the goods and services purchased by dockworker households⁶ and \$860.2 million of value added in California's economy.⁷

Further automation of container terminals at the Ports of Los Angeles and Long Beach would impact dock jobs, which make up the majority of hours worked in the San Pedro Bay Ports.

Table 2: Annual Induced Economic Impacts of Dockworker Household Spending, by Job Category, Ports of Los Angeles and Long Beach

Induced Impacts	Longshore	Clerk	Casual	Total
Induced Employment	5,815	947	304	7,065
Induced Labor Income	\$372,463,878	\$60,644,179	\$19,460,446	\$452,568,503
Induced Value Added	\$707,926,560	\$115,263,863	\$36,987,657	\$860,178,081
Induced Sales (Output)	\$1,132,983,935	\$184,471,260	\$59,196,001	\$1,376,651,197

Source: Pacific Maritime Association. 2021. Daily Person Records 2010-2021, data of 25,969,023 work-shift records of longshore, clerk and casual workers in the Ports of Los Angeles and Long Beach; Minnesota IMPLAN Group, Inc., IMPLAN System 2019 data and 2022 software. Note: “Induced Jobs” are person-years of employment, and include full-time and part-time jobs in ratios present in the national economy. The pre-pandemic years 2018 and 2019 were analyzed in this chapter to provide a “normal” baseline of employment.

Additional employment and sales generated when San Pedro Bay dockworkers spend their wages to buy goods and services (these economic multipliers are also called “induced impacts”) are broken out in Table 3.

Table 3: Annual Induced Economic Impacts of Dockworker Household Spending, by Job Category, Ports of Los Angeles and Long Beach

Ship Jobs: Induced Impacts	Longshore	Clerk	Casual	Total
Induced Employment	820	134	43	997
Induced Labor Income	\$52,539,323	\$8,554,398	\$2,745,068	\$63,838,788
Induced Value Added	\$99,859,300	\$16,258,987	\$5,217,436	\$121,335,723
Induced Sales (Output)	\$159,817,400	\$26,021,302	\$8,350,119	\$194,188,822

Dock Jobs: Induced Impacts	Longshore	Clerk	Casual	Total
Induced Employment	4,995	813	261	6,069
Induced Labor Income	\$319,924,555	\$52,089,782	\$16,715,378	\$388,729,715
Induced Value Added	\$608,067,261	\$99,004,876	\$31,770,221	\$738,842,358
Induced Sales (Output)	\$973,166,535	\$158,449,958	\$50,845,882	\$1,182,462,375

Source: Pacific Maritime Association. 2021. Daily Person Records 2010-2021, data of 25,969,023 work-shift records of longshore, clerk and casual workers in the Ports of Los Angeles and Long Beach. Minnesota IMPLAN Group, Inc., IMPLAN System 2019 data and 2022 software. Note: “Induced Jobs” are person-years of employment, and include full-time and part-time jobs in ratios present in the national economy. The pre-pandemic years 2018 and 2019 were analyzed in this chapter to provide a “normal” baseline of employment.

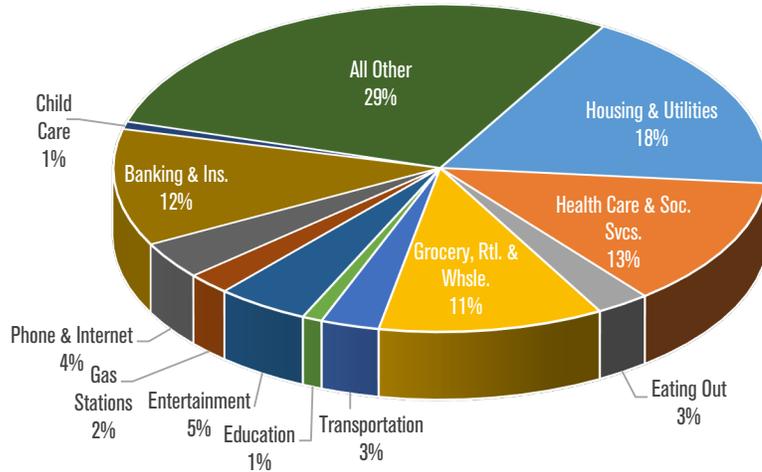
Patterns of Household Spending

Many businesses and industries are the beneficiaries of dockworkers’ household spending, measured in both jobs and sales supported. Figure 45 shows the impacts of grocery workers’ added household spending across almost all sectors of the economy.⁸ The share of increased household spending that will flow to different industries, increasing their economic output and employment, is as follows.

- Housing, in the form of rent and mortgage payments 18 percent
- Health services at hospitals, doctor’s office and clinics 13 percent
- Banking and insurance services 12 percent
- Grocery, retail and wholesale goods 11 percent
- Entertainment 5 percent
- Phone and internet 4 percent

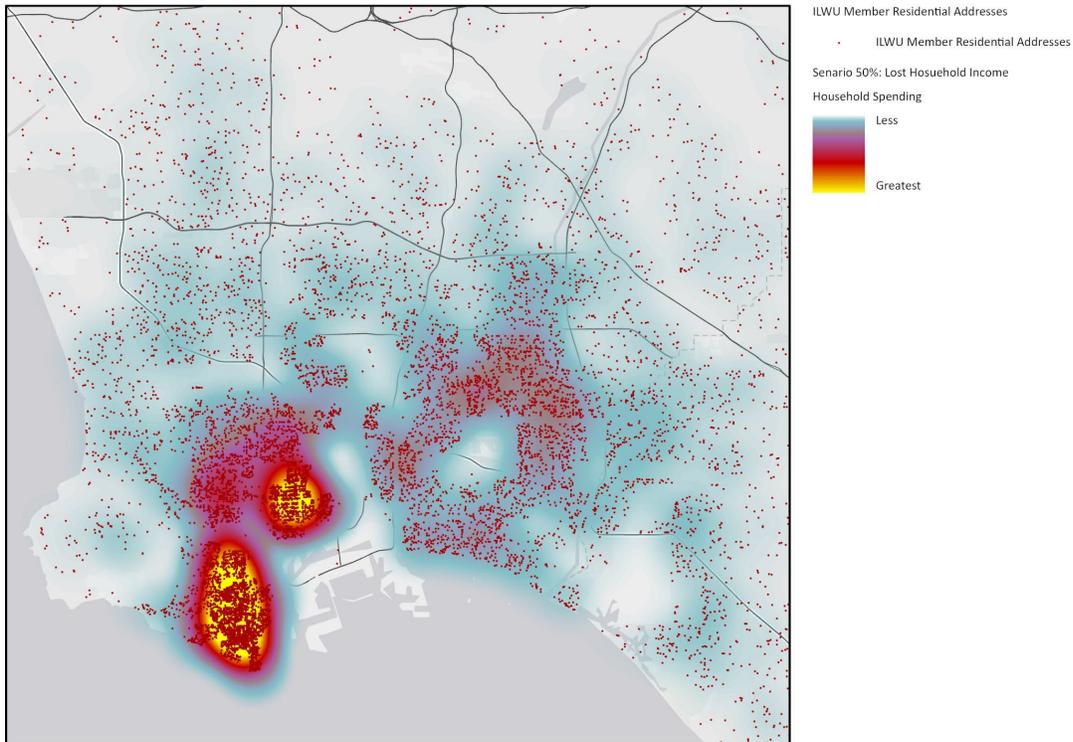
- Eating out: Food and beverages at restaurants and bars 3 percent
- Gas for private vehicles..... 2 percent
- Education and childcare services 2 percent

Figure 45: Worker Household Spending Patterns



Source: Economic Roundtable illustration based on the IMPLAN input/output model and national household survey data. Minnesota IMPLAN Group, Inc., IMPLAN System 2019 data and 2022 software.

Figure 46: Origin of Induced Economic Impacts of Dockworker Household Spending



Source: Pacific Maritime Association. 2021. Daily Person Records 2010-2021, data of 23.7 million work-shift records of longshore, clerk and casual workers in the Ports of Los Angeles and Long Beach; ILWU West Coast input on ship versus dock occupations. Minnesota IMPLAN Group, Inc., IMPLAN System 2019 data and 2022 software. Note: "Induced Jobs" are person-years of employment, and include full-time and part-time jobs in ratios present in the national economy. The pre-pandemic years 2018 and 2019 were analyzed in this chapter to provide a "normal" baseline of employment.

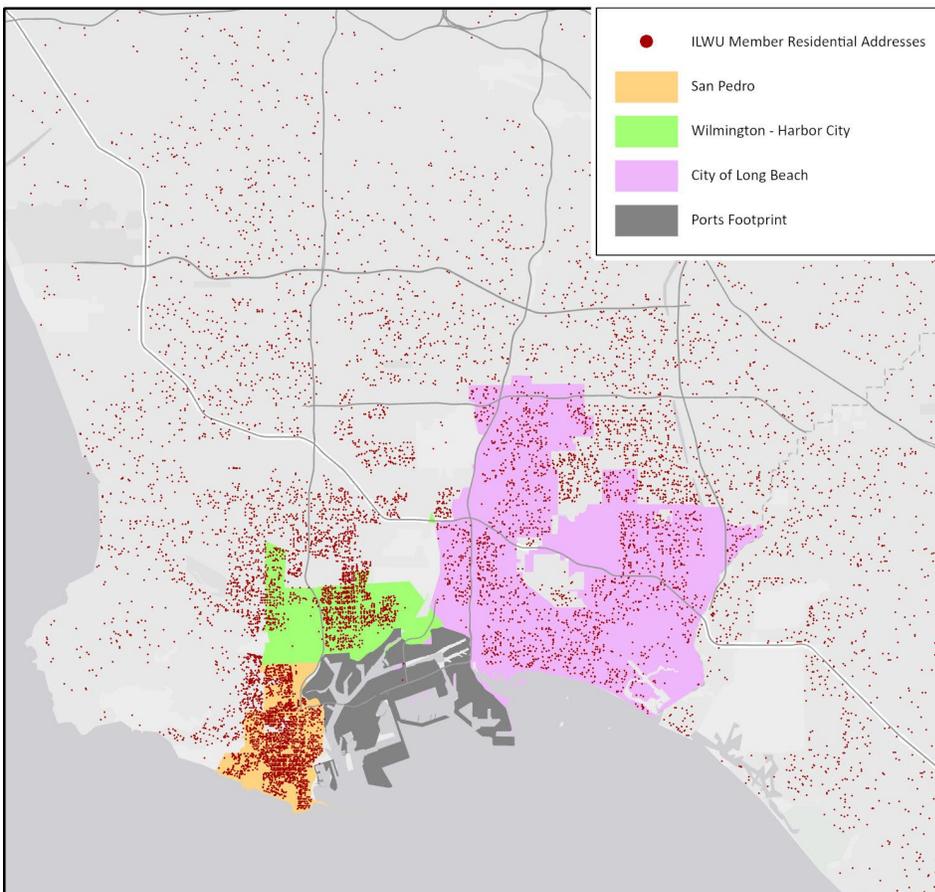
The geography of dockworkers' household spending, starting where they live, but spreading further into the communities where their families spend their earnings, is displayed in *Figure 46*.

Dockworkers' Share of Local Retail, Restaurant, Health Care, and Recreational Expenditures

A majority of dockworkers reside the communities of San Pedro and Wilmington-Harbor City neighborhoods of Los Angeles, as well as the City of Long Beach (*Figure 47*).

Their share of purchases at local businesses, as a share of all purchases by all wage earners amounts to 13 percent in San Pedro, 9.4 percent in Wilmington-Harbor City, and 1.3 percent in the City of Long Beach (*Figure 48*). Residents without earned income were excluded from this analysis to create a like-for-like comparison with dockworkers.

Figure 47: Dockworkers in San Pedro, Wilmington-Harbor City, City of Long Beach



Source: Pacific Maritime Association. 2021. Daily Person Records 2018-19, data of 4.4 million work-shift records of longshore, clerk and casual workers in the Ports of Los Angeles and Long Beach.

Figure 48: Dockworkers’ Share of Income San Pedro, Wilmington–Harbor City, City of Long Beach



Source: U.S. Census Bureau, 2016-2020 5-Year American Community Survey, Estimates Table S1901, Income in the Past 12 Months (in 2020 Inflation-Adjusted Dollars). Notes: Census Tract data for three dockworker communities, compared only to households with earned income.

The amount of dockworkers’ spending is highlighted in *Table 4*. In San Pedro, the largest share of wages is spent on housing costs, either mortgage payments or rent, \$66 million annually (23 percent), followed by grocery, retail and wholesale shopping, \$36 million (13 percent), and then health services at hospitals, doctor’s office and clinics, \$34 million (12 percent).

Table 4: Dockworkers’ Direct Expenditures by Community of Residence

Expenditure Categories	San Pedro	Wilmington Harbor City	City of Long Beach	Percent
Housing & Utilities	\$66,766,118	\$29,540,741	\$36,324,434	23%
Health Care & Soc. Svcs.	\$34,145,223	\$15,107,591	\$18,576,876	12%
Eating Out	\$10,751,558	\$4,757,038	\$5,849,438	4%
Grocery, Rtl. & Whsle.	\$36,859,630	\$16,308,583	\$20,053,663	13%
Transportation	\$8,914,242	\$3,944,116	\$4,849,837	3%
Education	\$3,540,951	\$1,566,698	\$1,926,472	1%
Entertainment	\$12,099,484	\$5,353,430	\$6,582,784	4%
Gas Stations	\$6,623,581	\$2,930,611	\$3,603,592	2%
Phone & Internet	\$12,615,126	\$5,581,576	\$6,863,321	4%
Banking & Ins.	\$30,204,356	\$13,363,950	\$16,432,828	10%
Child Care	\$2,906,392	\$1,285,936	\$1,581,237	1%
All Other	\$66,789,954	\$29,551,287	\$36,337,402	23%
Total	\$292,216,616	\$129,291,556	\$158,981,884	100%

Source: Pacific Maritime Association. 2021. Daily Person Records 2018-19, data of 4.4 million work-shift records of longshore, clerk and casual workers in the Ports of Los Angeles and Long Beach; Minnesota IMPLAN Group, Inc., IMPLAN System 2019 data and 2022 software.

Dockworkers in the Wilmington–Harbor City neighborhood spend \$29.5 million annually on housing costs, \$16 million on groceries, retail and wholesale goods, and \$15 million on health services at hospitals, doctor’s office and clinics.

Dockworkers living in the City of Long Beach represent a smaller share of a larger community, and their annual spending includes \$26 million annually for housing costs, following by \$20 million for groceries, retail and wholesale goods, and \$18.5 million for health services at hospitals, doctor’s office and clinics.

Economic Losses Due to Automation at LBCT and TraPac

Two shipping terminals – Long Beach Container Terminal (LBCT) in the Port of Long Beach, and Trans Pacific Container Service Corp. (TraPac) in the Port of Los Angeles – have automated container loading and unloading equipment. This has eliminated jobs and wages, and reduced economic activity in the communities where dockworkers live.

While the numbers of shipping containers handled at any terminal varies by year and season, and fluctuate further due to changing consumer demand and shipping costs, we normalized the data by analyzing the number of hours of work per shipping container handled, as well as the ratio of dockside hours to shipside hours. As presented in *Chapter 6, Table 1*, after automation there was a loss of 0.64 hours of work per container moved at LBCT and 0.50 hours of work per container at TraPac.

The annual economic impacts of these lost hours and wages, based on the reduced households spending that could have supported additional sales and employment at businesses in the Southern California region and throughout the state, is based on an average of 535,848 annual person-hours of port work was lost and \$41.8 million in annual wages not earned.

That direct loss of person-hours and wage at the LBCT and TraPac terminals took away the equivalent of an additional 254 year-round jobs and \$49.5 million in sales at California businesses (*Table 5*). These sales would have generated \$16.3 million of income for other workers who provide the goods and services purchased by dockworker households and \$30.9 million of value added in the state economy.

Automation at LBCT and TraPac eliminated 254 jobs at businesses that serve dockworkers.

Table 5: Annual Induced Economic Impacts of Dockworker Household Spending, lost due to Past Automation at LBCT and TraPac

Induced Impacts	Longshore	Clerk	Casual	Total
Induced Employment	209	34	11	254
Induced Labor Income	\$13,393,311	\$2,180,685	\$699,772	\$16,273,768
Induced Value Added	\$25,456,108	\$4,144,737	\$1,330,028	\$30,930,873
Induced Sales (Output)	\$40,740,612	\$6,633,344	\$2,128,610	\$49,502,567

Source: Pacific Maritime Association. 2021. *Daily Person Records 2010-2021*, data of 23.7 million work-shift records of longshore, clerk and casual workers in the Ports of Los Angeles and Long Beach; Minnesota IMPLAN Group, Inc., IMPLAN System 2019 data (“U.S. Package”) and 2022 software. Note: “Induced Jobs” are person-years of employment, and include full-time and part-time jobs in rations present in the national economy. The pre-pandemic years 2018 and 2019 were analyzed in this chapter to provide a “normal” baseline of employment.

Potential Future Economic Losses Due to Automation

The person-hours of work already lost at the San Pedro Bay Ports, along with the associated losses of household spending impacts in California, illustrate the full costs of automation. If there is automation at other shipping terminals, it will result in greater loss of hours and wages for dockworkers and further reduce sales by local business.

The Economic Roundtable quantified potential future economic losses from automation by analyzing two possible scenarios of shipping terminal automation, to estimate the economic impacts of lost household spending (*Table 6*). The first scenario projects the losses from losing half of employment because of automation, the second scenario projects losing three-quarters of employment. These scenarios apply to loss of dockside work but assume that shipside work would not be automated.

Table 6: Scenarios of Dock Work Hours and Wages Lost Due to Future Automation

	Scenario 1: 50% Loss of Hours Due to Automation	Scenario 2: 75% Loss of Hours Due to Automation
Dock Job Hours Lost	6,822,669	10,653,643
Dock Job Wages Lost	\$401,869,924	\$627,617,299

Source: Pacific Maritime Association. 2021. *Daily Person Records 2018-19*, data of 4.4 million work-shift records of longshore, clerk and casual workers in the Ports of Los Angeles and Long Beach.

Scenario 1: 50 Percent Loss in Hours and Wages

Scenario 1 projects the loss of 50 percent of dockside work hours, while shipside jobs stay steady. This is based on the loss in hours and wages seen at LBCT and TraPac, as presented in *Chapter 6, Table 1*. In this scenario, 6.8 million dock work hours are lost due to more work being carried out by automated container moving equipment, adding up to \$401.8 million in wages lost compared to operations in 2018 and 2019.

That direct loss of hours and wages in scenario 1 would eliminate the equivalent of an additional 2,445 year-round, non-port jobs that are currently supported by the consumer spending of dockworkers. This would be the result of \$476.3 million in lost purchases at California businesses by dockworker households (*Table 7*).

These lost sales would otherwise have generated \$156.6 million in earnings for other workers who provide the goods and services purchased by dockworker households and \$297.6 million of value added in the region around the ports and throughout California. The majority of these additional economic impacts are from the household spending of longshore workers, although the household spending of clerks and casual dockworkers also help generate these impacts.

Automation that eliminates 1/2 of dockside jobs would also eliminate 2,445 jobs at businesses that serve dockworkers.

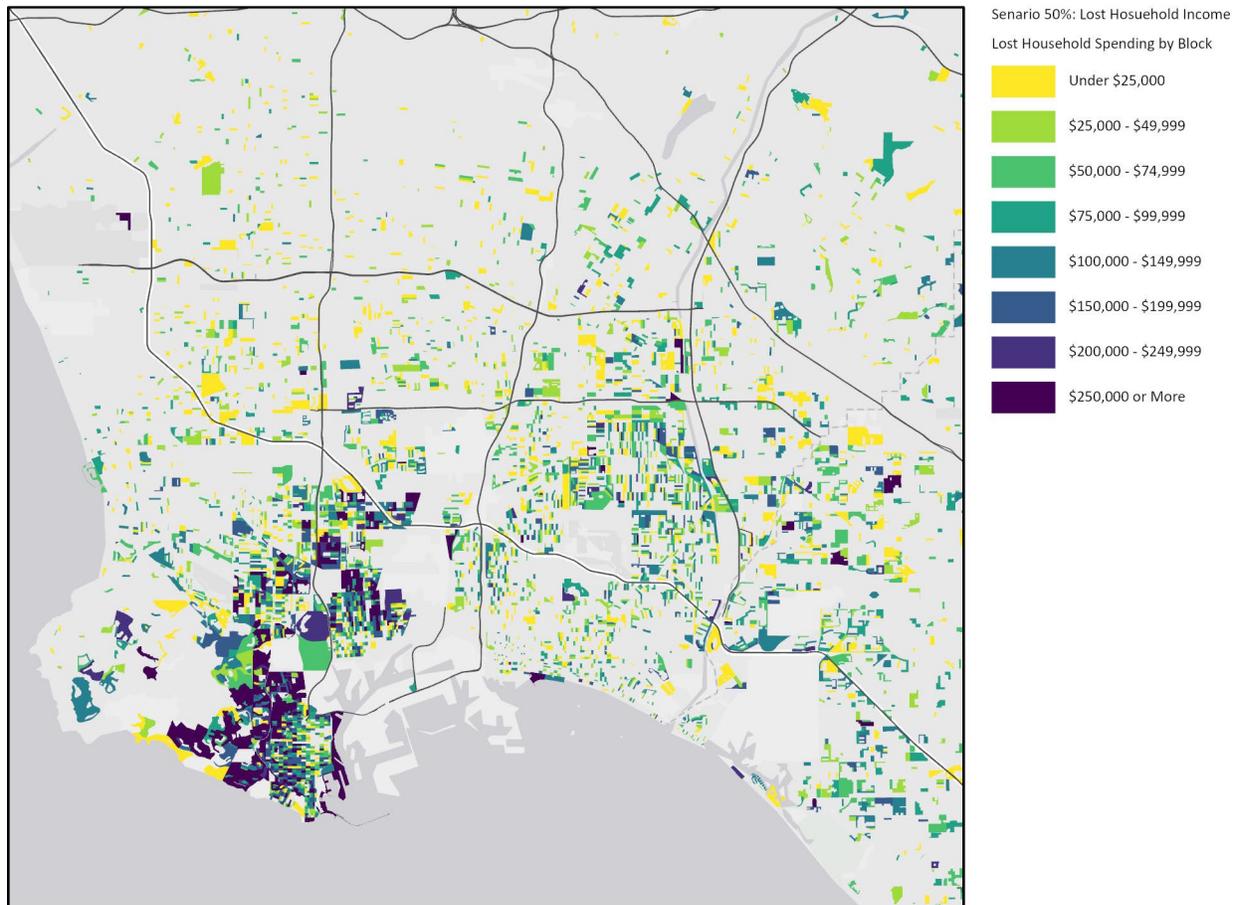
Table 7: Scenario 1, 50 Percent Loss of Hours and Wages Due to Future Automation, Leading to Declines in Dockworker Household Spending

Induced Impacts Lost	Longshore	Clerk	Casual	Total
Induced Employment	2,012	328	105	2,445
Induced Labor Income	\$128,872,486	\$20,982,884	\$6,733,313	\$156,588,683
Induced Value Added	\$244,942,561	\$39,881,292	\$12,797,728	\$297,621,580
Induced Sales (Output)	\$392,012,395	\$63,827,048	\$20,481,814	\$476,321,257

Source: Pacific Maritime Association. 2021. Daily Person Records 2018-19, data of 4.4 million work-shift records of longshore, clerk and casual workers in the Ports of Los Angeles and Long Beach; Minnesota IMPLAN Group, Inc., IMPLAN System 2019 data (“U.S. Package”) and 2022 software. Note: “Induced Jobs” are person-years of employment, and include full-time and part-time jobs in ratios present in the national economy. The pre-pandemic years 2018 and 2019 were analyzed in this chapter to provide a “normal” baseline of employment.

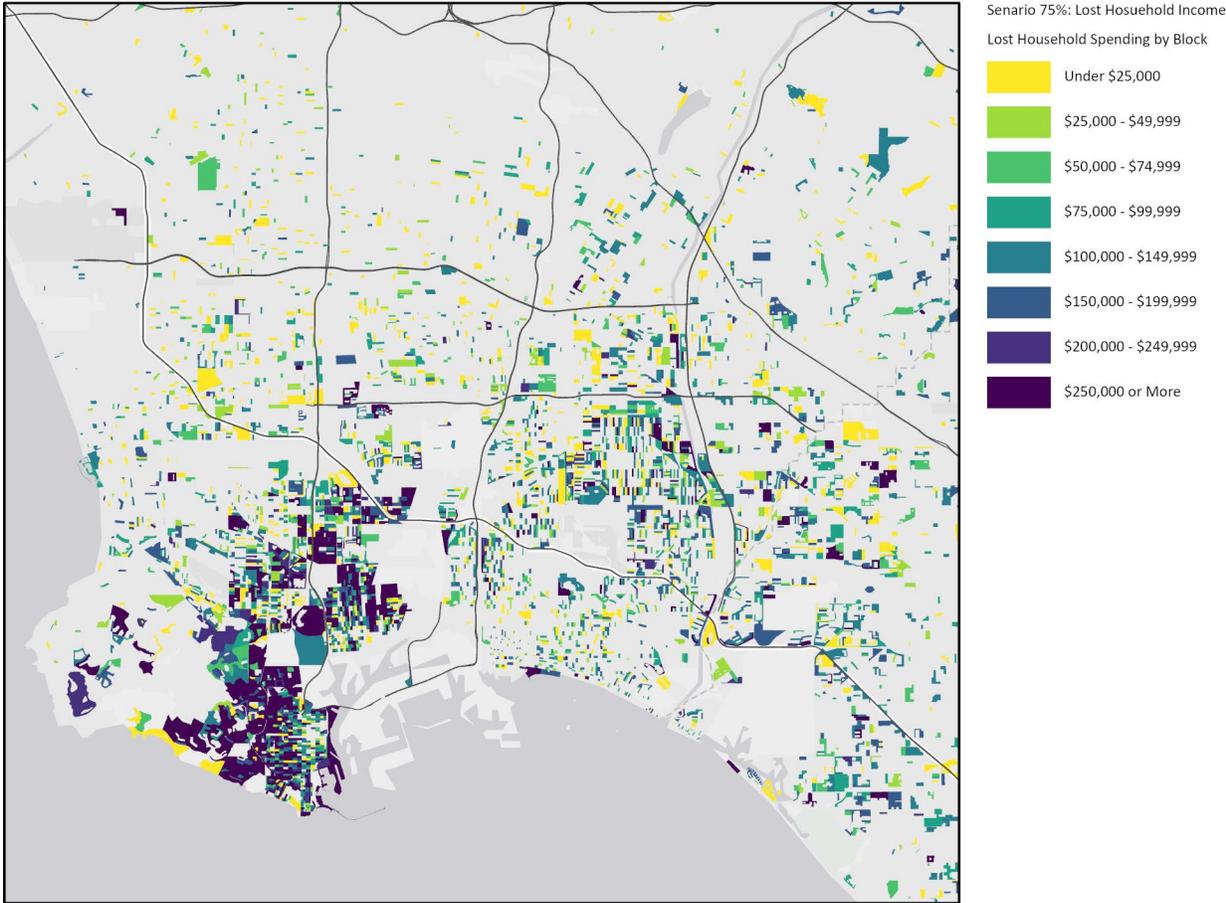
The geographic extent of where dockworkers’ household spending originates is illustrated in Figure 48. The ripple effects of lost household spending start in San Pedro, Wilmington, Long Beach and radiate outwards. Their household spending impacts ripples across the entire state of California, affecting not only local retail and service providers, but

Figure 48: Annual Loss of Dockworker Household Spending in Scenario 1: 50 Percent Loss of Dock Work Hours



Source: Pacific Maritime Association. 2021. Daily Person Records 2018-19, data of 4.4 million work-shift records of longshore, clerk and casual workers in the Ports of Los Angeles and Long Beach. Note: Maps aggregate dockworker households by census block. In some instances, contiguous census blocks have the same value, so some large areas of the same color shading appear to be a single large census block, but are several blocks each losing the same amount of household spending under this scenario.

Figure 49: Annual Loss of Dockworker Household Spending in Scenario 2: 75 Percent Loss of Dock Work Hours



Source: Pacific Maritime Association (PMA). 2021. Daily Person Records 2018-19, data of 4.4 million work-shift records of longshore, clerk and casual workers in the Ports of Los Angeles and Long Beach. Note: Maps aggregate dockworker households by census block. In some instances, contiguous census blocks have the same value, so some large areas of the same color shading appear to be a single large census block, but are several blocks each losing the same amount of household spending under this scenario.

agriculture, manufacturing and the operation of government. These further impacts are discussed later in this chapter.

Scenario 2: 75 Percent Loss in Hours and Wages

Scenario 2 projects the loss of 75 percent of dockside work hours, while shipside jobs stay steady. This is based on estimates of the high range of jobs lost at other ports that have automated.⁹ Some estimates of job loss are as high as 80 percent, which we adjust down by five percentage points to account for new automation control operations and maintenance jobs that would open up to some dockworkers.

In scenario 2, 10.7 million dock work hours would be lost directly to automated shipping container moving equipment, and \$627.6 million in wages would be lost compared to current manual operations in the San Pedro Bay container terminals.

In this scenario, the 75 percent loss of dock work hours and wages would eliminate even more of the economic impacts from dockworkers' current household spending. This annual loss amounts to 3,818 year-round, non-port jobs and \$743.9 million in sales at California businesses that provide goods and services for dockworkers (Table 8).

These at-risk induced sales tied to current dockworker household spending support \$244.6 million of income for other, non-dockworkers, and support \$464.8 million of value added in the region around the ports and throughout California.

The majority of these induced economic impacts are from the household spending of longshore workers, although the household spending of clerks and casual dockworkers also help generate these impacts.

Table 8: Scenario 2, 75 Percent Loss of Hours and Wages Due to Future Automation, Leading to Declines in Dockworker Household Spending

Induced Impacts	Longshore	Clerk	Casual	Total
Induced Employment	3,142	512	164	3,818
Induced Labor Income	\$201,265,626	\$32,769,859	\$10,515,701	\$244,551,186
Induced Value Added	\$382,537,182	\$62,284,304	\$19,986,754	\$464,808,240
Induced Sales (Output)	\$612,222,377	\$99,681,408	\$31,987,317	\$743,891,102

Source: Pacific Maritime Association. 2021. Daily Person Records 2018-19, data of 4.4 million work-shift records of longshore, clerk and casual workers in the Ports of Los Angeles and Long Beach; Minnesota IMPLAN Group, Inc., IMPLAN System 2019 data and 2022 software. Note: "Induced Jobs" are person-years of employment, and include full-time and part-time jobs in rations present in the national economy. The pre-pandemic years 2018 and 2019 were analyzed in this chapter to provide a "normal" baseline of employment.

For scenario 2, Figure 49 maps the location of dockworker households carrying out dock work assignments, which are the points of origin for their economic impacts. As with the prior scenario, the ripple effects of lost household spending start in San Pedro, Wilmington and Long Beach, and radiate throughout Los Angeles and Orange Counties. The full extent of these negative impacts is much broader, stretching across Southern California and the entire state, as analyzed in the next section.

Geography of Statewide Impacts

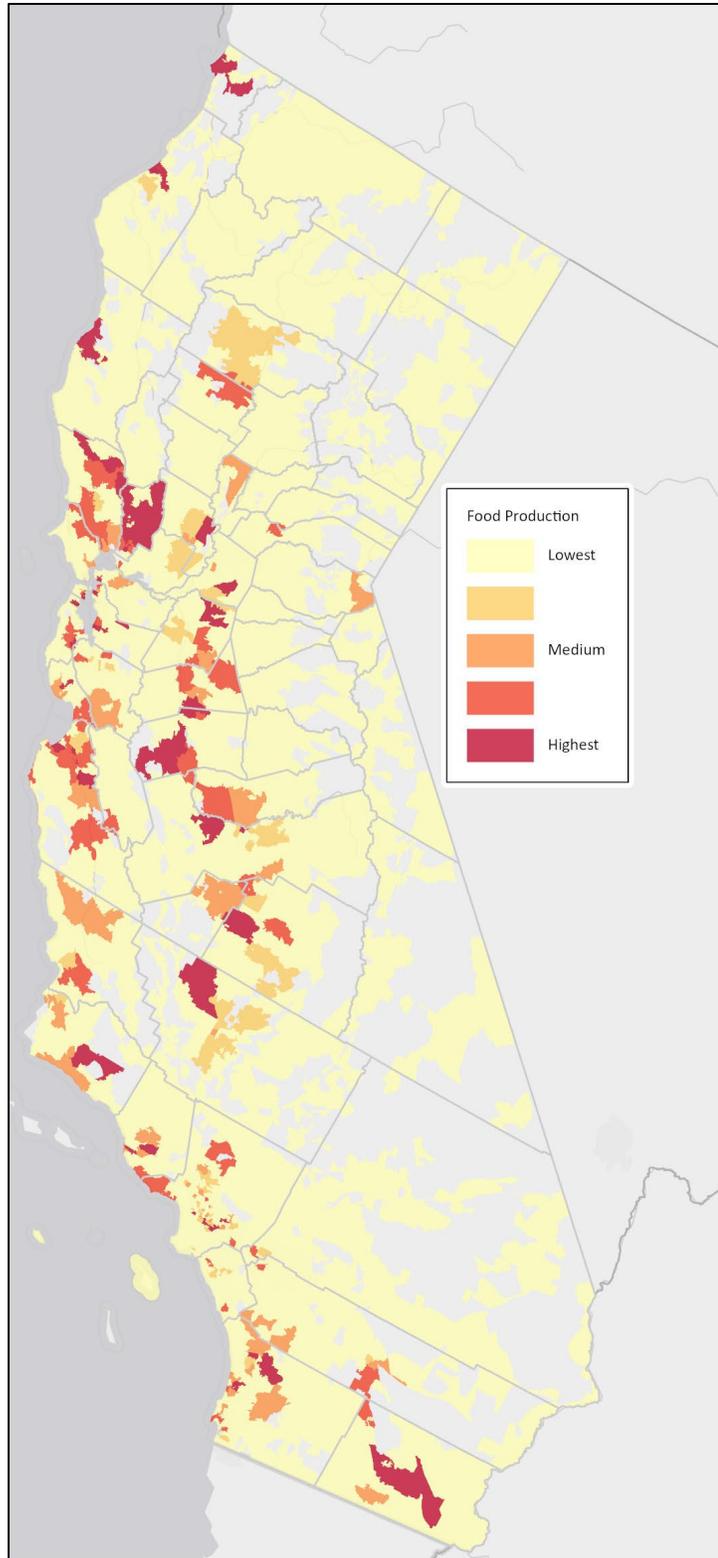
Although the loss of household spending by San Pedro Bay dockworkers will have its most immediate impacts where they and their family members shop – both in person and online – the losses of employment and sales reach across the state of California.

Food Production

When hours and wages are cut back for dockworkers, their families spend less at grocery stores. California is a major food producer, from farms,

Automation that eliminates 3/4 of dockside jobs would also eliminate 3,818 jobs at businesses that serve dockworkers.

Figure 50: California Food Production Employment



Source: U.S. Census Bureau. 2020. County Business Patterns: Complete ZIP Code Industry Detail File. Note: Employment ratio of total population in each ZIP Code Tabulation Area.

orchards, vineyards and fisheries to food processing factories. *Figure 50* shows where these dockworkers' reduced spending on groceries will be felt hardest, where food production jobs make up the largest share of the local labor force.

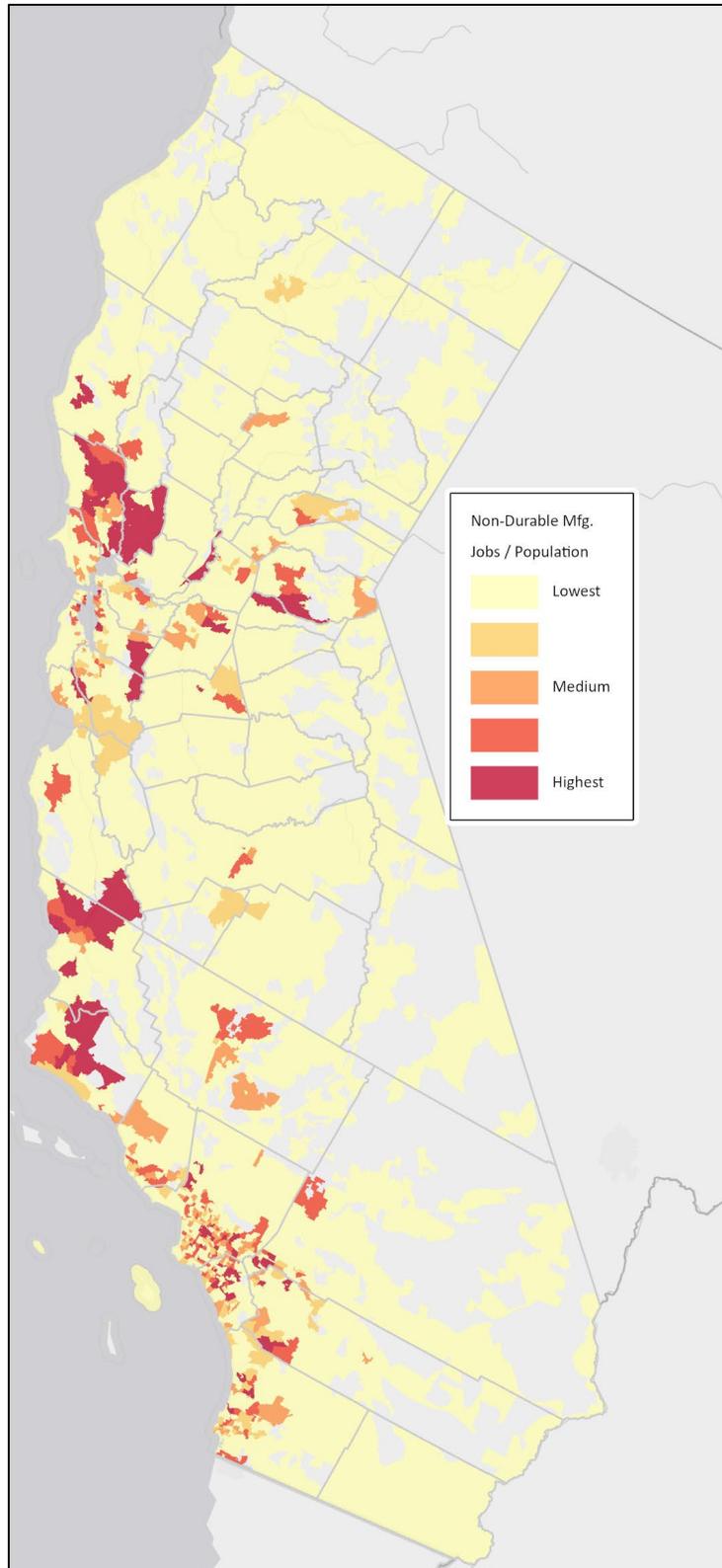
The California Central Valley and Imperial Valley stand out, but also exurban food production sites surround major population centers.

Non-Durable Manufacturing

California is a major manufacturer of non-durable goods, including beverages, textiles, clothing, leather products, paper products, printing, petroleum refining, chemical manufacturing, and plastics and rubber fabrication.

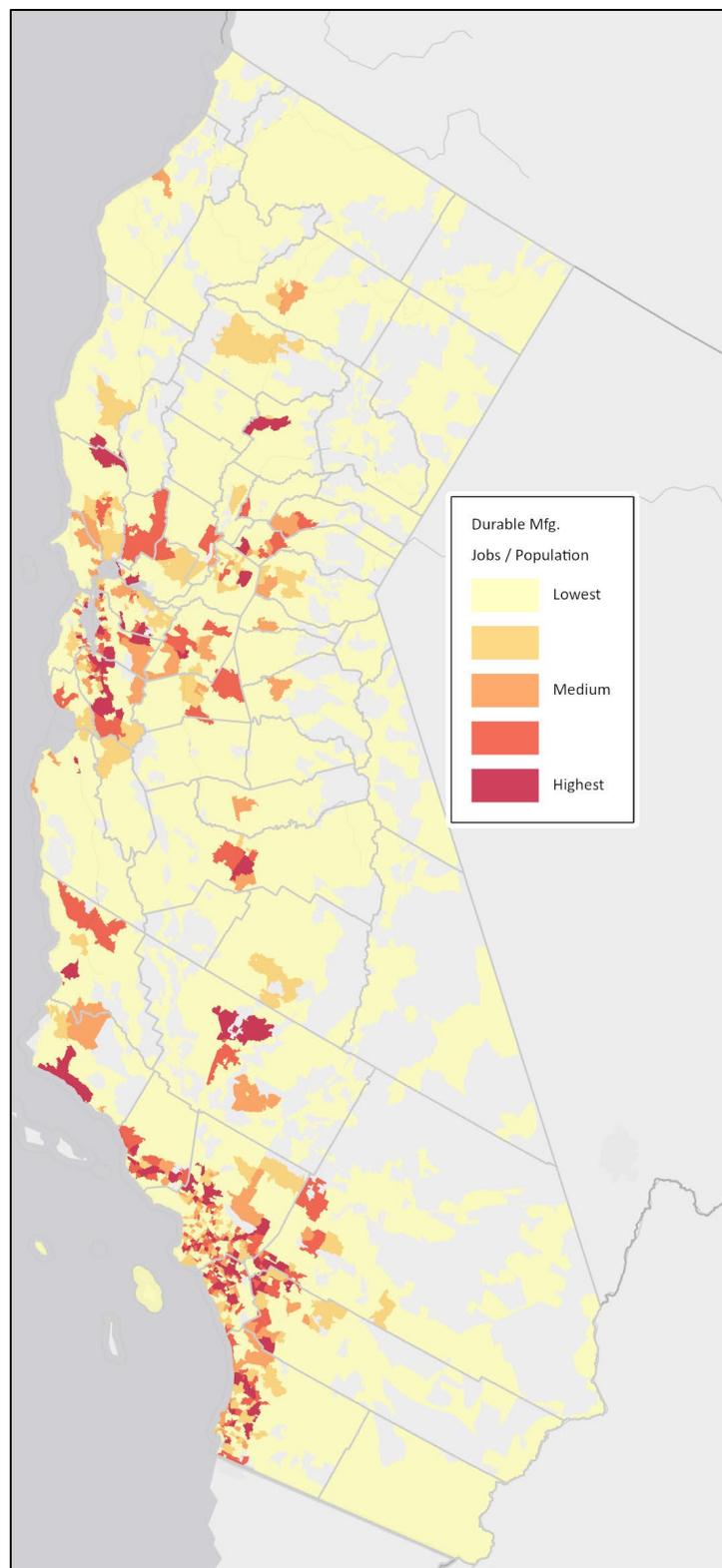
Figure 51 shows where non-durable manufacturing jobs are concentrated relative to the local population around major metropolitan areas of the state: Los Angeles, San Diego, Fresno, Sacramento, the northern San Francisco Bay region, but also in Santa Barbara and San Luis Obispo counties.

Figure 51: Non-Durable Manufacturing Employment



Source: U.S. Census Bureau. 2020. County Business Patterns: Complete ZIP Code Industry Detail File. Note: Employment ratio of total population in each ZIP Code Tabulation Area.

Figure 52: Durable Manufacturing Employment



Source: U.S. Census Bureau. 2020. County Business Patterns: Complete ZIP Code Industry Detail File. Note: Employment ratio of total population in each ZIP Code Tabulation Area.

Durable Manufacturing

California is a major manufacturer of durable goods, which include: furniture, primary metals, fabricated metals, machinery, computers and electronics, electrical equipment, appliances, and transportation equipment.

Figure 52 shows where these jobs are most concentrated.

Durable manufacturing is concentrated in a major metropolitan areas of the state: Los Angeles, San Diego, Fresno, Sacramento, the northern San Francisco Bay region, but also in Santa Barbara and San Luis Obispo counties.

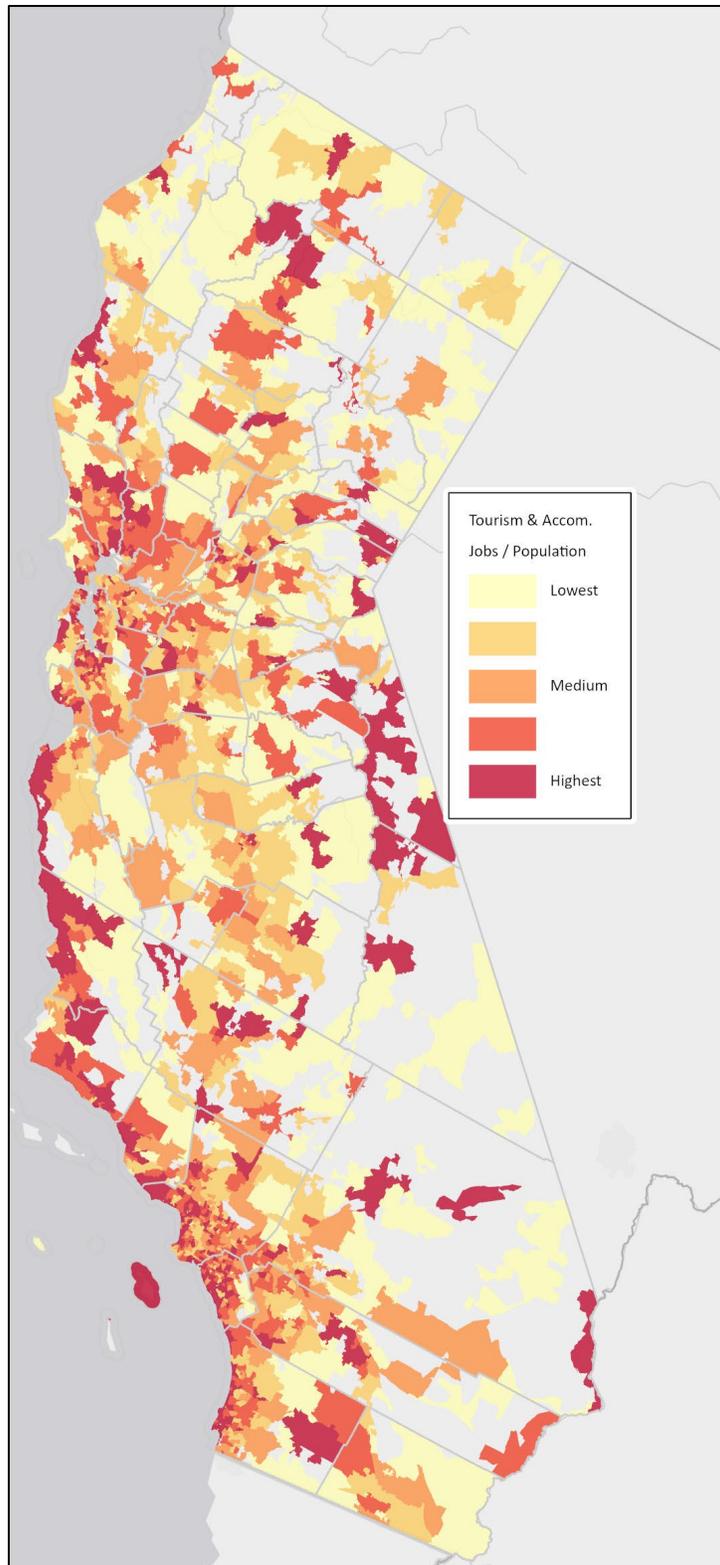
Lodging

California's balanced economy includes many service industries. Employment in the tourism and accommodation sector is shown in *Figure 53*.

Lodging establishments include hotels, motels, casino hotels, bed-and-breakfast inns, RV parks and recreational camps, rooming and boarding houses.

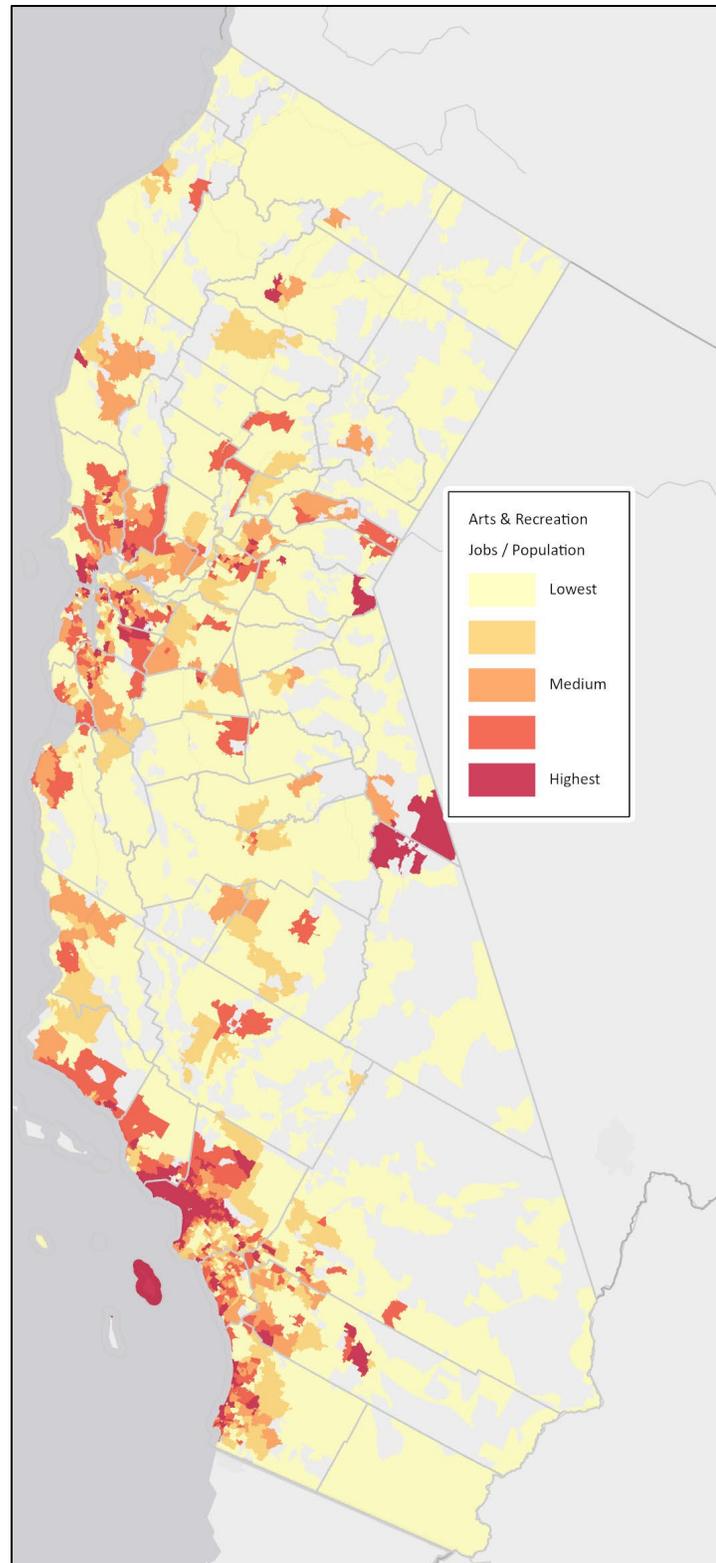
When port works and their families travel less in the state, hundreds of communities feel the loss. This includes the impacts on jobs but also Transient Occupancy Taxes (hotel "bed taxes") that support local government.

Figure 53: Tourism and Accommodation Employment



Source: U.S. Census Bureau. 2020. County Business Patterns: Complete ZIP Code Industry Detail File. Note: Employment ratio of total population in each ZIP Code Tabulation Area.

Figure 54: Arts and Recreation Employment



Source: U.S. Census Bureau. 2020. County Business Patterns: Complete ZIP Code Industry Detail File. Note: Employment ratio of total population in each ZIP Code Tabulation Area.

Entertainment

California's arts and recreation industries, include theater and dance companies and their performance venues, musical groups and artists, professional sports teams, racetracks, independent artists, and performers, museums and historical sites, zoos and botanical gardens, theme parks, casinos, golf courses, skiing facilities, marinas, fitness centers, and bowling alleys.

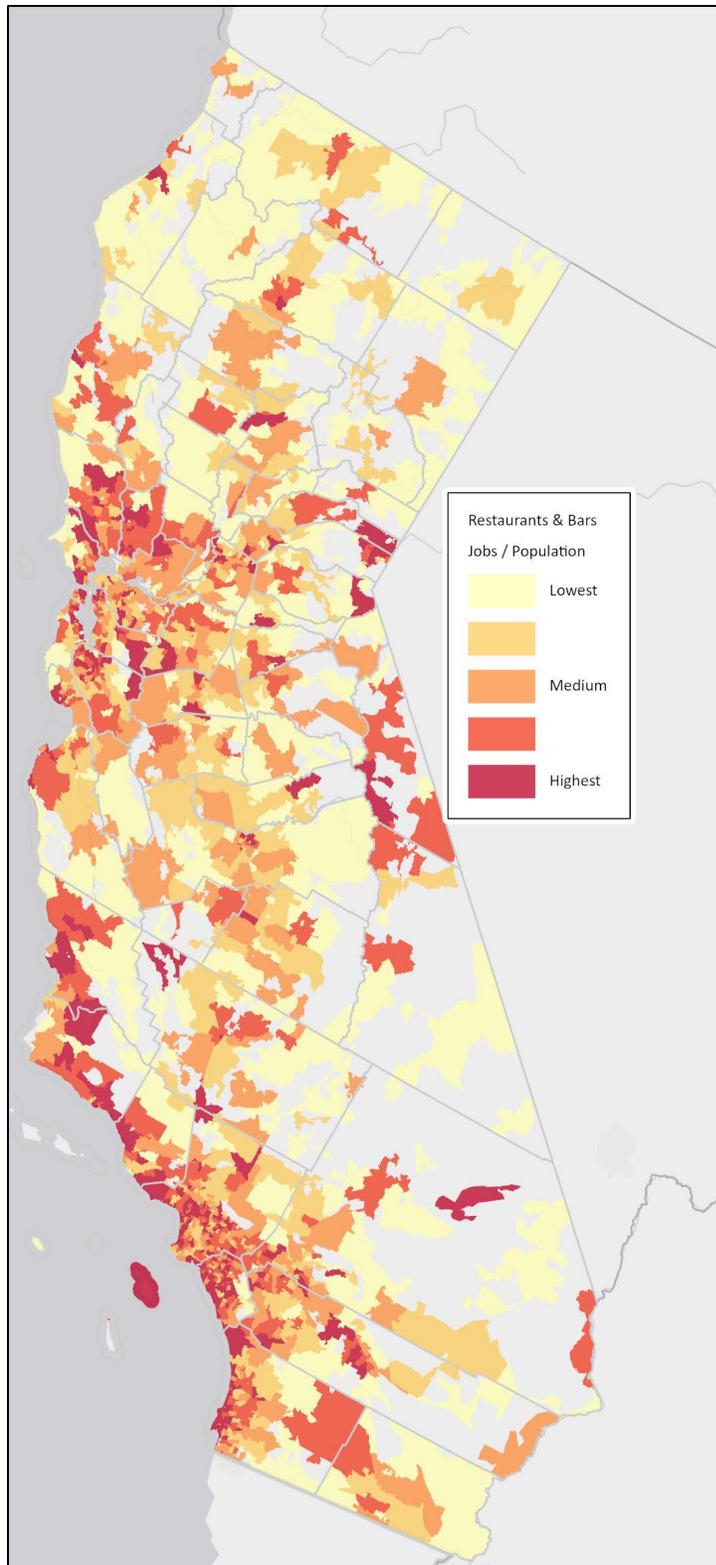
The greatest number of these businesses are in urban centers, as seen in Figure 54.

Restaurants

California's restaurants and bars include full-service as well as counter-based, fast-food restaurants, cafeterias, snack bars, food service contractors, caterers, mobile food delivery services and drinking establishments (Figure 55).

Restaurants and bars support employment statewide. Dockworkers and their families spend money in restaurants and bars as they travel up California's Coast, into the Sierra mountain communities, and beyond.

Figure 55: Restaurant and Bar Employment



Source: U.S. Census Bureau. 2020. County Business Patterns: Complete ZIP Code Industry Detail File. Note: Employment ratio of total population in each ZIP Code Tabulation Area.

Local, State and Federal Tax Impacts

Local, state and federal tax revenue would decrease significantly if there is further automation. Automation of shipping container terminals would eliminate significant amounts of tax revenue by eliminating work and wages of dockworkers carrying out dockside jobs. At the federal level, personal income tax accounts for 36 percent of this loss. At the state and local level, the greatest losses are in sales taxes (36 percent), property taxes (30 percent) and personal income taxes (16 percent).

Under scenario 1 – where further automation in the San Pedro Bay Ports cuts 50 percent of dock work hours and wages – the associated decrease in household spending would cause a \$35.5 million loss in federal taxes, and a \$31.7 million loss in state and local taxes. *Table 9* summarizes these lost federal, state and local tax revenues.

Table 9: Lost Public Tax Revenue in *Scenario 1: 50 Percent Decrease* in Dock Work Hours and Wages Due to Further Automation, by Source and Type of Taxes

Description of Federal Taxes	Employee Compensation	Proprietor Income	Tax on Prod. and Imports	Households	Corporations	Total
Social Ins Tax- Employee Contribution	\$7,645,173	\$929,525				\$8,574,699
Social Ins Tax- Employer Contribution	\$7,012,630					\$7,012,630
Tax on Production & Imports: Excise Taxes			\$1,805,200			\$1,805,200
Tax on Production & Imports: Custom Duty			\$1,463,208			\$1,463,208
Tax on Production & Imports: Non-Tax			\$159,140			\$159,140
Corporate Profits Tax					\$3,595,932	\$3,595,932
Personal Tax: Income Tax				\$12,881,137		\$12,881,137
Total Federal Tax	\$14,657,804	\$929,525	\$3,427,549	\$12,881,137	\$3,595,932	\$35,491,946
Description of State and Local Taxes						
Dividends					\$103,281	\$103,281
Social Ins Tax- Employee Contribution	\$279,701					\$279,701
Social Ins Tax- Employer Contribution	\$427,590					\$427,590
Sales Tax			\$11,397,835			\$11,397,835
Property Tax			\$9,377,635			\$9,377,635
Motor Vehicle License			\$270,057			\$270,057
Severance Tax			\$16,075			\$16,075
Other Taxes			\$1,752,957			\$1,752,957
State and Local Non-Taxes			\$393,833			\$393,833
Corporate Profits Tax					\$1,611,900	\$1,611,900
Personal Tax: Income Tax				\$5,049,094		\$5,049,094
Personal Tax: Non-Taxes (Fines- Fees)				\$675,543		\$675,543
Personal Tax: Motor Vehicle License				\$170,795		\$170,795
Personal Tax: Property Taxes				\$114,935		\$114,935
Personal Tax: Other Tax (Fish/Hunt)				\$25,318		\$25,318
Total State and Local Tax	\$707,291		\$23,207,988	\$6,035,283	\$1,715,583	\$31,666,144

Source: Pacific Maritime Association (PMA). 2021. *Daily Person Records 2018-19*, data of 4.4 million work-shift records of longshore, clerk and casual workers in the Ports of Los Angeles and Long Beach; Minnesota IMPLAN Group, Inc., IMPLAN System 2019 data and 2022 software.

Under scenario 2 – where further automation in the ports eliminates 75 percent of dock work hours and wages – the associated decrease in household spending would cause a \$55.4 million loss in federal taxes, and a \$49.5 million loss in state and local taxes. *Table 10* summarizes these lost federal, state and local tax revenues.

Table 10: Lost Public Tax Revenue in *Scenario 2: 75 Percent Decrease* in Dock Work Hours and Wages Due to Further Automation, by Source and Type of Taxes

Description of Federal Taxes	Employee Compensation	Proprietor Income	Tax on Prod. and Imports	Households	Corporations	Total
Social Ins Tax- Employee Contribution	\$11,939,791	\$1,451,679				\$13,391,470
Social Ins Tax- Employer Contribution	\$10,951,922					\$10,951,922
Tax on Production & Imports: Excise Taxes			\$2,819,257			\$2,819,257
Tax on Production & Imports: Custom Duty			\$2,285,155			\$2,285,155
Tax on Production & Imports: Non-Tax			\$248,536			\$248,536
Corporate Profits Tax					\$5,615,920	\$5,615,920
Personal Tax: Income Tax				\$20,117,017		\$20,117,017
Total Federal Tax	\$22,891,713	\$1,451,679	\$5,352,948	\$20,117,017	\$5,615,920	\$55,429,277

Description of State and Local Taxes						
Dividends					\$161,298	\$161,298
Social Ins Tax- Employee Contribution	\$436,822					\$436,822
Social Ins Tax- Employer Contribution	\$667,785					\$667,785
Sales Tax			\$17,800,482			\$17,800,482
Property Tax			\$14,645,450			\$14,645,450
Motor Vehicle License			\$421,759			\$421,759
Severance Tax			\$25,105			\$25,105
Other Taxes			\$2,737,667			\$2,737,667
State and Local Non-Taxes			\$615,065			\$615,065
Corporate Profits Tax					\$2,517,373	\$2,517,373
Personal Tax: Income Tax				\$7,885,384		\$7,885,384
Personal Tax: Non-Taxes (Fines- Fees)				\$1,055,025		\$1,055,025
Personal Tax: Motor Vehicle License				\$266,737		\$266,737
Personal Tax: Property Taxes				\$179,499		\$179,499
Personal Tax: Other Tax (Fish/Hunt)				\$39,540		\$39,540
Total State and Local Tax	\$1,104,606		\$36,244,899	\$9,425,557	\$2,679,298	\$49,454,360

Source: Pacific Maritime Association (PMA). 2021. *Daily Person Records 2018-19*, data of 4.4 million work-shift records of longshore, clerk and casual workers in the Ports of Los Angeles and Long Beach; Minnesota IMPLAN Group, Inc., IMPLAN System 2019 data (“U.S. Package”) and 2022 software.

These tax revenues benefit all California residents by paying for public roads and infrastructure, schools and colleges, social services, hospitals, public assistance programs, public safety, and local, county and state government administration.

Much like the loss of manufacturing jobs to overseas competitors, the elimination of good paying port jobs due to automation of shipping container terminals would negatively impact not only non-port businesses and non-dockworkers, but also government agencies at all levels.

Summary

Non-port businesses and their workers in Southern California have benefitted from the ongoing household spending of dockworkers, which supports the equivalent of 7,065 year-round jobs and \$1.376 billion in sales at local (and online) businesses.

These sales generate \$452.6 million in wages for other workers who provide the goods and services purchased by dockworker households, and \$860.2 million of value added in California's economy.

The share of purchases by dockworkers at local businesses as a share of all purchases by all wage earners amounts to 13 percent in San Pedro, 9.4 percent in Wilmington-Harbor City, and 1.3 percent in the City of Long Beach

Automation at LBCT and TraPac eliminated 535,848 annual person-hours of port work and \$41.8 million in annual wages not earned.

This automation shrank the economy, eliminating 254 year-round jobs and \$49.5 million in sales at California businesses, and \$30.9 million of value added in the state economy.

If *future* automation eliminates 50 percent of dockside work hours, 6.8 million dockwork hours and \$401.8 million in wages would be lost.

The follow-on effects from would eliminate 2,445 year-round, non-port jobs that are currently supported by the consumer spending of dockworkers. This would be the result of \$476.3 million in lost purchases in California's economy.

These lost sales would otherwise have generated \$156.6 million in earnings for other workers who provide the goods and services purchased by dockworker households and \$297.6 million of value added in the region around the ports and throughout California.

If *future* automation eliminates 75 percent of dockside work hours, 10.7 million dockwork hours and \$627.6 million in wages would be lost.

The follow-on effects from would eliminate 3,818 year-round, non-port jobs that are currently supported by the consumer spending of dockworkers. This would be the result of \$743.9 million in lost purchases in California's economy.

These lost sales would otherwise have generated \$244.6 million in earnings for other workers who provide the goods and services purchased by dockworker households and \$464.8 million of value added in the region around the ports and throughout California.



*Photo credit:
Economic Roundtable*

11. Recommendations

Recommendations

These eight recommended actions build on data analyzed and presented in this report. The recommendations align the policies of the San Pedro Bay Ports with their legal mandate to serve the interests of California residents. The first eight focus on actions to improve the economic and employment benefits provided by the ports. The final recommendation would strengthen California businesses' export success.

1. The Cities of Long Beach and Los Angeles should enact a displaced worker impact fee on any new automated equipment to offset public costs resulting from job loss caused by automation.
2. The State of California should enact a tax on automated terminal equipment that generates public revenue equivalent to the revenue from income and payroll taxes when containers are moved by dockworkers without automated equipment.
3. The San Pedro Bay Ports should eliminate all fee discounts for exporting empty cargo containers and enact a surcharge for empty containers that are exported to offset public costs that result from under-utilization of California's export capacity.
4. The San Pedro Bay Ports should provide discounts in shipping fees for exported containers that contain cargo.
5. The San Pedro Bay Ports should require minimum compensation equivalent to the prevailing wage rates for construction truck drivers for trucker drivers moving containers to and from the ports.¹⁰
6. The ILWU should play an active role in reviewing and providing public comment on terminal lease agreements.
7. The San Pedro Ports should withhold approval of plans to automate terminals unless it can be demonstrated that the automation will produce net benefits for California workers.
8. The San Pedro Bay Ports should reach out to California export industries through surveys and industry meetings to identify ways in which the ports can more effectively support exporting California products.

12. Author Biographies

Daniel Flaming is President of the Economic Roundtable. He specializes in applied policy research addressing homelessness, wage equity, affordable housing, and environmental sustainability. Previously he worked in local government managing delinquency prevention, affordable housing, job training, and research programs.

Patrick Burns is Senior Researcher at the Economic Roundtable. He specializes in labor market dynamics, economic impacts of industry change, and urban geography, with experience analyzing outcomes for detailed neighborhoods and groups of workers. He is experienced in data architecture and management.



*Image credit:
University of Glasgow*

Endnotes

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The report states, “automation at San Pedro Bay ports has added work, not come at its expense. From 2015 (the last year before automated operations) through 2021. . . paid hours at the two automated terminals rose 31.5%, compared to 13.9% at the non-automated terminals.”

This data is wrong. From 2015 to 2021, the number of hours of work at the two automated terminals increased only 22 percent. However, the number of containers that moved through LBCT and TraPac increased 148 percent, compared to 15 percent at all of the other terminals. Most of this increase was at LBCT, which came online as a greatly expanded terminal, consolidating two old terminals and filling in part of the bay. The increase in cargo at the two automated terminals was more than six times greater than the increase in employment for workers from San Pedro, Wilmington and Long Beach. Jobs were destroyed by automation. Meanwhile, in those same years, the number of containers that moved through all of the other terminals increased 15 percent, and the number of hours of work increased 13 percent. The nonautomated terminals continued to be reliable employers of workers from the community.

The report by Nacht and Henry also states, “the two ports risk further loss of discretionary cargo, threatening jobs, wages, and tax revenue essential to Southern California’s economic vitality. Increasing automation will enable the largest West Coast ports to remain competitive.”

This is incorrect; cargo volume has grown faster at the San Pedro Bay Ports than at other West Coast ports, as documented in chapter 3 of this report. Nacht and Henry provide no evidence of competitive threats to the San Pedro Bay Ports.

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<u>Consumer Items</u>	<u>2020</u>	<u>Percent</u>
Total Average Annual Expenditures	\$61,334	100%
Food	\$7,316	12%
Food at home	\$4,942	8%
Food away from home	\$2,375	4%

Alcoholic beverages	\$478	1%
Housing	\$21,409	35%
Apparel and services	\$1,434	2%
Transportation	\$9,826	16%
Healthcare	\$5,177	8%
Entertainment	\$2,912	5%
Personal care products, services	\$646	1%
Reading	\$114	0%
Education	\$1,271	2%
Tobacco and smoking supplies	\$315	1%
Miscellaneous	\$907	1%
Cash contributions	\$2,283	4%
Personal ins. and pensions	\$7,246	12%

Source: U.S. Bureau of Labor Statistics. 2021. *Economic New Release: Consumer Expenditures—2020 (USD-21-1617)*, Retrieved from: *Table A. Average income and expenditures of all consumer units, 2018-20*
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