SOURCES AND ACKNOWLEDGMENTS

Information in this report comes from both publicly available data sources, as well as organizational knowledge from the Los Angeles Area Chamber of Commerce and Siemens Cities Center of Competence, Americas.

Special acknowledgments and thanks to Julia Thayne and Dominik Lengauer.
Three years ago, the Los Angeles Area Chamber of Commerce launched the inaugural State of L.A. Infrastructure event, a now-annual gathering of more than 200 business and civic leaders in the L.A. metropolitan region to draw attention to critical infrastructure needs. During that inaugural event, the message was clear: L.A. needs not only to make significant investments in its energy, water, transportation, and telecommunications sectors, but also to reform state and local policies limiting the ability to fund, construct and maintain core infrastructure.

The first State of L.A. Infrastructure event was a call-to-action, and led to the joint publication from the Chamber and Siemens of “A Blueprint for a 21st Century Los Angeles Infrastructure” at the second State of L.A. Infrastructure in 2015.

The Blueprint sets out the economic case for a regional plan to repair and build infrastructure, which will guarantee the L.A. area’s global competitiveness well into the 21st century. It compares L.A.’s energy, water, transportation, and telecommunications infrastructure to those of key global competitor cities, and provides case studies as to how L.A. can benefit from other cities’ best practices in facilitating public-partnership collaboration and innovation on infrastructure investments. Although the Blueprint shows that L.A. as a region performs well on measures, such as electricity and water consumption and green electricity, it falls behind on other key indicators, such as livability, air quality, traffic congestion and public transport use.

With the Blueprint, the Chamber launched a decade-long campaign to advocate for increased investment in critical infrastructure assets – starting with a list of seven, member-agreed projects totaling more than $40 billion in investment, 130,000 jobs in the L.A. region, and 1.3 million jobs throughout the State over the next 10 years.

Since the Blueprint’s publication and the launch of the Chamber’s campaign, L.A. County and its municipalities have made strides in finding funding and financing for critical infrastructure projects. The passage of Measure M has guaranteed a funding stream for Metrorail, bus, toll lane, and other projects, such as the Chamber-advocated Westside Purple Line Extension. Los Angeles World Airports (LAWA) has been successful in passing the budget for the $5.5 billion Landside Access Modernization Program, another Chamber-advocated project. The list continues, with planned investments over the next 20 years in L.A.’s ports, electricity grid, rail networks, and water distribution systems.

Sincerely,

Gary Toebben
President & CEO
Los Angeles Area Chamber of Commerce
SUMMARY

It’s clear from these plans and pledges that both public and private sectors in L.A. agree: Without taking action on infrastructure, L.A. won’t be able to compete for the talent, trade, tech, and investment it needs to be successful in the 21st century.

In this follow-up to the Blueprint, we take a closer look at the investments the L.A. region is making in some of the sectors we covered in the original Blueprint. Moreover, we focus specifically on the critical infrastructure verticals of ports, airports, and rail networks, where much of the investment over the next 10 years is occurring. Currently, the combined Ports of LA and Long Beach are the 10th busiest container port in the world, and LAX is the 4th busiest airport in the world. L.A.’s public transit network ranks far lower on an urban mobility index (67, or just at the cusp of “below average,” based on research by Arthur D. Little and UITP).

We find that:

• Plans have become projects. In each of the major infrastructure verticals we examined, there are significant capital investments that will ensure L.A.’s ports, airports, and transit networks compare favorably to global competition in the 21st century. Investments include more than $7 billion in capital improvements for the Ports of L.A. and Long Beach over the next decade; more than $14 billion for Los Angeles International Airport (LAX) between 2009 and 2023; and upwards of $120 billion for transportation in L.A. County over the next 40 years.
• Many of these projects will be delivered in the 2020s. The L.A. metropolitan area in 2028 (when the City of L.A. will host the Summer Olympics) will be a vastly different place than the L.A. region under construction today. As the public sector literally lays the infrastructure groundwork for the private sector and the public to access L.A. – and the rest of the world – more efficiently, coordination among public and private sectors and the public will be imperative to ensuring that the L.A. region benefits, and benefits equitably, from investments in infrastructure.

• Our case studies – the Port of Hamburg in Germany, the Incheon Airport in Korea and Crossrail in London – exemplify how other cities are investing not just in standard upkeep of their critical infrastructure, but in major upgrades of the infrastructure verticals that are critical to their economic competitiveness.

The investments L.A. is making in its ports, airports, and rail networks will ensure that L.A.’s infrastructure can stand up to the population and economic activity projections for the next decade.

• However, L.A. must ensure that its investments now incorporate the commercially ready technologies, or provide enough flexibility for future incorporation of technologies, to guarantee world-class infrastructure beyond 2030.
PORTS

L.A. is Investing in Its Ports

The Port of Los Angeles covers 7,500 acres of land in L.A., with 27 terminals for ships and 86 ship-to-shore container cranes. On an annual basis, the Port handles 2,050 shipping vessels and close to 200,000 automobiles (mostly trucks). Combined, they convey 8.8 million containers (twenty-foot equivalent units or TEUs) into and out of the Port. This activity makes the Port of L.A. the number 1 container port in the U.S. and the number 19 container port in the world1. In addition, the Port of L.A. is a major source of jobs in L.A. County, directly supporting more than 100,000 local jobs.

The Port of Long Beach is roughly half the geographic size of the Port of L.A., with 22 shipping terminals and 66 cranes. The Port’s loaded containers account for nearly 1 in 5 containers moving through all U.S. ports, or more than 6.8 million TEUs annually. When combined with the Port of L.A., the Ports of L.A. and Long Beach rank as the number 10 container port in the world2.

Over the next decade, the Port of L.A. will spend $2.6 billion in capital improvements, while the Port of Long Beach will spend $4.5 billion3.

Capital improvement projects for the Port of L.A. include4:
- $510 million program by TraPac to install new cranes, electrify terminal equipment, and construct an on-dock rail facility, among other projects
- $383 million program to improvement transportation around the Port, notably reducing and separating port truck traffic from roadways heavily used by the public
- $200 million program to use Alternative Marine Power (onshore power supply) at 24 berths
- $26.6 million program to install a solar-powered micro-grid

Capital improvement projects for the Port of Long Beach include:
- $1.3 billion to build a new bridge allowing for additional clearance for larger cargo ships and for increased traffic flow along the bridge
- $1.3 billion to combine two shipping terminals into one state-of-the-art container terminal, with on-dock rail capacity, shore power hookups, and a longer wharf
- Expansion of one and construction of another on-dock rail facility to reduce traffic congestion and improve air quality
- The I-710 Corridor Project, which measures the potential environment impacts of improvement projects on the Corridor

Many of these projects respond to the Ports’ Clean Air Action Plan (launched in 2006, currently being updated), the statewide Sustainable Freight Action Plan (2016), and the mayors of L.A. and Long Beach’s recent pledge to a zero-emissions goods movement future. By 2030, GHG emissions from port-related sources will be down 40 percent compared to 1990 levels; there will be zero emissions for cargo handling equipment; and the Ports will be five years

Both Ports of Los Angeles and Long Beach are making significant capital investments in greening their ports, while continuing to grow throughout.

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away from zero-emissions, on-road drayage trucks.

Case Study: How the Port of Hamburg is Investing in Green Growth

The Port of Hamburg is Germany's largest sea port, and the third busiest port of Europe. Located in the middle of the city, the Port is almost as old as Hamburg itself, and inherently connected to the city's maritime history. Today, the Port faces various challenges: space constraints make it impossible to further expand the Port, yet cargo volumes are rising and customers expect quick transit times as well as environmentally friendly operations. The increasing presence of mega-carriers and cruise ships, running diesel generators to provide them with electricity, also put a strain on local air quality. Not to forget the fierce competition from the nearby ports of Rotterdam and Antwerp.

To tackle these challenges, the Port of Hamburg has always been committed to invest in technologies. One example is the Port’s long-standing commitment to rail. Since 1866, it offers access to all terminals and industrial firms in the port via the Port railway and since then consistently upgrades its rail infrastructure. Due to these investments, Hamburg is now Europe’s No. 1 rail port, with 100 freight trains leaving the port every day, transporting half the cargo that arrives at the port. The strong commitment to rail shows in the port’s carbon footprint: compared to the ports of L.A. and Long Beach, the Port of Hamburg emits just a fifth of CO2eq per handled container.

Rail however is not the only technology the Port is investing in. To keep transit times low, while cargo volumes rise, the Port needed to make sure that ships can be loaded and unloaded as quickly as possible. To do so, the Port automated its crane operations. The technology, known as Simocrane, manages crane drives to ensure that containers do not swing or turn cables. Cameras record the environment to avoid collisions and the system automatically places containers onto trailer units. This process significantly shortens the time needed to clear a cargo. Thanks to its integrated energy recovery system, the technology also helps to cut down emissions. When a load is lowered from great height, the potential energy involved is converted into electric power that can be fed back into the grid or re-used by other drives in the system.

To address the issue of local air pollution Hamburg invested in an on-shore power supply system. Ships coming to the Port can now shut down their Diesel generators and instead plug in to the local grid. A mobile robot arm transports the power cable connectors into the ship and automatically compensates for the tidal range during power supply. Thanks to the technology, local emissions from berthed ships could be reduced to zero, and an overall reduction in greenhouse gas and particulate matter emissions was achieved. Paying tribute to the fact that the Port is not just a site of global trade, but also one of Hamburg’s most iconic tourist attractions, the technology is stored safely in a flood-protected garage, ensuring that public access to the docks can be maintained.

Like Hamburg, the ports best tackling future challenges do so by continuously investing in their infrastructure. The Ports of L.A. and Long Beach have already shown a strong commitment to technologies such as on-shore power and crane automation. In 2004, the Port of L.A. was the world’s first port to run a containership on shore-side electricity, with Long Beach following four years later. Both ports also show strong investments in the area of crane automation, as in the $510 million development of the new TraPac terminal at the Port of L.A., which will be equipped with automated stacking cranes. Recent investments in the ports’ rail infrastructure such as the $84 million Green Port Gateway at Long Beach, or the $115 million Berth 200 Rail Yard at L.A. show that the ports are equally committed to achieve high levels of rail usage. For now, the differences to Hamburg remain staggering, with nine freight trains leaving the Port of Long Beach each day and 11 from the Port of L.A., compared to 100 in Hamburg.

How L.A.’s Ports Compare

We compared the Ports of L.A. and Long Beach to five of the top 25 ports around the world using global ranking, container traffic, capital improvements programs, and emissions as indicators. Many of these eight ports are trading partners, or leading customers, of the Ports of L.A. and Long Beach. Many of them are also possible competitors.

The comparison chart shows that L.A. and Long Beach perform well on container traffic, but poorly on important measures, such as overall emissions and annual capital improvement programs. In fact, in the ports of Hamburg and Antwerp, the ratio of annual CO2eq emissions to twenty-foot equivalent unit containers (TEU) is 1/5 and 1/2, respectively, of the same ratio for the Ports of L.A. and Long Beach. Put another way, the operations of the Ports of Hamburg and Antwerp are between 50 percent and 80 percent more sustainable per container than the Ports of L.A. and Long Beach! This difference is partly because both Ports of Hamburg and Antwerp are strongly connected to rail infrastructure, with cargo carried by diesel and electric trains, rather than by highways, with cargo carried by diesel trucks.

With regards to capital investment, the Port of L.A. ranks 8 of the 10 ports in the chart. The Port of Long Beach ranks first; however, half of its $500M capital improvement program is dedicated to replacing the Gerald Desmond Bridge. Capital improvement programs at other ports range from wharf and berth placement, to handling and storage equipment for containers, to purchasing additional sites, to investing in security and safety. Many of them respond to city or national mandates to become greener: for example, the European Union and Chinese government have mandated on-shore power supply in 100 percent and 50 percent of ports by 2025 and 2020, respectively. California has done something similar. By 2020, 80 percent of fleet calls must use shore power. (By 2017 it’s 70 percent.) Many of the capital improvement programs also respond to government incentives to implement innovative technologies, such as electric, automated ship-to-shore cranes, electric freight truck and train corridors, smart grids, increased security measures, and others.

With the Ports of L.A. and Long Beach’s ambitions to be the Greenest Container Ports in the world, it will be essential for them to carry out improvements already in place or scheduled to be in place in the next five years in European and Asian ports.
## PORTS

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Sources: WorldShipping.org; American Association of Ports; Ports of L.A., Long Beach, Rotterdam, Hamburg, Antwerp, and New York-New Jersey
L.A. Is Investing in Its Airports

Between 2009 and 2023, Los Angeles World Airports (LAWA) will spend $14 billion on capital improvements, considered to be the largest public works program in the history of the City of L.A. 21. Although the centerpiece project, the New Tom Bradley International Terminal (New TBIT), was completed in 2013, many other projects remain under construction, including:

- The $5.5-billion Landside Access Modernization Program (LAMP), featuring a 2.25-mile Automated People Mover, the Consolidated Rent-a-Car Center, and a Metro stop – all of which will be completed by 2023

- The $1.6-billion Midfield Satellite Concourse, with 12 new aircraft gates, new taxiways and taxi lanes, utility improvements, and a baggage optimization project

- The $515.8-million renovation of Terminal 1, with updates to security screening, baggage inspection, passenger waiting areas, baggage claim and airport office space

- The $573-million renovation of Terminals 7 and 8, which will refurbish public spaces, the ticketing lobby and security screening by Spring 2018

- The $270-million elevator, escalator, and moving walkway program

- The $613 million In-Line Baggage Handling and Screening System program

- The $118-million Curbside Appeal and Roadway Improvement project

Beyond the New TBIT, LAMP is perhaps the marquee program of the $14-billion LAX modernization project. Congestion around LAX airport is legendary, with upwards of 50 percent of trips to and from the airport occurring in personal passenger vehicles. During peak periods, more than 6,000 vehicles enter the airport every hour 22. Anyone who has been stuck in traffic around the LAX central terminal area has likely experienced the feeling of wanting to jump out of the car and walk to her terminal – only to discover that no sidewalk exists. When LAMP is completed, an automated people mover (or an automated train, which shuttles back and forth along a fixed rail route) will run every two minutes to connect a new Consolidated Rental Car Facility, with a new Metro station, an intermodal transportation facilities, and to three stations in the central terminal area.

The new Mexico City International Airport, to be completed in 2020, has a price tag of $11.3 billion, with roughly half of that funding coming from public sources and half from private sources. The private funds and financing will be a combination of bank loans and issuances of government bonds, while the public money is multi-year revenue, investment, and surpluses 23. When completed, the Airport will have an estimated annual throughput of 68 million passengers and 1.2 million tons of cargo 24. The new Beijing International Airport, to be completed in 2019, will cost $12.9 billion, accommodating 100 million passengers a year with its seven runways 25. Notably, plans for the new Beijing airport include a transportation hub, which will connect the suburban airport to local and high-speed rail lines to Beijing, Tianjin, and Hebei 26.

Only a handful of other airports from around the world are making similar levels of investment to LAWA over the next few years.
Case study – How South Korea’s Incheon Airport is Innovating for the Future

Built on an artificial island in the yellow sea just 30 miles west of Seoul, Incheon Airport first opened its gates in 2001. Originally designed for a capacity of 30 million passengers, growth forecasts were soon exceeded and in 2016 the airport served approximately 60 million passengers. Spurred by its success, Incheon now aims to become a global hub with an annual capacity of 100 million passengers. For South Korea’s economy, a further expansion of the largely state-owned airport is highly beneficial: the airport currently sustains close to 500,000 jobs, with a view of an additional 900,000 jobs being created in the next 10 years.

To prepare the airport for the rising passenger numbers, Incheon continuously invested in its infrastructure. In 2008, a third runway was opened, and in 2018 a second terminal will begin operations. The second terminal, which will increase capacity by 18 million passengers, also showcases the airport’s willingness to embrace new solutions: extensive gardens, featuring waterfalls, indoor streams, and koi ponds, wind their way through the new terminal, both improving indoor air quality, and making a stay at the airport a more pleasant experience. Autonomous robots, guiding travelers to their gate serve as a valuable amenity for passengers, and exemplify South Korea’s innovativeness in the technology sector. For Incheon, investments like these pay off, and for 12 consecutive years, the airport has been ranked No. 1 in the ACI’s passenger satisfaction survey.

However, to achieve the airport’s vision of becoming a global hub, capacity and passenger satisfaction are only one part of the story. Instead it is short transfer times that determine a hub’s competitiveness. For an airport, this boils down to how fast passengers can get from their arriving plane to a connecting flight, and more challenging, how fast their checked baggage can make the trip. To ensure a quick transfer of checked luggage, Incheon invested in one of the most modern baggage handling systems in the world. A total of 32 miles of conveyor belts handle 56,000 pieces of luggage per hour, moving them around with speeds of up to 33 feet per second. The system’s strength becomes clear when compared to those at other airports: in L.A., the baggage handling system sorts a mere 3,240 pieces of luggage per hour, and even in Munich, a major hub for Germany, the figure only increases to 17,800. The difference can also be seen in the minimum connecting time between flights. Here, Incheon’s 25 minutes are unrivalled by any other major hub such as Dubai (45 minutes), Tokyo-Haneda (45 minutes), or London-Heathrow (60 minutes).

Both the airports of Incheon and L.A. have shown strong investments in their infrastructure. The LAX modernization program, with an annual budget of $933 million, is one of the largest infrastructure programs in the history of L.A., and comparable in size to Incheon’s annual investment budget of $1.1 billion. For both airports, the investment pays off: LAX recently leapt from 7th to 4th busiest airport in the world, while Incheon quadrupled its annual passenger traffic in just 16 years and is considered to be the best airport in the world in terms of passenger satisfaction. Looking to South Korea, LAX can learn from Incheon and the way it embraces a new kind of airport. One that puts the passenger at the center of all efforts, improving their experience through green spaces or cutting edge technologies such guide robots and an ultra-efficient baggage handling system. In doing so, LAX could easily increase passenger satisfaction, while remaining one of the most important airports worldwide.

How L.A.’s Airports Compare

Between 2015 and 2016, the total number of passengers for all airports globally grew 5.6 percent, with total cargo growing 3.3 percent and total aircraft movements growing 2.3 percent. In that time period, LAX leapt from the 7th busiest airport in the world (by passenger volume) to the 4th busiest, with increased passenger traffic of 8 percent and international passenger traffic of 10.6 percent.

Based on a comparison to six other airports in the top 10 busiest air passenger hubs, LAX ranks highly with regards to annual number of passengers, amount of goods, and number of planes. However, it ranks very low on measures of passenger satisfaction (proxied by the World Airport Awards), with only Chicago O’Hare (ORD) ranking lower. It comes as little surprise, then, that both LAX and ORD rank highest with regards to average annual capital investments. Between 2009 and 2023, LAX will spend over $9 billion on terminal renovations, baggage handling, and transport into and out of the airport. In half that time, ORD will spend $2.2 billion on terminal improvements, parking and roadway projects, and safety and security.

Although not in the comparison chart, it’s also important to note that L.A. is one of few global cities without two major international airports. Beijing, Tokyo, New York, Paris, and London all have multiple hubs, with combined passenger traffic from hubs topping 103 million – Hartsfield-Jackson Airport’s, the busiest airport in the world, annual passenger traffic.
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Sources: Los Angeles World Airports, Hartsfield-Jackson Airport, Heathrow Airport, Incheon Airport, Beijing Airport, Dubai Airport, Airports Council International, World Airport Awards
This past November, the people of L.A. County voted for the fourth time for self-taxation to pay for transportation infrastructure improvements. This time, the voters approved a ½ cent sales tax increase that will generate upwards of $120 billion for transportation improvements over the next 40 years. “Measure M” has a wide remit, including improving freeway traffic flow and safety; repairing potholes, sidewalk, and local streets; synchronizing signals; and keeping fares low.

Perhaps most impactful, though, the management plan for Measure M includes major expansions of the rail, subway, and bus networks. Combined, the plan calls for three new Bus Rapid Transit (BRT) routes, 10 new Metrorail lines (including expansions), and regional commuter rail (Metrolink and Amtrak) improvements. To view the graphic showing the planned Measure M projects is to see a region transformed. The L.A. area’s public transit system will finally, look like the global cities’ to which L.A. compares itself.

With all of this investment in building out L.A.’s transit networks come questions about how L.A.’s inhabitants and business communities will benefit from the investment. Increased accessibility, connectivity, and efficiency are obvious and immediate advantages of having more rail lines with more frequent trains, more bus routes with on-time buses, etc. There’s no question that people will be able to use public transit to get to more places around the region more quickly.

As in other burgeoning city markets, the L.A. region will also have opportunities to benefit from transit-oriented developments (TOD). London and Tokyo, for example, both pursued targeted transit-oriented development programs. The programs strategically re-capture some of the private sector returns from increased land value of developments adjacent to new stations. The Los Angeles County Metropolitan Transportation Authority (L.A. Metro) has a nascent program looking towards TODs through the lens of transit-oriented communities, where multiple parcels near high-transit corridors are compact, walkable, and bikeable.

L.A. has either the challenge or the advantage, depending on one’s perspective, of growing its passenger rail network during the advent of rideshare (Uber and Lyft), autonomous and electric vehicles, and microtransit. Viewed as a challenge, they are competitors to L.A. Metro’s new rail, bus, and BRT routes. Viewed as an advantage, they are complements to the network, providing more first-and-last-mile connections and greater accessibility to harder-to-reach communities. One key for ensuring that advances in transport technology supplement, rather than supplant, existing transit options is to partner – which L.A. Metro is already doing. Another key is to ensure technological compatibility, especially through secure, shared data pooling. This is an area where L.A. could show leadership, especially as other global city regions struggle to figure out the optimal mix of different types of transportation modes to deliver safety, sustainability, and accessibility to customers.

**Case Study – How London Is Using Crossrail to Connect**

London’s population has continuously grown since the late 1980s, reaching 8.7 million in 2017. Until 2030, London is now expected to grow by an additional 1.3 million people, making it finally reach 10 million inhabitants. For transport planners, the influx to London poses serious challenges: already, the city suffers from the impacts of congestion, with journey times via car increasing by 7 percent every year, and Underground stations often being so overcrowded that they have to be temporarily closed. To relieve the city’s transport network and prepare it for future growth, London is
now building a new metro line, known as Crossrail. The new line is set to open in 2018 and is fundamentally different to other Tube lines in London. With a total route length of 73 miles, it is three times as long as London’s average metro line, spreading out far into the western and eastern suburbs of the capital. Using an innovative funding model and state of the art technology, London was able to add a metro line to its transportation network that will bring far-reaching economic, social, and environmental benefits to the city.

Work on the $19 billion project started in 2009 and was jointly funded by local businesses, London’s transport authority, and the UK’s national government. $300 million in individual business contributions were secured from Canary Wharf Group, the developer of the eponymous business district in London’s east, and from Heathrow Airport, both served by the new line. The majority of business contributions were raised through a 2 percent levy on major businesses’ property tax rates.46 Using this model, London raised an additional $5.4 billion, thereby recapturing a significant amount of the value it created by constructing the new line. In the end, the project is set to both satisfy the public and private sector: estimates show that Crossrail will contribute $55bn to UK’s GDP (a 2 percent increase), leading to a tax boost of $22 billion.

Just as with the project’s funding, construction of the new rail line demanded innovative solutions. Some of these solutions significantly help to reduce the environmental impact of Crossrail. Trains for the new line will be up to 50 tons lighter than comparable trains, and fitted with regenerative brakes, thus able to re-use the energy generated during braking.47 As the trains approach stations, they will be on a slight uphill gradient to assist with braking, and similarly, on a slight downhill gradient as they depart. Stations on the new line will be fitted with LED lights and ground source heat exchangers, which can be used by oversite developments to harness excess heat.48 Due to these measures, and the replacement of 14 million car journeys annually once the new service opens, Crossrail is expected to amortize carbon emissions from construction in just seven years.49

Another example for Crossrail’s innovativeness can be found in the line’s signaling system. The line’s route across central London and into the suburbs provides a technical challenge as trains need to switch between the ETCS, a uniform signaling system used by trains throughout Europe, and the CBTC, commonly used for subway systems. The switch between the two systems during motion is a world premiere, and is being developed by Siemens.

Just like L.A., London is currently undergoing one of the largest expansions of its transport network. With Measure M, and London’s increased property tax rate for businesses, both cities have employed innovative models to fund these projects. Looking to London, L.A. can learn from London’s way of planning ahead of time. Crossrail’s stations are designed for a capacity that will serve London well during the next 120 years50, and a second mega-project, Crossrail 2, is already underway. Employing a similar visionary approach, L.A. would be able to secure a world-class transport networks for generations to come.

### How L.A.’s Rail Networks Compare

<table>
<thead>
<tr>
<th>Urban Mobility Index</th>
<th>Number of metro rail lines</th>
<th>Number of stations</th>
<th>Annual Number of Passengers (in millions)</th>
<th>Annual average spend, $USD, Millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Los Angeles</td>
<td>67</td>
<td>6</td>
<td>93</td>
<td>416</td>
</tr>
<tr>
<td>New York City</td>
<td>35</td>
<td>25</td>
<td>472</td>
<td>1,757</td>
</tr>
<tr>
<td>Chicago</td>
<td>64</td>
<td>8</td>
<td>145</td>
<td>241</td>
</tr>
<tr>
<td>Washington, D.C.</td>
<td>42</td>
<td>6</td>
<td>91</td>
<td>180</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>1</td>
<td>11</td>
<td>93</td>
<td>1,949</td>
</tr>
<tr>
<td>Paris</td>
<td>7</td>
<td>16</td>
<td>300</td>
<td>1,520</td>
</tr>
<tr>
<td>London</td>
<td>9</td>
<td>11</td>
<td>270</td>
<td>1,378</td>
</tr>
<tr>
<td>São Paulo</td>
<td>34</td>
<td>5</td>
<td>61</td>
<td>1,107</td>
</tr>
</tbody>
</table>

Sources: Los Angeles County Metropolitan Transit Authority, New York Metropolitan Transit Authority, Washington Metropolitan Transit Authority, RATP, Transport for London, Seoul Metro, Tokyo Metro, Transit Chicago, Urban Mobility Index, and U.S. Census Bureau
CONCLUSION: L.A. – A HIGH-TECH REGION

Our analysis clearly shows that the L.A. region is accelerating into the 21st century by investing in the critical infrastructure that drives growth, attracts foreign investment, and draws businesses. The L.A. area’s ports, airports, and rail networks will look vastly different in 2028, when the City of L.A. hosts the Olympics, than they do today.

As L.A. invests in the next 10 years of growth, though, it must also look to the period beyond 2030. It’s no surprise to the reader that patterns of human behavior, and human expectations as to how the built environment will respond, are changing, and changing rapidly. And in support of those changing behaviors, the private sector is making leaps and bounds in developing technologies. Auto manufacturers have promised fully autonomous vehicles by as early as 2021. New models of electric vehicles will have ranges of 200 miles+. Hyperloop One and SpaceX, both headquartered in L.A., are just two companies exploring high-speed passenger and goods movement on Earth, and beyond. Digital connectivity via devices and shared databases holds great promise for making people and processes more productive. Any one of these types of technologies, when adopted, could fundamentally change our relationship to the spaces around us. This particularly holds true in urban mega regions, such as the one we have here in the L.A. region.

Any project that L.A. is investing in now, whether it’s at the ports, the airport, or along new rail networks, must have embedded flexibility to adopting new technologies in the future. Many of the products that are currently in pilot phase – or even still corporate R&D initiatives – will soon be starting to commercially deploy. Now is the time for public and private sectors to plan jointly for scaling technologies, to think through how high-tech projects can augment critical infrastructure, rather than supplant them. L.A. has the public, political, and business will to embrace technological advances. It should also exert its power in filtering them with an understanding of how they benefit the community at-large.

In the future, the L.A. region can and should be known globally for having a foundation of solid, critical infrastructure, as well as for embracing a high-tech future that, at its core, brings everyone forward with it.
PORTS

4 Port of Los Angeles, Annual Budget FY2016-17, https://www.portoflosangeles.org/Publications/Adopted_Annual_Budget_FY2016-17.pdf
   https://hhla.de/en/sustainability/key-figures.html

AIRPORTS

11 English (US) Siemens, 2017, Smart Ports – Competitive Cities, p. 53
16 Port of Los Angeles, https://www.portoflosangeles.org/facilities/rail_intermodal_yards.asp
18 Port of LA, 2017, Email correspondence

RAIL

43 The World Airport Awards are based on a survey of international passengers.


Using 19 criteria such as public transport frequency or mean travel time to work, Arthur Little and UITP’s Urban Mobility Index assesses the mobility maturity and performance of 84 cities worldwide. Cities ranked 1-11 provide above average mobility; 12-68 provide average mobility; and 69-100 provide below average mobility. [Urban Mobility Index, 2014, http://www.adlittle.com/fileadmin/editorial/downloads/fum/2014_ADL_Future_of_Urban_Mobility_2_0_Ranking_table.pdf]