Ministry of Foreign Affairs

The Circular Economy and the Built Environment in the Los Angeles Region: *Opportunities for Dutch Companies*

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The Circular Economy and the Built Environment in the Los Angeles Region:

Opportunities for Dutch Companies

A Market Development Study

Los Angeles County Economic Development Corporation

This report was prepared by the Institute for Applied Economics of the Los Angeles County Economic Development Corporation (LAEDC).

As the Southern California region's premier economic development organization, the mission of the LAEDC is to attract, retain and grow businesses and jobs in the regions of Los Angeles County.

The LAEDC Institute for Applied Economics offers objective economic and policy research for public agencies and private firms. The Analysis Group focuses on economic impact studies, regional industry analyses, economic forecasts and issue studies, particularly workforce development and foreign direct investment

Executive Summary

This market study is intended to map the circular economy in California, specifically focusing on the Los Angeles region. State and local public policy aimed at supporting the circular economy will be reviewed and the region's circular industries will be studied. The study will highlight potential partners and opportunities for Dutch companies that will be entering the Los Angeles region's circular economy. Circular opportunities in the region include various elements of the smart city approach to sustainability such as sustainable waste management practices, smart water policies, urban farming, and the use of circular methods and products to construct buildings. The ultimate goal of the study is to serve as a catalyst to building a long term and effective relationship between the Netherlands and the Los Angeles circular sector.

Circular Policy Framework in California and the Los Angeles Region

The circular economy is the concept of systematically rebuilding the economy to encourage the continued use of resources. Core elements of circularity are embedded within each key urban system including water, housing, infrastructure, and food. Much like in a circular economy, in a circular city, resources are kept at their highest potential for as long as possible, through reusing, repairing, remanufacturing, and recycling. Public private partnerships, neighborhood initiatives, and international exchange of knowledge are all needed to achieve these goals. A circular economy development path will reduce carbon dioxide emissions and meet California and the Los Angeles region's ambitious climate goals. In addition, a circular economy development path can increase the resilience of cities in the Los Angeles region by increasing the ability to adapt to negative external environmental shocks such as droughts. Policymakers in the Los Angeles region have actively steered and stimulated circular market activity by setting specific targets, changing public procurement policy, raising awareness among the public and private businesses, and encouraging innovative pilots. In addition, efforts have been made to steer education and training programs towards sustainable jobs.

California, specifically the Los Angeles region, has embraced the circular economy concept and has enacted various public policies to encourage the shift to circularity. Since 2018, California has pursued one of the most ambitious climate agendas in the country, renewed by Governor Gavin Newsom's executive order in October of 2020.[1] These climate action plans recognize the importance of collaboration with foreign companies and other states to help achieve their sustainability goals.

City and county governments can move more rapidly than state and national governments to change policy to support the advancement of particular opportunities within the circular economy through

[1] State of California. "Governor Newsom Launches Innovative Strategies to Use California Land to Fight Climate Change, Conserve Biodiversity and Boost Climate Resilience." October 8, 2020. https://www.gov.ca.gov/2020/10/07/governor-newsom-launches-innovative-strategies-to-use-california-land-to-fight-climatechange-conserve-biodiversity-and-boost-climate-resilience/

urban planning, infrastructure, and local business development. In addition, local governments are more responsive to and aware of local conditions. As a result, local governments at the county and city level play important roles in determining the extent and direction of circular economic development.

Los Angeles County and many city governments within have recognized that collaboration between businesses, nonprofit organizations, and government agencies is crucial. Collaboration between these parties creates the knowledge required to identify the most relevant circular economy opportunities and barriers in each focus industry.

While California has a framework in place to achieve important sustainability goals, individual counties and cities in California, in particular Los Angeles County and Cities of Los Angeles, Santa Monica, Long Beach, and Culver City, have much more comprehensive plans in place which contain well-defined goals, target benchmarks, and proposed actions.

Mapping Out Key Circular Public Policy Strategies

Reducing Emissions: California is making a strong push to reduce carbon pollution within its borders, with the centerpiece of this effort being a cap-and trade program in place until at least 2030. The state's Department of Water Resources aims to achieve carbon neutrality by 2045, while cities around the state (including Los Angeles and San Francisco) share similar timelines. Key strategies will be to reduce emissions from transportation through transitioning to electric vehicles, monitoring and reducing industrial emissions and achieving net zero carbon in all buildings.

Supplying Renewable Energy to Neighborhoods: Major cities are planning to transition to 100% renewable electricity over the next few decades. There are plans to make significant investments into upgrading power system infrastructure, increasing solar energy capacity and phasing out natural gas operations, while also strengthening building infrastructure (such as insulation) to reduce energy demand overall.

Mobility and Public Transit: To reduce the impact of vehicle emissions, California is making efforts to shift residents towards sustainable modes of transportation. For example, the City of Los Angeles plans to upgrade bus and rail infrastructure and extend the reach of these systems, while also designing more pedestrian-friendly corridors and expanding bike lane networks.

Water and Waste: The state and counties and cities within it are developing stronger water conservation and smart water policies. For example, the City of Los Angeles wants to source 70% of Los Angeles's water locally by 2035, including plans to increase stormwater capture, complete new groundwater remediation facilities and improve wastewater recycling. Many California cities also have lofty waste reduction goals.

Urban Ecosystems: Southern California cities like Long Beach and Los Angeles are looking at a range of methods to strengthen urban ecosystems and resilience, including the installation of cool roofs,

cool pavements, and other designs to reduce urban heat impacts, planting and maintaining tree canopy in areas of greatest need, and adding new parks and open spaces around their cities.

Circular Cities of Focus in the Los Angeles Region

While California has a framework in place to achieve important sustainability goals, individual counties and cities in California, in particular Los Angeles County and Cities of Los Angeles, Culver City, Long Beach and Santa Monica, have much more comprehensive plans in place which contain well-defined goals, target benchmarks, and proposed actions. These plans will guide circular development in the region and are the source of multiple circular opportunities for companies that supply circular products and services.

This report will focus on the cities of Los Angeles, Culver City, Long Beach and Santa Monica because they have adopted these comprehensive sustainability plans. The fact that these cities have adopted comprehensive sustainability plans with clear goals and proposed actions indicates that they are leading cities working towards a more circular economy.

Circular Industries in the Los Angeles Region

Eight focus industries in the Los Angeles region's circular economy were identified.[2] The focus industries are:

- Clean and Renewable Energy
- Waste Management
- Transportation
- Food and Agriculture
- Construction
- Industry: Oil, and Gas
- Infrastructure and Urban Development
- Water Supply and Waste

An Overview of Potential Opportunities and Challenges

Opportunities

Both the state government of California and its component cities and counties are taking aggressive action against climate change with significant targets for promoting the sustainable development of the region. As their goals have a wide range of focuses, from water and waste to urban ecosystems and mobility to reducing emissions, there are opportunities for Dutch companies from all sectors to build partnerships. Leading California companies, both large corporations as well as small and medium enterprises, are innovating and implementing circular economy solutions. There is a high

[2] An overview of these circular focus industries listed by U.S. Census Bureau North American Industry Classification System (NAICS) code is provided in Appendix A.

level of political support for transitioning to the circular economy in the Los Angeles region and new circular economy business models are more likely to emerge and succeed in regions that can support a high potential market demand for the goods and services derived from them, making the Los Angeles region an area primed for circular economic development.[3]

Smart Water Storage: Many major cities are exploring strategies to expand accessibility to water while conserving and recycling this resource at much higher levels. This would provide an opportunity for Dutch companies that specialize in smart water policies, water capture and storage, and efficient recycling to build partnerships and solutions in California.

Focus on Smart and Sustainable Building Policies: Cities in the region have focused much of their circular strategies on circular building policy. For example, the City of Los Angeles wants to engage cities around the globe on smart building policies, including methods to design energy efficient buildings, reduce their carbon footprint, and reduce material waste during construction. Smart and sustainable building policies will be a key to future construction in the Golden State, where there is still a high demand for affordable housing and building space. Dutch companies that focus on the built environment will find multiple opportunities in the Los Angeles. region.

Urban Development: Some of the techniques and community driven approaches developed successfully in the Netherlands could be implemented successfully in cities in and around Los Angeles, such as Culver City and Santa Monica, as these cities face challenges from providing affordable housing to insulating themselves from the effects of statewide droughts. Dutch companies that focus on a circular, neighborhood-centric built environment will find multiple opportunities in the Los Angeles. region.

Strength of Green Jobs and Private Sector Investment: The availability of green jobs and circular private sector investment in the Los Angeles region provides an environment ripe with opportunity. For example, the City of Los Angeles has a tremendous amount of resources to utilize for its sustainability endeavors; it seeks to increase private sector green investment in Los Angeles by $750 million by 2025 and $2 billion by 2035. California is opening green career pathways at community college and trade/technical schools to create a regional workforce that is ready to participate in the circular economy.

Barriers and Challenges

The Challenge of COVID-19: At the current moment in time, states and nations are focused on economic recovery and keeping businesses afloat while maintaining the safety of the population. There is a chance that in the near-term, basic economic growth will be prioritized over sustainability goals in the region, which has the potential to set back circular progress.

[3] Ellen Macarthur Foundation. *Cities in the Circular Economy: An Initial Exploration*. 2017. https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Cities-in-the-CE_An-Initial-Exploration.pdf

Non-Financial Barriers: While many circular economy investment opportunities have a sound underlying profitability there are often non-financial barriers that hold back the pace of investment.[4] Policymakers and nonprofit organizations can play an important role in helping businesses overcome these barriers.

Barriers can include consumer and business customs and habits that can prevent the adoption of new ideas and technologies. The circular economy concept is still not widely known among the American public or business community. Policy interventions in the Los Angeles regional economy have served to close information gaps and raise awareness. While these policies have begun to chip away at ingrained patterns of behavior and ways of thinking, these barriers remain.

Barriers can also be informational in nature, dealing with things such as finding partners and investment opportunities, dealing with the legal and regulatory framework (e.g. zoning laws), and finding a source of qualified labor. Policy can therefore serve to facilitate partnerships either among businesses or between businesses and nonprofit organizations or government departments. Policy interventions can also include technical support to businesses, grants, and support for partnerships and pilot projects.

Increasing the Visibility of Dutch Companies

Regional circular industry trade expositions present opportunities for Dutch companies in the industry to increase the exposure of their circular products and services and to network and find potential partners and clients. Building partnerships with entities that already have visibility in the regional circular economy will serve to increase the visibility of new market entrants' circular products and services. New market entrants can further their visibility by joining regional membership organizations such as the U.S. Green Building Council Los Angeles and the Los Angeles Economic Development Corporation (LAEDC). In addition, joining these organizations can provide opportunities to forge connections with potential partners.

Finally, as with most entries into new markets, the timing of entry is essential to maximizing company visibility and the probability of success. As new regional sustainability plans and past plan phases go into effect, first movers into the market will have significant advantages as technology adopted early on becomes established in the different circular industries. There is no time like the present to join the Los Angeles region's growing circular economy.

[4] Ellen Macarthur Foundation. *Delivering the Circular Economy - A Toolkit for Policymakers*. 2015. https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation_PolicymakerToolkit.pdf

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Study Overview

The goal of this study is to give a clear overview of business opportunities for Dutch companies and knowledge institutes as well as connect Dutch businesses to relevant projects being undertaken in the Los Angeles region. In addition, the study will identify opportunities for collaboration between Dutch companies and public and private partners in California focused on circular urban development. This market study begins by providing a quick overview of recent policy developments focused on the circular economy throughout California, as well as in Los Angeles County and key cities within it. It will then map the circular economy sector in the county, focusing on various elements of the smart city approach that will be of particular interest to Dutch companies, such as the design of circular buildings and communities, innovations in the recycling materials and their use in building construction, sustainable water practices, and sustainable urban food production. Opportunities and potential barriers in the sector will be identified, focusing on industries that will be of particular interest to the Dutch companies. Potential public and private partners will be identified, and past project successes and upcoming projects of interest will be highlighted. Finally, some suggestions regarding how to increase the visibility of Dutch innovations will be provided.

Overview of Policies Related to the Circular Economy in California and Los Angeles Region

Section Overview

- While California has a framework in place to achieve important sustainability goals, individual counties and cities in California, in particular Los Angeles County and Cities of Los Angeles, Culver City, Long Beach, and Santa Monica, have much more comprehensive plans in place which contain well-defined goals, target benchmarks, and proposed actions.
- Los Angeles' Countywide Sustainability Plan, OurCounty, is a regional sustainability plan for Los Angeles County which was created in 2019 and represents the most ambitious county sustainability plan in the United States.
- The City of Los Angeles has similarly ambitious sustainability plans in place: LA's 2019 Sustainable City pLAn, also called LA's Green New Deal, expands on the 2015 pLAn by laying out more aggressive goals that will help transform Los Angeles into a more circular city.
- The City of Long Beach's Climate Action and Adaptation Plan (LBCAAP) is a planning document that outlines the city's proposed approach to address climate impacts on the city and to reduce the city's impact on the climate and the environment.
- Culver City's General Plan serves as the city's policy guide for land use and development decisions. Culver City's existing General Plan, updated between 1968 and 2014, contains nine "elements" which include circular topics such as land use, transportation, housing, open space, and conservation of natural resources.
- In 2019, the Santa Monica City Council adopted its own Climate Action and Adaptation Plan, the SMCAAP. The SMCAAP includes comprehensive plans for adapting to climate change and developing community resilience to environmental shocks such as rising sea levels, focusing on zero net carbon buildings, zero waste, and sustainable mobility.

The circular economy is the concept of systematically rebuilding the economy to encourage the continued use of resources. Core elements of circularity are embedded within each key urban system from water, to housing and infrastructure, to food. Much like in a circular economy, in a circular city, resources are kept at their highest potential for as long as possible, through reusing, repairing, remanufacturing, and recycling. Public private partnerships, neighborhood initiatives, and international exchange of knowledge are all needed to achieve these goals. A circular economy development path will reduce carbon dioxide emissions and meet California and the Los Angeles region's ambitious climate goals. In addition, a circular economy development path can increase the resilience of cities in the Los Angeles region by increasing the ability to adapt to negative external environmental shocks such as droughts. Policymakers in the Los Angeles region have actively steered and stimulated circular market activity by setting specific targets, changing public procurement policy, raising awareness among the public and private businesses, and encouraging innovative pilots. In addition, efforts have been made to steer education and training programs towards sustainable jobs.

California, specifically the Los Angeles region, has embraced the circular economy concept and has enacted various public policies to encourage the shift to circularity. Since 2018, California has pursued one of the most ambitious climate agendas in the country, renewed by Governor Gavin Newsom's executive order in October of 2020.[5] These climate action plans recognize the importance of collaboration with foreign companies and other states to help achieve their sustainability goals.

City and county governments can move more rapidly than state and national governments to change policy to support the advancement of particular opportunities within the circular economy through urban planning, infrastructure, and local business development. In addition, local governments are more responsive to and aware of local conditions. As a result, local governments at the county and city level play important roles in determining the extent and direction of circular economic development.

Los Angeles County and many city governments within have recognized that collaboration between businesses, nonprofit organizations, and government agencies is crucial. Collaboration between these parties creates the knowledge required to identify the most relevant circular economy opportunities and barriers in each focus industry.

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[5] State of California. "Governor Newsom Launches Innovative Strategies to Use California Land to Fight Climate Change, Conserve Biodiversity and Boost Climate Resilience." October 8, 2020. https://www.gov.ca.gov/2020/10/07/governor-newsom-launches-innovative-strategies-to-use-california-land-to-fight-climatechange-conserve-biodiversity-and-boost-climate-resilience/

An Overview of State and Local Revenue Generating Programs for Sustainable Development

State of California

California's cap-and-trade program seeks to reduce greenhouse gas emissions by capping industry emissions and allowing companies to buy and sell credits. Cap-and-trade program revenues are deposited into California's Greenhouse Gas Reduction Fund and then allocated to state agencies that implement programs to reduce greenhouse gas emissions, encourage environmental sustainability, clean water, and promote electric vehicles use. The law requires that 35% of the generated funds be directed towards environmentally disadvantaged and low-income communities. Program investment priorities include:[6]

- Reducing air pollutants
- Fostering low- and zero-carbon transportation
- Promoting sustainable agriculture
- Encouraging climate adaptation and resilience
- Fostering and clean energy research

Los Angeles County

The County has taken steps to commit to public transit through the passages of Measure R in 2008 and Measure M in 2016. Both measures increased the County sales tax to fund transportation projects and improvements.

Measure R allocates generated revenues to seven transportation categories:[7]

- 35% to new rail and bus transit projects
- 20% to bus operations
- 20% to carpool lanes and highways
- 15% for local city improvements.
- 3% to Metrolink projects
- 2% to Metro Rail system improvement
- 5% to rail operations

Measure M seeks to:[8]

- Expand the County's rail and rapid transit system
- Improve local, regional, and express bus service and connectivity
- Make public transportation more accessible and affordable
- Foster technology and innovation and incorporate new technology and innovations into the County's transportation system
- Reduce pollution

[6] Center for Climate and Energy Solutions. "California Cap and Trade." https://www.c2es.org/content/california-cap-and-trade/
[7] Metro. "Measure R." https://www.metro.net/projects/measurer/
[8] Metro/ "Measure M." https://theplan.metro.net/

Santa Monica

In 2017, the City of Santa Monica implemented a water neutrality requirement on new construction projects. The water neutrality requirement limits new water demand from projects that use more water than previous projects. Fees paid in the place of reduced water demand are allocated to the city's water efficiency projects.

Overview of County and City Sustainability Plans in the Los Angeles Region

The major sustainability plans in the Los Angeles region are introduced in this section. These plans will guide circular development in the region and are the source of multiple circular opportunities for companies that supply circular products and services.

Los Angeles County

Los Angeles's Countywide Sustainability Plan, OurCounty, is a regional sustainability plan for Los Angeles County which was created in 2019 and represents the most ambitious county sustainability plan in the United States.

About two-thirds of the county's land area, with over a million residents, is made up of unincorporated areas. Los Angeles County holds many governing powers in these unincorporated areas that would otherwise be held by city governments. As a result, OurCounty will help guide decision-making regarding the circular direction in these unincorporated areas as well as inform actions being taken by municipalities within the county.

The plan identifies lead governmental entities and private sector partners who will work together to achieve OurCounty's goals. The county's plan supports the growth of the circular economy through procurement practices, land use authority, and multiple economic and labor force development incentives. OurCounty also addresses strategies to effectively manage waste, water, energy, and material resources, as well as to improve access to healthy food within the county.

City of Los Angeles

The City of Los Angeles has similarly ambitious sustainability plans in place. In 2015, Mayor Garcetti unveiled Los Angeles's first Sustainable City pLAn. Since then, Los Angeles became the top solar city in the country, reducing greenhouse gas emissions by 11% in a single year and creating over 35,000 green jobs.

LA's 2019 Sustainable City pLAn, also called the Green New Deal, expands on the 2015 pLAn by laying out more aggressive goals that will help transform Los Angeles into a more circular city.
This deal contains the following targets: recycle 100% of wastewater by 2025, plant 90,000 trees by 2021, and utilize 100% renewable energy by 2045. Additionally, goals include reducing top sources of harmful emissions from buildings, transportation, and trash. The 2019 Green New Deal is estimated to cut City emissions by an additional 30% above and beyond the path of the original 2015 original pLAn.

Culver City

Culver City's General Plan serves as the city's policy guide for land use and development decisions. Culver City's existing General Plan, updated between 1968 and 2014, contains nine "elements" which include circular topics such as land use, transportation, housing, open space, and conservation of natural resources.

A comprehensive update to the existing General Plan is set to be reviewed and adopted by mid-2022. An updated General Plan can produce many circular benefits for Culver City including:

- Providing further circular direction for housing decisions.
- Establishing clear and objective standards for circular (re)development.
- Identifying ways to further conserve and better use scarce natural resources.

Long Beach

In 2010, the Long Beach City Council adopted the Long Beach Sustainable City Action Plan. The plan was created to guide policy decisions to create a more circular Long Beach. The Sustainable City Action Plan includes measurable goals and actions regarding buildings and neighborhoods, energy, green economy and lifestyle, transportation, urban nature, waste reduction, and water. The 2021 Workplan lists actions that are part of the Sustainable City Action Plan and will be priorities for 2021. These priorities will be reviewed in the industry-specific sections later in this study.

The City of Long Beach's Climate Action and Adaptation Plan (LBCAAP) is a planning document that outlines the city's proposed approach to address climate impacts on the city and to reduce the city's impact on the climate and the environment. The LBCAAP seeks to reduce negative local impacts resulting from poor air quality, drought, flooding, and rising sea levels. In January of 2021, the Long Beach City Council confirmed the LBCAAP which is expected to be fully adopted by the fall of 2021.

Santa Monica

Santa Monica's Sustainable City Plan was adopted in 1994 with updates in 2003, 2006, and 2014. The Plan is founded on 11 guiding principles that have guided the city's sustainable decisions, including that the concept of sustainability guides city policy, that environmental equality, economic health and social equity are mutually dependent, and that Santa Monica is linked with the regional, national, and global community. The plan expressed that the highest priority sustainability issues will be addressed first, with the most cost-effective programs and policies selected and that the city is committed to procurement practices which minimize negative environmental impact. It also acknowledges that cross-sector partnerships are crucial to achieving the city's sustainability goals.

In 2019, the Santa Monica City Council adopted the Climate Action & Adaptation Plan (SMCAAP). The SMCAAP also includes comprehensive plans for adapting to climate change and developing community resilience to environmental shocks such as rising sea levels, focusing on zero net carbon buildings, zero waste, and sustainable mobility. Furthermore, the Climate Adaptation section focuses on community resilience to climate change through four sectors: Climate Ready Community, Water Self-Sufficiency, Coastal Flooding Preparedness, and Low Carbon Food & Ecosystems.

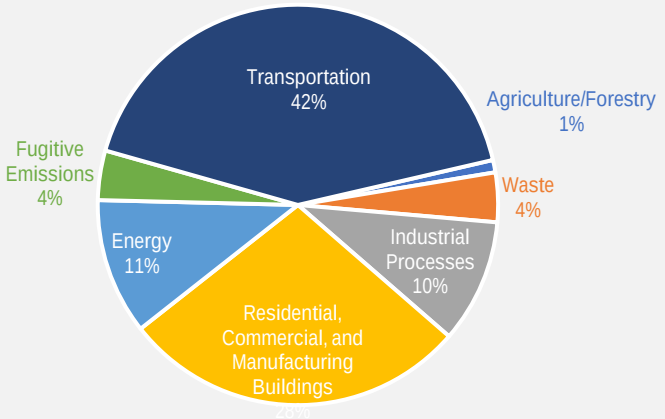
Understanding the Circular Economy in the Los Angeles Region

Section Overview

- This section identifies industries in the LA region with high circularity potential.
- An industry's circularity potential can be identified in many ways, such as by considering each industry's material and energy usage profile, as well as greenhouse gas and waste creation. Circularity potential accounts for both resource consumption and waste creation, as well as how effectively material is recovered and the potential for improvement.
- Industries with high circularity potential can also be identified by the extent to which regional sustainability policy initiatives focus on each particular industry.

The Los Angeles region is nationally recognized as a pioneer in the circular economy. An industry-centric analysis can help identify potential opportunities available and challenges faced by companies interested in investing in the region's circular economy. First, however, industries in the LA region with high circularity potential must be identified. An industry's circularity potential can be identified in many ways such as by considering each industry's material and energy usage profile, as well as greenhouse gas and waste creation. Circularity potential takes into account both resource consumption and waste creation, as well as how effectively material is recovered and the potential for improvement.

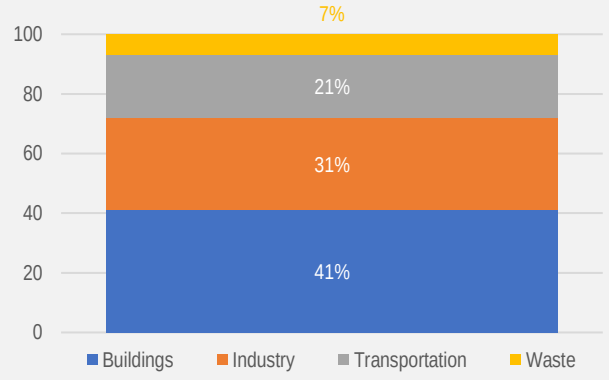
Exhibit 3-1: Greenhouse Gas Emissions by Industry
LA County (2015)



Source: 2015 LA County Greenhouse Gas Emissions Inventory

Exhibits 3-1 and **3-2** show greenhouse gas emissions by industry in both Los Angeles County and the City of Los Angeles. As can be seen in **Exhibit 3-1**, transportation and the energy used in buildings and facilities make up around 70% of Los Angeles County's total greenhouse gas emissions. Because of their significance these represent important sectors in the circular economy. **Exhibit 3-2** shows the City of Los Angeles's greenhouse gas emissions

Exhibit 3-2: Greenhouse Gas Emissions by Source
City of LA (2017)



Source: Garcetti, Eric. pLAn, 2019.

by source. Four industries, buildings, industry, transportation, and waste are responsible for emitting all of the City's greenhouse gases.

Industries with high circularity potential can also be identified by regional sustainability policy initiative's focus on each particular industry. In the case of the Los Angeles region, the particular policy initiatives that were used to determine the circularity potential of different industries were Los Angeles County's sustainability plan as well as sustainability plans put forth by the Cities of Los Angeles, Culver City, Long Beach, and Santa Monica.

Overview of Circular Industries and Opportunities

Section Overview

- Eight focus industries in the Los Angeles region's circular economy were identified. These include:
  - Clean and Renewable Energy
  - Waste Management
  - Transportation
  - Food and Agriculture
  - Construction
  - Industry: Oil, and Gas
  - Infrastructure and Urban Development
  - Water Supply and Waste

Eight focus industries in the Los Angeles region's circular economy were identified.[9] The focus industries are:

Clean and Renewable Energy: Circular opportunities exist in the area of clean and renewable energy, particularly in the supply of renewable energy-generation technologies and energy storage technologies.

Waste Management: The waste management industry in the Los Angeles region has significant circular potential. It is essential to consider non-producing contributors to resource consumption and waste in the economy. Consumer product packaging represents an opportunity to reduce resource use. Increased recycling of plastic packaging and the substitution of bio-based packaging for petroleum-based plastic packaging are areas of opportunity. In addition, there is opportunity for technologies that can help enable circular economy activity by helping to minimize structural waste.

Transportation: Another non-producing industry sector with high circularity potential is the transportation sector which is a significant energy consumption sector that is a main contributor to

[9] An overview of these circular focus industries listed by U.S. Census Bureau North American Industry Classification System (NAICS) code is provided in Appendix A.

air pollution. Opportunities exist to expand pedestrian and bike infrastructure and to increase the number of electric vehicle charging stations in the region.

Food and Agriculture: Reducing unnecessary food waste presents a circular opportunity for the region. Opportunities to construct urban food towers and maximize value from organic by-products and waste streams also presents an important circular opportunity.

Construction: The analysis of this industry sector focuses on the construction of new buildings and renovation of existing buildings. The construction sector is highly dependent on raw materials and creates significant volumes of waste. In construction, 3D printing of building modules, the reuse and recycling of components and building materials, and use of recycled material in construction were identified as areas of opportunity.

Industry: Oil, and Gas: As can be seen in **Exhibits 3-1** and **3-2**, the industrial sector accounts for a significant percentage of both the County and City of Los Angeles's greenhouse gas emissions. As a result, it can be considered an important part of the region's circular economy. Opportunities exist for businesses that provide technology and services that can help reduce oil and gas emissions.

Infrastructure and Urban Development: Los Angeles County's growing population increases the demand for homes, buildings, and the infrastructure needed to support them. Sustainable infrastructure and urban development will be essential to managing this growth. Companies with expertise in developing circular neighborhoods will find multiple opportunities available to them. In addition, companies that have expertise ensuring that surface water is kept at livable levels have a number of opportunities in the region.

Water Supply and Waste: Water scarcity combined with a growing population means that significant opportunities are present in this vital industry. Companies that have expertise in smart water management, particularly in areas such as the capture, storage, and use of rainwater, will find many opportunities.

With each of the identified focus industries that have high circularity potential in the region, an in-depth industry-specific analysis will be conducted. In this analysis, the most relevant circular economy opportunities and challenges focusing on the business profiles of Dutch companies will be presented.

Circular Industries in the Los Angeles Region: An In-Depth Analysis

Section Overview

- The following section outlines the industries that constitute the circular economy in the Los Angeles region in order to identify potential opportunities and barriers for companies that focus on the circular economy.
- This section will also identify individual companies, nonprofit organizations, and government agencies operating in the Los Angeles region's circular economy that could serve as potential partners for Dutch companies.
- In addition, circular project success stories in the region will be highlighted.
- Below, one key opportunity and one key barrier will be provided for a selection of the highlighted circular industries.

Waste Management:

Key Opportunity

- Supply technologies that can help enable circular economy activity by collecting and analyzing data on materials used in economic activity to help minimize structural waste.

Key Barrier

- Overcoming attitudes and habits regarding what is considered waste and what should be reused and recycled.

Food and Agriculture:

Key Opportunity

- Opportunities for companies that can develop vertical farming systems. Opportunities are present to both set up their own farms and sell urban farming technology to other farms.

Key Barrier

- Water can be prohibitively expensive.

Construction:

Key Opportunity

- The retrofitting of old construction can be performed using both 3D printing and material passports. In order for these two technologies to maximize their circular impact, the material choice for 3D printing needs to be managed with circularity in mind. There is significant opportunity for partnerships between the providers of both technologies.

Key Barrier

- Social barriers exist for the adoption of many technologies with circular potential in the construction industry. Many established firms in the construction industry are reluctant to change long-established practices that stand in the way of adopting circular technologies.

Infrastructure and Urban Development:

Key Opportunity

- Companies that produce technology which helps address sea level rise have a number of opportunities in the region.

Key Barrier

- Myopic thinking must be overcome when considering long-term investments to solve problems whose benefits will largely be enjoyed by future generations.

Water Supply and Waste:

Key Opportunity

- Companies that have expertise in smart water management particularly in areas such as the capture, storage, and use of rainwater will find many opportunities.

Key Barrier

- Changing current attitudes regarding water management to reflect a circular focus.

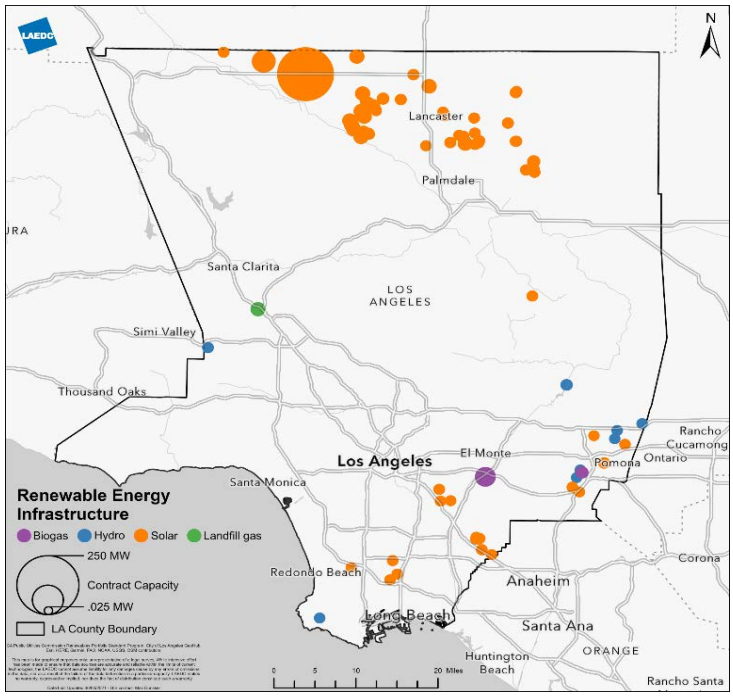
The following sections will outline the industries that make-up the circular economy in the Los Angeles region in order to identify potential opportunities and barriers for companies that focus on the circular economy. These sections will also identify individual companies, nonprofit organizations, and government agencies operating in the Los Angeles region's circular economy that could serve as potential partners for Dutch companies. Profiles of successful businesses operating in the circular economy will be provided. In addition, circular project success stories in the region will be highlighted. Finally, Appendix C will identify potential projects and business opportunities for Dutch companies in the Los Angeles region's circular economy.

The set of industries with high circularity potential in the region and the opportunities identified in each is not exhaustive. Opportunities may exist in addition to those identified. In addition, opportunities are likely to arise in the future that are not currently in existence. Each of the opportunities identified are limited by barriers. The significance and type of barriers vary with each opportunity. Opportunities, challenges, and policy specifics typically differ by sector. However, there is overlap between many of the policies, the opportunities, and barriers in these sectors.

While many of the opportunities that will be reviewed are already being pursued to some extent, there is significant potential to expand. While the Los Angeles region is nationally recognized as a pioneer in the circular economy, it still has many opportunities available to become more circular.

Clean & Renewable Energy

Exhibit 4-1: Renewable Energy Infrastructure in LA County



Industry at a Glance

A circular economy is one that moves all sectors of the economy away from carbon-intensive practices. Within California, multiple energy initiatives color the path towards a renewable, electrified future, with various county and city entities enacting their own sustainability plans.

In 2019, California ranked 47th out of 50 states in energy consumption per capita.[10] Among California's counties, Los Angeles County consumes the most electricity, however, it is among the bottom half of counties regarding electricity consumption per capita.[11] While energy demand per person is lower than for most U.S. consumers, the massive population of California, and Los Angeles within the context of California, makes both geographies a significant market for electricity. This high demand creates a welcoming market for Dutch companies seeking to promote renewable energy technologies. Various government policies provide incentives and markets for renewable and clean energy products.

A map of renewable energy infrastructure is shown in **Exhibit 4-1**. Though there are solar sites scattered throughout the county, along with some hydroelectric and landfill gas sites, most of the renewable energy generation occurs in the Antelope Valley, in the north of the county, and the Pomona Valley, in the east of the county. The size of the marker indicates the contract capacity for generation at that site, with the largest marker being a solar farm present in the northern reaches of the county.

The energy sector in Los Angeles County was made up of 213 establishments and employed 8,984 workers at the end of 2020.[12] The Los Angeles Department of Water and Power's (LADWP) 2017 Final Power Strategic Long-Term Resource Plan forecasts that peak electricity demand in Los Angeles

County will grow by 0.4 percent per year until 2027; longer-term forecasts project that this rate of increase will grow to up to 0.8% by 2040.[13]

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[10] U.S. Energy Information Administration. "Ranking: Total Energy Consumed Per Capita, 2018." https://www.eia.gov/state/rankings/?sid=CA#series/12

[11] California Energy Commission. "Electricity Consumption by County." https://ecdms.energy.ca.gov/elecbycounty.aspx, data.census.gov 2019 5 year ACS estimates.

[12] Sum of NAICS 2211 and 3359.

[13] Los Angeles Department of Water and Power. "2017 Power Strategic Long-Term Resource Plan." December 2017. https://www.ladwp.com/ladwp/faces/wcnav_externalId/a-p-doc?_adf.ctrl-

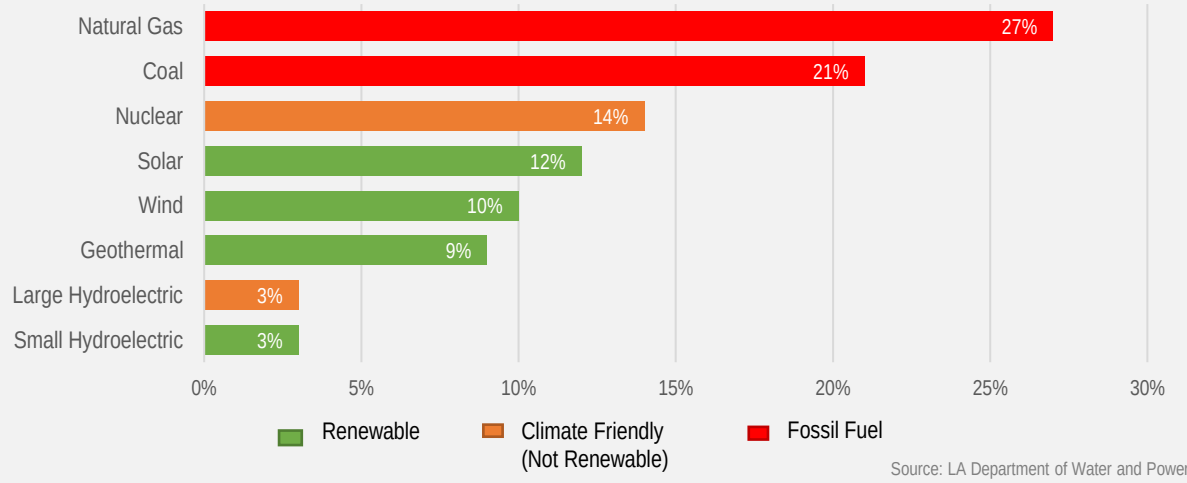
The LADWP serves over 4 million City of Los Angeles customers, making it the largest municipal utility in the United States. **Exhibit 4-2** below lists electricity generation by power source for the LADWP. **Exhibit 4-3** further indicates which power sources are renewable and climate friendly and which are fossil fuels. The map shows the locations of renewable energy infrastructure across the county.

Exhibit 4-2: Los Angeles Power Sources (2019)

Power Source	Percentage
Natural Gas	27%
Coal	21%
Nuclear	14%
Solar	12%
Wind	10%
Geothermal	9%
Large Hydroelectric	3%
Small Hydroelectric	3%

Source: LA Department of Water and Power[14]

Exhibit 4-3: Los Angeles Power Sources Fossil Fuels vs. Renewables (2019)



Source: LA Department of Water and Power

State of California

Under the leadership of then-Governor Jerry Brown, California enacted SB 100, "The 100 Percent Clean Energy Act of 2018," which set several ambitious targets:

- Powering all retail electricity needs in California with zero-carbon resources, such as wind or solar power by 2045.
- Ensuring that at least 60 percent of California's electricity is from renewable sources by 2030.
- Requiring the California Energy Commission, Public Utilities Commission, and Air Resources Board to issue a joint agency policy report starting in 2021 and every four years thereafter.

The first joint agency policy report, published on March 15th, indicates that California has made steady progress in the years following SB 100, with decreasing greenhouse gas emissions and an increase in the utilization of renewable energy sources. It also forecasts the growth in resources

state=jxv8y8qwu_4&_afrLoop=270749761784851&_afrWindowMode=0&_afrWindowId=null#%40%3F_afrWindowId%3Dnull%26_afrLoop%3D270749761784851%26_afrWindowMode%3D0%26_adf.ctrl-state%3Dakr555m1m_30

[14] Los Angeles Department of Water and Power: "Facts and Figures." https://www.ladwp.com/ladwp/faces/ladwp/aboutus/a-power/a-p-factandfigures?_adf.ctrl-state=xvkkkt0n4_4&_afrLoop=226252857407787

necessary to accomplish the ambitious sustainability goals, projecting large increases in electricity power capacity in regards to utility-scale solar (+56.9 GW), battery storage (+48.6 GW), and offshore wind (+10 GW), as the state phases out geothermal (-2.7 GW) and biomass (-1.3 GW) renewable technologies.[15]

Under the ambitious climate goals set by the previous administration, and embraced by current Governor Gavin Newsom, California's renewable energy economy will have to expand rapidly over the next few decades, opening the door for Dutch businesses with innovative technologies surrounding renewable energy generation.

California's energy industry is transitioning towards renewable energy. This rapid transition is due in large part to California's ambitious Renewables Portfolio Standard (RPS) as well as technological and economic changes that are making renewables increasingly more cost effective. California's ambitious RPS requires utilities in the state to attain a 33% renewables power mix by 2020, a 60% mix by 2030, and a 100% mix by 2045. California cities are moving to meet these emissions reduction targets largely by transitioning to 100% local consumption of renewable electricity. This transition towards renewable electricity will significantly reduce energy emissions from buildings due to the current high use of natural gas in existing buildings. In order to achieve net carbon neutrality by 2045, natural gas emissions from existing and new buildings, which make up around 13% of the greenhouse gas inventory in the state of California, must be reduced. Although energy-efficiency improvements in buildings will serve to decrease natural gas emissions, it will eventually be necessary to transition away from natural gas use to electricity.

Los Angeles County

Los Angeles County's OurCounty Plan, enacted in 2019, outlines the actions that the county will have to take in several sectors to make Los Angeles a more healthy, sustainable community. Regarding renewable energy, the county has set several goals:

- Achieving a 25% reduction in greenhouse gas emissions and establishing 3 GW of new distributed energy sources by 2025
- Achieving a 50% reduction in greenhouse gas emissions and establishing 6 GW of new distributed energy sources by 2035
- Achieving carbon neutrality and establishing 10 GW of new distributed energy sources by 2050

Starting from a baseline of 105 million metric tons of carbon dioxide emissions in 2015 and 894 GW of distributed energy-generation capacity in 2018, change must happen quickly for Los Angeles County to reach its targets. In order to accomplish these targets, the county is investing in building decarbonization, community shared solar facilities, and microgrids for disadvantaged communities, among several other long-term and short-term actions.[16]

With a need for renewable technologies to achieve emissions reduction and energy-generation, attaining the county's climate goals is dependent on the introduction of innovative technologies to

[15] California Energy Commission. *SB100 Joint Agency Report*. https://www.energy.ca.gov/sb100#anchor_report
[16] LA County Government. "Strategy 7A." https://ourcountyla.lacounty.gov/strategies/strategy-7a?goal=831

the region, creating opportunities for Dutch companies which specialize in those sectors of the circular economy.

City of Los Angeles

The City of Los Angeles' major sustainability legislation is LA's Green New Deal, also known as the Sustainable City pLAn. The policy was first enacted by Mayor Garcetti in 2015 and has since been updated in 2019, with the plan to update it every four years henceforth. The updated plan sets an even more ambitious course than its predecessor, with a goal to save an additional 200 million tons of greenhouse gas emissions with the following targets:

- Recording a 50% reduction in greenhouse gas emissions (from the 1990 baseline) by 2025, as opposed to the 45% target set in 2015.
- Recording a 73% reduction in greenhouse gas emissions (from the 1990 baseline) by 2025, as opposed to the 60% target set in 2015.
- Achieving carbon neutrality by 2050, as opposed to the 80% of the 1990 baseline set in 2015.[17]

This feasibility of accomplishing these emissions goals has recently been assured by the National Renewable Energy Laboratory (NREL), who partnered with local entities to produce the LA100 study to inform Los Angeles's path to 100% renewable energy. The report evaluates a multitude of circumstances, including a forecasted increase in per capita energy demand, and insists that the 100% target is achievable if coupled with the electrification of other sectors. NREL projects that solar, wind, storage, and hydrogen cells will all be tools necessary to reach the county's energy-generation and storage goals.[18] Furthermore, the city will need to invest in energy efficiency and demand response programs that encourage households to use electricity during times when solar and wind power are most available.

Significant challenges in the city's transition to clean and renewable energy exist. Building the necessary clean and renewable energy facilities will require overcoming inevitable land-use disputes as renewable energy developers take over increasing amounts of open space in rural areas. In addition, getting renewable and clean electricity to the city will require building new costly transmission lines.[19]

The Los Angeles Department of Water and Power is investing in several of these renewable energies, with plans to invest nearly $1 billion in solar, wind, and storage. The Los Angeles Department of Water and Power has set ambitious goals outside of LA's Green New Deal, seeking to supply 55% renewable energy by 2025, 80% by 2036, and 100% by 2045. In addition, clean energy has also become a regional policy priority: the LA Green New Deal seeks to provide 100% clean power for the 2028 Olympic and Paralympic Games.

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[17] Garcetti, Eric. G*LA's Green New Deal*. 2019. https://plan.lamayor.org/sites/default/files/pLAn_2019_final.pdf

[18] https://www.nrel.gov/docs/fy21osti/79444-ES.pdf

[19] Roth, Sammy. "Los Angeles Now Has a Roadmap for 100% Renewable Energy." *Los Angeles Times*. March 24, 2021. https://www.latimes.com/business/story/2021-03-24/los-angeles-now-has-a-roadmap-for-100-renewable-energy

Long Beach

The use of electricity and natural gas in residential and commercial buildings contributes at around a quarter of emissions in Long Beach. In order to meet the LBCAAP's 2030 targets, the city must decrease building energy use and transition to clean, renewable energy.

Opportunities and Barriers: An Overview

Given the profile of Dutch companies, significant specific opportunities for Dutch companies were not identified in this industry. However, a brief overview of general opportunities and barriers is provided.

Opportunities

- Opportunities to provide renewable energy-generation technologies, energy storage technologies.
- Opportunities exist for companies that advise businesses, nonprofit organizations and governments on how to become more energy efficient and to effectively transition towards renewable and clean energy sources.

Key Barriers

- Complex network of electricity providers to navigate.
- Land-use disputes as renewable energy developers take over increasing amounts of open space in rural areas.
- Need to build new costly transmission lines to deliver clean and renewable energy.[20]

Organization and Company Spotlight

The **LA Cleantech Incubator (LACI)** is the City's official cleantech business incubator. LACI was established to foster the clean technology industry in the Los Angeles region. LACI partners with an extensive network of advisors to provide assistance to budding companies. Assistance includes leadership and business development coaching. LACI accelerates development of cleantech start-ups by offering flexible office space and access to a network of experts and capital. LACI recently merged with CleanTech LA, bringing together business, government and academia to expand the circular sector in Los Angeles.

Circular Project Success Story

The **Los Angeles Community College District (LACCD)** is investing $9.6 billion in modernizing and renovating its 9 colleges in Los Angeles County. As part of this effort, the LACCD is incorporating sustainability into its renovations. LACCD has installed over 10 MW of solar energy which has saved over $10 million. In addition, the solar installations serve as a living lab for students enrolled in Renewable Energy Programs such as those offered through the Los Angeles Trade-Tech College. LACCD is committed to adding renewable energy generation at all of its campus sites.

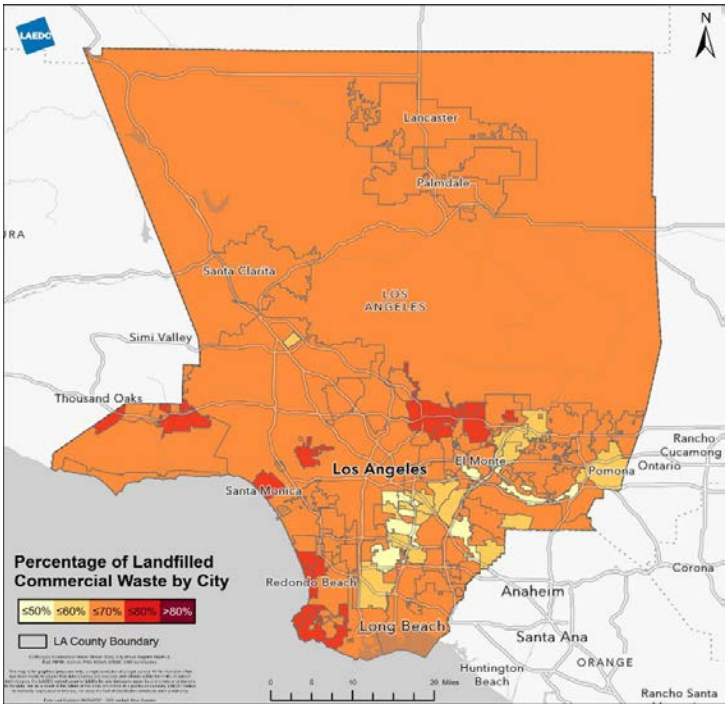
[20] Roth, Sammy. "Los Angeles Now Has a Roadmap for 100% Renewable Energy." *Los Angeles Times*. March 24, 2021. https://www.latimes.com/business/story/2021-03-24/los-angeles-now-has-a-roadmap-for-100-renewable-energy

Waste Management

Industry at a Glance

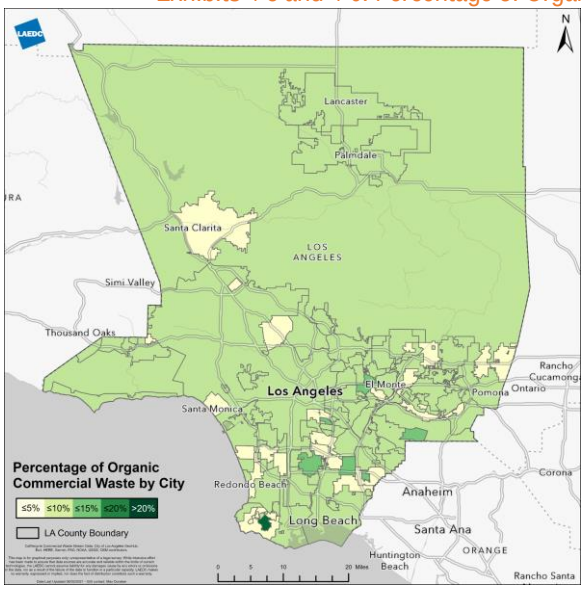
One of the key tenets of the circular economy is to redefine waste as an input stream for other industries, with the idea that changing the context of how we view waste will change the value associated with waste materials. While this terminology is not ubiquitous among Californians, the idea is familiar: the state and the Los Angeles region have succeeded in providing incentives and creating markets for recycled goods, thereby diverting millions of tons of waste away from landfills.

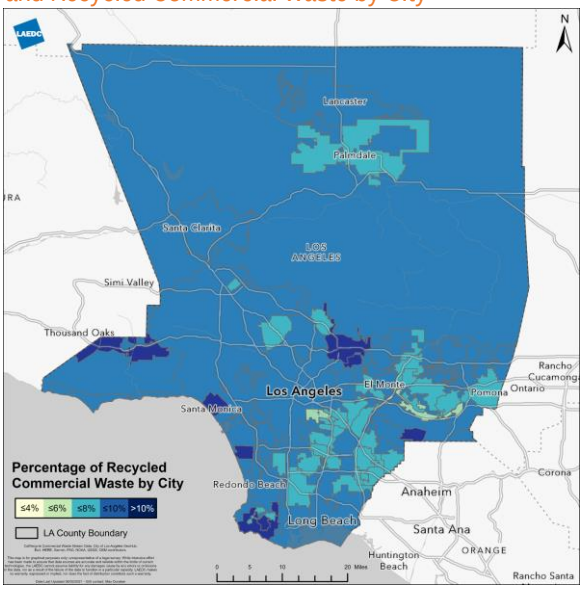
Exhibit 4-4: Percentage of Landfilled Commercial Waste by City



The waste sector in Los Angeles County was made up of 561 establishments and employed 11,727 workers at the end of 2020.[21] Between 2019 and 2034 waste generation in Los Angeles County is projected to increase by around 15.4%.[22]

Exhibits 4-5 and 4-6: Percentage of Organic and Recycled Commercial Waste by City





[21] Sum of NAICS 5621, 5622, and 5629.
[22] Los Angeles County Public Works. "Countywide Integrated Waste Management Plan: 2019 Annual Report." September 2020. https://dpw.lacounty.gov/epd/swims/ShowDoc.aspx?id=14372&hp=yes&type=PDF

According to CalRecycle's 2019 State of Disposal and Recycling Report, of California's 77.5 million tons of waste produced last year, 55% went to landfills, 19% were exported as recyclables, 12% were composted/anaerobically digested/mulched, and 6% were recycled or source reduced; the remaining materials were split between a myriad of strategies to reuse waste.[23] The breakdown of landfilled, composted, and recycled commercial waste by city in LA County is shown in **Exhibits 4-4**, **4-5**, and **4-6** on the previous page.

The Los Angeles County Department of Public Works reported that in 2017 County residents and businesses generated an estimated 28.05 million tons of solid waste.[24] About 65% of that total waste is either reused, recycled or diverted from landfills with only approximately 10.3 million tons of waste ending up in a landfill.

State of California

Across California, the California Department of Resources Recycling and Recovery, known as CalRecycle, has been the leader in waste management, from encouraging household recycling to incentivizing the use of recycled materials in industrial applications. The agency has taken a statewide approach to decreasing California's dependence on landfills, diverting organic materials away from landfills, expanding infrastructure for manufacturing and recycling, exploring new funding models for materials management programs, promoting state procurement of post-consumer recycled content products, and promoting extended producer liability, along with emphasizing the source reduction of waste, commercial recycling programs, and recycling for other products.[25]

With only 37% of waste recycled last year, CalRecycle admits that it is unlikely that California will meet its goal of recycling 75% of all waste by 2020, though it resolves to stay committed to reaching the goal. Despite its likely inability to reach its recycling goal, CalRecycle has still initiated a change in the waste management culture of California through several grants in 2019:

- Greenhouse Gas Reduction Fund Grants: 41 awardees, $22,939,297 awarded
- Beverage Container Recycling Grants: 415 awardees, $12,254,206 awarded
- Tire Recycling Management Fund Grants: 104 awardees, $12,927,492 awarded
- Other grants: 310 awardees, $38,234,162

These programs, along with others such as the Recycled Content Construction Products Catalog[26], which centralizes information on sources of recycled building materials, provide opportunity and visibility to companies striving to divert waste streams and create a more circular economy.

[23] CalRecycle. "State of Disposal and Recycling for Calendar Year 2019." "https://www2.calrecycle.ca.gov/Publications/Details/1697
[24] Los Angeles Almanac. "Solid Waste Disposal in Los Angeles County." http://www.laalmanac.com/environment/ev04.php
[25] CalRecycle. "California's 75% Initiative Defining the Future." Last Updated February 17, 2021. https://www.calrecycle.ca.gov/75percent#:~:text=The%20Legislature%20and%20Governor%20Brown,decreasing%20California's%20reliance%20on%20landfills
[26] CalRecycle. "Recycled Content Construction Product Catalog." Last Updated April 16, 2021. https://www.calrecycle.ca.gov/condemo/products

Los Angeles County

Los Angeles County's OurCounty Plan has several goals addressing the sustainable production and consumption of resources, emphasizing that the relationship between these processes is deeply interconnected. The county will take aggressive actions in many aspects of waste management, including reducing waste generation, developing regional capacity to beneficially reuse organic waste, and diverting reusable/recyclable materials from landfills, with the following targets:

- By 2025, eliminating 25% of per capita waste generation (from 2017 baseline), reducing organic waste sent to landfills by 75% (from 2014 baseline), increasing capacity for organic waste processing by 20% (from 2014 baseline), and diverting 80% of waste from landfills (from 2017 baseline)
- By 2035, eliminating 30% of per capita waste generation (from 2017 baseline), reducing organic waste sent to landfills by 90% (from 2014 baseline), increasing capacity for organic waste processing by 30% (from 2014 baseline), and diverting 90% of waste from landfills (from 2017 baseline)
- By 2035, eliminating 35% of per capita waste generation (from 2017 baseline), reducing organic waste sent to landfills by 95% (from 2014 baseline), increasing capacity for organic waste processing by 45% (from 2014 baseline), and diverting 95% of waste from landfills (from 2017 baseline)

The county's first priority in waste reduction is source reduction. Reducing the demand for the production of new goods can be achieved by, for example, implementing policies for purchasing recycled goods instead of newly-made products.

The county's second priority in waste reduction is improving waste management strategies. This will involve reducing the amount of waste that goes to landfills with strategies such as more effectively separating and recycling materials such as plastics which can later be reused or recycled. In addition, organic wastes can be composted and used for food production or for energy generation. Los Angeles County's Sustainability Plan also seeks to expand existing countywide programs that incentivize the development of recycling markets and quality recycled materials. Furthermore, Los Angeles County's Sustainability Plan seeks to increase the diversion requirements in the county's Construction & Demolition Debris Ordinance and encourage the use of recycled-content materials in construction projects as well as to incentivize the use of recycled materials in public art projects funded by the County.

While the county is relying on individual accountability to reduce waste generation, many programs will require institutional change and innovative technological advancements to be feasible. The county's ambitious waste management goals create opportunity for Dutch companies who occupy this sector of the circular economy, creating demand for technologies that can address the many waste management facets of the OurCounty plan.

City of Los Angeles

Within its Green New Deal, the City of Los Angeles has set waste management goals which are even more ambitious than the state or county, such as phasing out municipal use of single-use plastics and eliminating organic waste going to landfills by 2028. Several other pertinent targets have been established:

- By 2025, increasing the landfill diversion rate to 90% and increasing proportion of waste products to be productively reused/repurposed to 25%. Also, developing a resource recovery hub pilot with potential initiatives including providing support to startup companies utilizing secondary material through the Los Angeles Cleantech Incubator.
- By 2030, reduce municipal solid waste generation per capita by 15%
- By 2035, increasing the landfill diversion rate to 95% and increasing proportion of waste products to be productively reused/repurposed to 50%
- By 2050, increasing the landfill diversion rate to 100%

Reaching these bold targets will require the city to move towards a system where discarded materials become resources for others to use and where recycling becomes standard practice for households and businesses. Additionally, to accomplish these goals, there must be a 99% reduction in emissions generated from the city's waste sector.

Many other ambitious targets are fastly approaching, with goals to increase construction and demolition waste recycling requirements to at least 80%, to pilot use of 100% recycled aggregate, and to increase municipal hot mix asphalt capacity to pave all city streets using 50% recycled asphalt by 2021. Other innovative strategies to be enacted this year include piloting a sector-specific recycling program, with potential sectors including film studios and the textile and apparel industry, piloting an industrial materials exchange program and assessing the potential for reusable material exchange across several of Los Angeles's industries.

Santa Monica

The City of Santa Monica's CAAP seeks to divert 95% of waste from landfills by 2030. Furthermore, the city seeks to pilot decentralized systems that convert organic waste into usable energy or useful byproducts such as compost. Additionally, the city will explore the use of fees and fines to increase incentives for recycling.

Opportunities and Barriers: An Overview

Opportunities

- Implementation of landfill diversion technologies.
- Opportunities exist for companies that advise businesses, nonprofit organizations and governments on how to become more circular in how waste is managed.
- Supply technologies that can help enable circular economy activity by collecting and analyzing data on materials used in economic activity to help minimize structural waste.
- Opportunities for companies that recycle and reuse construction and demolition waste.
- Increased recycling of plastic packaging and the substitution of bio-based packaging for petroleum-based plastic packaging are areas of opportunity.

Key Barriers

- Overcoming attitudes and habits regarding what is considered waste and what should be reused and recycled.

Organization and Company Spotlight

EcoSet Consulting's Material Oasis reuse center facilitates the reusing and repurposing of discarded materials on film and TV show sets. Items such as set walls, scenic elements, construction materials and props, are recirculated to schools, nonprofits, filmmakers and theaters.

Circular Project Success Story

Vallarta Supermarkets has 50 stores throughout California and is committed to the circular transformation of LA's Hispanic community. In 2019, Vallarta Supermarket implemented a retrofit that reduced energy usage by 13.6% and waste by 50%. Vallarta implemented this project along with multiple partners including LADWP, SoCalGas, and consultants with expertise in energy and water efficiency as well as waste reduction. Store energy usage in 2019 was 13.6% (221,280 KWH) lower than in 2018. When the project is fully implemented, it is estimated that it will achieve a 20% energy reduction. The project also implemented recycling and organic waste diversion which decreased the amount of waste landfilled by 53% (397 tons/year).[27]

Transportation

Industry at a Glance

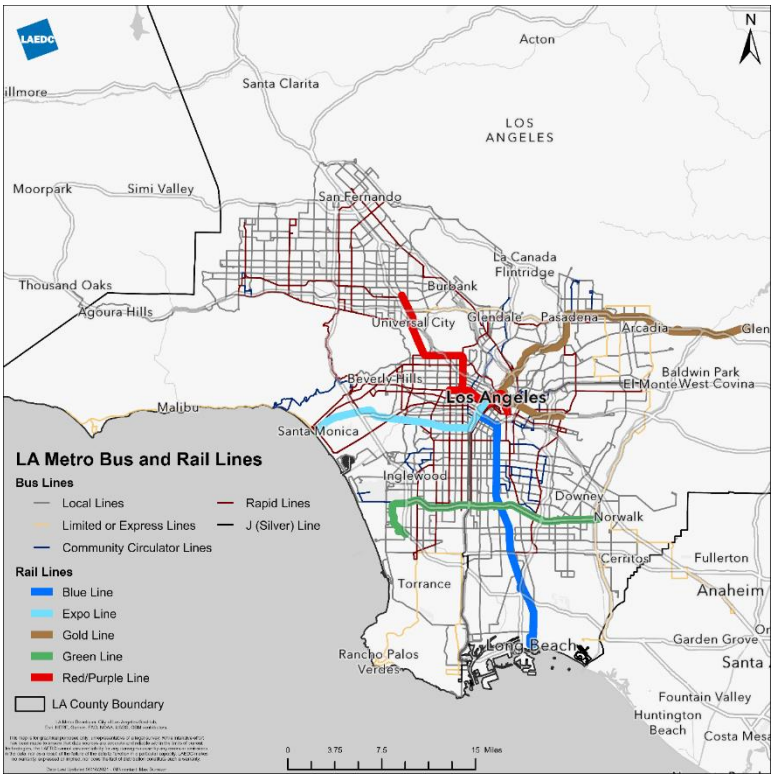
Transportation and its connected industry, warehousing, represent perhaps the fastest growing industry in the Los Angeles region. Real Gross Domestic Product (GDP) growth in transportation and warehousing totaled 11.5% in 2018, with total GDP of around $28 billion, representing approximately 3.7% of the region's total GDP. The urban transit system in Los Angeles County was made up of 36 establishments and employed 1,267 workers at the end of 2020.[28]

Los Angeles County total Construction and Warehousing employment as of April 2021 totaled 201,200 with a year-over -year percentage increase of 9.95%.[29] In the third quarter of 2020, the Los Angeles-Long Beach-Glendale Metropolitan area was home to around 17,471 Transportation and Warehousing 9,152 businesses.[30]

[27] Better Building Challenge. https://www.la-bbc.com/case-studies-summary
[28] NAICS 48511.
[29] California Employment Development Department. "California Industry Employment Changes Calculator." https://www.labormarketinfo.edd.ca.gov/data/industry-employment-calculator.html
[30] California Employment Development Department. "Size of Business Data." https://www.labormarketinfo.edd.ca.gov/LMID/Size_of_Business_Data.html

From 2018-2028, Transportation and Warehousing employment in the Los Angeles-Long Beach-Glendale Metropolitan area is projected to increase by 12.5%.[31]

Exhibit 4-7: LA Metro Transit Routes



Los Angeles County total Transit and Passenger Transportation employment as of April 2021 totaled 7,900 with a year-over -year percentage decrease of 4.44%.[32] From 2018-2028, Transit and Passenger Transportation employment in the Los Angeles-Long Beach-Glendale Metropolitan area is projected to increase by 8%.[33]

The 2015 American Community Survey found that around 78% of Los Angeles County commuters drove alone, 10% carpooled, 6% took public transportation, and 6% walked, or used a bike, motorcycle, or taxi to travel to work.[34] Los Angeles County has been experiencing a growing goods movement trend throughout the County. Regional truck vehicle miles traveled (VMT) are projected to grow by over 80% by 2035 relative to a 2008 baseline from around 6.8% of total VMT in 2008 to approximately 10% by 2035.

A 2015 study estimated that around 25% of the County's incorporated land is dedicated to roads and parking with 14% of that land used for parking.[35]

Caltrans reports that Los Angeles County drivers averaged 21.9 daily vehicle miles traveled (VMT) per capita in 2017.[36] According to the U.S. Census only around 11% of all commute trips in Los

[31] California Employment Development Department. "Long-Term Industry Employment Projections." https://data.edd.ca.gov/Employment-Projections/Long-Term-Industry-Employment-Projections/sp6i-jezb/data
[32] California Employment Development Department. "California Industry Employment Changes Calculator." https://www.labormarketinfo.edd.ca.gov/data/industry-employment-calculator.html
[33] California Employment Development Department. "Long-Term Industry Employment Projections." https://data.edd.ca.gov/Employment-Projections/Long-Term-Industry-Employment-Projections/sp6i-jezb/data
[34] "Transportation Briefing." Our County. July 2018. https://ourcountyla.lacounty.gov/wp-content/uploads/2018/08/Our-County-Transportation-Briefing_For-Web.pdf
[35] Chester, M., Fraser, A., Matute, J., Flower, C. & Ram Pendyala. "Parking Infrastructure: A Constraint on or Opportunity for Urban Redevelopment? A Study of Los Angeles County Parking Supply and Growth." (2015). *Journal of the American Planning Association*. 81:4, 268-286.
[36] Los Angeles County Government. "Total and Average Daily per Capita Vehicle Miles Traveled in LA County (2005-2017)."

Angeles County were made by foot, bike, micromobility, or public transit in 2015.[37] Transportation accounts for 19% of the City of Los Angeles's GHG emissions and is the leading contributor to air pollution.

Los Angeles County

One of OurCounty's sustainability goals is to reduce the need for single-occupancy and privately owned vehicles among Los Angeles County residents in order to decrease the impact of vehicles on the environment. The county has taken steps to commit to public transit through the passages of Measure R in 2008 and Measure M in 2016. Both measures increased the county sales tax to fund transportation projects and improvements. In addition, the county has expanded transit through partnerships with LA Metro and Metrolink to increase the likelihood that people choose public transit alternatives to private vehicles. By 2025, Los Angeles County seeks to increase all trips by foot, bike, micromobility, or public transit by at least 15% and to reduce average daily VMT per capita to 20 miles. By 2035, these targets increase to at least 30% of all trips being made by foot, bike, micromobility, or public transit and a reduction in average daily VMT per capita to 15 miles. Finally, by 2045, these targets increase to at least 50% of all trips being made by foot, bike, micromobility, or public transit and a reduction in average daily VMT per capita to 10 miles.

City of Los Angeles

The City of Los Angeles has identified zero emission transportation and goods movement as essential to improving the city's air quality and meeting its climate goals. The city seeks to increase the percentage of electric and zero emission vehicles in Los Angeles to 25% by 2025, 80% by 2035, and 100% by 2050. Research shows that around 20% of EV drivers in California switched back to gasoline in large part due to the fact that charging their electric vehicles was inconvenient.[38] This finding indicates that in order for EV technology to really take hold, the region's charging infrastructure will need to be expanded to make charging more convenient. To encourage the adoption of electric vehicles (EVs) Los Angeles plans to distribute 1,000 used EV rebates, 11,500 Level 2 EV charger rebates, and 75 DC fast charger rebates by 2021. Furthermore, the city's Sustainability Plan seeks to transform 100% of LA Metro and LA Department of Transportation buses to zero emission by 2030, install 28,000 EV chargers citywide by 2028, and to get 10,000 trucks working at the Port of Los Angeles to zero emission. In addition, the city seeks to electrify 10% of its taxi fleet by 2022 and 100% by 2028.

The city is moving beyond transit-oriented development, seeking to redefine the relationship its residents have with alternatives to automotive transportation, such as public transit, biking, and walking. By 2025, the city wants to have 35% of all trips made by walking, biking, micro-mobility/matched rides, or public transit, increasing to 50% by 2035 and staying at or above that level by 2050. By 2028, the LA Green New Deal seeks to expand the bike lane network by 20 lane-miles per year and increase bicycle-supportive infrastructure such as parking.

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[37] Los Angeles County Government. "Strategy 8A." *OurCounty LA*. https://ourcountyla.lacounty.gov/strategies/strategy-8a

[38] Reuter, Dominick. "1 in 5 Electric Vehicle Owners in California Switched Back to Gas Because Charging Their Cars is a Hassle, New Research Shows." *Business Insider*. April 30, 2021. https://www.businessinsider.in/thelife/news/1-in-5-electric-vehicle-owners-in-california-switched-back-to-gas-because-charging-their-cars-is-a-hassle-new-research-shows/articleshow/82332806.cms

By 2025, the city is also looking to support LA Metro with implementation of a congestion pricing pilot, increase its average Walk Score to 75, and implement Vision Zero safety improvements for pedestrians and cyclists. By 2028, the city seeks to improve travel time on the county's bus network by 30%, complete 28 projects with funding allocated by Measure M, and ensure all city residents have access to high-quality mobility options within a 10 minute walk from their home.

In tandem, the city wants to reduce Vehicle Miles Traveled (VMT) per capita by 13% by 2025, 39% by 2035, and 45% by 2050. Steps towards this goal should already have been undertaken by 2021, including adopting a Mobility First policy, launching an app to map curbside designations throughout the city, and expanding Metro Bike Share to at least three new neighborhoods.

Long Beach

The LBCAAP seeks to reduce reliance on personal motor vehicles and increase transit, biking, and walking trips. It will do so by improving the speed, efficiency, and safety of public transit. In addition, the city will expand and improve pedestrian and bikeway infrastructure. Furthermore, the city seeks to increase employment and residential development near public transit options. Finally, the City of Long Beach seeks to increase access to additional electric vehicle charging stations and transition to low- and zero emissions vehicles.

Santa Monica

By 2030, Santa Monica seeks to convert 25% of commuter trips to public transit and convert 50% of personal automobiles to electric or zero emission vehicles.

Opportunities and Barriers: An Overview

Opportunities

- Opportunities for companies that advise businesses, nonprofit organizations and governments on how to rely on data-driven approaches to solve important circular problems have many opportunities in the Los Angeles region's transportation industry.
- Opportunities exist to expand pedestrian and bike infrastructure and to increase the number of electric vehicle charging stations in the region. Building this infrastructure with sustainable materials in mind represents an additional opportunity.

Key Barriers

- Habits and norms regarding transportation are difficult to change. The Los Angeles region is personal vehicle-centric. Encouraging individuals to switch to public transit options presents a significant challenge.

Organization and Company Spotlight

PortTech Los Angeles is a non-profit innovation center dedicated to creating circular businesses for ports and the goods transportation industry. PortTech connects entrepreneurs, strategic partners and investors, to accelerate innovation to advance clean technologies.

The **Los Angeles Cleantech Incubator (LACI)** partnered with the California Air Resources Board, the California Energy Commission, and the Ports of Los Angeles and Long Beach in an effort to transition the transportation sector to zero emissions. The partnership issued a Request for Information for Zero Emission Trucks, Pilots and Infrastructure for Goods Movement, and received responses from nearly 40 companies in the transportation industry. Responses to the request will inform pilots and identify shortcomings and potential solutions to reduce carbon and air pollution in the Los Angeles Region.
LACI is currently looking for startups in Zero Emissions Mobility. LACI's Transportation Electrification Partnership (TEP) will work with policymakers, business partners, and other private-public collaboration to help achieve the following goals in Los Angeles by the 2028 Olympic and Paralympic Games[39]:

- Increase the adoption of electric light duty vehicles to be 30% of all vehicles on the road and represent 80% of sales.
- Shift at least 20% of all single passenger vehicle trips to zero emissions public transportation.
- Ensure that 100% of all public investment in goods movement will advance zero emissions goals.

Food and Agriculture

Industry at a Glance

With over $50 billion dollars in revenue in 2019, California is a major source of food for the United States, where it makes up 13% of the national market, as well as for the world, with over $20 billion of that revenue from exports.[40] While statewide commodities include almonds, grapes, milk, and berries, Los Angeles County agricultural production, which made up about .35% of California's agricultural economy in 2019, is predominantly nursery products, such as woody ornamentals and bedding plants.[41] The agriculture sector in Los Angeles County was made up of 354 establishments and employed 4,037 workers at the end of 2020.[42] Los Angeles County total farm employment as of April 2021 totaled 4,400 with a year-over -year percentage increase of 18.92%.[43] From 2018-2028, farm employment in the Los Angeles-Long Beach-Glendale Metropolitan area is projected to decrease by 17%.[44]

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[39] Los Angeles Cleantech Incubator. "Apply for LACI Startup Incubation Program Cohort 3." *Los Angeles Cleantech Incubator*. May 5, 2021. https://laincubator.org/apply-for-laci-startup-incubation-program-cohort-3/

[40] California Department of Food and Agriculture. *California Agricultural Statistics Review (2019-2020).* https://www.cdfa.ca.gov/Statistics/PDFs/2020_Ag_Stats_Review.pdf

[41] Los Angeles County Department of Agricultural Commissioner / Weights & Measures. *2019 Los Angeles County Crop & Livestock Review.* http://file.lacounty.gov/SDSInter/acwm/1079785_2019CropReport-Web.pdf

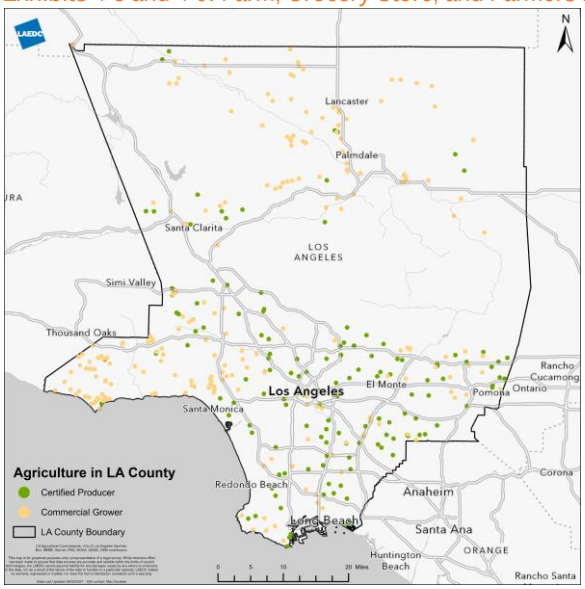
[42] Sum of NAICS 111 and 44523.

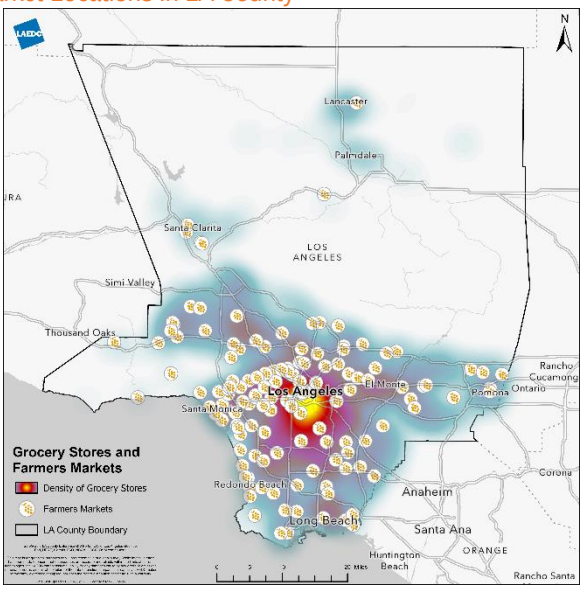
[43] California Employment Development Department. "California Industry Employment Changes Calculator." https://www.labormarketinfo.edd.ca.gov/data/industry-employment-calculator.html

[44] California Employment Development Department. "Long-Term Industry Employment Projections." https://data.edd.ca.gov/Employment-Projections/Long-Term-Industry-Employment-Projections/sp6i-jezb/data

The size of the food industry in California and demand for food in the Los Angeles region provides multiple circular opportunities for businesses. For example, the food industry provides a significant opportunity to increase valuable extraction from waste: American households wasted an estimated 153kgs of food per year in 2018, 17% of their total waste. However, that figure represents less than a fourth of the total wasted food, with industrial and food services also responsible for a large portion of food waste.[45] In the Los Angeles region, there are multiple non-profit actors in this space, including LA Food Policy Council's Food Waste Reduction and Recovery Working Group, which organizes household food scrap dropoffs, and Food Forward, which gleans excess food from farmers' and wholesale markets. To meet the waste management targets of reducing organic waste, California and Los Angeles regional entities will need to bolster programs which create a second market for organic waste, whether it is supporting the donation and distribution of this excess food, centralizing services to compost the material, or finding new and innovative solutions, like bio-based packaging, to support a more circular food system.

Exhibits 4-8 and 4-9: Farm, Grocery Store, and Farmers Market Locations in LA County





State of California

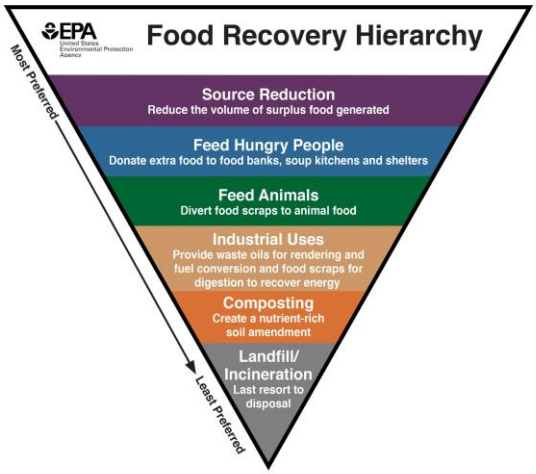
California's effort to reduce food waste is informed by the EPA's Food Recovery Hierarchy[46], with the state attempting interventions at several junctions to prevent food from reaching landfills. Though it is shaped like a downward-oriented triangle, the EPA's Food Recovery Hierarchy highlights the many ways that food waste can circulate throughout our society and economy.

For most households, source reduction is a personal responsibility, whereby food waste can be mitigated through everything from buying less at the store to methodical meal planning, so there is little ability for the state to control waste generation. The same is true for businesses, so the state has

[45] U.S. EPA Office of Resource Conservation and Recovery. *2018 Wasted Food Report.* November 2020. https://www.epa.gov/sites/production/files/2020-11/documents/2018_wasted_food_report-11-9-20_final_.pdf

[46] U.S. EPA. "Food Recovery Hierarchy." [picture]. https://www.epa.gov/sustainable-management-food/food-recovery-hierarchy

stepped in to at least prevent waste generated by businesses from going directly to landfills. The Mandatory Commercial Organics Recycling program, authorized with AB 1826, mandates that all businesses that produce a certain amount of organic waste must recycle it, and that most local jurisdictions implement an organic waste recycling program.[47] Though it does not directly impact source reduction, this program opens the door to utilize food waste in other levels of the food recovery hierarchy.



Source: US EPA

Once food waste is created, the hierarchy prioritizes feeding hungry people. In 1977, California was the first state to shield good faith food donors from liability in order to promote food donations; protections were bolstered by AB 1219 in 2017, expanding liability protections from non-profits to include donations to individuals.[48] This legislation allows multiple non-profit entities to repurpose food waste, whether it comes from one of California's many backyard fruit trees or from the shelves of wholesale grocers, into food for those who need it most, addressing issues around the creation of organic waste and the prevalence of food insecurity in California. By 2025, SB 1318, which focuses on reducing methane emissions from organic waste, will mandate that California must recover 20% of edible food that would otherwise be headed to landfills to feed people in need, a goal that won't be possible to achieve without CalRecycle Food Waste Prevention and Rescue grants and a committed community of nonprofits.[49]

Further down the Food Recovery Hierarchy, California is making additional efforts to divert organic waste from landfills, with the California Department of Food and Agriculture creating its Safe Animal Feed Education Program to support the state's diversion efforts.[50] Additionally, CalRecycle hosts its Recycled-Content Product Manufacturers Directory, which increases visibility for recycled-content products in industrial and agricultural applications.[51] In response to targets set by the California legislature, government and nonprofit entities have played a major role in reducing the amount of organic waste going to landfills, either by redirecting it to feed those most in need or repurposing it as an input into other products.

Los Angeles County

A sustainable food system is a county priority. Los Angeles County will leverage its public services, and regulatory authority to encourage a sustainable food system within the county while using its

[47] CalRecycle. "Mandatory Commercial Organics Recycling." Last updated October 28, 2020. https://www.calrecycle.ca.gov/recycle/commercial/organics/
[48] Californians Against Waste. "*AB 1219 (Eggman)* The California Good Samaritan Food Donation Act – SIGNED INTO LAW." https://www.cawrecycles.org/ab1219eggman
[49] CalRecycle. "Food Recovery in California." Last Updated January 12, 2021. https://www.calrecycle.ca.gov/organics/slcp/foodrecovery
[50] State of California. *Budget Change Proposal.* September 2019. https://esd.dof.ca.gov/Documents/bcp/2021/FY2021_ORG8570_BCP3695.pdf
[51] CalRecycle. "Recycled-Content Product Manufacturers (RCPM)." https://www2.calrecycle.ca.gov/buyrecycled/manufacturers/directory/

purchasing power and business services to make food production more sustainable. To do so, the county will work two-fold, by supporting the fair and sustainable production of food and improving access to healthy food for all people.

The county is also seeking to support the use of public and private land for urban and peri-urban agriculture, by identifying available public parcels, streamlining permitting, and incentivizing the conversion of vacant property to agricultural use.[52] The county pledges to support urban agriculture entrepreneurs in adopting regenerative agricultural practices, such as carbon sequestration, by offering training, technical assistance, and financing, in addition to county policies to support regenerative agriculture through the Department of Consumer and Business Affairs. Additionally, the Departments of Public Health and Parks and Recreation will implement a Good Food Purchasing Policy to promote local, fair, and sustainable agricultural production, especially among vendors who are certified for sustainable practices regarding water, public health, energy use, pesticides, and workers' rights.[53]

The OurCounty Plan seeks to expand access to healthy food through the state's CalFresh program, known nationally as SNAP, with the goal of signing up the 31% of families who were eligible but not enrolled in 2017 by 2025. Also by 2025, the county wants all farmers' markets to accept CalFresh benefits, when only 63% did in 2017; to further bolster the use of CalFresh benefits at farmers' markets, the county aims to increase participation in programs such as Market Match, which increases the purchasing power of CalFresh users.[54] Those who are food insecure may also benefit from the Department of Public Works Food DROP donation program, which serves the county's unincorporated areas by diverting food heading to landfills and making it available to the communities.[55]

Situated south of California's fertile Central Valley, Los Angeles County has not been known as a mecca for agriculture since the days that orange groves populated the Pomona Valley; however, urban agriculture will be an important tool in creating a local, fair, and sustainable food system. Under the guidance of the OurCounty Plan, the expansion of urban farming and food assistance programs will allow the region's cities to grow more food and feed more people.

City of Los Angeles

With 421 farms in the city of Los Angeles, there is a large growth potential for urban agriculture entrepreneurs which the city is keen to maximize. The City of Los Angeles' Green New Deal will employ many of the same mechanisms as the OurCounty plan, with a focus on expanding urban agriculture, access to healthy food, and food recovery programs to create a more resilient food system.

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[52] Los Angeles County. "Strategy 10a." *OurCounty LA*. https://ourcountyla.lacounty.gov/strategies/strategy-10a?goal=837
[53] Los Angeles County. "Strategy 10B." *OurCounty LA*. https://ourcountyla.lacounty.gov/strategies/strategy-10b?goal=837
[54] ibid
[55] Los Angeles County Public Works. "The Los Angeles County Food Drop Program." https://dpw.lacounty.gov/epd/sbr/food-drop.aspx

By the end of 2021, LA's Green New Deal aims to accomplish several ambitious goals:

- doubling the participation in LA's Urban Agriculture Incentive Zone program through establishing new zoning categories for innovative food production and encouraging urban farming through the city's compost giveaway and distribution plan
- increasing the number of edible gardens in the city's park and public libraries by 50%
- piloting two healthy soil projects by exploring incentives for regenerative agriculture, developing a soil strategy that addresses carbon sequestration and water capture, and amplifying community education campaigns
- commissioning a study to strengthen the city's infrastructure for a more resilient local food system, in part by promoting the Good Food Purchasing Policy
- establishing a healthy food cart program and supporting early-stage good food entrepreneurs by expanding opportunity, removing regulatory barriers, providing technical assistance, and developing sidewalk vending permits
- increasing food recovery beyond pre-packaged food at LAX

By 2025, the city expects to add at least 120 new urban agricultural sites, with an ultimate goal of adding nearly 250 additional sites by 2035. In that time frame, the city also seeks to expand access to healthy food for underserved communities, with the establishment of five Good Food Zones to provide affordable, fresh food and the enrollment of all eligible families in CalFresh by 2025. In 2035, the city wants all low-income residents to live within half a mile of fresh food, closing a gap of over 400,000 low-income Angelenos, when measured in 2010.[56]

With urban agriculture occupying a large part of the City of Los Angeles's plans for a resilient food system, there may be opportunities for Dutch vertical farming businesses to set up urban farms throughout the region and to sell their produce directly in farmers markets or through retailers. In addition, opportunities are present to provide other urban farms in the Los Angeles region with software and other carbon sequestration or water capture technologies that could help them make their operations more sustainable, efficient, and circular.

Long Beach

The City of Long Beach Sustainable City Action Plan's 2021 Workplan seeks to administer the Urban Agriculture Incentive Zone program, conduct outreach, and provide matchmaking services to encourage adoption on vacant lots in the City of Long Beach.

The LBCAAP seeks to encourage local urban agricultural practices that decrease air pollution. The city plans to continue and expand incentives for urban agricultural practices that increase local food production and reduce air quality impacts due to the transportation of food from outside of the region. The city plans to evaluate ways to reduce barriers to urban agriculture by, for example, zoning code amendments and waiving and reducing fees. Additionally, The city seeks to encourage urban agriculture to incorporate drought-tolerant practices that further reduce water use and emissions.

[56] Garcetti, Eric. *LA's Green New Deal*. 2019. https://plan.lamayor.org/sites/default/files/pLAn_2019_final.pdf

Culver City

Culver City hosts a year-round farmers market that offers fresh produce and a selection of other food. When space for vendors becomes available, Culver City selects vendors by considering healthfulness, eco-consciousness, and nearness of production.

Santa Monica

The City of Santa Monica's CAAP seeks to increase self-reliance through local food production and to decrease or capture carbon emissions from food production, consumption, and waste. By 2030, the city seeks to increase resiliency through local food production and reduce carbon emissions from food production, consumption, and waste.

The City of Santa Monica sets up farmers markets throughout the city three days a week to provide residents with locally produced food. All farmers markets in Santa Monica accept CalFresh, Farmers Market WIC and Senior Farmers Market Nutrition Program checks. This policy serves to make locally grown, low-carbon food available to low-income residents.

The City of Santa Monica seeks to increase access to locally grown food by planting fruit and nut trees in parks and private sites. It will do so by using a combination of education outreach programs, rebates and other incentives. The city will encourage micro-agriculture operations that use open land and rooftops or space-efficient operations such as aquaponics. Santa Monica will also consider converting underused parkways, vacant properties, or parts of the Airport for urban farming.

Opportunities and Barriers: An Overview

Opportunities

- Reduce avoidable food waste by building awareness and knowledge for consumers and businesses, and creating markets for second-tier (refused) food, free compost.
- Opportunities for companies that can develop vertical farming systems. Opportunities are present to both set up their own farms and sell urban farming technology to other farms.
- Increase use of renewable energy and circular packaging.
- Opportunities for companies that advise businesses, nonprofit organizations and governments on how to become more circular in the food industry.

Key Barriers

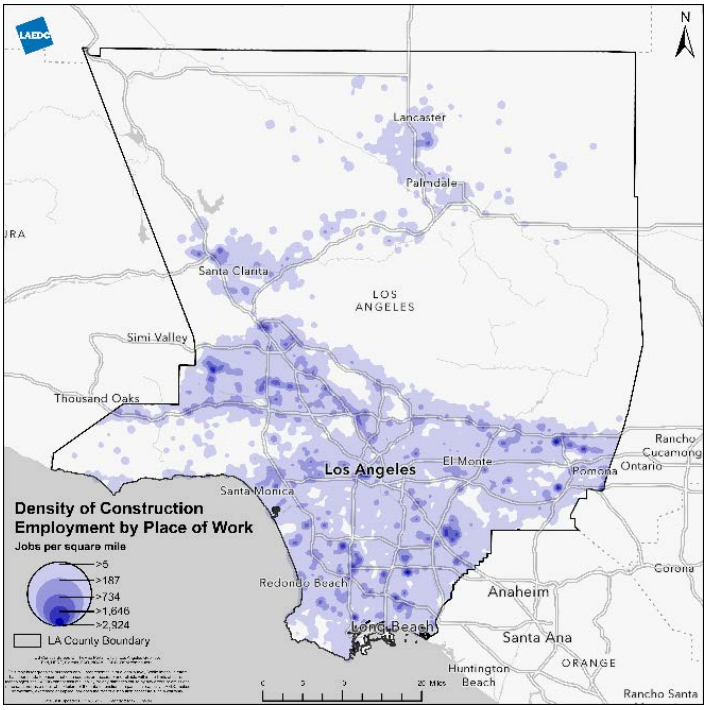
- Consumer and business customs and habits.
- High cost of water.
- Availability of capital.

Organization and Company Spotlight

COMPRA Foods was developed through a partnership between the **Los Angeles Food Policy Council** and **Leadership for Urban Renewal Network**. COMPRA serves as an alternative food distribution system for small grocers in "food desert" neighborhoods in Los Angeles. The program provides thousands of low-income consumers in communities with access to affordable produce and healthy food.

Construction

Exhibit 4-10: Map of Employment in Construction Sector by Place of Work



Industry at a Glance:

The construction industry in the Los Angeles region represents the second largest construction industry in the U.S. Construction represents one of the top industries by employment and Gross Domestic Product in the Los Angeles region. In 2018, GDP in the Los Angeles County construction industry was around $20.5 billion which represented around 2.6% of the total GDP in the County.[57] 2019 Employment growth in the construction industry in Los Angeles County was around 2.3% with employment equaling 242,362 or around 3.6% of total jobs in the County.[58] The building construction industry is a significant and crucial Los Angeles industry with around 12,842 businesses making up around 1.47% of Los Angeles County establishments.[59]

Construction employment is expected to expand in 2021 and may return to pre-recession levels as early as 2022.[60] As of April 2021, the Construction industry in Los Angeles County employed 148,100 people with a year-over -year percentage increase of 13.49%.[61] In the third quarter of 2020, the Los Angeles-Long Beach-Glendale Metropolitan area was home to around 17,471 Construction businesses.[62] From 2018-2028, Construction employment in the Los Angeles-Long Beach-Glendale Metropolitan area is projected to increase by 11.2%.[63]

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[57] California Regional Economic Analysis Project. 2020. https://california.reaproject.org/analysis/industry-structure/industries_by_region/employment/

[58] California Regional Economic Analysis Project. 2020. https://california.reaproject.org/analysis/industry-structure/industries_by_region/employment/

[59] World Trade Center Los Angeles. "Construction of Buildings." https://www.wtcla.org/industries/construction-of-buildings

[60] California Department of Transportation. "Los Angeles County Economic Forecast." 2020. https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/transportation-economics/socioeconomic-forecasts/2020-pdf/los-angeles-2020-a11y.pdf

[61] California Employment Development Department. "California Industry Employment Changes Calculator." https://www.labormarketinfo.edd.ca.gov/data/industry-employment-calculator.html

[62] California Employment Development Department. "Size of Business Data." https://www.labormarketinfo.edd.ca.gov/LMID/Size_of_Business_Data.html

[63] California Employment Development Department. "Long-Term Industry Employment Projections." https://data.edd.ca.gov/Employment-Projections/Long-Term-Industry-Employment-Projections/sp6i-jezb/data

The construction industry is one of the industries with the highest circular potential in California and the Los Angeles region. The state already excels in building LEED certified buildings, with 400 certified in 2019 alone.[64] While LEED certification points are awarded for recycled materials, they are not mandated. A circular construction industry minimizes virgin material use and employs efficient construction techniques that minimize waste. Reducing primary material consumption in the built environment will have many potential benefits such as reduced spending on waste management. However, traditional industry habits are a significant barrier.

State of California

Since 2007, with the passage of the California Green Buildings Standards Code (CALGreen), the first of its kind in the United States, California has been mindful to add to its built environment in a sustainable, eco-friendly manner. The code features regulations for new buildings regarding water and material conservation; energy, water, resource efficiency, and environmental quality.[65]

As mentioned in the waste management section, CalRecycle maintains the Recycled Content Construction Products Catalog, an easy to navigate, centralized hub for recycled-content construction materials. The catalog is organized by product, with a plethora of materials ranging from the drywall to pipefittings and contact information for the companies that produce them.

California has been a leader in creating, incentivizing, and supporting a more circular construction sector in the United States. Leading by example, state buildings no longer take energy from the grid, and hopes that the construction industry will follow.[66]

Los Angeles County

Buildings are a significant consumer of energy, accounting for over 40% of Los Angeles County's greenhouse gas emissions. The construction industry is divided into construction of new buildings and repair and maintenance of existing buildings. While new construction will allow new energy efficient buildings to be built, the majority of the buildings in the county are ones that were constructed in the past. Placing existing building owners and managers on a circular path presents both an opportunity and a challenge. Opportunities for significant energy retrofits will need to be identified and building owners will require access to affordable capital to make these energy efficiency retrofits.

Over the next 25 years, Los Angeles County's OurCounty Plan has set ambitious timelines to reduce building energy consumption:

- By 2025, building energy use intensity will be reduced by 15% and all new building and 50% of major building renovations will be net zero carbon
- By 2035, building energy use intensity will be reduced by 25% and 75% of major building renovations will be net zero carbon

[64] U.S. Green Building Council. "Top Ten States for LEED." https://www.usgbc.org/resources/top-ten-states-leed-2019
[65] State of California Department of General Services. "CALGreen Codes." https://www.dgs.ca.gov/BSC/CALGreen
[66] State of California Green Buildings. "Greening State Buildings for a Brighter Future." https://www.green.ca.gov/buildings/

- By 2045, building energy use intensity will be reduced by 35% and 100% of major building renovations will be net zero carbon

Constructing highly efficient and zero carbon homes will allow the county to significantly reduce emissions from buildings. The county government has significant influence over shaping what the future building stock will look like. For example, by piloting building performance standards and adopting the Tier 1 CALGreen building standards, the future stock of buildings will help reduce energy demand and greenhouse gas emissions in the Los Angeles region. The Los Angeles Bureau of Sanitation developed the City of Los Angeles Green Business Certification Program**,** which is made up of three individual programs: the Los Angeles Green Lodging Program**,** the Los Angeles Green Business Program and the Los Angeles Green Arts Program.[67]

Los Angeles Sanitation and Environment's (LASAN) Green Business Certification Program offers free sustainability consulting to help businesses meet environmental standards established by the California Green Business Network. Once the required circular measures are met by a business, it is certified and become part of a network of green certified businesses. The Green Business Program focuses on three business sectors – restaurants, auto repair shops, and office and retail enterprises. Additional commercial and industrial sectors will be added as program capacity and demand increases.

Certified green businesses are then to receive the multiple benefits including information about potential rebates, free environmental consulting to help reduce the business's environmental impact, access to the California Green Business Promotional Toolkit to help promote the business, listing on the California Green Business Directory, and opportunities to be featured on LASAN social media.

The Green Lodging Program concentrates on the hospitality sector, with a non-profit organization, conducting certifications in partnership with the Los Angeles Tourism & Convention Board. The Los Angeles Bureau of Sanitation provides program oversight. To receive certification, hotels must demonstrate circular practices in waste management, energy efficiency, wastewater management, and environmentally conscious purchasing.

The Green Arts Program operates along with Arts: Earth Partnership (AEP) and Los Angeles's Department of Cultural Affairs. The Green Arts Program certifies theaters, galleries, studios, museums, and other venues for the arts arts-related activities. Opportunities exist for providers of circular products and services as more businesses in the Los Angeles region seek to obtain green certification. Los Angeles County seeks to collaborate with the City of Los Angeles, Santa Monica, and other members of the Building Decarbonization Coalition to develop building energy performance standards that put the county on a path towards building decarbonization.

The OurCounty Plan also urges the adoption of an energy and water efficiency ordinance for existing buildings, requiring all privately owned buildings over 20,000 square feet to report their energy and water use, and demonstrate a plan for achieving energy and water efficiency.

[67] Discover Los Angeles. "Los Angeles Green Building Certification Program." March 14, 2019. https://www.discoverlosangeles.com/things-to-do/los-angeles-green-business-certification-program

Crucially, the county does not extricate the construction sector from the idea of developing other infrastructures. Within the county's goal of creating buildings and infrastructure that support human health and resilience, there is an emphasis on how construction fits into a larger schema, which focuses on how additional factors in the built environment, such as water systems, tree canopy cover, and heat trapping surfaces, create better, safer places to live, work, and play.

City of Los Angeles

The city is prioritizing the construction of clean and healthy buildings in a deliberate, sustainable fashion. A key part of the city's plan calls for near-term reductions in greenhouse gas emissions from building energy use which are more aggressive than any other sector, with a 50% reduction by 2025 and 100% by 2035. Since buildings are the city's largest source of climate pollution, this is a necessary step towards carbon neutrality. Though 0% of the county's buildings were net zero carbon in 2019, all new buildings will have to be by 2030, and all buildings in the county will have to be net zero carbon by 2050.

By the end of 2021, several milestones should be accomplished:

- designing and implementing policies to decarbonize new buildings
- designing and implementing policies to decarbonize existing buildings
- using energy efficiency to deliver 15% of Los Angeles's projected electricity needs, scaling up to 30% by 2030
- investing $100 million in energy efficiency programs to renters and affordable housing customers
- achieving and maintaining over 85% compliance with Existing Energy and Water Efficiency program

There are also new demands on building energy use per square foot, with planned reductions of 22% by 2025, 34% by 2035, and 44% by 2050. The city, like the state of California, is choosing to lead by example, reducing municipal energy use 18% by 2025, 35% by 2035, and 44% by 2050, ensuring that all new municipally owned buildings and major renovations be all-electric, effective immediately. The city also seeks to implement greenhouse gas performance standards for material procurements for purchasing by city departments. Initiatives include updating the city's Environmentally Preferred Products Purchasing Program to include additional construction materials and a greenhouse gas performance standard and identifying embedded carbon emissions in the city's supply chain.

Long Beach

Around 26% of the City of Long Beach's emissions come from residential and commercial buildings. As a result, in order to meet the LBCAAP's 2030 targets, the city must decrease building energy use and transition to clean, renewable energy. The LBCAAP seeks to increase the energy efficiency of existing buildings in the city by providing access to energy efficiency financing, rebates, and incentives for building owners. Furthermore, the city seeks to ensure that new buildings are low carbon or carbon-neutral.

The City of Long Beach Sustainable City Action Plan's 2021 Workplan seeks to continue a free program offering to certify businesses through the California Green Businesses Network. This

program also connects businesses with resources and incentive programs to help them become more circular.

Culver City

Culver City's municipal code establishes a Green Building Program that requires new buildings over 49,999 square feet and major renovations on existing buildings over 49,999 square feet to meet 80% of the 25 sustainability items listed in the code. These 25 sustainability items include measures regarding energy efficiency, water conservation, construction materials, and renewable energy. The municipal code also requires these buildings to receive Leadership in Energy and Environmental Design (LEED) Certified certification, to recruit a LEED Accredited Professional to work on the project, and register the project with the U.S. Green Building Council (USGBC).

Culver City's Municipal Code incorporates sustainability conditions of approval into development projects. The City requires new construction, major renovation, or additions of 10,000 square feet or more to adhere to the 2016 California Building Standards and the 2008 City Mandatory Solar Photovoltaic Requirement. Conditions of building approval may also include guidelines on solid waste management, transportation demand and trip reductions, bike lane installations, efforts to reuse and recycle construction and demolition debris, and development of a Standard Urban Stormwater Mitigation Plan to comply with National Pollution Discharge Elimination System requirements.

Santa Monica

The City of Santa Monica's CAAP seeks to transition towards a zero-net carbon-built environment. It seeks to decrease fossil fuel use in existing buildings by 20% and discourage the use of fossil fuels in new buildings.

Around 30% of Santa Monica's total carbon emissions come from buildings' use of energy. Electricity is currently generated by a mix of fossil fuel and renewable energy sources. In 2017, the City of Santa Monica became the first city in the world to require that new homes generate as much energy as they consume. This Zero Net Energy requirement still allowed for the use of natural gas. The city seeks to develop building design guidelines for climate-resilient buildings and to conduct outreach campaigns with building the industry and trades.

Opportunities and Barriers: An Overview

Opportunities

- Firms that focus on the built environment, particularly on the design and construction of new circular buildings and their components, retrofit of existing buildings, and circular urban development and infrastructure will find many opportunities in the Los Angeles region.
- Companies that provide circular building components and materials, such as bio-based or recycled materials, will find market opportunities in the region's construction industry.
- 3D printing has the potential to significantly reduce structural waste during construction and building renovation.
- The reuse and high-quality recycling of building components and materials could reduce the need for new materials, decrease construction and demolition waste, and as a result, reduce the industry's carbon footprint.

- The retrofitting of old construction can be performed using both 3D printing and material passports. In order for these two technologies to maximize their circular impact, the material choice for 3D printing needs to be managed with circularity in mind. There is significant opportunity for partnerships between the providers of both technologies.
- As the reuse and recycling of materials expands, a new industry of intermediaries connecting suppliers with buyers of these materials will emerge. Material passport companies will have an opportunity to create partnerships with such intermediaries and even move into the intermediary business if efficient. Digital material passports have the potential to become the new standard, aided by emergence of material intermediaries who link material suppliers and demanders.[68]
- Opportunities are present in launching public procurement pilots which will serve to demonstrate and advertise the benefits of existing circular materials and construction techniques. Public procurement practices that focus on projects that reuse or use recycled materials have the potential to encourage the adoptions of these circular building practices.
- Opportunities exist for companies that advise businesses, nonprofit organizations and governments on how to become more circular in the construction and retrofit of buildings. In particular, companies that rely on data-driven approaches to solve important circular problems have many opportunities in the Los Angeles region.

Key barriers

- Key barriers in the construction industry include incomplete and unclear regulatory and legal frameworks and customs and habits in the construction industry.[69] Social barriers exist for the adoption of many technologies with circular potential in the construction industry. Many established firms in the construction industry are reluctant to change long-established practices that stand in the way of adopting circular technologies. Because of the conservative nature of the construction industry, the opportunities to acquire dedicated partners quickly are likely greatest with boutique builders and architects who have already advertised their commitment to moving their industry in a circular direction.
- While the use of 3D printing for smaller components in construction is increasing, the technology for 3D printing of entire buildings is not yet available. In addition, the regulatory framework has yet to fully address this new pioneering technology.
- Reuse and high-value recycling of components and materials in construction present an additional circular opportunity in the construction industry sector, however, tight regulation of the industry and uncertainty about the performance and health issues of reused or recycled materials are limiting factors. In addition, split incentives for initial investors, architects/engineers, subcontractors and ultimate building owners makes it difficult for new practices to take hold.[70]

[68] Ellen Macarthur Foundation. *Delivering the Circular Economy - A Toolkit for Policymakers*. 2015. https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation_PolicymakerToolkit.pdf
[69] Ellen Macarthur Foundation. *Delivering the Circular Economy - A Toolkit for Policymakers*. 2015. https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation_PolicymakerToolkit.pdf
[70] Ellen Macarthur Foundation. *Delivering the Circular Economy - A Toolkit for Policymakers*. 2015. https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation_PolicymakerToolkit.pdf

Organization and Company Spotlight

The **Building Decarbonization Coalition** works to power California's homes and workspaces with clean energy by uniting building industry stakeholders with energy providers, environmental organizations and local governments. The Coalition is also introducing consumer education and contractor accreditation programs. In addition, it helps governments work with builders, contractors, and designers towards the transition to zero emission buildings.

The **LA Better Buildings Challenge** (LABBC) works with policymakers, industry, and advocacy groups, to achieve an ambitious goal of engaging 1,000 buildings by 2025 to meet the Building Energy Use targets in the 2015 Sustainable City pLAn. Through the Better Buildings Challenge, hundreds of businesses, manufacturers, educational institutions, school districts, and state and local governments have committed to reducing building energy usage. The LABBC collaborates with LA's top 25 percent of sustainable buildings to showcase and support their work towards sustainability. The LA Better Buildings Challenge is funded by the LADWP and SoCalGas. It offers a collaborative setting where building owners and managers can share best circular practices and gain recognition for sustainable achievements. Furthermore, the LABBC offers personalized advisory services to support circular building upgrades. The LABBC helps participants with regulatory compliance, evaluating vendor proposals, referrals to qualified contractors, rebate and incentive support and peer to peer introductions.[71]

In 2019, the **U.S. Green Building Council-Los Angeles** launched a Net Zero Building Technology Accelerator focused on the creating technologies to foster the growth of zero carbon, zero energy, zero water, and zero waste buildings. The accelerator will encourage startups and pilots with building partners at the end of the program. The Technology Accelerator will work closely with businesses to address technical issues before these businesses enter the market.

LA Green Designs seeks opportunities for development, re-development, restoring, residential and commercial projects that provide a positive impact on communities. Its goal is to create dynamic projects through green building practices using sustainable materials to inspire the community to adopt sustainable living practices.

LaTerra Development is a prominent real estate development company in California with more than 3,000 multifamily units under construction or in its development pipeline. The company's mission is to create multifamily and mixed-use developments that incorporate green building practices and sustainable materials.

[71] Better Business Challenge. "LA's Best Buildings." https://www.la-bbc.com/

Global infrastructure firm **AECOM** works with public and private sector clients to deliver on their sustainability goals. Headquartered in the city of Los Angeles, AECOM exceeded its original 2020 goal of reducing enterprise-wide emissions by 20 percent and is now seeking to reduce emissions by an additional 20 percent by 2025. AECOM plans to achieve its goal through efforts such as consolidating offices and creating more energy efficient office spaces.

El Monte-based **Greencity Building Company (GBC)** focuses on sustainable urban development and architecture. Typical projects undertaken by GBC include mixed-use developments, neighborhood-serving retail projects, boutique office, commercial, and hospitality projects, and various types of residential projects. GBC believes that small and medium-scale architecture and developments better serve existing communities than do large-scale developments.

Kilroy Realty Corporation is a real estate investment trust that has committed to achieving carbon neutrality for its over 2 million existing and under construction building square feet in Los Angeles. Initiatives such as onsite energy efficiency and renewable energy projects will be undertaken to meet this ambitious goal.

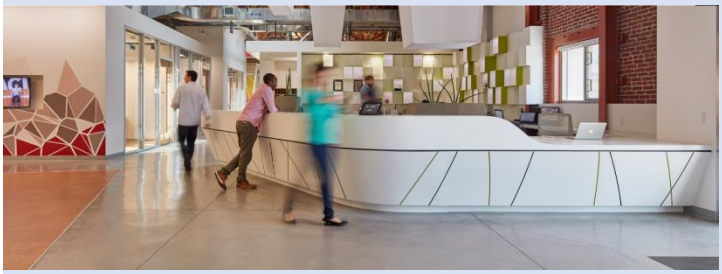
David Hertz Architects' Studio of Environmental Architecture (SEA) is dedicated to designing and constructing sustainable buildings and public sculptures. In addition, SEA produces industrial design and conducts materials research. SEA approaches sustainable development from a systems approach and has unique expertise incorporating regenerative design and sustainability into residential and commercial projects. SEA is headquartered in Venice Beach and has its own think tank, the Resilience Lab, which works to develop green technologies and to provide local communities with sustainable planning services.

Culver City-based **Gaia** provides guidance during the development of sustainable buildings. Gaia promotes cost effective sustainability measures to support developers, building owners, architects, and contractors in their efforts to deliver and maintain impactful circular projects. The company provides sustainable building certification consulting services as well as energy modeling and education services.

REthink Development, owns, retrofits, and develops sustainable buildings. REthink partners with other companies and organizations on green building projects and is knowledgeable on cutting-edge technologies, techniques, and materials in the green building industry.

LivingHomes Atwater is an example of a recent REthink project that incorporated a variety of circularity features. In 2017, REthink developed and sold LivingHomes Atwater, a mixed-use project in the Atwater Village neighborhood. The company used prefabricated modular construction and state of the art green building techniques for the project. The homes were designed to meet LEED Platinum certification with Cradle to Cradle products.

Circular Project Success Story



The **Los Angeles Department of Water and Power's (LADWP) La Kretz Innovation Campus** is the first building in the nation to achieve LEED v3 Platinum as well as WELL v1 Gold Core and Shell certification.[72]

Source: John Friedman Alice Kimm Architects.[73]

The La Kretz Innovation Campus, located in LA's Arts District, is managed by the **Los Angeles Cleantech Incubator (LACI)**. The campus merges science, entrepreneurship, sustainability and policymaking to advance the circular economy. LEED Platinum certification was achieved as a result of features such as a greywater system that provides irrigation, a microgrid energy solar and battery system, a 175-kilowatt photovoltaic solar canopy, and two bioswales.
The building was able to achieve WELL Gold certification as a result of access to LADWP's potable water system, inside air quality and the overall building design. Building amenities include LADWP's Customer Engagement and Sustainable Living Labs and an advanced prototyping center which includes a 3-D printing and laser shop.

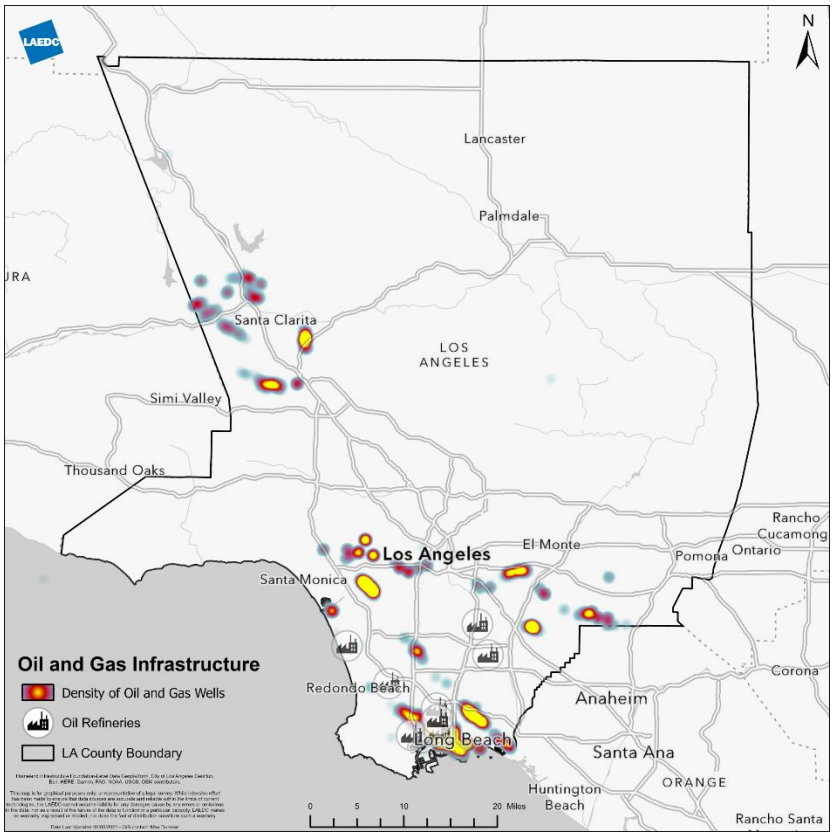
For a list and description of upcoming and potential circular construction projects see Appendix C.

[72] Los Angeles Department of Water and Power. "La Kretz Innovation Campus Achieves Leed V3-Platinum in New Construction and Well V1 Gold Core and Shell Certifications." October 10, 2019. https://www.ladwpnews.com/la-kretz-innovation-campus-achieves-leed-v3-platinum-in-new-construction-and-well-v1-gold-core-and-shell-certifications/

[73] John Friedman Alice Kimm Architects. "La Kretz Innovation Campus." https://www.jfak.net/work/la-kretz-innovation-campus-lkic-and-arts-district-park/ [picture].

Industry: Oil and Gas

Exhibit 4-11: Oil and Gas Infrastructure in LA County



Industry at a Glance:

The industrial sector accounts for around a quarter of the City of Los Angeles's greenhouse gas emissions and around 10% of Los Angeles County's. Los Angeles County is the largest urban oil field in the nation containing around 5,100 active and idle oil wells.[74] A 2020 Capitol Matrix Consulting report found that Los Angeles County's oil and gas industry represents over 60% of California's total refining capacity. The industry supports 133,000 jobs and contribute around $32 billion in gross regional product.[75] As of April 2021, the Petroleum and Coal Products Manufacturing industry in Los Angeles County employed 5,400 individuals with a year-over -year percentage decrease of 3.57%.[76] From 2018-2028, Petroleum and Coal Products Manufacturing employment in the Los Angeles-Long Beach-Glendale Metropolitan area is projected to decrease by 10.7%.[77]

Oil and gas extraction operations in Long Beach are a significant source of emissions. In 2015, oil fields in Long Beach produced over 13 million barrels of crude oil and 5 billion cubic feet of natural gas. The resulting life cycle emissions totaled almost 3 times more than the city's emissions due to its production inventory. Around 96% of the Long Beach's oil and gas life cycle emissions are credited to crude oil, with the remaining 4 percent due to natural gas. Around 76% of oil and gas life cycle emissions occur downstream, around 14% midstream in activities such as oil refining, and 5%

[74] "LA City Council Initiates Process for Oil Drilling Tax On 2022 Ballot." May 19, 2021. My News LA. https://mynewsla.com/weather/2021/05/19/l-a-city-council-initiates-process-for-oil-drilling-tax-on-2022-ballot/

[75] Fuels Market News. "New Report Shows Critical Impact of Oil and Gas Industry in Los Angeles County." October 21, 2020. https://fuelsmarketnews.com/new-report-shows-critical-impact-of-oil-and-gas-industry-in-los-angeles-county/

[76] California Employment Development Department. "California Industry Employment Changes Calculator." https://www.labormarketinfo.edd.ca.gov/data/industry-employment-calculator.html

[77] California Employment Development Department. "Long-Term Industry Employment Projections." https://data.edd.ca.gov/Employment-Projections/Long-Term-Industry-Employment-Projections/sp6i-jezb/data

upstream in activities such as extraction, with the remaining 4% representing life cycle natural gas emissions.

City of Los Angeles

The City of Los Angeles has targets in place to increase the use of air quality monitoring programs, develop a sunset strategy for oil and gas operations in Los Angeles, and improve inspection practices for industrial facilities. The Los Angeles Green New Deal seeks to reduce industrial emissions by 38% by 2035 and 82% by 2050. In addition, by 2021, the LA Green New Deal seeks to create an annual oil well and a facilities compliance inspection program. Initiatives include improved tracking for flaring emissions and evaluating waste to energy conversion technology pilot projects to replace flares at oil drill sites. Furthermore, by 2021, the City seeks to support the implementation of refinery and heavy-duty industry emissions reduction plans which include initiatives such as leak detection and repair and implementing best available retrofit control technology.

Los Angeles City Councilmembers Paul Krekorian and Nithya Raman recently introduced a motion to initiate a measure for the November 2022 ballot that will tax companies that extract oil and gas within the city limits.[78] In addition, the motion intends to stop new development or expansion of existing oil infrastructure. Furthermore, the motion would require the complete shutdown of all existing oil and gas wells over the next 20 years.

Long Beach

The LBCAAP seeks to increase the monitoring and regulation of oil extraction and refining. The city seeks to deploy air monitors outside of active wells and to conduct an audit checking for possible emissions coming from active or abandoned oil wells.

Opportunities and Barriers: An Overview

Opportunities

- Opportunities exist for companies that provide products and services to monitor emissions from oil wells.
- Opportunities for leak detection and repair technology and services.
- Companies that perform environmental impact assessment and analyze the cost efficiency of measures will find many opportunities in this industry as many City plans seek to undertake assessments to guide and evaluate sustainability policy in this area. In particular, companies that rely on data-driven approaches to solve important circular problems have many opportunities in the Los Angeles region.

Infrastructure & Urban Development

Industry at a Glance:

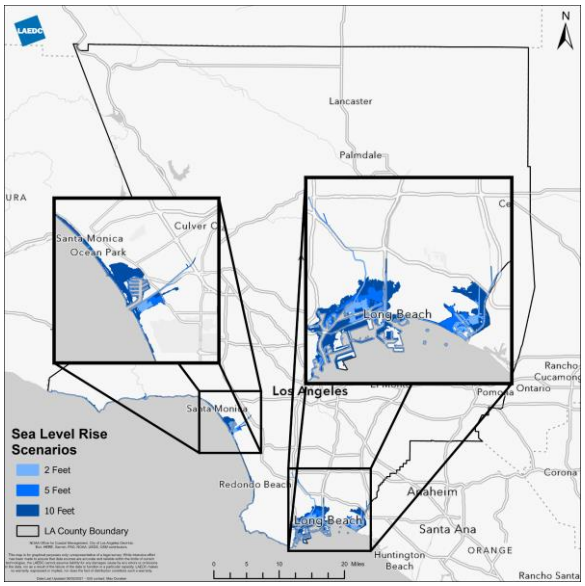
While Los Angeles is one of a handful of megacities in the United States and stands on the bastion of sustainability, there are many difficulties in applying urban development techniques over such a

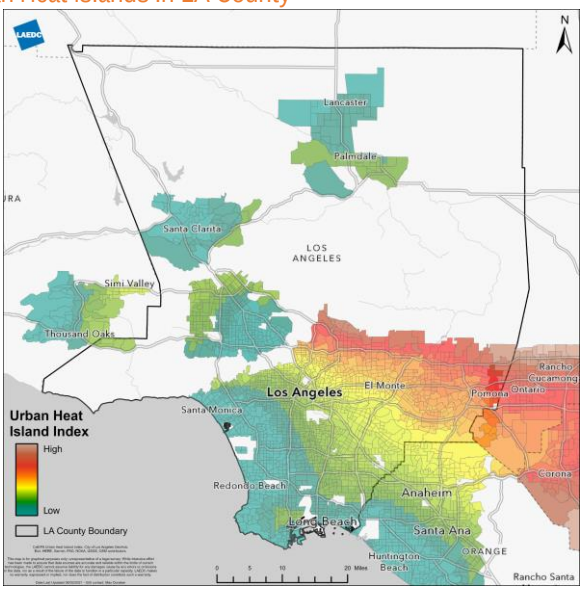
[78] "Krekorian, Raman Call for a Tax on Oil Companies in Los Angeles." January 15, 2021. https://www.paulkrekorian.org/krekorianramantaxonoilcompanies

large, heterogeneous area. Los Angeles County is a microcosm of California in this regard: a geography with a multitude of ecosystems and varying population densities that demands variation in its approach to planning.

The infrastructure and urban development sector in Los Angeles County was made up of 659 establishments and employed 20,087 workers at the end of 2020.[79] As of April 2021, the Heavy and Civil Engineering Construction industry in Los Angeles County employed 15,400 individuals with a year-over -year percentage increase of 10.79%.[80] From 2018-2028, Heavy and Civil Engineering Construction employment in the Los Angeles-Long Beach-Glendale Metropolitan area is projected to increase by 2.6%.[81]

Exhibits 4-12 and 4-13: Sea Level Rise Scenarios and Urban Heat Islands in LA County





State of California

Support for many urban development initiatives in California comes from the U.S. Department of Housing and Urban Development, with grants and programs designed around the creation of single family and multifamily housing.

At the state level, urban development efforts are also supported by the California Department of Housing and Community Development. The agency funds projects across the state in a variety of key areas through its Affordable Housing and Sustainable Community (AHSC) Program, Golden State

[79] Sum of NAICS 237, 924, and 925.
[80] California Employment Development Department. "California Industry Employment Changes Calculator." https://www.labormarketinfo.edd.ca.gov/data/industry-employment-calculator.html
[81] California Employment Development Department. "Long-Term Industry Employment Projections." https://data.edd.ca.gov/Employment-Projections/Long-Term-Industry-Employment-Projections/sp6i-jezb/data

Acquisition Fund, Multifamily Housing Program, and others, to facilitate construction of infrastructure and housing across the state.[82]

Another state entity active in this sector is the California Strategic Growth Council, supporting the AHSC program and the Transformative Climate Communities (TCC) Program. Through the State of California's TCC program, neighborhoods across the state, including Pacoima-Sun Valley, Watts, and Fresno – have harnessed local knowledge and experience to transform their neighborhoods in a circular manner. After receiving awards over $55 million by the State of California and leveraging over $200 million from the City of Los Angeles and other partners, each community worked to deliver meaningful circular change to their neighborhoods.

One of California's most ambitious pieces of infrastructure is the nation's first high-speed rail system, planned for a corridor between Los Angeles and San Francisco. Executed by the California High-Speed Rail Authority, the project aims to connect the state's "mega-regions", contributing to economic development and enabling more sustainable transit.[83] While the project has been criticized for issues around delays, cost, and environmental impact, the state is still investing a massive amount of funds in the project, with the hope that it will soon reshape the transit infrastructure of the state.

Los Angeles County

Los Angeles County's growing population increases demand for homes, buildings, and the infrastructure needed to support them. Sustainable infrastructure and urban development will be essential to managing this growth. The county's OurCounty Plan spreads infrastructure and urban development strategies across several goals.

To build resilient and healthy community environments where residents thrive, the county is focusing on tackling pollutant exposure, housing affordability, and community resiliency, through the following strategies:

- Pollutant Exposure
    - Los Angeles County's Department for Regional Planning will complete the development and start the implementation of the Green Zones program to target land use strategies to help improve public health and quality of life for residents in vulnerable communities that have been disproportionately impacted by cumulative exposure to pollution.
    - by 2025, decrease childhood asthma prevalence to 6.8%, decrease average diesel particulate matter emissions to 20% of 2017 levels, and attain the Federal and State annual PM2.5 standard.
    - by 2035, decrease childhood asthma prevalence to 6%, eliminate on-road diesel particulate matter emissions, reduce toxicity-weighted concentrations of emissions in disadvantaged communities by 40%, and attain the Federal and State annual 8-hour ozone standard.
    - by 2045, decrease childhood asthma prevalence to 5% and reduce toxicity-weighted concentrations of emissions in disadvantaged communities by 80%.

[82] California Department of Housing and Community Development. "Programs – Active." https://www.hcd.ca.gov/grants-funding/active-funding/index.shtml
[83] California High Speed Rail Authority. "About." https://hsr.ca.gov/about/

- Housing Affordability
    - by 2025, build 110,000 new affordable units across the County, meet 25% of the Regional Housing Needs Assessment housing production targets for very low, low, and moderate-income housing in unincorporated areas, enroll 90% of eligible households in utility rate assistance programs, and prevent at-risk affordable housing units from being converted to market rate.
    - by 2035, build 300,000 new affordable units across the County, meet 50% of the Regional Housing Needs Assessment housing production targets for very low, low, and moderate-income housing in unincorporated areas, and enroll all eligible households in utility rate assistance programs.
    - by 2045, build 585,000 new affordable units across the County and meet 100% of the Regional Housing Needs Assessment housing production targets for very low, low, and moderate-income housing in unincorporated areas.

- Community Resiliency
    - by 2025, train 5,000 people through the Community Emergency Response Training (CERT) program and offer 30% of CERT trainings in languages other than English.
    - by 2035, train 10,000 people through the CERT program and offer 40% of CERT trainings in languages other than English.
    - by 2045, train 15,000 people through the CERT program and offer 60% of CERT trainings in languages other than English.

Importantly, Los Angeles County's Sustainability Plan seeks to incorporate climate adaptation and resilience into planning, building, infrastructure, and community development plans. As much as the Los Angeles region needs to build, with one goal of the county being to increase housing density and limit urban sprawl, the OurCounty Plan outlines that development will be limited in high climate-hazard areas. Infrastructure in the county often lacks resiliency such as a diverse range of water sources during droughts, and cool surfaces and canopies that reduce urban heat effects.

Urban heat island effects are in large part the result of commonly used materials, such as conventional pavement, that absorb and retain heat and conventionally coincide with less affluent neighborhoods. Los Angeles County's Sustainability Plan seeks to abate this issue, and the heat-stress related hospitalizations it causes in part by expanding the use of sustainable pavement methods and materials on County roadways.

Los Angeles County's Sustainability Plan seeks to change how residents move throughout the county, prioritizing transit-oriented development and promoting more walkable neighborhoods. In 2012, 47% of households were within high-quality transit areas and, as of 2019, 17 cities and/or unincorporated communities had a Walk Score of 70 or above. The county's goals include:

- by 2025, build at least 50% of new housing within a half mile of high-frequency transit and attain a Walk Score of 70 or higher in 25 cities and/or unincorporated communities.
- by 2035, build at least 65% of new housing within a half mile of high-frequency transit and attain a Walk Score of 70 or higher in 35 cities and/or unincorporated communities.

- by 2045, build at least 75% of new housing within a half mile of high-frequency transit and attain a Walk Score of 70 or higher in 45 cities and/or unincorporated communities.

Parks, beaches, and public lands are also essential to the sustainable development of the county: improving access, adopting inclusive design and programming, and utilizing sustainability best practices for the design and management of facilities will increase the communal benefits that these public spaces provide. One goal of the county is to increase the percentage of residents living within a half mile of a park or open space, from 49% in 2018 to 65% in 2025, 75% in 2035, and 85% in 2045.

City of Los Angeles

LA's Green New Deal also has its own ambitious strategies to make Los Angeles a more livable city. In addition to environmental concerns, the homelessness epidemic in Los Angeles must be addressed in its urban development strategy: despite being only about 40% of the countywide population, the City of Los Angeles has nearly two-thirds of the county's unhoused population, highlighting the need for new construction to increase housing supply throughout the city.[84]

By 2021, the city would like to build 100,000 new housing units with 15,000 new units of affordable housing. A total of 45,000 new affordable housing units are scheduled to be built by 2035. However, that is not the end of the city's development goals: 150,000 new units are expected to be built by 2025 and 275,000 new units by 2035. Also, by 2035, the city aims to create or preserve 50,000 income-restricted affordable housing units and increase stability for renters.

Separate from redefining residents' relationship with their cars, the city is seeking to redefine their relationship with the natural environment, focusing on creating a resilient urban ecosystem. To do so, the city is investing in increasing tree canopy in the highest need areas, initiating the LA River Ecosystem Restoration (ARBOR) Plan, creating a 32-mile fully connected LARiverWay, reducing the urban/rural temperature differential, achieving no-net loss of native biodiversity, and ensuring an increasing proportion of residents live within a half mile of a park or open space.

Over the next five years, the city is looking to plant at least 90,000 trees, complete a full tree inventory, create an Urban Forest Management Plan, and align city policies to protect public and private trees.

By 2021, major improvements to the LA River should be underway, including partnering to develop a 100-acre LA River open space, initiating work on reaches 6, 7, and 8 from the ARBOR Plan, completing three active transportation bridges, and finishing one additional mile of LARiverWay bike paths. Ten additional miles should be added to the LARiverWay bike paths by 2025, and by that time, the city plans to have eight partnership opportunities for river-adjacent public and private properties.

To reduce the urban/rural temperature differential by one degree by 2025 and two more by 2035, the city will be piloting its concept of cool neighborhoods, with 6 areas receiving cool roofs, cool

[84] "2020 Greater Los Angeles Homeless Count Presentation." Los Angeles Homeless Services Authority. [PowerPoint presentation]. https://www.lahsa.org/documents?id=4558-2020-greater-los-angeles-homeless-count-presentation

pavements, and urban greening. When installing cool roofs, 13,000 by 2021, and cool pavement, 250 lane miles by 2028, the city will focus on the areas with highest heat vulnerability and heat island effects. In addition, the LA Green New Deal seeks to update cool surface regulations to require that at least 50% of all non-roof surfaces around new buildings meet certain cool surface criteria.

Additionally, the city is displaying a commitment to supporting urban ecosystems through maintaining a no-net loss of native biodiversity by 2035. Action is already underway in 2021, with LA hoping to pilot its first wildlife corridor and update its Integrated Pest Management plan; by 2025, the city hopes to develop a citywide strategy to protect and enhance native biodiversity while partnering with the county to place in the top three cities/counties in the City Nature Challenge.

Like the county, the city is also setting targets for the percentage of the population with a half mile of a park or open space, but with more ambitious targets: by 2025, the percentage should be 65%, rising to 75% by 2035, and achieving 100% by 2050. To do this, the City will add at least 8 parks by 2021 and 30 parks by 2025, as well as establishing 25 joint-use parks in underserved communities.

Opportunities exist for circular consulting companies that can devise actionable circular urban development and infrastructure strategies suited to the regional economy. In addition, opportunities are present for companies that provide circular materials for road surfaces and sidewalks.

Long Beach

When resurfacing streets, the City of Long Beach uses asphalt containing 15% recycled material including recycled tires. In addition, the city reuses materials from street projects by recycling asphalt as well as reusing it in other street projects.

The LBCAAP seeks to reduce extreme heat effects by incorporating cool surfaces and green infrastructure throughout the city. The city seeks to increase the number of reflective streets, cool surfaces, and shade canopies.

Long Beach seeks to transform existing infrastructure into green infrastructure such as permeable pavement, bioretention areas, and bioswales. The city will begin by identifying locations where green infrastructure will have the greatest impact such as areas subject to flooding during heavy rainfall and high-impact alleys or streets.

More intense rainfall events together with higher tides as a result of rising sea levels, are expected to exacerbate urban flooding in developed areas of Long Beach if no action is taken to increase stormwater system capacity so that discharge runoff can be collected during flooding. The city will identify critical assets that are at risk to rising sea levels and either relocate them or implement protective measures. Examples of protective retrofits include elevation and protection of electrical systems and access routes, installation of flood-proofed generators, actions to protect underground utilities and telecommunications, and floodproofing of building entries that could become a flood pathway.

Permanent inundation from rising sea levels along with increased temporary flooding will threaten low-lying coastal communities in the city. Around 1.3 million square feet of residential and commercial buildings in Long Beach could be exposed to annual king tides by 2030. These threatened

buildings are mainly located in Marina Pacifica and along Shoreline Drive south of Ocean Boulevard. In addition, 9.5 million square feet of mostly residential buildings are exposed to flooding from a 100-year storm surge by 2030. These buildings are mostly located in Naples Island, Belmont Shore, and the Peninsula. By 2050, annual king tide flooding may threaten up to 8.4 million square feet of buildings. Important city infrastructure is expected to be threatened by flooding from king tides by 2030. This at-risk infrastructure includes a solid waste facility, power stations, and 18 storm drain outfalls which could cause inland urban flooding if they are under water.

The LBCAAP seeks to begin addressing rising sea levels by incorporating relevant data into policies and regulations by analyzing the effects of coastal flooding and increased severity of rainfall events on watershed flooding. The LBCAAP seeks to ensure that city projects and investments account for forecasted sea level rise and flooding impacts. Additionally, the LBCAAP seeks to ensure that Long Beach will take action to protect vulnerable shoreline areas and wastewater infrastructure by flood proofing at risk sewer pump stations.

Between 2030 and 2050, the city plans to begin relocating and elevating important infrastructure and elevating riverine levees. A recent study found that portions of existing levees adjacent to the city's channels and rivers (Los Angeles River, Los Cerritos Channel, and San Gabriel River) may need to be raised or modified to increase flood protection. The City of Long Beach will work with partner agencies to raise channel banks and levees to provide enhanced flood protection and to implement channel modification projects.

Additionally, between 2050 and 2100, the city seeks to extend sea walls and storm surge barriers as appropriate as well as to elevate at-risk streets.

Santa Monica

The City of Santa Monica has expressed concern over rising sea level rise that can lead to several coastal hazards such as beach erosion and flooding. In addition, coastal flooding caused by storms and high tides can also inflict serious damage. In order to prepare for the potential impacts of rising sea levels, Santa Monica along with the USC Sea Grant, Ocean Protection Council, California Coastal Commission, and the State Coastal Conservancy, commissioned reports that provide vulnerability assessments. Transportation and utilities infrastructure, beaches, homes, and businesses are at risk from rising sea levels and coastal flooding. Additionally, the Santa Monica Pier, a major tourist attraction, is also at risk. The City of Santa Monica adopted the Local Coastal Program Land Use Plan which established strategies that will be implemented once the sea level rises by certain amounts. As changes to shoreline conditions take place, new policy phases will be activated.

The city seeks to develop a shoreline management plan for areas vulnerable to sea level rise and flooding. This plan will include strategies to adapt to rising sea levels and adapt to changes in wave height, flooding, and erosion hazards in the short and long term for these areas.

By 2030, Santa Monica seeks to enhance natural systems to prevent damage from coastal flooding and to increase the resilience of public and private assets in the coastal flood zone.

Opportunities and Barriers: An Overview

Opportunities

- Opportunities exist for circular consulting companies that can devise actionable circular urban development and infrastructure strategies suited to the regional economy.
- Opportunities are present for companies that provide circular recycled materials for road surfaces, sidewalks, and bus shelters.
- Companies that have expertise ensuring that surface water is kept at livable levels have a number of opportunities in the region.
- Opportunities for companies that advise businesses, nonprofit organizations and governments on how to develop in a circular manner. Companies that perform environmental impact assessment and analyze the cost efficiency of measures will find many opportunities in the region as many City plans seek to undertake assessments to guide and evaluate circular urban development policy. In particular, companies that rely on data-driven approaches to solve important circular problems have many opportunities in the Los Angeles region.

Key Barriers

- Attitudes and habits regarding urban development and infrastructure must be changed to reflect a more circular focus.
- Myopic thinking must be overcome when considering long-term investments to solve problems whose benefits will be enjoyed by future generations.
- Financing for long-term circular development and infrastructure projects.

Circular Project Success Stories

Source: Lowe[86]

Ivy Station, is a 500,000-square-foot mixed-use development located in Culver City that began its staggered reveal in 2021. Ownership of Ivy Station includes Lowe, AECOM-Canyon Partners and Rockwood Capital.[85] The development will reduce indoor water use by 35% over the LEED baseline exceeding the California Green Building Code's mandatory 20% reduction.

In addition, the development will decrease wastewater generation by 40% over the LEED baseline. Open space and public right of way will allow for storm water capture detention and discharge to

[85] Business Wire. "Ivy Station Reveal." April 28, 2021. https://www.businesswire.com/news/home/20210428005794/en/Ivy-Station-Reveal-%E2%80%93-Upper-Ivy-Apartments-at-500000-square-foot-Mixed-use-Development-Welcoming-Residents-%E2%80%93-Office-Hotel-and-Retail-Set-for-Summer-Opening
[86] Lowe. "Ivy Station." [picture]. https://lowe-re.com/buildings-beyond/ivy-station/

(…continued) comply with City storm water regulations and address drought-related issues. Onsite water measures may include water monitoring devices, rainwater collection systems to provide for the capture of runoff from drains and pipes, and collection in underground cisterns for water reuse. Storm water will be captured on site, stored in cisterns, and reused for irrigation.87 The development's energy strategy depends on a variety of features including the incorporation of high-performance façade materials, low energy mechanical systems, and on-site renewable energy systems. The development will feature the installation of a photovoltaic system that will comply with Culver City requirements. The development is also expected to significantly reduce vehicle miles traveled per occupant and resident who will be able to rely on multiple modes of nearby public transportation.

TCC Implementation Grant Projects:

Green Together Northeast San Fernando Valley was a TCC implementation grant of $23 million that resulted in a park renovation that included a stormwater bioswale, 2,090 trees planted, 35 cool roofs installed, and a 1.6-acre underground infiltration gallery installed in Fernangeles Park to capture stormwater.

Watts Rising was a TCC implementation grant of $32 million that resulted in 300 single-family home energy efficiency retrofits, 5.2 miles of bike lanes, 25 pedestrian improvements, 50 urban mini-farms, 1/2 mile green/complete street from Grape Street to Alameda Street, and over 35,000 square feet of grocery store offering fresh fruits and vegetables.

Transform Fresno was a TCC implementation grant of $66.5 million that resulted in 200 home-solar installations, 200 energy efficiency improvements, and the construction of 56 affordable homes. Additionally, over 2,500 new trees were planted, 17 acres of new parks and community gardens were constructed, the frequency of the local electric bus system was increased, electric vehicle- and bike-sharing programs were created, and West Fresno City College constructed a satellite campus on a new site.

Santa Monica's recently completed **Clean Beaches Project for Pier Drainage Basin** was recently awarded the Envision Gold award for sustainable infrastructure. The Clean Beaches Project was designed to improve beach water quality and strengthen Santa Monica's drought resiliency by expanding the diversion capacity at the Santa Monica Pier storm drain outfall. [88] The project was specifically designed to collect rainwater from Santa Monica's Downtown area which is then routed to the Santa Monica Urban Runoff Recycling Facility (SMURRF) for treatment and distribution for non-potable uses.[89] The Clean Beaches Project includes the construction of a water storage tank near the Santa Monica Pier as well as a stormwater diversion and harvesting system

[87] *Ivy Station - Comprehensive Plan.* https://www.culvercity.org/files/assets/public/documents/community-development/current-projects/ivy-staff/160314attachmentno6a_ivyst.pdf
[88] Institute for Sustainable infrastructure. "Santa Monica Clean Beaches Project Earns Envision Gold Award." August 13,2019. https://sustainableinfrastructure.org/santa-monica-clean-beaches-project/
[89] Institute for Sustainable infrastructure. "Santa Monica Clean Beaches Project Earns Envision Gold Award." August 13,2019. https://sustainableinfrastructure.org/santa-monica-clean-beaches-project/

(…cont.) to collect urban and stormwater runoff, and brackish water that will be treated at the City's urban runoff recycling facility.[90]

The Clean Beaches Project pursues the following circular goals:

- Fresh water protection and preservation of the natural environment
- Water self-sufficiency
- Minimizing the negative impact of environmental shocks
- Decreasing carbon emissions

The project's $15 million cost was funded by three sources:

- California State Water Resources Control Board Clean Beaches Initiative Grant Program ($3.7 million)
- City water funds ($5.3 million)
- The Santa Monica City Clean Beaches and Ocean Parcel Tax Fund (Measure V) ($6 million)

The Santa Monica City Clean Beaches and Ocean Parcel Tax (Measure V) represents the Project's largest funding source and was passed with over two-thirds of the City's voting residents voting in support. Having such an overwhelming proportion of a city's voting residents approving a funding measure will be a significant barrier for future circular projects. While this type of funding represents an important reason for Santa Monica's Clean Beaches Project's success, similar funding for future circular projects in Santa Monica and in other cities in the Los Angeles region will be difficult to obtain.

Water

Industry at a Glance:

Water management throughout California today does not yet fully recognize the interconnectedness of all water sources, including groundwater, surface water, rainwater, and wastewater. The current approach, complicated by its overlapping and sometimes contradictory water rights, is not well-suited to adapting to the needs of a rapidly growing region and to shocks such as drought. The Los Angeles region has a tremendous need for innovation in this sector, to continue supporting its dense population and growth as an industrial metropolis, making it a center for opportunities for entrepreneurs in the circular economy.

The water sector in Los Angeles County was made up of 96 establishments and employed 1,127 workers at the end of 2020.[91]

[90] Pollalis, S.N., and Olga Tzioti. "The Business Case for Sustainable Infrastructure Case Studies Series Gold Envision Award Clean Beaches Project Santa Monica, Los Angeles." *The Zofnass Program for Sustainable Infrastructure*. February 2020. https://research.gsd.harvard.edu/zofnass/files/2020/06/200430_CLEAN-BEACHES.pdf

[91] Sum of NAICS 22131 and 22132.

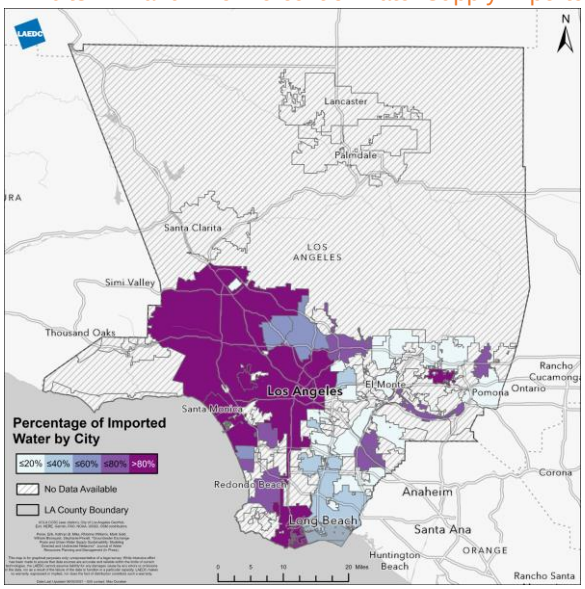
Approximately 41% of Los Angeles County's water supply comes from local sources: 9% of this locally sourced water comes from local recycled water sources while 32% is sourced from local groundwater. The remainder of county's water supply is imported.

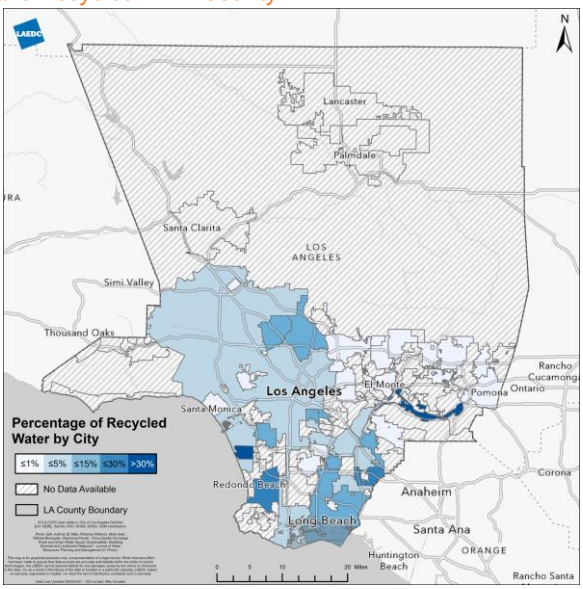
Long Beach Water reports that around 25% of the city's water supply comes from the Colorado River with about 15% coming from the Northern California Bay-Delta. Forecasts predict drought in the region as a result of reduced water supply from these important sources.[92][93] In addition, local water demand is expected to increase.

By 2030, demand for water in the City of Los Angeles is projected to increase by around 10 percent to over 700,000 acre feet.[94] In the City of Long Beach, water demand is expected to rise by around 4.8 percent to over 70,000 acre feet. Forecasts for the City of Santa Monica project a fall in water demand to around 12,000 acre feet, a decrease of almost 14 percent by 2030.

Longer and more frequent droughts combined with increased demand indicates that the water industry will be an important circular industry in the region. The region will need to more efficiently use its existing water supply as well as to diversify its sources of water.

Exhibits 4-14 and 4-15: Percent of Water Supply Imported and Recycled in LA County





State of California

California's ecosystem unique in that that water is plentiful in some places, like in the northern part of the state where few people are spread amongst the Sierra Nevada, Klamath, and Northern Coast

[92] Pierce, David., D. Cayan, and B. Thrasher. *Statistical Downscaling Using localized Constructed Analogs (LOCA). American Meteorological Society*. 2014.
[93] California Energy Commission. *Our Changing Climate 2012: Vulnerability and Adaptation to the Increasing Risks from Climate Change in California. A Summary Report on the Third Assessment from the California Climate Change Center*. CEC-500- 2012-007. 2012.
[94] Porse, Erik, Kathryn B. Mika, Rhianna Williams, Mark Gold, William Blomquist, Stephanie Pincetl. "Groundwater Exchange Pools and Urban Water Supply Sustainability: Modeling Directed and Undirected Networks". *Journal of Water Resources Planning and Management* (In Press).

mountain ranges, and scarce in others, such as the fertile Central Valley and dense urban centers like the Bay Area, Los Angeles, and San Diego: to balance the mismatched geography of water supply and water demand across the state, regulation and oversight have been essential to preserving and distributing California's water resources.

A centerpiece in these efforts is the California Department of Water Resources' California Water Plan, a strategic plan that is updated every five years that presents the status and trends of the state's water-dependent natural resources, water supplies, and water demands. The 2018 update identifies several challenges, including persistent groundwater overdraft in some regions and declining ecosystem health and services; to overcome these, the state pledges to improve integrated watershed management and restore critical ecosystem functions, among others.[95]

In 2010, the Department of Water Resources established its Environmental Stewardship Policy, advancing a department-wide "total resource management" approach to planning and designing projects, adopting a more circular approach to water resource management. One example is the California State Water Project, which delivers water to about 25 million residents and 750,000 acres of irrigated farmland; while the project is one of the largest single consumers of energy in the state, accounting for 3% of total statewide electricity use, it generates nearly half the electricity it uses at its reservoirs and in-conduit generating stations, making it a semi-circular project.

The Department of Water Resources also has its own Climate Action Plan, currently in Phase I: Greenhouse Gas Emissions Reduction Plan (GGERP). The GGERP identifies 11 reduction measures for greenhouse gas emissions, including efficiency improvements to existing facilities, purchase and development of renewable and high efficiency electricity supplies, improvements to construction practices, and improvements to business activities that will reduce emissions, and others: the state anticipates that the measures will reduce annual emissions in 2030 by over 2.3Mt and by over 2.7Mt in 2045.[96]

Additionally, the state has taken on an integrated water management approach, which manages water alongside its codependent natural resources, bringing focus and funding to projects that support water resources while restoring ecosystems which ensure reliable water supplies. To look holistically at our water system, California first needed to change its approach to groundwater: for over a century, groundwater withdrawals were not measured, leading to a depletion of underground aquifers. When withdrawals outpace nature's ability to recharge the aquifers, the side effects can be multiplicative: long-term groundwater level and storage declines, land subsidence, surface water depletions, seawater intrusion, and water quality degradation ensure that overdrafting nature's supply of groundwater will permanently diminish the amount available for future generations. To stem this tide, California passed the Sustainable Groundwater Management Act in 2014, which established a framework for groundwater management. The legislative package began requiring governments and water agencies to halt overdraft and balance water demand and supply, creating a need for many of the agencies to measure groundwater withdrawals for the first time. While basins

[95] California Natural Resources Agency Department of Water Resources. *California Water Plan: Update 2018.* June 2019. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/California-Water-Plan/Docs/Update2018/Final/California-Water-Plan-Update-2018.pdf#page=23
[96] California Department of Water Resources. *Climate Action Plan.* https://water.ca.gov/Programs/All-Programs/Climate-Change-Program/Climate-Action-Plan

of different priority levels and overdraft magnitudes have different timelines, it is estimated that all basins will reach sustainability by 2042.

Los Angeles County

Los Angeles County's Sustainability Plan seeks to create an integrated and resilient water system in the County by investing in water management solutions that diversify and increase reliability of the water supply, increase the percentage of water that is locally sourced, and prioritize natural systems solutions. Additionally, the county wants to ensure that where there is water demand, there is access to safe, clean, and affordable water.

Los Angeles County's Sustainability Plan seeks to develop a local water supply plan. In 2017, around 41% of Los Angeles County's water supply came from local sources: 9% of this locally sourced water came from local recycled water sources while 32% was sourced from local groundwater. The OurCounty plan sets a target that by 2025, 50% of water will be locally sourced, 65% by 2035, and 80% by 2045. To achieve these goals, the county will have to consume less water, as well as find new ways of recapturing and recycling water. The region has started construction on a large groundwater remediation facility, passed a county-wide stormwater measure, and increased wastewater recycling. The county is exploring how to reduce barriers and increase accessibility to alternative water sources such as rainwater, greywater, stormwater, and recycled water to aid in these efforts. In particular, this will involve incentivizing residential and commercial/small business greywater systems and streamlining permitting pathways.

By 2025, the county seeks to comply with Clean Water Act permit requirements to achieve water quality standards. Furthermore, the county seeks to support efforts to clean up contaminated aquifers, decreasing the number in Los Angeles County from 7 in 2017 to fewer than 5 by 2025, fewer than 2 by 2035, and zero by 2045. Additionally, the county seeks to support efforts to maximize the sustainable yield from local groundwater basins.

Los Angeles County's Sustainability Plan sets a target that by 2025 per capita water demand does not exceed 115 gallons per day, dropping by 15 gallons over each of the following decades, so that it does not exceed 100 gallons per day in 2035, and 85 gallons per day by 2045. To achieve this goal, Los Angeles County's Sustainability Plan seeks to implement strong water conservation measures. Water conservation is essential to a sustainable water supply in Los Angeles County and can be increased by reducing wasted water and leaks. The county's Sustainability Plan seeks to adopt building code changes that improve water efficiency and reduce indoor and outdoor water use above current CALGreen standards. Additionally, Los Angeles County's Sustainability Plan seeks to develop incentives for residential and commercial/small business water conservation and stormwater retrofits, chiefly those that use a watershed approach.

Los Angeles County plans to assess the region's drinking water systems to bolster resiliency regarding droughts, as well as to evaluate the risk of water quality issues due to factors such as aging infrastructure and deferred maintenance. It also seeks to implement mechanisms for the protection, preservation, and restoration of natural buffers to water bodies, such as floodplains, streams, and wetlands.

City of Los Angeles

Along with the County, the City of Los Angeles has become a leader in water conservation and smart water policy. The LA Green New Deal will accelerate the city's water goals serving to increase water supply and quality. These include recycling all wastewater, fully utilizing groundwater capturing, cleaning stormwater, and continuing the trend of decreasing water demand per capita.

Sourcing water locally from, for example, groundwater and recycled water, uses less energy and makes the city's water supply more resilient to drought and other shocks. The LA Green New Deal seeks to source 70% of water locally, recycle 100% of all wastewater for reuse, and capture 150,000 acre ft/yr of stormwater by 2035. To aid in this, the LA Green New Deal seeks to build a minimum of 10 new multi-benefit stormwater capture projects by 2025, 100 by 2035, and 200 by 2050 to increase local water supply and quality. Additionally, the city seeks to convert watering on 85% of public golf course acreage to recycled water.

Like the county, the city is also setting targets for decreasing potable water use per person. The city is aiming for a 22.5% reduction by 2025 and a 25% reduction by 2035; with those targets, city residents would be using just under 100 gallons per person per day from 2035 through 2050. The City of Los Angeles also seeks to decrease its own municipal water use by at least 25% by 2025 and 30% by 2035. Implementing effective water conservation measures will allow the city to more easily reach these water use reduction targets.

By 2021, the LA Green New Deal seeks to complete a programmatic Environmental Impact Report for One Water LA 2040 Plan and to update important infrastructure such as the Venice Pumping Plant to increase resilience to flooding and sea-level rise. Further planned initiatives include completion of groundwater remediation facilities in the San Fernando Basin, developing a plan to maximize the use of West Coast and Central Basins, and improving Los Angeles Aqueduct system reliability and resiliency.

By 2021 the LA Green New Deal seeks to produce 1.5 million gallons per day of recycled water at Hyperion Water Reclamation Plant and to pilot membrane reactor technology to clean recycled water. In addition, by 2025, the City seeks to recycle 17,000 acre ft/yr of water at the Donald C. Tillman Water Reclamation Plant to recharge into groundwater basins and to reduce annual sewer spills to fewer than 65 by 2025 and fewer than 60 by 2035.

By 2021, the City of Los Angeles seeks to expand the incorporation of green infrastructure into street and sidewalk repair projects by, for example, including stormwater capture capacity into six complete streets and to divert up to around 28,000 acre ft/yr of urban runoff to improve local water quality by, for example, constructing low flow diversions to the Hyperion Water Reclamation Plant. Finally, by 2021, the city seeks to expand targeted campaigns to increase awareness of Los Angeles's water policy goals among the public.

Long Beach

The Long Beach Water Department pumps groundwater that supplies around 60% of Long Beach's water. The remaining approximately 40% of the city's water supply is imported, mainly from the Colorado River watershed and the Sacramento-San Joaquin Bay Delta. Furthermore, the Long Beach

Water Department operates hundreds of miles of sanitary sewer lines that collect and deliver over 40 million gallons of wastewater per day for treatment.

The LBCAAP seeks to create a more diverse water supply portfolio which will increase drought resiliency and reduce the supply of imported water. In order to diversify its water supply and reduce dependence on imported water, the City of Long Beach's CAAP seeks to identify ways to increase the supply and use of recycled water and greywater, and to increase the capture and storage of rainwater. The city seeks to identify partners and participants for recycled water and greywater outreach and education to advertise available water programs. The city seeks to create incentives or requirements for greywater use for irrigation integration into new building standards.
In addition, the LBCAAP seeks to expand the use of green infrastructure and green streets in the city to further diversify its water supply, increase natural and stormwater capture, and prevent urban runoff.

Long Beach will continue to develop additional water use efficiency and conservation programs. The LBCAAP seeks to identify incentives and implement requirements to be included in City contracts in order to reduce the use of potable water and increase the use of recycled and reclaimed water.

Santa Monica

The City of Santa Monica's CAAP seeks to achieve water self-sufficiency by 2023. The city conducted a vulnerability assessment that analyzed how buildings, infrastructure and the overall city economy will be affected by climate change. The vulnerability assessment found areas of medium-high vulnerability include water infrastructure and areas of medium vulnerability include water supply, sanitary water and sewer infrastructure, and stormwater infrastructure.

In 2017, the City of Santa Monica implemented a water neutrality requirement on new construction projects. The water neutrality requirement limits new water demand from projects that use more water than previous projects. Fees paid in the place of reduced water demand are allocated to the city's water efficiency projects. Furthermore, the city has implemented components of the Sustainable Water Infrastructure Project to expand the use of alternative water sources, such as stormwater, wastewater and brackish water from the beach. The Sustainable Water Infrastructure Project is made up of three elements designed to operate in combination to conserve groundwater, reduce wastewater, and improve beach water quality. The first element of the Project features a modular reverse osmosis unit at the Santa Monica Urban Runoff Recycling Facility. The Santa Monica Urban Runoff Recycling Facility also treats stormwater and brackish groundwater for reuse. The second element of the Project features an underground Advanced Water Treatment Facility that can treat up to one million gallons of wastewater per day. In addition, the Advanced Water Treatment Facility also treats stormwater for non-potable reuse. The third project element features a 4.5 MG underground stormwater harvest tank. The increased production of recycled water from the Sustainable Water Infrastructure Project, the upgrade of the Santa Monica Urban Runoff Recycling Facility, and the construction of the Advanced Water Treatment Facility will combine to provide the City with a resilient, locally sourced supply of water.

Opportunities and Barriers: An Overview

Opportunities

- Companies that have expertise in smart water management particularly in areas such as the capture, storage, and use of rainwater will find many opportunities.
- Companies with expertise in circular wastewater management will also find many opportunities in the region.
- Companies that specialize in extracting valuable resources such as clean water, energy and fertilizers, from wastewater will find many opportunities.
- Companies with expertise managing natural water systems will also find multiple opportunities.
- Opportunities for companies that advise businesses, nonprofit organizations and governments on how to become more circular. Companies that perform environmental impact assessment and analyze the cost efficiency of measures will find many opportunities in the region as many City plans seek to undertake assessments to guide and evaluate sustainability policy. In particular, companies that rely on data-driven approaches to solve important circular problems have many opportunities in the Los Angeles region.

Key Barriers

- Changing current attitudes regarding water management to reflect a circular focus.

Company and Organization Spotlight

OurWaterLA is a coalition of organizations across Los Angeles County whose goal is to secure clean, safe, and reliable water for users in the County. OurWaterLA seeks to augment the local supply of water, reduce local water pollution and flood risk, and effectively manage the impact of droughts and other shocks. The coalition works with community groups, clean water advocates, labor and business leaders, municipalities and other public departments and agencies.

Torrance-based **Phyn** has created a smart water valve called Phyn Plus.[97] Phyn Plus is combined with artificial intelligence-driven software to analyze water consumption, detect leaks and automatically shut off water supply in an emergency. Phyn's water valves can be installed in many different types of buildings such as single-family homes, condos, apartments, and restaurants.

West Los Angeles-based **Noria Water Technologies Inc.**, a LACI portfolio company, provides solutions for improving water treatment processes, such as the membrane-based filtration and purification of wastewater, groundwater, seawater and industrial water. Noria's hardware and software products provide real-time monitoring for membrane-based water treatment processes and are used in plants that process anywhere from a few thousand gallons of water a day to more than 100 million gallons daily.

[97] Huang, Coco. ''Water Tech Companies are Springing Up in LA.'' *Los Angeles Business Journal*. October 12, 2020. https://labusinessjournal.com/news/2020/oct/12/water-tech-companies-springing-up-los-angeles/

Clean Water Technology provides customized wastewater treatment solutions to a range of industries, including the food and beverage, and automotive and transportation sectors. Clean Water's solutions work to turn wastewater into a reusable resource. Many businesses have limited space for equipment to treat wastewater. Clean Water's solutions seek to economize on space while removing as many contaminants as possible from wastewater.

On the demand side, education is vital to reducing residential water consumption. **Saya Life**, a LACI tenant, has developed a system to analyze water consumption in individual units for multifamily and commercial properties. The system features water detecting flood sensors, a smart remote shutoff flow meter, and the capability to send data to a mobile device. The system allows tenants to know how much water they consume as well as in what activities they have consumed the water such as how much was used for showering versus toilet use. Saya's system can also inform property managers about potential risks of water damages.

The **Nature Conservancy** has developed a model for stormwater capture and habitat. The Los Angeles River Habitat Restoration & Stormwater Capture Project offers a model for increasing local water quality and supply that also leads to habitat restoration. The project will be located near the Rio De Los Angeles State Park and has an expected completion date of 2022.

Circular Project Success Stories[98]

Source: Better Buildings Challenge[99]

Westfield Century City's groundwater repurposing project saved 12 million gallons of water that was previously wasted. Westfield's Century City property is located on top of a natural spring whose water was being discharged to the sewer. Westfield discovered how this water could be utilized onsite in their cooling tower to reduce their potable water consumption. Westfield partnered with the LADWP for funding assistance and the LABBC as a technical resource for the project.

LABBC provided a strategy for a groundwater repurposing initiative, which involved redirecting water from the natural spring to the cooling towers instead of losing this water to the City sewer. In addition, Westfield worked with LABBC on rebate applications for the Water Savings Incentive Program and water conservation Technical Assistance Program. The project served to reduce Century City's water overall consumption by around sixty million gallons per year.

[98] Better Building Challenge. https://www.la-bbc.com/case-studies-summary
[99] Better Building Challenge. "Westfield Century City's Extensive Groundwater Repurposing Project Saves 12 Million Gallons of Water Previously Wasted." [pictures]. https://www.la-bbc.com/case-studies/westfield-century-city-extensive-groundwater-repurposing-project-saves-12-million-gallons-of-water-previously-wasted

The Business Environment, Labor Markets, and Public Procurement/Partnerships

Section Overview

- This section reviews the business environment and labor market in the Los Angeles region.
- It is necessary to realize that as the regional economy moves in a circular direction, restructuring will take place that will result in short- and long-term impacts on economic activity.
- Focusing on workforce transition as the economy moves in a circular direction is essential. In addition to preparing the workforce for transition, Los Angeles County seeks to steer younger populations towards career paths in a circular economy.
- City of Los Angeles Mayor Eric Garcetti established a Jobs Cabinet to help train the next generation of green workers. The cabinet is made up of leading employers and workforce development organizations and will serve to identify workforce skill gaps in the size and identify strategies to close those gaps.
- The City of Long Beach seeks to partner with local workforce and economic development organizations such as the Pacific Gateway Workforce Innovation Network as well as with educational institutions like Long Beach Community College and the Long Beach Unified School District to create circular job training programs.
- Los Angeles County and city governments within the county have instituted procurement policies to move the circular economy forward. Circular economy standards have been incorporated into many government procurement guidelines in the Los Angeles region.

The Business Environment and the Labor Market

This section reviews the business environment and labor market in the Los Angeles region. An analysis of the regional economy can provide important insights regarding the opportunities available to companies considering entry into the Los Angeles market for circular products and services.

It is necessary to realize that as the regional economy moves in a circular direction restructuring will take place that will result in short- and long-term impacts on economic activity. Naturally, there will be both winners and losers as a result. This poses a challenge to the advancement of circular initiatives as local governments will likely institute policies to reduce the adverse economic impact felt by some individuals and businesses in the economy.

Los Angeles County

Focusing on workforce transition as the economy moves in a circular direction is essential. In addition to preparing the workforce for transition, the County seeks to steer younger populations towards career paths in a circular economy.

Los Angeles County's Sustainability Plan seeks to partner with community-based organizations, educational institutions, and the private sector to connect new and established labor force

participants with training and employment opportunities within the growing circular sectors of the economy.

City of Los Angeles

The LA Green New Deal seeks to reach 2 million Los Angeles residents through outreach, education, and training programs by 2025 to increase the number of residents on board with circular initiatives. For example, by 2025, the city seeks to partner with the Los Angeles Unified School District to support sustainability education as well as partner with the Los Angeles Community College District to increase course offerings that prepare students for circular careers.

The LA Green New Deal seeks to provide Green Jobs courses at LA Trade Technical College and place students in green internships. In addition, the City of Los Angeles seeks to add a circular curriculum to the WorkSource Development Center training.

Mayor Garcetti established a Jobs Cabinet to help train the next generation of green workers. The cabinet is made up of leading employers and workforce development organizations and will serve to identify workforce skill gaps in the size and identify strategies to close those gaps.

The LA Green New Deal seeks to maintain the City of Los Angeles's top ranking for offering the most business incentives of any city within Los Angeles County. The city seeks to increase private sector circular investment in Los Angeles by $750 million by 2025 and $2 billion by 2035 and will do so through tax incentives, low-cost loan and grant programs, and regulatory guidance through the LA Industry Initiative. In addition, the City of Los Angeles seeks to provide free business consulting through nine BusinessSource Centers on topics such as financial analysis, marketing, business planning, and loan consultations. The city will also provide microloans for eligible businesses ranging from $5,000-$50,000 and provide free business services for employers through sixteen WorkSource Centers which include customized employee recruitment, free job listings, candidate screening, and on-the-job training. Furthermore, the city seeks to promote Bureau of Contract Administration's Contractor Assistance Seminars that provide free training for bidding on public works construction projects.

Long Beach

The City of Long Beach seeks to partner with local workforce and economic development organizations such as the Pacific Gateway Workforce Innovation Network as well as with educational institutions like Long Beach Community College and the Long Beach Unified School District to create circular job training programs. Furthermore, the City will work with local businesses to identify circular opportunities and will make connections between companies and local job training programs.

Company Spotlight

Angeleno Group (AG), based in Los Angeles, provides growth capital for next generation circular solutions companies. Since its founding in 2001, AG has become one of the country's largest dedicated sustainability investment firms. It seeks to invest in high growth, well managed, innovative businesses with proven technologies. AG actively participates in the growth of its portfolio companies through board participation and collaboration with company management.

(…cont.) In addition, AG supports its portfolio companies in product and business development, strategy, sales and corporate finance.

AG's investment focus areas include:

- Clean Energy Transition: Renewable Power at Scale
- Energy Storage
- Resource Efficiency: Water, Agriculture & Sustainable Inputs
- Critical Infrastructure & Resiliency
- Sustainable Mobility and Smart Cities

Public Procurement Policies and Partnerships

Los Angeles County and city governments within the County have instituted procurement policies to move the circular economy forward. Circular economy standards have been incorporated into many government procurement guidelines in the Los Angeles region. Furthermore, the importance of circular partnerships has been recognized by many of the local governments in the region.

Los Angeles County

Los Angeles County's Sustainability Plan addresses using the County's purchasing power to support organizations at the forefront of the circular economy. By implementing contracting and purchasing policies that advance circular goals, the County will direct funds and projects towards entities that have a positive circular impact on the region. Los Angeles County's Sustainability Plan seeks to apply circularity as a lens for consideration of County departmental budget requests.

The success of OurCounty relies on County government as well as on multiple partners in the public, private, and nonprofit sectors. The County seeks to create and strengthen these partnerships, establish new funding techniques, and leverage its own purchasing power to advance the County's Sustainability Plan. Los Angeles County's Chief Executive Office seeks to assist County departments and the Center for Strategic Partnerships to develop public private partnerships to support implementation of OurCounty actions.

Long Beach

The city recognizes that for its LBCAAP to succeed, the city must lead by example by incorporating circularity into its operations. The LBCAAP seeks to have the city take action to further increase efficient energy and water use in its buildings.

The city has committed to transition its municipal buildings to 100% renewable electricity and ensure that new municipal buildings are net-zero carbon. In addition, the City of Long Beach has a Solar Energy Power Purchase Agreement to install 10 solar arrays at various city-owned properties. This agreement will serve to reduce the city's energy costs and its carbon footprint.

Furthermore, the city seeks to perform municipal energy and water audits, set targets for reducing energy and water use, and make necessary efficiency upgrades. Additionally, the city seeks to transition its vehicle fleet to low- and zero-carbon vehicles, incorporate sea level rise considerations into city plans, integrate green infrastructure into city projects and support programs that protect

against air pollution.

The LBCAAP seeks to address drought by including recycled water and greywater measures, and rainfall capture into existing and new city facilities. The city will feature green infrastructure technology on city-owned properties to increase stormwater capture. In addition, the city will feature greywater irrigation in new city-owned properties and evaluate the ability to increase greywater use in existing buildings. The LBCAAP also seeks to install rain barrels or cisterns at city owned properties and use captured rainfall for irrigation.

Circular Project Success Stories

The City of Long Beach's **Civic Center and City Hall** feature circular features and practices. The new more energy efficient City Hall consumes only 25% of the energy that the old City Hall consumed. The city's Civic Center features rooftop photovoltaic panels on its library and produces its own renewable energy. In addition, the Civic Center captures rainwater and stores it in an underground cistern that is then used to irrigate the Center's landscaping.

Source: City of Long Beach[100]

Los Angeles's City Hall East achieved a 20% water savings and 85% reduction in sewer charges through an electrochemical water treatment system in 2019. Cooling towers provide significant opportunities for water savings in large buildings. Since Los Angeles 's water contains large amounts of minerals chemical treatment is necessary to protect equipment. The City's General Services Department (GSD) identified new cooling tower technologies as a key opportunity to reduce water usage in City buildings. In addition to reducing water consumption, GSD sought to eliminate the use of chemicals, reduce sewer discharges, reduce maintenance costs, and increase the life of cooling towers.

GSD partnered with Dynamic Water Technologies – Universal Environmental Technology (DWT–UET) to accomplish these goals and with the LADWP to provide rebates. The City also partnered with the National Renewable Energy Laboratory (NREL) to verify the energy savings that DWT-UET technology produced. The technology was introduced as a pilot project for Los Angeles City Hall East which contains a floor area of 1,836,745 square feet.

The electrochemical water treatment system allowed City Hall East to achieve 20% overall water savings (1.16 million gallons), an 85% reduction in sewer charges, significant maintenance cost savings, eliminated the need for corrosion-inhibiting chemicals, and increased the life of the equipment.

[100] Long Beach City Government. ''Civic Center Grand Opening.'' [picture]. https://longbeach.gov/pages/city-news/civic-center-grand-opening/

Increasing the Visibility of Circular Innovations: Expos and Membership Organizations

Section Overview

- Sustainable industry trade expositions present opportunities for circular companies to increase the exposure of their products and services, to network, and to identify potential partners and clients.
- Building partnerships with entities that already have visibility in the regional circular economy will serve to increase the visibility of new market entrants' circular products and services.
- New market entrants can further increase their visibility by joining regional membership organizations such as the U.S. Green Building Council Los Angeles and the Los Angeles Economic Development Corporation (LAEDC). Joining these organizations can provide opportunities to forge connections with potential partners.
- Finally, as with most entries into new markets, the timing of entry is essential to maximizing company visibility and the probability of success. As new regional sustainability plans and past plan phases go into effect, first movers into the market will have significant advantages as technology adopted early on becomes established in the different circular industries.

Sustainable industry trade expositions present opportunities for circular companies to increase the exposure of their products and services and to network and find potential partners and clients.
The Municipal Green Building Conference & Expo has become the largest and longest-running gathering of leading circular building advocates within both the public and private sectors in Southern California. Hosted by the U.S. Green Building Council Los Angeles, the Expo was attended by over 1300 people in 2020. The trade show provides networking opportunities and an occasion to inform local government agencies, building industry professionals, and the public about new circular building technologies, products, and practices.

The Metropolitan Water District of Southern California has hosted 11 Spring Green Expos. The Expos were put on hold during 2019 and 2020 due to Metropolitan's ongoing seismic retrofit improvements at the district downtown Los Angeles headquarters. The Expos have provided Metropolitan employees, along with other agencies, businesses and conservation organizations an opportunity to showcase their products and services that save water and promote circularity. The Water District has not yet decided if or when they will resume hosting their Spring Green Expo.

The Greenbuild International Conference/Expo hosts the largest annual event for green building professionals. The Greenbuild Expo invites architects, consultants, sustainability managers, designers, educators and builders in the circular industry to attend. Joining the Expo as an exhibitor will provide an opportunity for businesses to showcase products and technology and make connections with potential partners and clients. In 2021 Greenbuild is scheduled to take place in San Diego.

Building partnerships with entities that already have visibility in the regional circular economy will serve to increase the visibility of new market entrants' circular products and services. New market entrants can further their visibility by joining regional membership organizations such as the U.S. Green Building Council Los Angeles and the Los Angeles Economic Development Corporation (LAEDC). In addition, joining these organizations can provide opportunities to forge connections with potential partners.

For example, members of the LAEDC enjoy multiple benefits that can help increase a company's visibility in the regional marketplace including[101]:

- Access to top state and local political leaders and stakeholder groups.
- Global connectedness with potential business and government partners in Los Angeles's top markets for international trade and investment.
- Expertise from LAEDC professionals, fellow members, partner organizations, and external networks.
- Invitations to member-only events and meetings throughout the year.
- Presenting or speaking opportunities at LAEDC meetings and events.
- Networking opportunities with top-level executives and business leaders in the Los Angeles County region.
- Subscription and opportunities to be featured in the LAEDC Briefly Newsletter.
- Sponsorship opportunities for events and meetings.
- Opportunities to showcase your company in LAEDC marketing communications channels.
- Company recognition on the LAEDC digital and print brand assets, at public LAEDC events.
- Opportunities to host meetings and events at your office space to showcase your business.
- Participation in industry growth councils to engage with thought leaders in key regional industries.

Membership in high-profile organizations can be promoted on company websites and product literature. Company websites and literature can also highlight partnerships with high-visibility partners.

Finally, as with most entries into new markets, the timing of entry is essential to maximizing company visibility and the probability of success. As new regional sustainability plans and past plan phases go into effect, first movers into the market will have significant advantages as technology adopted early on becomes established in the different circular industries. There is no time like the present to join the Los Angeles region's growing circular economy.

[101] Los Angeles Economic Development Corporation. "Become a Member." https://laedc.org/become-a-member/

Conclusion

This market study mapped the circular economy in California, specifically focusing on the Los Angeles region. State and local public policy aimed at supporting the circular economy was reviewed and the region's circular industries were studied. The study highlighted potential partnerships and opportunities for Dutch companies that will be entering the Los Angeles region's circular economy. Circular opportunities in the region include various elements of the smart city approach to sustainability such as circular waste management practices, smart water policies, urban farming, and the use of circular methods and products to construct buildings. The ultimate goal of the study is to serves as a starting point for Dutch companies eager to enter the region's circular market and to foster a long term and effective relationship between the Netherlands and the Los Angeles region. Indeed, leveraging Dutch expertise is critical to rethinking and transforming how we create, build, and live.

Appendix A: Circular Sectors by U.S. Census Bureau NAICS Code

Circular Industry	Sectors	Subsectors	Industry Group	NAICS Industry	National Industry
Clean & Renewable Energy	22 – Utilities	221 – Utilities	2211 – Electric Power Generation, Transmission, and Distribution	22111 – Electric Power Generation	221111 – Hydroelectric Power Generation
					221113 – Nuclear Electric Power Generation
					221114 – Solar Electric Power Generation
					221115 – Wind Electric Power Generation
					221116 – Geothermal Electric Power Generation
					221117 – Biomass Electric Power Generation
					221118 – Other Electric Power Generation
				22112 – Electric Power Transmission, Control, and Distribution	221121 – Electric Bulk Power Transmission and Control
					221122 – Electric Power Distribution
	31-33 – Manufacturing	335 – Electrical Equipment, Appliance, and Component Manufacturing	3359 – Other Electrical Equipment and Component Manufacturing	33591 – Battery Manufacturing	335911 – Storage Battery Manufacturing

Circular Industry	Sectors	Subsectors	Industry Group	NAICS Industry	National Industry
Waste Management	22 – Utilities	221 – Utilities	2213 – Water, Sewage, and Other Systems	22132 – Sewage Treatment Facilities	221320 – Sewage Treatment Facilities
	56 – Administrative and Support and Waste Management and Remediation Services	562 – Waste Management and Remediation Services	5621 – Waste Collection	56211 – Waste Collection	562111 – Solid Waste Collection
					562112 – Hazardous Waste Collection
					562119 – Other Waste Collection
			5622 – Waste Treatment and Disposal	56221 – Waste Treatment and Disposal	562211 – Hazardous Waste Treatment and Disposal
					562212 – Solid Waste Landfill
					562213 – Solid Waste Combustors and Incinerators
					562219 – Other Nonhazardous Waste Treatment and Disposal
			5629 – Remediation and Other Waste Management Services	56291 – Remediation Services	562910 – Remediation Services
				56292 – Materials Recovery Facilities	562920 – Materials Recovery Facilities
				56299 – All Other Waste Management Services	562991 – Septic Tank and Related Services
					562998 – All Other Miscellaneous Waste Management Services

Circular Industry	Sectors	Subsectors	Industry Group	NAICS Industry	National Industry
Transportation	23 – Construction	237 – Heavy and Civil Engineering Construction	2373 – Highway, Street, and Bridge Construction	23731 – Highway, Street, and Bridge Construction	237310 – Highway, Street, and Bridge Construction
	31-33 – Manufacturing	335 – Electrical Equipment, Appliance, and Component Manufacturing	3359 – Other Electrical Equipment and Component Manufacturing	33591 – Battery Manufacturing	335911 – Storage Battery Manufacturing
					335912 – Primary Battery Manufacturing
					335999 – All Other Miscellaneous Electrical Equipment and Component Manufacturing
	48-49 – Transportation and Warehousing	485 – Transit and Ground Passenger Transportation	4851 – Urban Transit Systems	48511 – Urban Transit Systems	485111 – Mixed Mode Transit Systems
					485112 – Commuter Rail Systems
					485113 – Bus and Other Motor Vehicle Transit Systems
					485119 – Other Urban Transit Systems
			4852 – Interurban and Rural Bus Transportation	48521 – Interurban and Rural Bus Transportation	485210 – Interurban and Rural Bus Transportation

Circular Industry	Sectors	Subsectors	Industry Group	NAICS Industry	National Industry
Food and Agriculture	11 – Agriculture, Forestry, Fishing and Hunting	111 – Crop Production	1111-1113 – Product-based farming industry groups, with NAICS and national industries pertaining to specific crops		
			1114 – Greenhouse, Nursery, and Floriculture Production	11141 – Food Crops Grown Under Cover	111419 – Other Food Crops Grown Under Cover
			1119 – Other Crop Farming	11199 – All Other Crop Farming	111998 – All Other Miscellaneous Crop Farming
	31-33 – Manufacturing	325 – Chemical Manufacturing	3253 – Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing	32531 – Fertilizer Manufacturing	325314 – Fertilizer (Mixing Only) Manufacturing
	44-45 – Retail Trade	445 – Food and Beverage Stores	4452 – Specialty Food Stores	44523 – Fruit and Vegetable Markets	445230 – Fruit and Vegetable Markets
	56 – Administrative and Support and Waste Management and Remediation Services	562 – Waste Management and Remediation Services	5622 – Waste Treatment and Disposal	56221 – Waste Treatment and Disposal	562219 – Other Nonhazardous Waste Treatment and Disposal

Circular Industry	Sectors	Subsectors	Industry Group	NAICS Industry	National Industry
Construction	23 – Construction	236 – Construction of Buildings	2361 – Residential Building Construction	23611 – Residential Building Construction	236115 – New Single-Family Housing Construction (except For-Sale Builders)
					236116 – New Multifamily Housing Construction (except For-Sale Builders)
					236117 – New Housing For-Sale Builders
					236118 – Residential Remodelers
			2362 – Nonresidential Building Construction	23621 – Industrial Building Construction	236210 – Industrial Building Construction
				23622 – Commercial and Institutional Building Construction	236220 – Commercial and Institutional Building Construction
		238 – Specialty Trade Contractors	2381-2389 – Trade-based construction industry groups, with NAICS and national industries pertaining to specific contractor specialties		

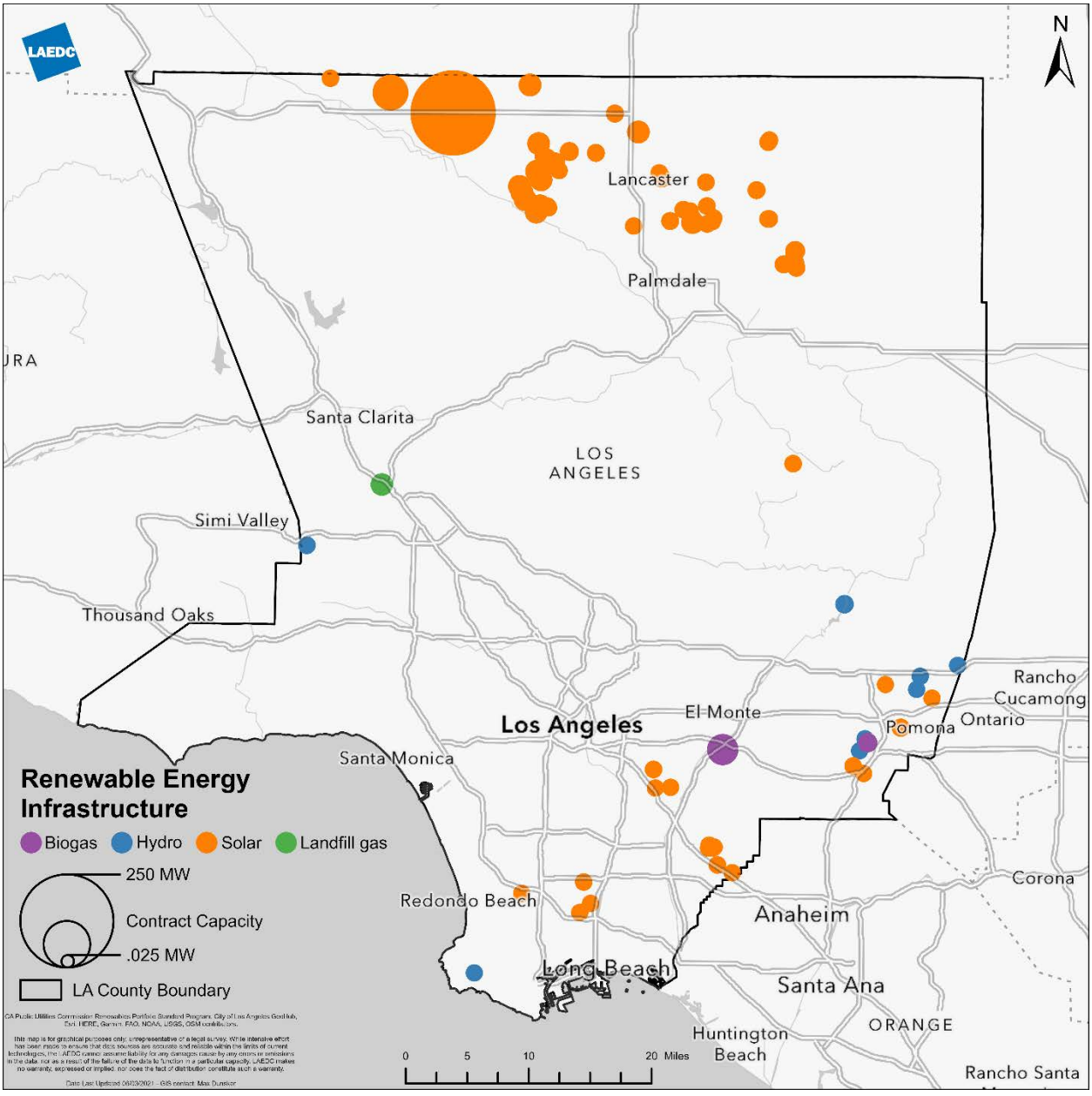
Circular Industry	Sectors	Subsectors	Industry Group	NAICS Industry	National Industry
Industry	21 – Mining, Quarrying, and Oil and Gas Extraction	211 – Oil and Gas Extraction	2111 – Oil and Gas Extraction	21112 – Crude Petroleum Extraction	211120 – Crude Petroleum Extraction
				21113 – Natural Gas Extraction	211130 – Natural Gas Extraction

Circular Industry	Sectors	Subsectors	Industry Group	NAICS Industry	National Industry
Infrastructure & Urban Development	23 – Construction	237 – Heavy and Civil Engineering Construction	2373 – Highway, Street, and Bridge Construction	23731 – Highway, Street, and Bridge Construction	237310 – Highway, Street, and Bridge Construction
	92 – Public Administration	924 – Administration of Environmental Quality Programs	9241 – Administration of Environmental Quality Programs	92411 – Administration of Air and Water Resource and Solid Waste Management Programs	924110 – Administration of Air and Water Resource and Solid Waste Management Programs
				92412 – Administration of Conservation Programs	924120 – Administration of Conservation Programs
		925 – Administration of Housing Programs, Urban Planning, and Community Development	9251 – Administration of Housing Programs, Urban Planning, and Community Development	92511 – Administration of Housing Programs	925110 – Administration of Housing Programs
				92512 – Administration of Urban Planning and Community and Rural Development	925120 – Administration of Urban Planning and Community and Rural Development

Circular Industry	Sectors	Subsectors	Industry Group	NAICS Industry	National Industry
Water	22 – Utilities	221 – Utilities	2213 – Water, Sewage, and Other Systems	22131 – Water Supply and Irrigation System	221310 – Water Supply and Irrigation System

Appendix B: Maps of the Circular Economy

Exhibit 4-1



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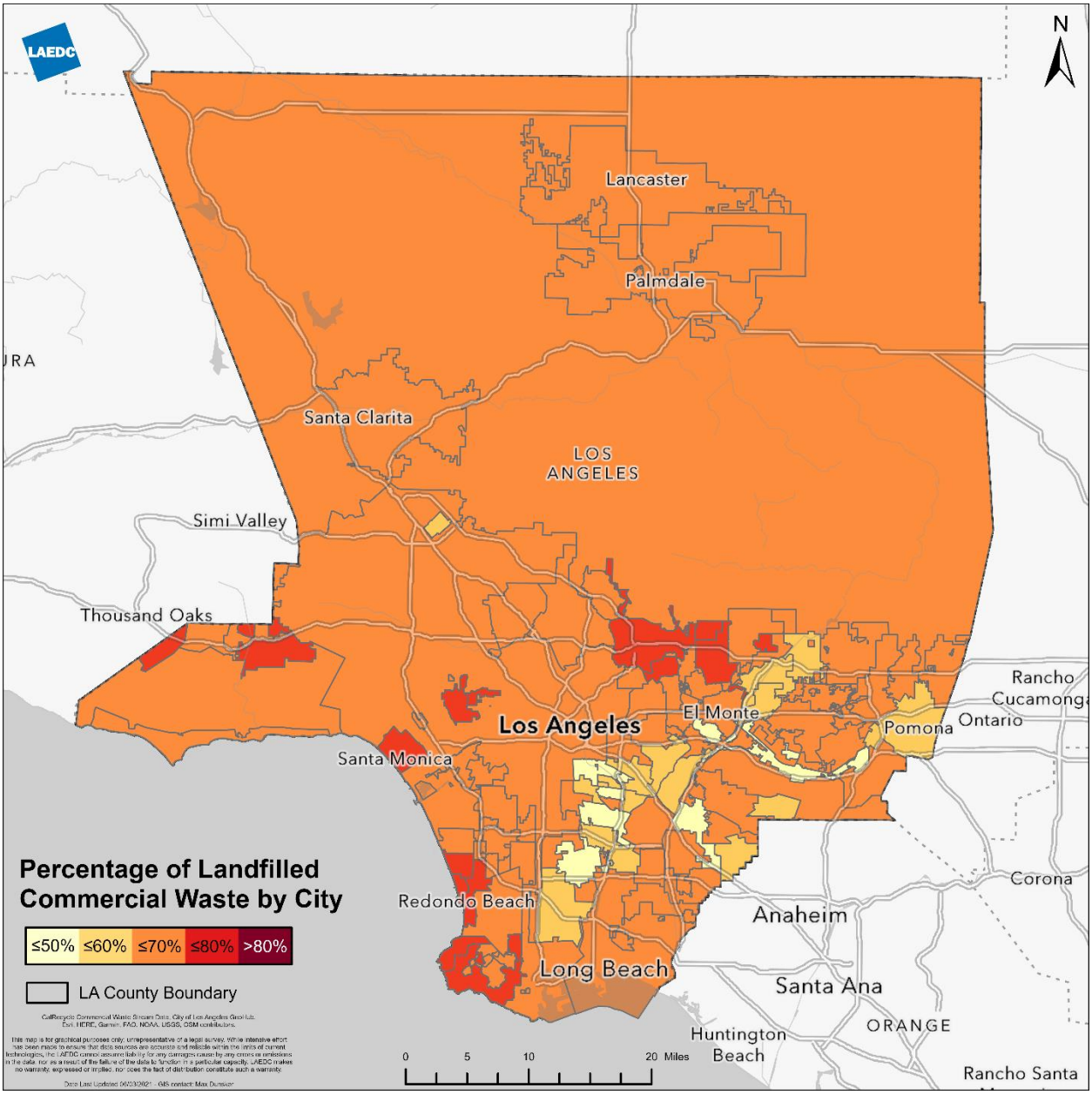
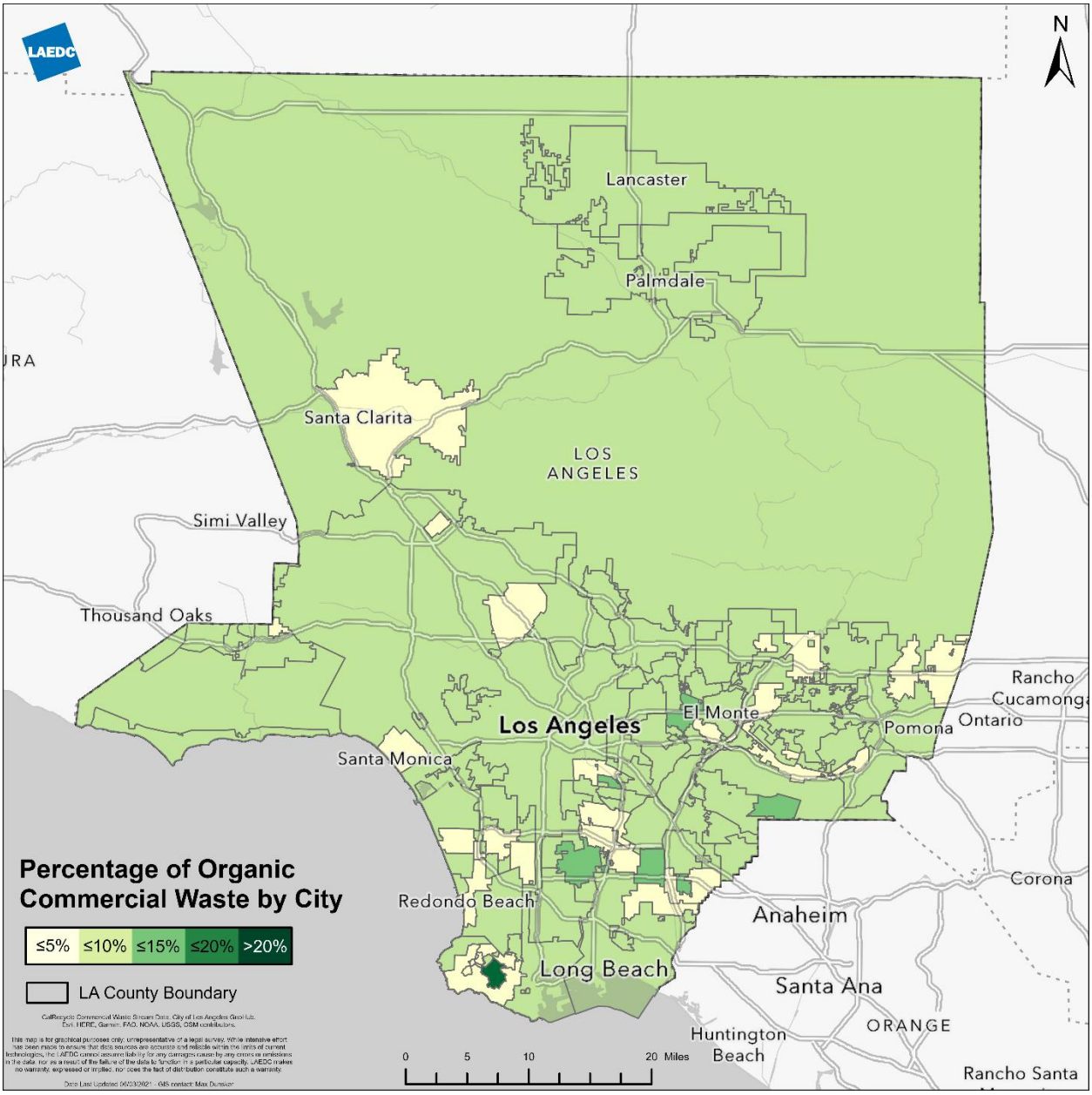

LAEDC
N
Lancaster
Palmdale
Santa Clarita
LOS ANGELES
Simi Valley
Thousand Oaks
Los Angeles
El Monte
Pomona
Ontario
Rancho Cucamonga
Santa Monica
Redondo Beach
Long Beach
Anaheim
Corona
Santa Ana
ORANGE
Huntington Beach
Rancho Santa
Percentage of Landfilled Commercial Waste by City
≤50% ≤60% ≤70% ≤80% >80%
LA County Boundary
0 5 10 20 Miles

Exhibit 4-5


LAEDC
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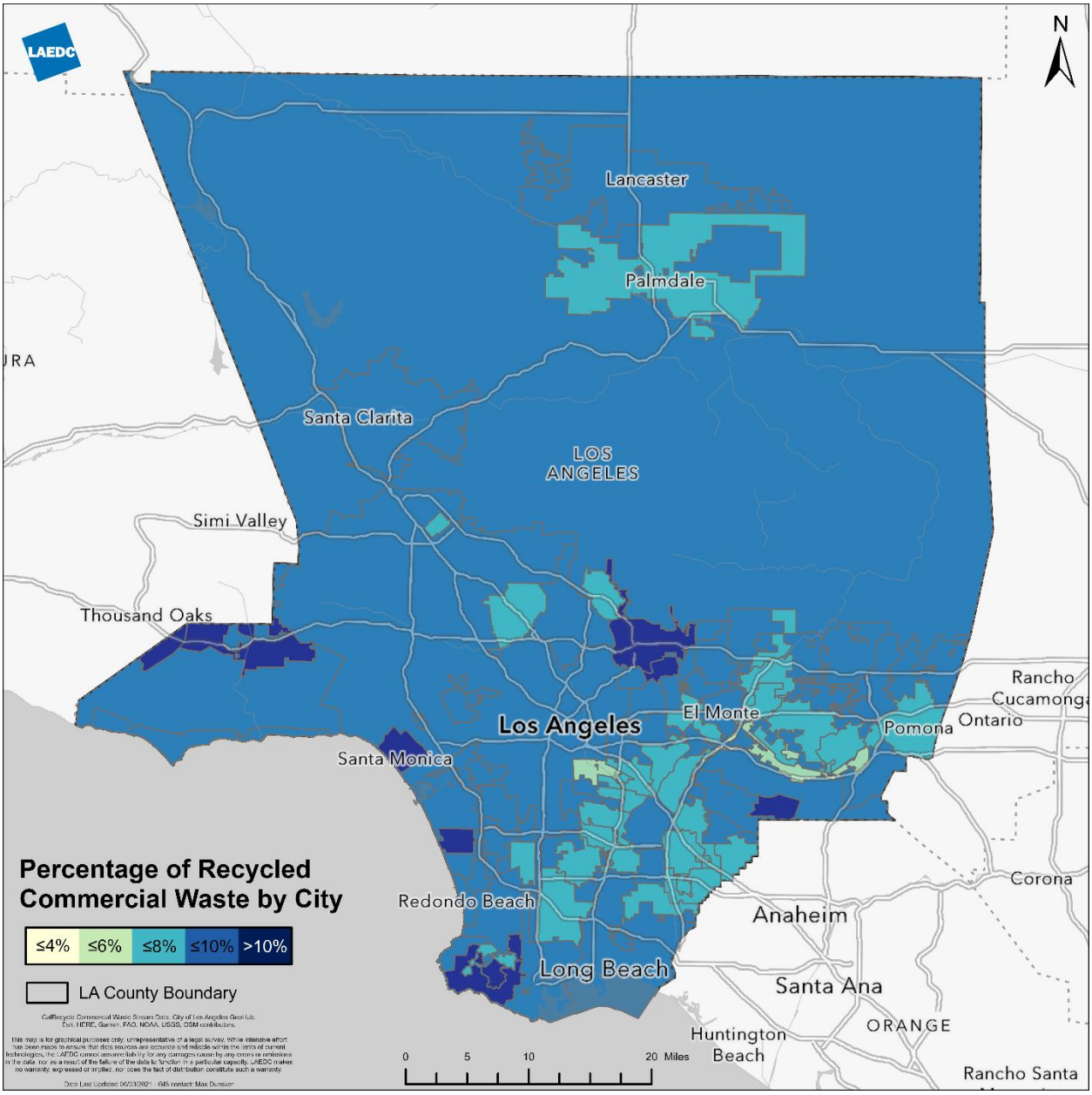
Ontario
Rancho Cucamonga
Santa Monica
Redondo Beach
Anaheim
Corona
Long Beach
Santa Ana
ORANGE
Huntington Beach
Rancho Santa
Percentage of Organic Commercial Waste by City
≤5% ≤10% ≤15% ≤20% >20%
LA County Boundary
0 5 10 20 Miles

Exhibit 4-6


LAEDC
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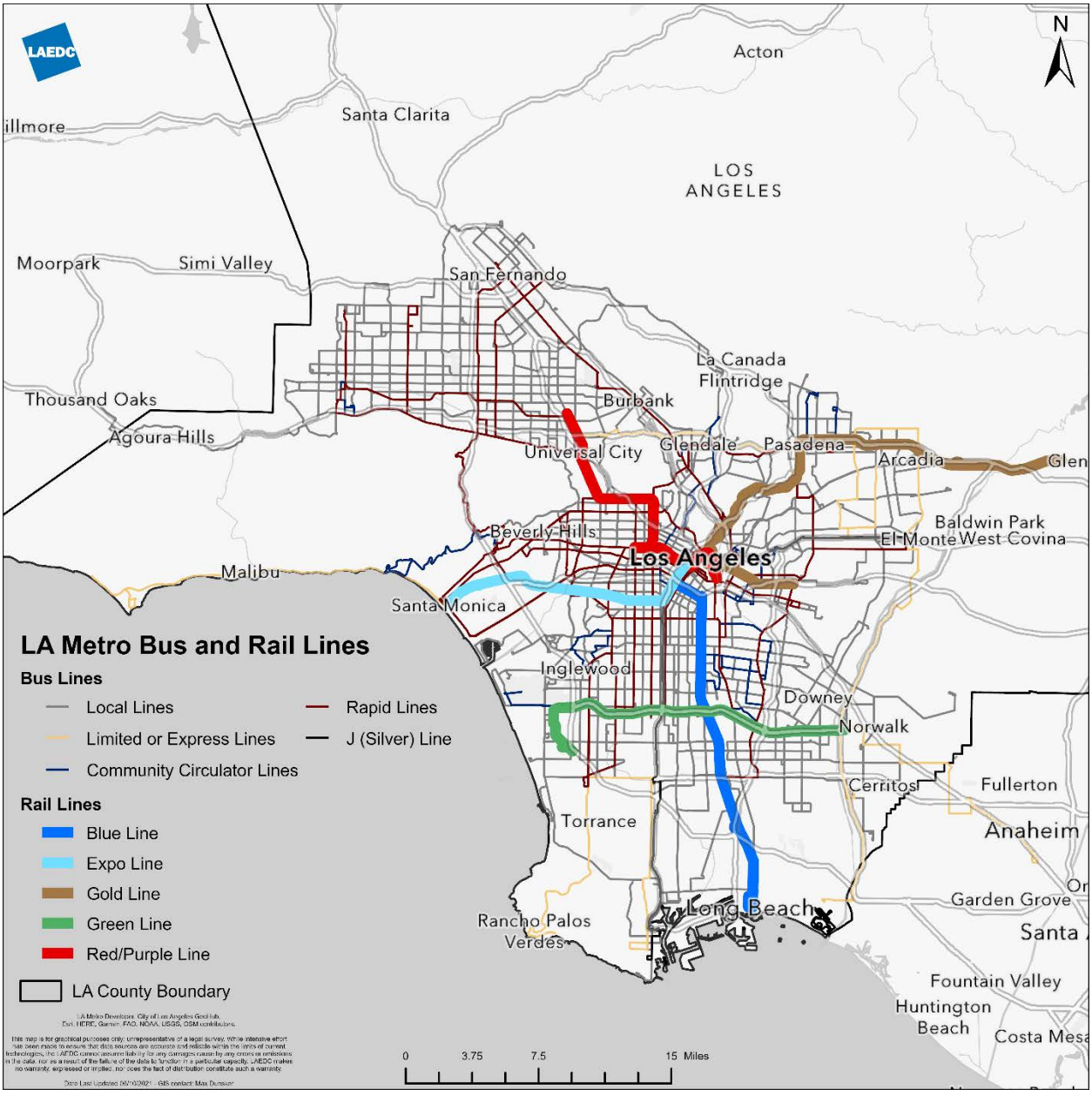
Ontario
Rancho Cucamonga
Santa Monica
Redondo Beach
Long Beach
Anaheim
Corona
Santa Ana
ORANGE
Huntington Beach
Rancho Santa
Percentage of Recycled Commercial Waste by City
≤4% ≤6% ≤8% ≤10% >10%
LA County Boundary
0 5 10 20 Miles

Exhibit 4-7


LAEDC
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Acton
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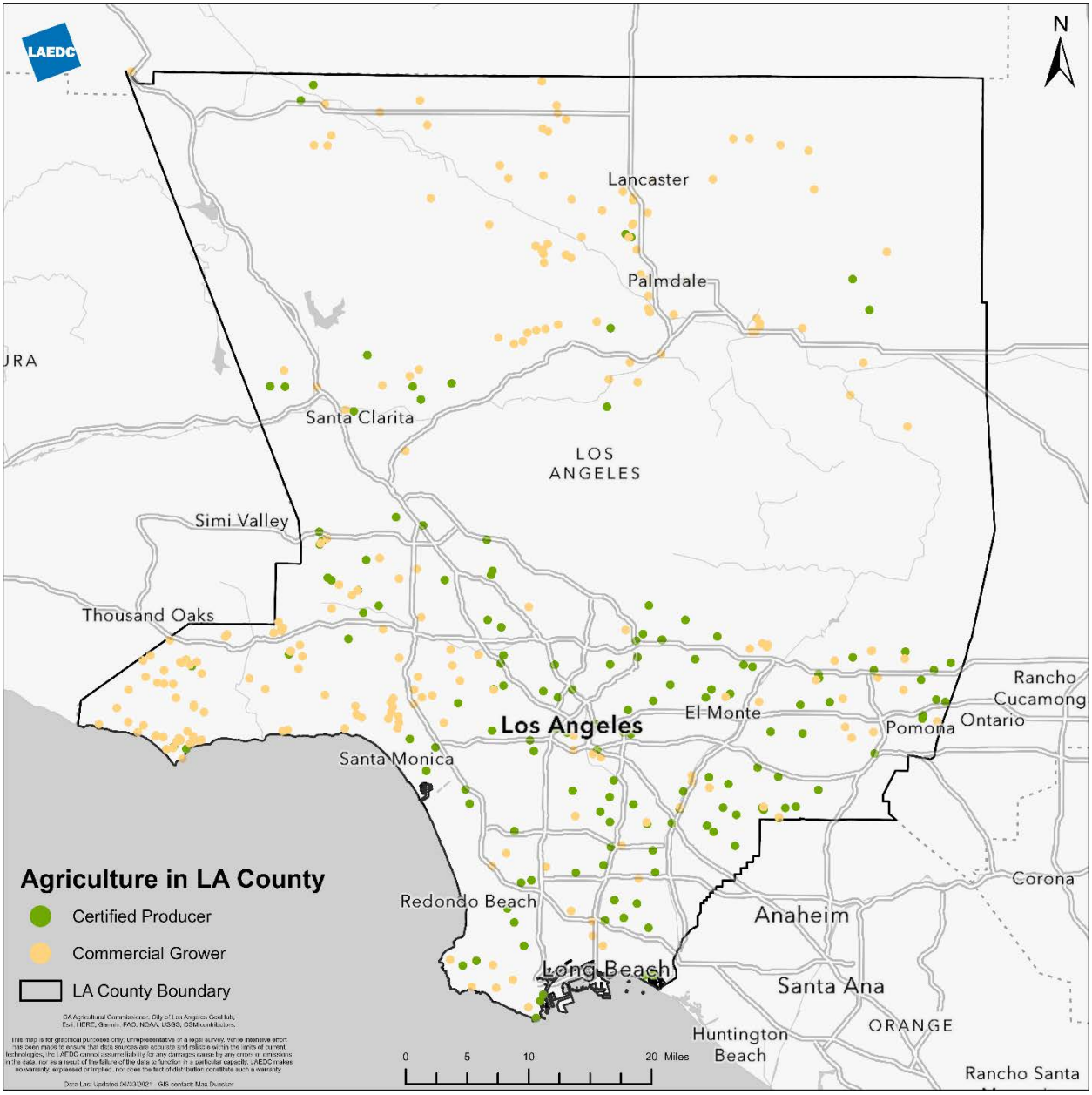
illmore
LOS ANGELES
Moorpark
Simi Valley
San Fernando
La Canada Flintridge
Thousand Oaks
Burbank
Agoura Hills
Universal City
Glendale
Pasadena
Arcadia
Glen
Beverly Hills
Baldwin Park
El Monte
West Covina
Malibu
Los Angeles
Santa Monica
LA Metro Bus and Rail Lines
Bus Lines
Local Lines
Rapid Lines
Limited or Express Lines
J (Silver) Line
Community Circulator Lines
Rail Lines
Blue Line
Expo Line
Gold Line
Green Line
Red/Purple Line
LA County Boundary
Inglewood
Downey
Norwalk
Cerritos
Fullerton
Torrance
Anaheim
Garden Grove
Long Beach
Rancho Palos Verdes
Santa
Fountain Valley
Huntington Beach
Costa Mesa
0
3.75
7.5
15 Miles

Exhibit 4-8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Long Beach
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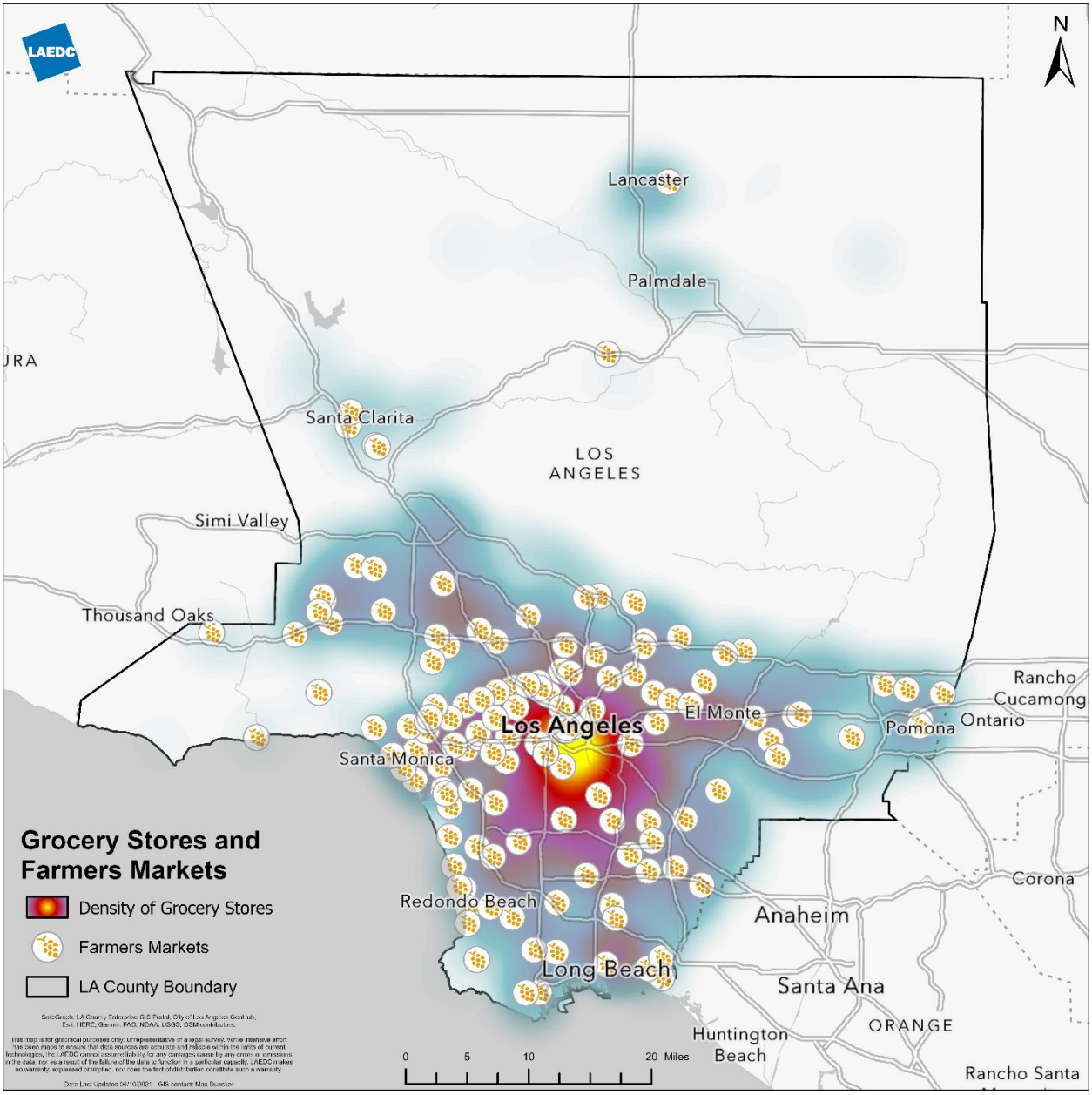
Huntington Beach
Rancho Santa
Agriculture in LA County
Certified Producer
Commercial Grower
LA County Boundary
0 5 10 20 Miles

Exhibit 4-9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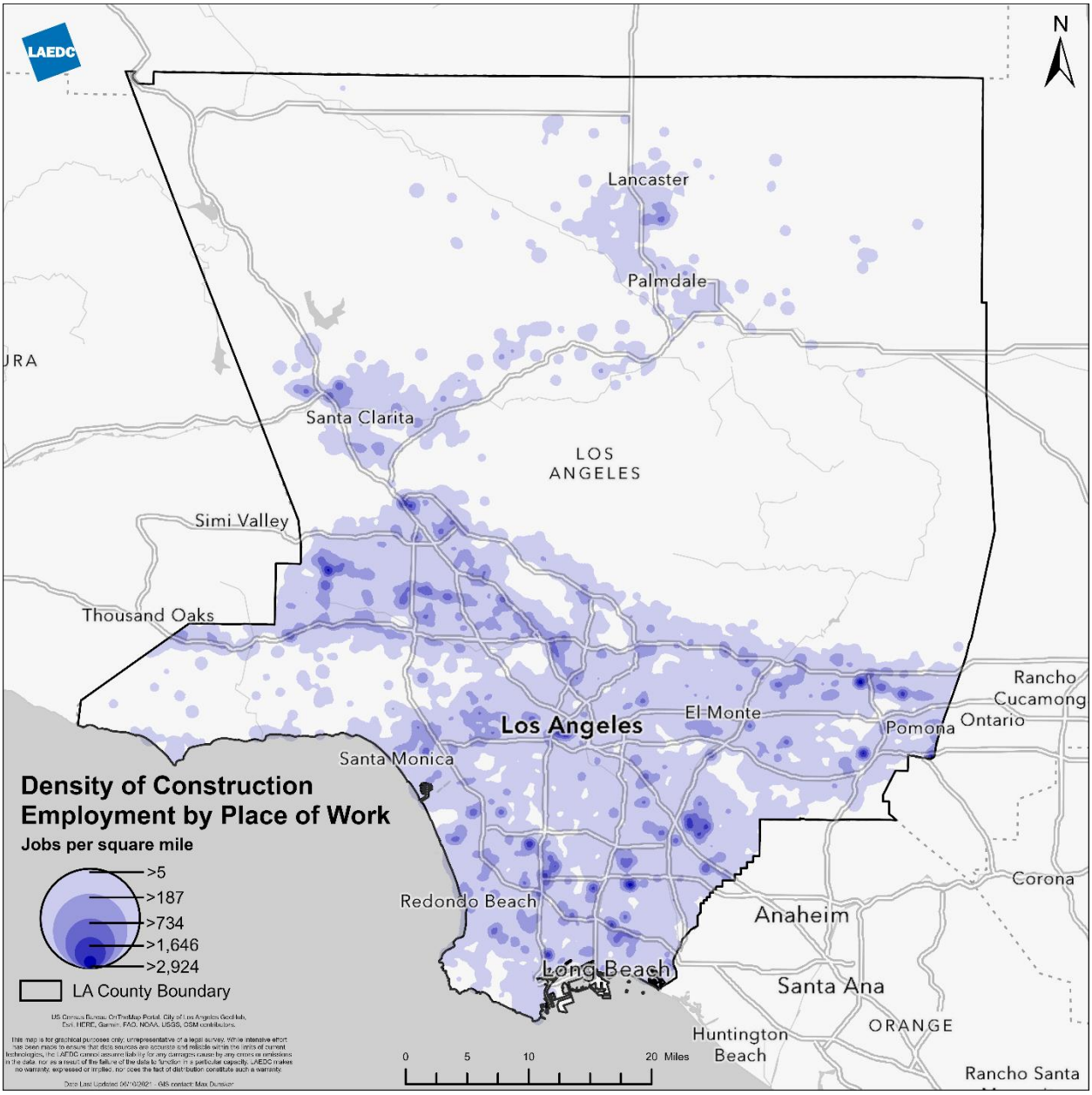
Rancho Cucamonga
Santa Monica
Redondo Beach
Anaheim
Corona
Long Beach
Santa Ana
ORANGE
Huntington Beach
Rancho Santa
Grocery Stores and Farmers Markets
Density of Grocery Stores
Farmers Markets
LA County Boundary
0 5 10 20 Miles

Exhibit 4-10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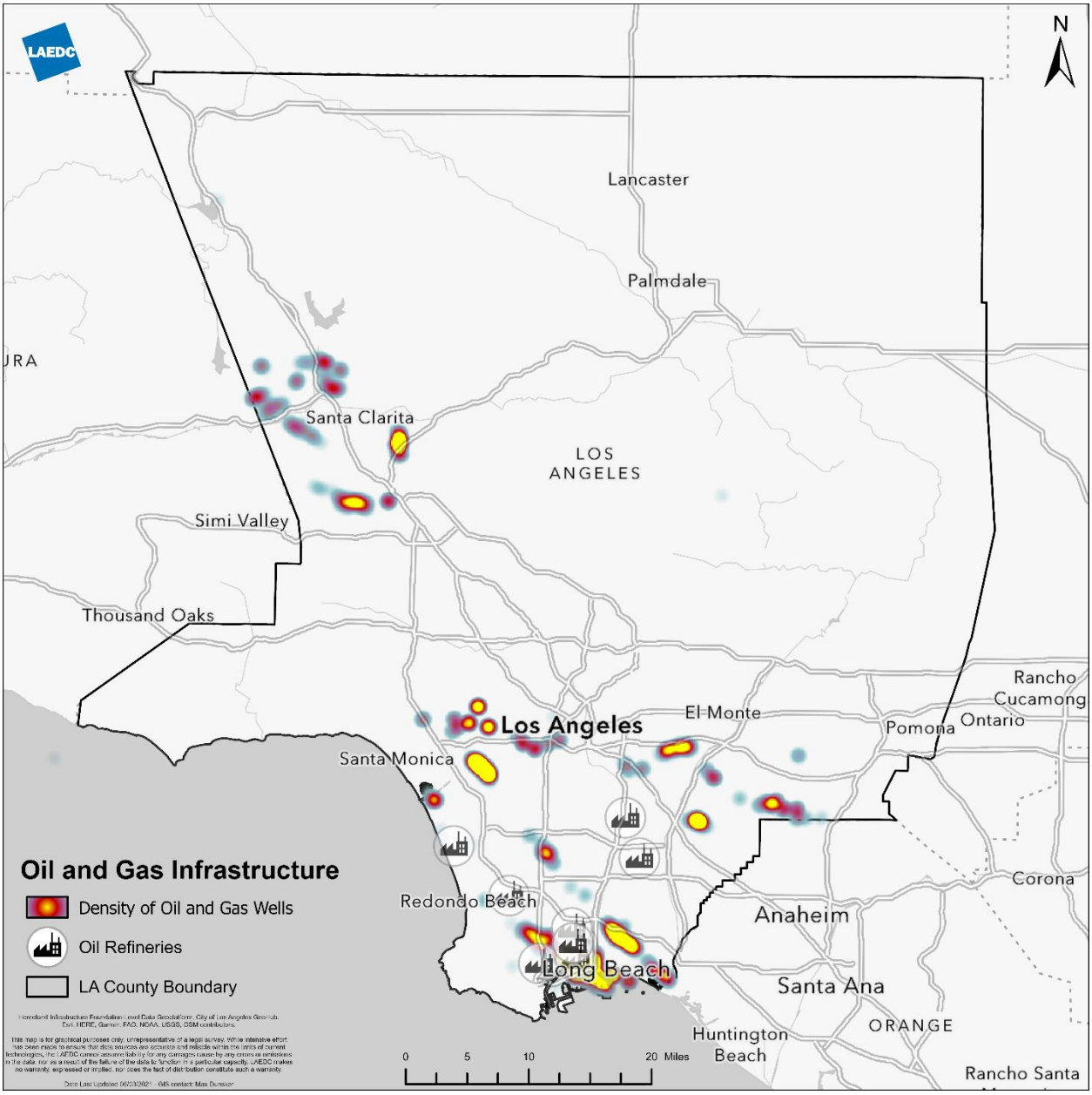
Redondo Beach
Long Beach
Anaheim
Corona
Santa Ana
ORANGE
Huntington Beach
Rancho Santa
Density of Construction Employment by Place of Work
Jobs per square mile
>5
>187
>734
>1,646
>2,924
LA County Boundary
0 5 10 20 Miles

Exhibit 4-11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Redondo Beach
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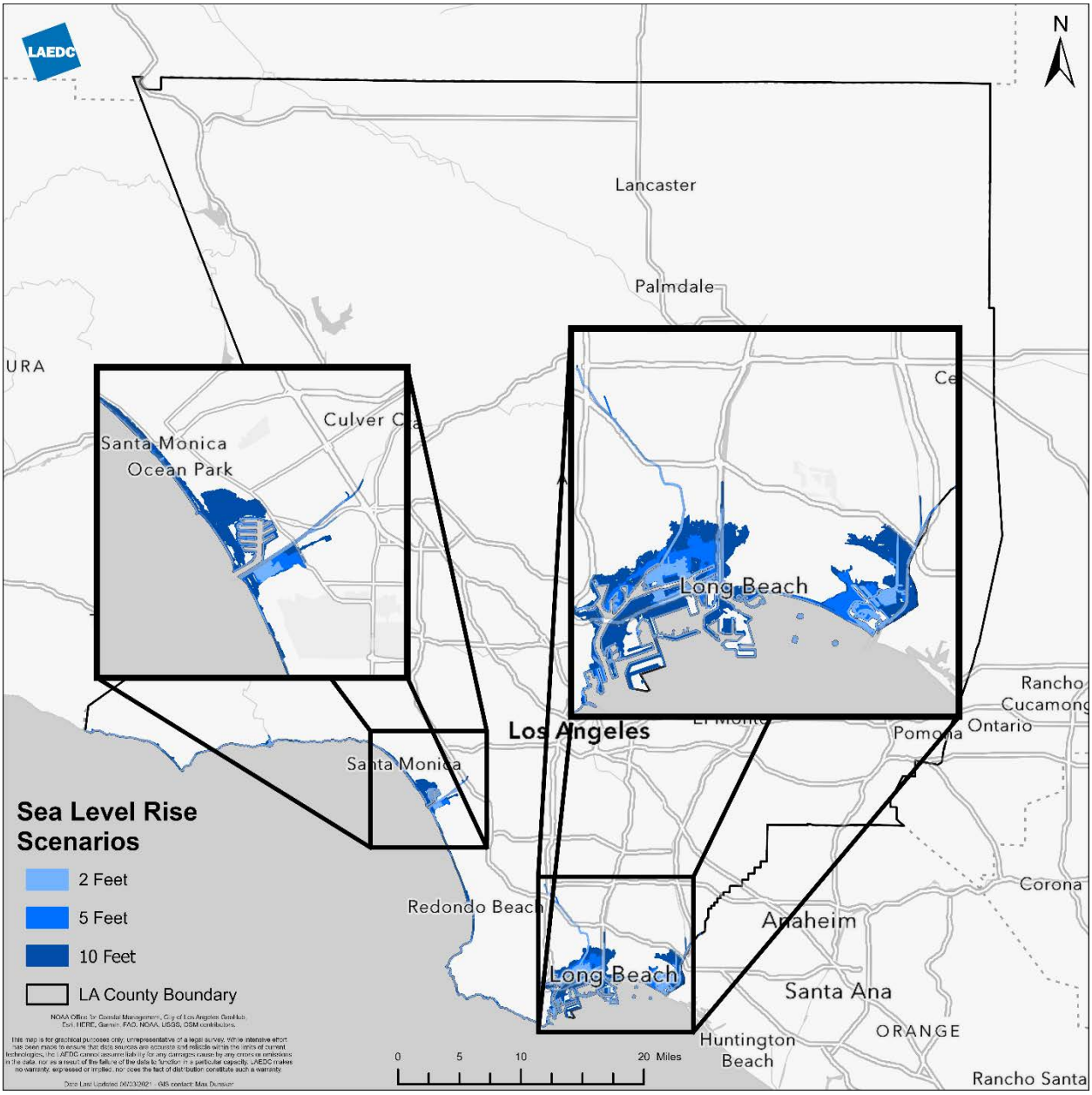
Long Beach
Santa Ana
ORANGE
Huntington Beach
Rancho Santa
Oil and Gas Infrastructure
Density of Oil and Gas Wells
Oil Refineries
LA County Boundary
0 5 10 20 Miles

Exhibit 4-12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Ocean Park
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Los Angeles
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Pomona
Ontario
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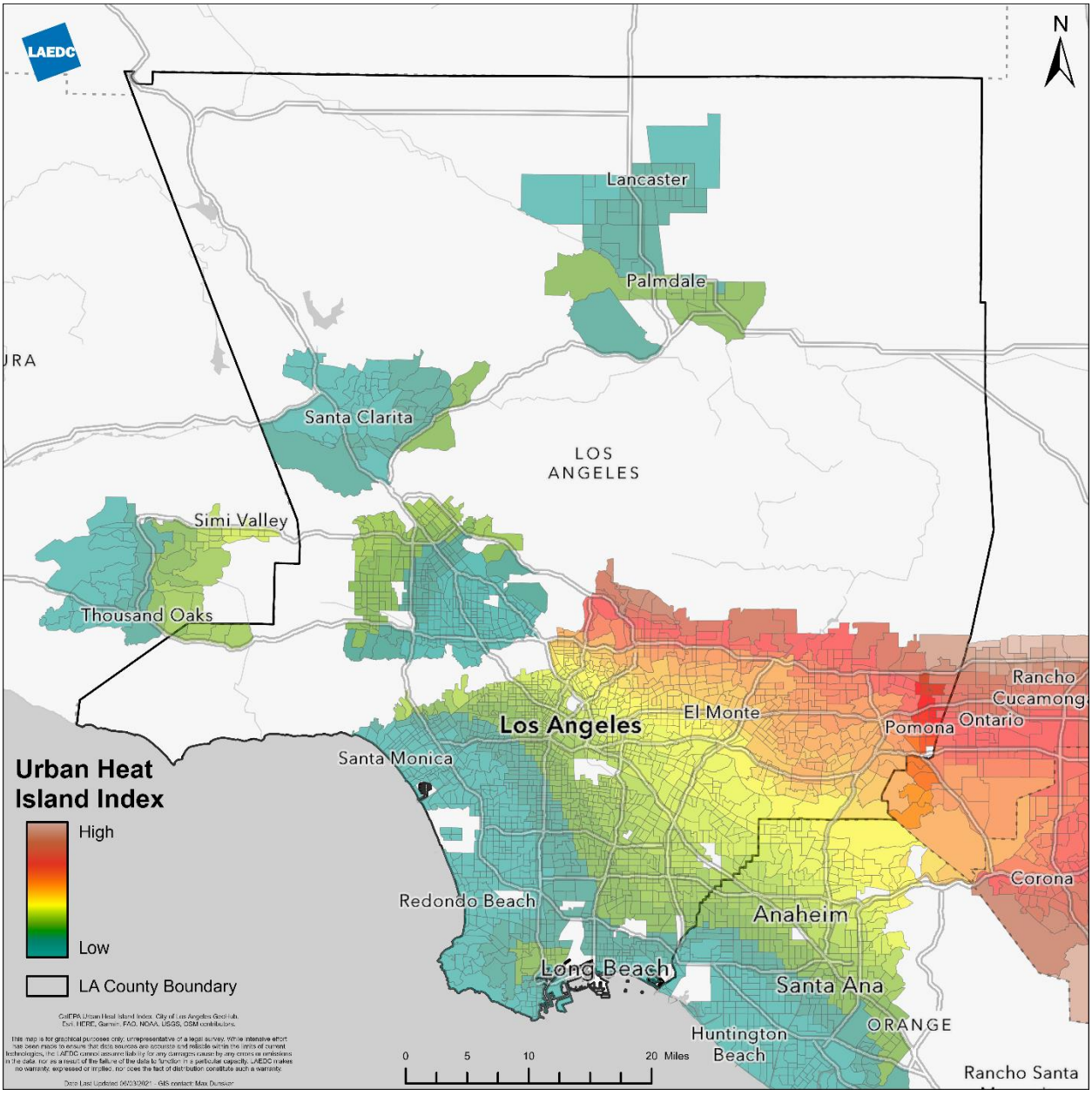
Redondo Beach
Anaheim
Long Beach
Santa Ana
ORANGE
Huntington Beach
Rancho Santa
Sea Level Rise Scenarios
2 Feet
5 Feet
10 Feet
LA County Boundary
0 5 10 20 Miles

Exhibit 4-13


LAEDC
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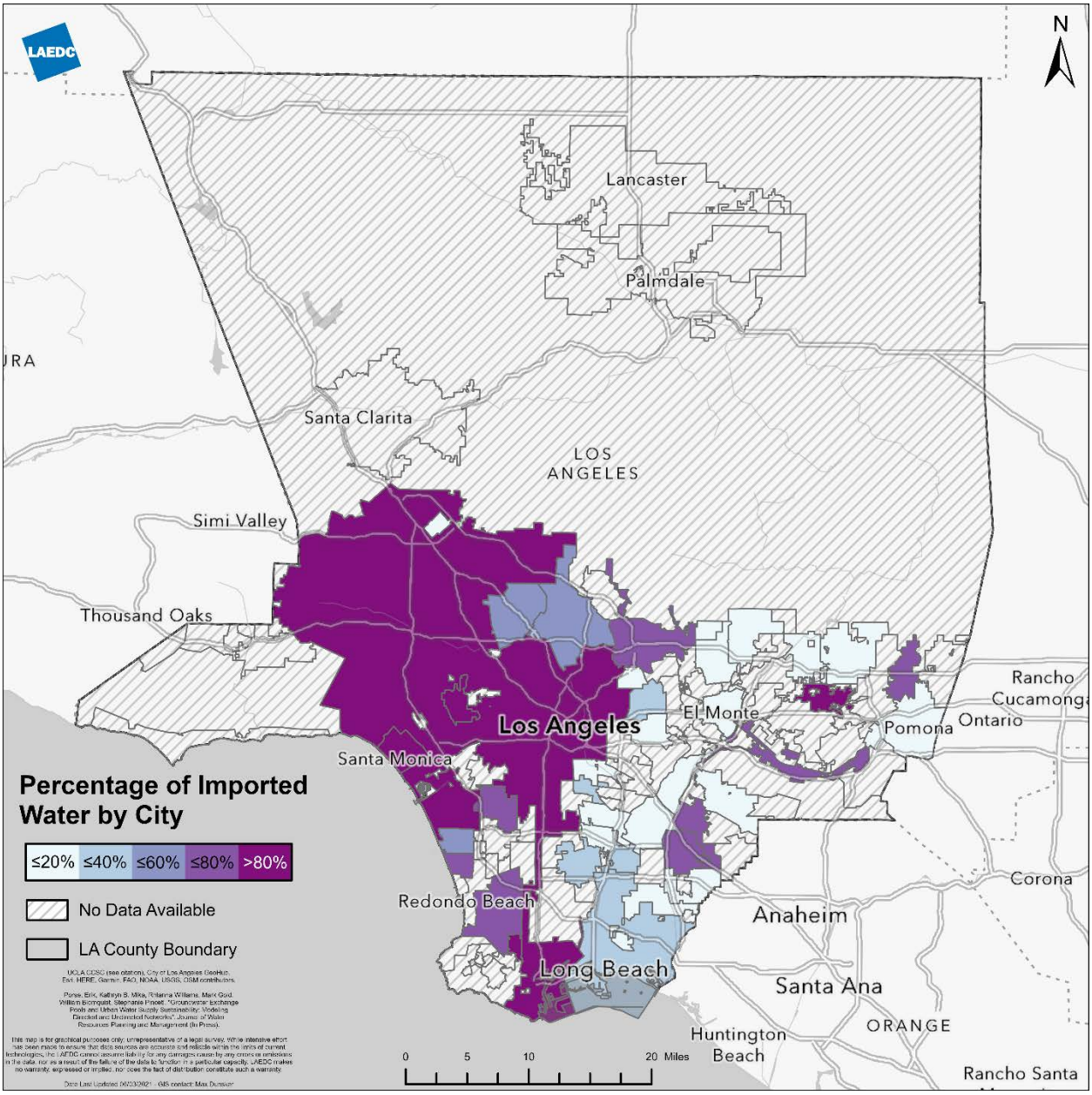
Rancho Cucamonga
Santa Monica
Redondo Beach
Anaheim
Long Beach
Santa Ana
Corona
Huntington Beach
ORANGE
Rancho Santa
Urban Heat Island Index
High
Low
LA County Boundary
0 5 10 20 Miles

Exhibit 4-14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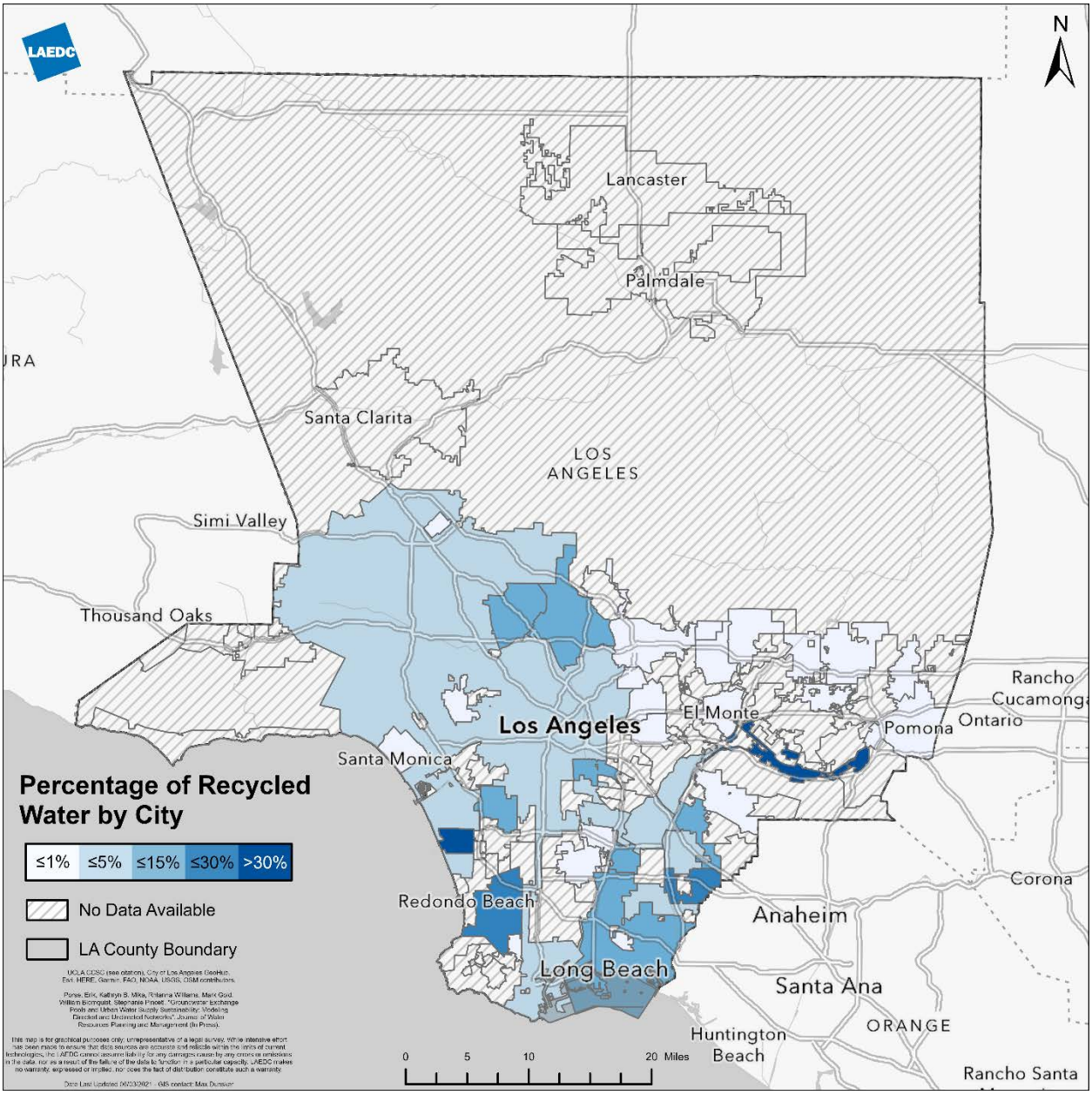
Rancho Cucamonga
Santa Monica
Redondo Beach
Anaheim
Corona
Long Beach
Santa Ana
ORANGE
Huntington Beach
Rancho Santa
Percentage of Imported Water by City
≤20% ≤40% ≤60% ≤80% >80%
No Data Available
LA County Boundary
0 5 10 20 Miles

Exhibit 4-15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Rancho Cucamonga
Santa Monica
Redondo Beach
Anaheim
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Long Beach
Santa Ana
ORANGE
Huntington Beach
Rancho Santa
Percentage of Recycled Water by City
≤1% ≤5% ≤15% ≤30% >30%
No Data Available
LA County Boundary
0 5 10 20 Miles

Appendix C: Circular Industry Summaries

Clean and Renewable Energy Industry

Opportunities in the Clean and Renewable Energy Industry	Barriers in the Clean and Renewable Energy Industry
Opportunities to provide renewable energy-generation technologies, energy storage technologies.	Complex network of electricity providers to navigate.
Opportunities exist for companies that advise businesses, nonprofit organizations and governments on how to become more energy efficient and to effectively transition towards renewable and clean energy sources.	Land-use disputes as renewable energy developers take over increasing amounts of open space in rural areas.
	Need to build new costly transmission lines to deliver clean and renewable energy.

Organizations of Interest and Potential Local Partners in the Clean and Renewable Energy Industry

The **LA Cleantech Incubator (LACI)** is the City's official cleantech business incubator. LACI was established to foster the clean technology industry in the Los Angeles region. LACI partners with an extensive network of advisors to provide assistance to budding companies. Assistance includes leadership and business development coaching. LACI accelerates development of cleantech start-ups by offering flexible office space and access to a network of experts and capital. LACI recently merged with CleanTech LA, bringing together business, government, and academia to expand this circular sector in Los Angeles.

Waste Management Industry

Opportunities in the Waste Management Industry	Barriers in the Waste Management Industry
Implementation of landfill diversion technologies.	Overcoming attitudes and habits regarding what is considered waste and what should be reused and recycled.
Opportunities exist for companies that advise businesses, nonprofit organizations and governments on how to become more circular in how waste is managed.	
Supply technologies that can help enable circular economy activity by collecting and analyzing data on materials used in economic activity to help minimize structural waste.	
Opportunities for companies that recycle and reuse construction and demolition waste.	
Increased recycling of plastic packaging and the substitution of bio-based packaging for petroleum-based plastic packaging are areas of opportunity.	

Organizations of Interest and Potential Local Partners in the Waste Management Industry

EcoSet Consulting's Material Oasis reuse center facilitates the reusing and repurposing of discarded materials on film and TV show sets. Items such as set walls, scenic elements, construction materials and props, are recirculated to schools, nonprofits, filmmakers, and theaters.

Transportation Industry

Opportunities in the Transportation Industry	Barriers in the Transportation Industry
Opportunities for companies that advise businesses, nonprofit organizations, and governments on how to rely on data-driven approaches to solve important circular problems have many opportunities in the Los Angeles region's transportation industry.	Habits and norms regarding transportation are difficult to change. The Los Angeles region is personal vehicle-centric. Encouraging individuals to switch to public transit options presents a significant challenge.
Opportunities exist to expand pedestrian and bike infrastructure and to increase the number of electric vehicle charging stations in the region. Building this infrastructure with sustainable materials in mind represents an additional opportunity.	

Organizations of Interest and Potential Local Partners in the Transportation Industry

The **Los Angeles Cleantech Incubator (LACI)** partnered with the California Air Resources Board, the California Energy Commission, and the Ports of Los Angeles and Long Beach in an effort to transition the transportation sector to zero emissions. The partnership issued a Request for Information for Zero Emission Trucks, Pilots and Infrastructure for Goods Movement, and received responses from nearly 40 companies in the transportation industry. Responses to the request will inform pilots and identify shortcomings and potential solutions to reduce carbon and air pollution in the Los Angeles Region.

LACI is currently looking for startups in Zero Emissions Mobility. LACI's Transportation Electrification Partnership (TEP) will work with policymakers, business partners, and other private-public collaboration to help achieve the following goals in Los Angeles by the 2028 Olympic and Paralympic Games[102]:

- Increase the adoption of electric light duty vehicles to be 30% of all vehicles on the road and represent 80% of sales.
- Shift at least 20% of all single passenger vehicle trips to zero emissions public transportation.
- Ensure that 100% of all public investment in goods movement will advance zero emissions goals.

PortTech Los Angeles is a non-profit innovation center dedicated to creating circular businesses for ports and the goods transportation industry. PortTech connects entrepreneurs, strategic partners, and investors, to accelerate innovation to advance clean technologies.

[102] Los Angeles Cleantech Incubator. "Apply for LACI Startup Incubation Program Cohort 3." *Los Angeles Cleantech Incubator*. May 5, 2021. https://laincubator.org/apply-for-laci-startup-incubation-program-cohort-3/

Food and Agriculture Industry

Opportunities in the Food and Agriculture Industry	Barriers in the Food and Agriculture Industry
Reduce avoidable food waste by building awareness and knowledge for consumers and businesses and creating markets for second-tier (refused) food, free compost.	Consumer and business customs and habits will need to be overcome in order for the food and agriculture industry to become more circular.
Opportunities for companies that can develop vertical farming systems. Opportunities are present to both set up their own farms and sell urban farming technology to other farms.	The high cost of water in the Los Angeles area will increase costs for new entrants into the industry.
Increase use of renewable energy and circular packaging.	Availability of capital.
Opportunities for companies that advise businesses, nonprofit organizations, and governments on how to become more circular in the food industry.	

Organizations of Interest and Potential Local Partners in the Food and Agriculture Industry

COMPRA Foods was developed through a partnership between the **Los Angeles Food Policy Council** and **Leadership for Urban Renewal Network**. COMPRA serves as an alternative food distribution system for small grocers in "food desert" neighborhoods in Los Angeles. The program provides thousands of low-income consumers in communities with access to affordable produce and healthy food.

Construction Industry

Opportunities in the Construction Industry	Barriers in the Construction Industry
Firms that focus on the built environment, particularly on the design and construction of new circular buildings and their components, retrofit of existing buildings, and circular urban development and infrastructure will find many opportunities in the Los Angeles region.	Key barriers in the construction industry include incomplete and unclear regulatory and legal frameworks as well as customs and habits in the construction industry. Social barriers exist for the adoption of many technologies with circular potential in the construction industry. Many established firms in the construction industry are reluctant to change long-established practices that stand in the way of adopting circular technologies. Because of the conservative nature of the construction industry, the opportunities to acquire dedicated partners quickly are likely greatest with boutique builders and architects who have already advertised their commitment to moving their industry in a circular direction.
Companies that provide circular building components and materials, such as bio-based or recycled materials, will find market opportunities in the region's construction industry.	While the use of 3D printing for smaller components in construction is increasing, the technology for 3D printing of entire buildings is not yet available. In addition, the regulatory framework has yet to fully address this new pioneering technology.
3D printing has the potential to significantly reduce structural waste during construction and building renovation.	Reuse and high-value recycling of components and materials in construction present an additional circular opportunity in the construction industry sector, however, tight regulation of the industry and uncertainty about the performance and health issues of reused or recycled materials are limiting factors. In addition, split incentives for initial investors, architects/engineers, subcontractors, and building owners makes it difficult for new practices to take hold.

The reuse and high-quality recycling of building components and materials could reduce the need for new materials, decrease construction and demolition waste, and as a result, reduce the industry's carbon footprint.
The retrofitting of old construction can be performed using both 3D printing and material passports. For these two technologies to maximize their circular impact, the material choice for 3D printing needs to be managed with circularity in mind. There is significant opportunity for partnerships between the providers of both technologies.
As the reuse and recycling of materials expands, a new industry of intermediaries connecting suppliers with buyers of these materials will emerge. Material passport companies will have an opportunity to create partnerships with such intermediaries and even move into the intermediary business if efficient. Digital material passports have the potential to become the new standard, aided by emergence of material intermediaries who link material suppliers and demanders.
Opportunities are present in launching public procurement pilots which will serve to demonstrate and advertise the benefits of existing circular materials and construction techniques. Public procurement practices that focus on projects that reuse or use recycled materials have the potential to encourage the adoptions of these circular building practices.
Opportunities exist for companies that advise businesses, nonprofit organizations, and governments on how to become more circular in the construction and retrofit of buildings. In particular, companies that rely on data-driven approaches to solve important circular problems have many opportunities in the Los Angeles region.

Organizations of Interest and Potential Local Partners in the Construction Industry

The **Building Decarbonization Coalition** works to power California's homes and workspaces with clean energy by uniting building industry stakeholders with energy providers, environmental organizations, and local governments. The Coalition is also introducing consumer education and contractor accreditation programs. In addition, it helps governments work with builders, contractors, and designers towards the transition to zero emission buildings.

The **LA Better Buildings Challenge** (LABBC) works with policymakers, industry, and advocacy groups, to achieve an ambitious goal of engaging 1,000 buildings by 2025 to meet the Building Energy Use targets in the 2015 Sustainable City pLAn. Through the Better Buildings Challenge, hundreds of businesses, manufacturers, educational institutions, school districts, and state and local governments have committed to reducing building energy usage. The LABBC collaborates with LA's top 25 percent of sustainable buildings to showcase and support their work towards sustainability. The LA Better Buildings Challenge is funded by the LADWP and SoCalGas. It offers a collaborative setting where building owners and managers can share best circular practices and gain recognition for sustainable achievements. Furthermore, the LABBC offers personalized advisory services to support circular building upgrades. The LABBC helps participants with regulatory compliance, evaluating vendor proposals, referrals to qualified contractors, rebate and incentive support and peer to peer introductions.

In 2019, the **U.S. Green Building Council-Los Angeles** launched a Net Zero Building Technology Accelerator focused on the creating technologies to foster the growth of zero carbon, zero energy, zero water, and zero waste buildings. The accelerator will encourage startups and pilots with building partners at the end of the program. The Technology Accelerator will work closely with businesses to address technical issues before these businesses enter the market.

LA Green Designs seeks opportunities for development, re-development, and restoration of residential and commercial projects that provide a positive impact on communities. Its goal is to create dynamic projects through green building practices using sustainable materials to inspire the community to adopt sustainable living practices.

LaTerra Development is a prominent real estate development company in California with more than 3,000 multifamily units under construction or in its development pipeline. The company's mission is to create multifamily and mixed-use developments that incorporate green building practices and sustainable materials.

REthink Development, owns, retrofits, and develops sustainable buildings. REthink partners with other companies and organizations on green building projects and is knowledgeable on cutting-edge technologies, techniques, and materials in the green building industry.

LivingHomes Atwater is an example of a recent REthink project that incorporated a variety of circularity features. In 2017, REthink developed and sold LivingHomes Atwater, a mixed-use project in the Atwater Village neighborhood. The company used prefabricated modular construction and state of the art green building techniques for the project. The homes were designed to meet LEED Platinum certification with Cradle to Cradle products.

Global infrastructure firm **AECOM** works with public and private sector clients to deliver on their sustainability goals. Headquartered in the City of Los Angeles, AECOM exceeded its original 2020 goal of reducing enterprise-wide emissions by 20 percent and is now seeking to reduce emissions by an additional 20 percent by 2025. AECOM plans to achieve its goal through efforts such as consolidating offices and creating more energy efficient office spaces.

El Monte-based **Greencity Building Company (GBC)** focuses on sustainable urban development and architecture. Typical projects undertaken by GBC include mixed-use developments, neighborhood-serving retail projects, boutique office, commercial, and hospitality projects, and various types of residential projects. GBC believes that existing communities are better served by small and medium-scale architecture and developments than by large-scale developments.

Kilroy Realty Corporation is a real estate investment trust that has committed to achieving carbon neutrality for its over 2 million existing and under construction building square feet in Los Angeles. Initiatives such as onsite energy efficiency and renewable energy projects will be undertaken to meet this ambitious goal.

David Hertz Architects' Studio of Environmental Architecture (SEA) is dedicated to designing and constructing sustainable buildings and public sculptures. In addition, SEA produces industrial design and conducts materials research. SEA approaches sustainable development from a systems approach and has unique expertise incorporating regenerative design and sustainability into residential and commercial projects. SEA is headquartered in Venice Beach and has its own thinktank, the Resilience Lab, which works to develop green technologies and to provide local communities with sustainable planning services.

Culver City-based **Gaia** provides guidance during the development of sustainable buildings. Gaia promotes cost effective sustainability measures to support developers, building owners, architects, and contractors in their efforts to deliver and maintain impactful circular projects. The company provides sustainable building certification consulting services as well as energy modeling and education services.

Oil and Gas Industry

Opportunities in the Oil and Gas Industry	Barriers in the Oil and Gas Industry
Opportunities exist for companies that provide products and services to monitor emissions from oil wells.	
Opportunities for leak detection and repair technology and services.	
Companies that perform environmental impact assessment and analyze the cost efficiency of measures will find many	

opportunities in this industry as many city plans seek to undertake assessments to guide and evaluate sustainability policy in this area. In particular, companies that rely on data-driven approaches to solve important circular problems have many opportunities in the Los Angeles region.	

Infrastructure & Urban Development Industry

Opportunities in the Infrastructure & Urban Development Industry	Barriers in the Infrastructure & Urban Development Industry
Opportunities exist for circular consulting companies that can devise actionable circular urban development and infrastructure strategies suited to the regional economy.	Attitudes and habits regarding urban development and infrastructure must be changed to reflect a more circular focus.
Opportunities are present for companies that provide circular recycled materials for road surfaces, sidewalks, and bus shelters.	Myopic thinking must be overcome when considering long-term investments to solve problems whose benefits will be enjoyed by future generations.
Companies that have expertise ensuring that surface water is kept at livable levels have a number of opportunities in the region.	Financing for long-term circular development and infrastructure projects.
Opportunities for companies that advise businesses, nonprofit organizations, and governments on how to develop in a circular manner. Companies that perform environmental impact assessment and analyze the cost efficiency of measures will find many opportunities in the region as many city plans seek to undertake assessments to guide and evaluate circular urban development policy. In particular, companies that rely on data-driven approaches to solve important circular problems have many opportunities in the Los Angeles region.	

Organizations of Interest and Potential Local Partners in the Infrastructure and Urban Development Industry

LA Green Designs seeks opportunities for development, re-development, and restoration of residential and commercial projects that provide a positive impact on communities. Its goal is to create dynamic projects through green building practices using sustainable materials to inspire the community to adopt sustainable living practices.

LaTerra Development is a prominent real estate development company in California with more than 3,000 multifamily units under construction or in its development pipeline. The company's mission is to create multifamily and mixed-use developments that incorporate green building practices and sustainable materials.

El Monte-based **Greencity Building Company (GBC)** focuses on sustainable urban development and architecture. Typical projects undertaken by GBC include mixed-use developments, neighborhood-serving retail projects, boutique office, commercial, and hospitality projects, and various types of residential projects. GBC believes that existing communities are better served by small and medium-scale architecture and developments than by large-scale developments.

Water Industry

Opportunities in the Water Industry	Barriers in the Water Industry
Companies that have expertise in smart water management particularly in areas such as the capture, storage, and use of rainwater will find many opportunities.	Changing current attitudes regarding water management to reflect a circular focus.
Companies with expertise in circular wastewater management will also find many opportunities in the region.	

Companies that specialize in extracting valuable resources, such as clean water, energy, and fertilizers, from wastewater will find many opportunities.
Companies with expertise managing natural water systems will also find multiple opportunities.
Opportunities for companies that advise businesses, nonprofit organizations, and governments on how to become more circular. Companies that perform environmental impact assessment and analyze the cost efficiency of measures will find many opportunities in the region as many city plans seek to undertake assessments to guide and evaluate sustainability policy. In particular, companies that rely on data-driven approaches to solve important circular problems have many opportunities in the Los Angeles region.

Organizations of Interest and Potential Local Partners in the Water Industry

OurWaterLA is a coalition of organizations across Los Angeles County whose goal is to secure clean, safe, and reliable water for users in the county. OurWaterLA seeks to augment the local supply of water, reduce local water pollution and flood risk, and effectively manage the impact of droughts and other shocks. The coalition works with community groups, clean water advocates, labor and business leaders, municipalities, and other public departments and agencies.

Torrance-based **Phyn** has created a smart water valve called Phyn Plus.[103] Phyn Plus is combined with artificial intelligence-driven software to analyze water consumption, detect leaks, and automatically shut off water supply in an emergency. Phyn's water valves can be installed in many different types of buildings such as single-family homes, condos, apartments, and restaurants.

West Los Angeles-based **Noria Water Technologies Inc.**, a LACI portfolio company, provides solutions for improving water treatment processes, such as the membrane-based filtration and purification of wastewater, groundwater, seawater, and industrial water. Noria's hardware and software products provide real-time monitoring for membrane-based water treatment processes and are used in plants that process anywhere from a few thousand gallons of water a day to more than 100 million gallons daily.

Clean Water Technology provides customized wastewater treatment solutions to a range of industries, including the food and beverage and automotive and transportation sectors. Clean Water's solutions work to turn wastewater into a reusable resource. Many businesses have limited space for equipment to treat wastewater. Clean Water's solutions seek to economize on space while removing as many contaminants as possible from wastewater.

On the demand side, education is vital to reducing residential water consumption. **Saya Life**, a LACI tenant, has developed a system to analyze water consumption in individual units for multifamily and commercial properties. The system features water detecting flood sensors, a smart remote shutoff flow meter, and the capability to send data to a mobile device. The system allows tenants to know how much water they consume as well as in what activities they have consumed the water such as how much was used for showering versus toilet use. Saya's system can also inform property managers about potential risks of water damage.

[103] Huang, Coco. ''Water Tech Companies are Springing Up in LA.'' *Los Angeles Business Journal*. October 12, 2020. https://labusinessjournal.com/news/2020/oct/12/water-tech-companies-springing-up-los-angeles/

The **Nature Conservancy** has developed a model for stormwater capture and habitat. The Los Angeles River Habitat Restoration & Stormwater Capture Project offers a model for increasing local water quality and supply that also leads to habitat restoration. The project will be located near the Rio De Los Angeles State Park and has an expected completion date of 2022.

Trade Expositions of Interest

The **Municipal Green Building Conference & Expo** has become the largest and longest-running gathering of leading circular building advocates within both the public and private sectors in Southern California. Hosted by the U.S. Green Building Council Los Angeles, the Expo was attended by over 1300 people in 2020. The trade show provides networking opportunities and an occasion to inform local government agencies, building industry professionals, and the public about new circular building technologies, products, and practices.

The **Greenbuild International Conference/Expo** hosts the largest annual event for green building professionals. The Greenbuild Expo invites architects, consultants, sustainability managers, designers, educators and builders in the circular industry to attend. Joining the Expo as an exhibitor will provide an opportunity for businesses to showcase products and technology and make connections with potential partners and clients. In 2021, Greenbuild is scheduled to take place in San Diego.

The Metropolitan Water District of Southern California has hosted 11 **Spring Green Expos.** The Expos were put on hold during 2019 and 2020 due to Metropolitan's ongoing seismic retrofit improvements at the district downtown Los Angeles headquarters. The Expos have provided Metropolitan employees, along with other agencies, businesses, and conservation organizations an opportunity to showcase their products and services that save water and promote circularity. The Water District has not yet decided if or when they will resume hosting their Spring Green Expo.

Next Steps

- After reviewing the county and city-specific details contained in this report regarding the industries of interest, companies should identify opportunities and geographical areas of interest for their products or services. After doing so, companies can narrow in on specific partners and organizations of interest as well as on the specific geographical area(s) to do business.

  Companies that focus on the built environment should review Appendix D which contains a list of upcoming circular development projects that may be of interest.

- For those companies interested in doing business directly with LA County and the cities highlighted in this report it is recommended that they familiarize themselves with the relevant public procurement processes and take actions that will allow them to effectively participate in the procurement process.

  Appendix E contains general guidance on doing business with the County of Los Angeles and with the cities within LA County that are reviewed in the report.

- Review the list of potential partners and organizations of interest listed above and visit the websites of those that companies identify as being most relevant. After conducting a deeper dive into what the company or organization does, reach out to a company or organization representative by visiting the Contact sections of their web pages.

- Companies should plan to attend upcoming regional circular industry trade expositions as a vendor to showcase their products and services and to find potential partners and opportunities in the LA region.

- Join membership organizations that can serve to increase company visibility and to provide companies with network opportunities with other companies in the region's circular economy.

- Reach out to other circular Dutch companies who can serve as potential partners and who may be able to share information about potential opportunities, lessons learned, and partners in the LA region.

Appendix D: Upcoming Circular Projects

11111 Jefferson Blvd. Mixed Use Project[104]

Project Site Location:

The development will officially be located at 11111 Jefferson Boulevard, Culver City, California, 90230. The site is bordered by Jefferson Boulevard to the east, Machado Road to the north and Sepulveda Boulevard to the west.

Development Details:

The development will sit on 3.43-acre (149,553 square feet). The development will construct up to 230 residential units, with 19 of these units classified as affordable to very low-income households, resulting in up to 244,609 square feet of residential area. In addition, up to 55,050 square feet of ground floor retail area is planned which includes restaurants, and a fitness center. Finally, up to 11,450 square feet of second floor office space is planned.

Project Timeline:

Project construction is planned to begin as early as the second quarter of 2022 and to be finished by the third quarter of 2024.

[104] Environmental Science Associates. "11111 Jefferson Blvd. Mixed Use Project Draft Environmental Impact Report State Clearinghouse No. 2020090329." 2021. https://www.culvercity.org/files/assets/public/documents/community-development/current-projects/11111-jefferson-blvd/11111-jefferson_draft-eir.pdf

AO, 2020[105]

Planned Circular Features:

The project development is designed to support environmental sustainability through energy efficiency, water conservation, and emission reductions measures.

Energy efficiency, water conservation, and emissions reductions measures will be considered in the design, construction, and operation of the development. The incorporation of features such as solar photovoltaic power, electric vehicle charging stations, energy efficient appliances, water efficient plumbing and landscaping has been proposed.

All development components will meet Culver City's required Green Building Program requirements. The development will include 132 EV capable spaces, 63 EV charging stations, and 63 EV-ready spaces, in accordance with the CALGreen Code addressing infrastructure for EV charging stations.

100 East Ocean Boulevard[106]

Project Site Location:

The development will officially be located at 100 East Ocean Boulevard, Long Beach, CA 90802. The site is bordered by Ocean Boulevard to the north, Pine Avenue to the west, Seaside Way to the south, and a commercial building to the east.

Development Details:

The planned development includes a 30-story, 537,075 square foot building of up to 375.5 feet in height that would include 429 hotel room units, The development will also include 23,512 square feet of restaurant space, and 26,847 square feet of space used classified as meeting and ballroom space. Pedestrian walkways and new landscaping will also be included.

Project Timeline:

Development is expected to take place over approximately 30 months with completion originally predicted in 2022. This timeline may have been pushed back significantly due to COVID-19.

[105] "11111 Jefferson Blvd. Mixed Use Project." [picture]. https://www.culvercity.org/files/assets/public/documents/community-development/current-projects/11111-jefferson-blvd/11111-jefferson_draft-eir.pdf

[106] Eyestone Environmental, LLC. "100 East Ocean Project Draft Environmental Impact Report SCH No. 2018121006." August 2019. https://www.longbeach.gov/globalassets/lbds/bureau-pages/planning/current-planning/eir/100-east-ocean-project-draft-eir--august-2019-

Source: GDB Architects Incorporated / RELM, 2018.[107]

Planned Circular Features:

The planned development will incorporate features to support and promote environmental sustainability to comply with the City of Long Beach Green Building Ordinance. Furthermore, the development has been designed to achieve the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Silver certification. Planned energy conservation, water conservation, and waste reduction features include but are not limited to:

Energy Conservation and Efficiency:

- Energy-efficient building design practices and technologies such as high-performance window glazing and improved insulation to minimize heat gain.
- Low-emitting materials to encourage indoor environmental quality.
- Insulated plumbing pipes and high-efficiency water heaters and boilers.

[107] GDB Architects Incorporated. "Project Rendering." [picture]. https://www.longbeach.gov/globalassets/lbds/bureau-pages/planning/current-planning/eir/100-east-ocean-project-draft-eir--august-2019-

Water Conservation:

- Incorporate water conservation measures to comply with Long Beach Water Department requirements for new developments.
- Use of cooling tower automatic water treatment to reduce cooling tower water waste.

Water Quality:

- On-site storm water treatment and reuse system containing a below- grade cistern and reuse pump capable of accommodating up to 3,102 cubic feet of stormwater. The system will include underground steel reinforced polyethylene detention tanks with irrigation reuse pump. The treated stormwater may be used for on- site landscape irrigation.
- Catch basin inserts and screens to remove contaminants from runoff.
- Preparation and implementation of a Stormwater Pollution and Prevention Plan, a City of Long Beach Low Impact Development Plan, and a Standard Urban Stormwater Mitigation Plan to control stormwater runoff, minimize pollutants and reduce erosion effects during and after site development.

Solid Waste:

- Building materials with a minimum of 10% recycled-content for the construction of the building structure.
- Development and implementation of a construction waste management plan to recycle and/or salvage at least 75% of nonhazardous construction debris or minimize the generation of construction waste to 2.5 pounds per square foot of building floor space.

300-370 S. Fairfax Avenue[108]

Project Site Location:

The development will officially be located at 300-370 S. Fairfax Avenue; 6300-6370 W. 3rd Street; and 347 S. Ogden Drive in the City of Los Angeles, California.

Development Details:

The project will transform an aging commercial retail center into a smart-growth, mixed-use development that will supply residential, retail and restaurant space in the Wilshire Community area of the City of Los Angeles.

The development will include an eight-story mixed-use building containing up to 83,994 square feet of commercial space and 331 residential dwelling units containing 426,994 square feet of space. In total, the development will include up to 490,682 square feet of floor area.

[108] City of Los Angeles. "3rd and Fairfax Mixed-Use Project State Clearinghouse No. 2019029111." February 2021. https://planning.lacity.org/eir/3rd_and_Fairfax_Mixed-Use/deir/DEIR%20Sections/II.%20Project%20Description.pdf

Project Timeline:

The development will feature a construction schedule of approximately 32 months, with final buildout occurring in 2023.

Source: MVE + Partners, June 1, 2020.[109]

Planned Circular Features:

The development aims to provide "smart-growth" development. This includes efforts to encourage a reduction in vehicle miles traveled by providing multi-family housing and employment space in a designated Transit Priority Area. In addition, the development seeks to create a sustainable neighborhood with scalable design that is compatible with unique adjacent on- and off-site land uses.

The proposed development will incorporate circular building features and construction methods required by the Los Angeles Green Building Code and CALGreen. These standards will serve to reduce energy and water usage and waste and as a result reduce associated greenhouse gas emissions. The development is designed to meet the minimum energy efficiency standards of the Los Angeles Green Building Code and will meet the criteria for certification at the U.S. Green Building Council's (USGBC) LEED certified level or equivalent.

The project will incorporate state-of-the-art green building technology initiatives and circular practices that exceed local, state, and national standards for green building practices. The construction will include circular design to meet or surpass all City of Los Angeles current building code and California's Energy Efficiency Standards for Residential and Nonresidential Buildings requirements.

To achieve these lofty goals, the development will incorporate circular building materials, systems, and features wherever feasible, including high-efficiency appliances, water saving features, non-VOC paints and adhesives, and high-performance building enclosure including high performance glazing, cool roof and green roof, and optimized insulation levels. The building will also be designed to accommodate on-site electric vehicle chargers in accordance with the Los Angeles Green Building Code.

[109] MVE + Partners. "3rd and Fairfax Mixed-Use Project." June 1, 2021. https://planning.lacity.org/eir/3rd_and_Fairfax_Mixed-Use/deir/DEIR%20Sections/II.%20Project%20Description.pdf

Hollywood Center[110]

Project Site Location:

The development will officially be located at 1720-1724, 1740-1768, 1745-1753, and 1770 North Vine Street; 1746-1764 North Ivar Avenue; 1733- 1741 North Argyle Avenue; 6236, 6270, and 6334 West Yucca Street, Los Angeles, CA 90028. The project is bordered by Yucca Street on the north, Ivar Avenue on the west, Argyle Avenue on the east, and adjacent development and Hollywood Boulevard on the south, and divided by Vine Street.

Development Details:

The Hollywood Center Project is a mixed-use development sitting on about 4.46-acres. The development plans to demolish an existing building on the west site. The development will be redeveloped to contain 1,005 residential units and up to 30,176 square feet of commercial uses, within four new mixed-use buildings (West Building, East Building, West Senior Building, East Senior Building) which range in height from 11 to 46 stories. Overall, the development will contain up to 1,287,150 square feet of floor area. Under a proposed East Site Hotel Option 104 residential units within the East Building will be replaced with a hotel, with no change to the building height or general shape. The Project with the East Site Hotel Option would contain 884 residential units made up of 768 market-rate and 116 senior affordable units; a 220-room hotel, and up to 30,176 square feet of commercial space. Overall, East Site Hotel Option development would contain up to 1,272,741 square feet of floor area.

Project Timeline:

Development was scheduled to begin as early as 2021.

In the overlapping construction scenario, development will finish in around 4.5 years (beginning 2021 and completed in 2025). In the sequential construction scenario development is expected to be completed in under seven years (beginning in 2021 and finishing in 2027). In either of the two scenarios, buildout of the West Site is expected to be in 2024.

SOURCE: Shimahara, 2019 Hollywood Center Project

[110] City of Los Angeles. "Hollywood Center Project City of Los Angeles Draft Environmental Impact Report." April 2020. https://planning.lacity.org/eir/HollywoodCenter/deir/Draft%20EIR%20Sections/II.%20Project%20Description.pdf

Planned Circular Features:

The planned development is an Environmental Leadership Development Project (ELDP) under Assembly Bill 900, certified by the Governor on August 16, 2018. This project was deemed eligible under the Jobs and Economic Improvement through Environmental Leadership Act of 2011 (AB 900). To be certified as an ELDP, the development must result in a minimum investment of $100 million, create high-wage jobs, and not result in net additional greenhouse gas emissions. In addition, a mixed-use project, such as the Hollywood Center, must meet additional requirements. The development must be located on an infill site, be designed to achieve LEED Gold certification, be in accordance with any relevant regional circular communities strategies and be at least 15 percent more transportation efficient than similar projects.

The development has been designed to meet the standards for United States Green Building Council Leadership in Energy and Environmental Design (LEED) Gold Certification. Circular elements include:

- Water conservation and rainwater management strategies, such as graywater and rainwater capture systems, green roofs, and water-permeable paving.
- Light-colored, reflective paving materials, and roof and grade-level vegetation.
- Drought tolerant plant and tree species.
- Efficient heating, ventilation, and air conditioning (HVAC) systems.
- A high-performance building envelope.
- Enhanced indoor air quality through the use of low-volatile organic compound emitting materials.

The development's urban location enables the project to earn LEED Location and Transportation credits associated with public transit, bike usage, and EV charging stations. The development will be easily accessible by several public transit options. A Transportation Demand Management (TDM) Program will be implemented to reduce single occupant vehicle trips and increase the trips taken by alternative modes of transportation including by walking, bicycle, carpool, and public transit.

Clean Tech Corridor LA CRA RFP[111]

Source: REthink Development

REthink partnered with the Bedford Group to compete for a Los Angeles Community Redevelopment Agency RFP to develop a clean tech campus to be located in Los Angeles's clean tech corridor. REthink assembled a design team of **Gensler** and the smaller creative firm of **Escher Gunewardena Architecture** to come up with two alternative approaches which included: 2 mega watts of solar power, an onsite biodigester, and bioswales and rainwater capture elements. Rethink has

[111] Rethink Development. "Clean Tech Corridor LA CRA RFP." [picture]. https://www.rethinkdev.com/projects-1/clean-tech-corridor-la-cra-rfp

received letters of interest in the project from a number of potential circular partners.

Walt Disney /ABC Studios at the Ranch, LA

Source: REthink Development[112]

Walt Disney/ABC Studios is planning to build a new studio located in Santa Clarita, a city in Los Angeles County north of Los Angeles. The project will feature a 58-acre, 510,000 square foot film and television studio within a section of Walt Disney's Golden Oak Ranch. Los Angeles County requires the studio development to achieve at least a LEED Silver certification. To attain LEED Silver certification, a project. LEED Certification ensures that a building was built or renovated with circularity in mind by considering sustainability features such as material and resource use, water and energy efficiency and indoor environmental quality. This upcoming development will provide an opportunity to circular companies that concentrate on the built environment. The start date and expected duration of development of the property is yet to be announced.

Abbot Kinney Hotel

REthink is leading the development of an 84-room hotel and mixed-use project in the commercial district on Abbot Kinney Blvd in Venice, CA. The redevelopment of the site is currently in the entitlement phase and will integrate lean design principles and a sustainable development approach that go beyond LEED. The hotel will be built repurposing and mixing materials.

Source: REthink Development[113]

[112] Rethink Development. "Walt Disney Studio LEED and Carbon Evaluation." [picture]. https://www.rethinkdev.com/projects-1/walt-disney-studio-leed-and-carbon-evaluation

[113] Rethink Development. "Abbot Kinney Hotel and Mixed-Use - Striving for LEED NC Platinum." [picture]. https://www.rethinkdev.com/projects-1/abbot-kinney-hotel-and-mixed-use-striving-for-leed-nc-platinum

Appendix E: A Concise Guide to Doing Business

Doing Business with Los Angeles County and Cities Within

This section of the report will provide Dutch companies with guidance on doing business with the County of Los Angeles. It will then provide guidance and general steps to doing business with the cities within the county that are reviewed in the report.

Los Angeles County

General Resources
Public Listings:

- LA County's List of Open Solicitations can be found at: https://camisvr.co.la.ca.us/LACoBids/BidLookUp/OpenBidList
- LA County Public Works' Business Opportunities: https://dpw.lacounty.gov/contracts/opportunities.aspx
- Los Angeles Business Assistance Virtual Network (LABAVN): https://labavn.force.com/LABAVN/s/
    - LABAVN Open Bid Opportunities are listed at: https://data.lacity.org/City-Infrastructure-Service-Requests/BAVN-Open-Bid-Opportunities/qtax-byj7

The first step in doing business with the County of Los Angeles begins with registering a company as a County Vendor. Vendor registration link: https://camisvr.co.la.ca.us/webven/

- Basic information needed for registration:
    - Taxpayer identification number and certification
    - Company/organization main contact name, phone, address
    - California Sales Tax Permit number, if applicable
    - A list of the types of Products and/or Services the company provides
- Vendor Self Service (VSS) Portal: allows Vendors to respond to solicitations online including access to previous solicitation responses; manage account information; view financial transactions and respond to solicitations online. VSS link: https://lacovss.lacounty.gov/webapp/VSSPSRV11/AltSelfService

Preference Programs

Special considerations are often made for companies that fall within certain classification categories. Below are some of the classification categories that will provide qualifying companies with additional consideration when doing business with LA County.

Local Small Business Enterprises (LSBEs) are eligible to receive a 15% bid price reduction or preference[114] when bidding on certain goods and services solicited by Los Angeles County.
Requirements:

- Be independently owned and operated
- Not be dominant in its field of operation
- Have its main office in Los Angeles County for at least the last 12 months
- Have owners (officers in the case of a corporation) who live in California
- With its affiliates, be either:
    - A business with 100 or fewer employees and an average annual gross receipt of $15 million or less over the last three years.
    - A manufacturer with 100 or fewer employees.

Social Enterprise (SEs) are also eligible to receive a 15% bid price reduction or 'preference' when bidding on certain goods and services solicitations from LA County.
Requirements:

- Has been in operation for at least one (1) year providing transitional jobs, including access to supportive services to a transitional workforce employing at least 51% of a transitional workforce
- Is certified as a B Corporation by B Labs or is incorporated as a Benefit or Social Purpose Corporation with the State of California
- Is certified Green by a city government located within Los Angeles County[115]
- A business whose primary purpose is the common good as demonstrated through a published mission statement and whose principal business activity is directly related to accomplishing that stated social mission.

Disabled Veteran Business Enterprises (DVBEs) can receive a 15% bid price reduction or 'preference' when bidding on certain goods and services solicitations from Los Angeles County.
To qualify, the business must be certified by one of the following departments:

- The U.S. Department of Veterans Affairs (VA): certifies a business as a Service Disabled Veteran Owned Small Business (SDVOSB).
- State of California, Department of General Services (DGS): certifies a business as a Disabled Veteran Business Enterprise (DVBE).

The **Community Business Enterprise (CBE) Program** is for listing minorities, women, disabled veterans, or disadvantaged businesses to be included on the County's CBE listing, where county departments, public agencies, private sector prime and subcontractors can find/hire business to meet subcontracting goals.
To qualify, business must be certified as any one of the following:

- Minority Business Enterprise (MBE)

[114] The actual preference is calculated on the cost or price component of the lowest most responsible and responsive bid amount. The bid price reduction cannot exceed $150,000. The 15% preference is used only to determine the lowest bidder or proposal and does not change the amount of contract award.

[115] For information on becoming a certified green business in Los Angeles: http://lacitysan.org/greenbusiness

- Women Business Enterprise (WBE)
- Disadvantaged Business Enterprise (DBE)
- Disabled Veteran Business Enterprise (DVBE)

This section will conclude by providing guidance and general steps to doing business with the cities within the county that are reviewed in the report.

City of Los Angeles[116][117]

Companies that would like to bid on contracts with the City of LA must first register for a Tax Registration Certificate (TRC). Companies that are exempt from the TRC must instead register for a Vendor Registration Number (VRN). Registered companies can join the City of LA's **Business Assistance Virtual Network (LABAVN)** system to find opportunities with the City of Los Angeles. The LABAVN posts all bids that are available within the city and publishes all contract awards and their details.

- The LABAVN website can be found at: https://uat.labavn.org/index.cfm?fuseaction=home.faq

In order to encourage local sourcing, the City of Los Angeles created the **Local Preference Ordinance**. The Local Preference Ordinance provides local LA businesses with an 8% competitive advantage on all city contracts. The Ordinance also requires government departments looking to purchase goods and services from businesses in LA County to consider their bid proposals at 8% below the submitted value for contracts that are selected based primarily on the lowest bid.[118]

In addition, the City of LA established the **Business Inclusion Program**, which is designed to encourage small business participation in government contracting. The program was designed to increase the participation of minority, women, small and disabled veteran businesses in city contracts. It includes 6 certification categories:

(1) Minority Business Enterprise (MBE),

(2) Women Business Enterprise (WBE),

(3) Small Business Enterprise (SBE),

[116] For more information see: https://bca.lacity.org/BIS-Program-and-Local-Business-Preference#:~:text=Business%20Inclusion%20Program.%20Based%20on%20the%20Mayor%27s%20Executive,Enterprise%20%28EBE%29%2C%20%285%29%20Disabled%20Veteran%20Business%20Enterprise%20

[117] *For more information see: https://www.bidnet.com/resources/business-insights/city-of-los-angeles-government-contracting-for-small-and-medium-sized-businesses-en.jsp*

[118] "Doing Business with the City of L.A." Mayor's Office of Economic and Workforce Development. losangelesworks.org. 2010. Web. 11 Dec. 2015

(4) Emerging Business Enterprise (EBE),

(5) Disabled Veteran Business Enterprise (DVBE), and

(6) Other Business Enterprise (OBE)

Finally, **Provisionally Qualified Local Business (PQLB)** may also participate in the Local Business Preference Program. In order to qualify as a PQLB, a business must:

- Have a proposed contract with the City of Los Angeles of at least $1,000,000 with a term of at least three years;
- Demonstrate that it is a party to a contract to occupy a commercial space within Los Angeles County with occupancy commencing no later than 60 days after the date on which the contract with the city is executed by submitting to the city a copy of a lease or deed;
- Before beginning performance under a contract with the city show proof of ability to satisfy one of the following requirements by submitting a business plan or other evidence to the city:
    - Have at least 60 of its full-time employees perform work within the county at least 60% of their total regular hours worked yearly;
    - Be headquartered in the county.

Long Beach[119]

The City of Long Beach purchases most of its materials, supplies, equipment and services through a centralized purchasing system managed by the City Purchasing Agent. Purchases are made through a competitive bidding process that is not subject to negotiations. City contract awards are made to the lowest bidder meeting the bid specifications.

The City of Long Beach seeks to provide significant opportunities for small, minority-owned, women-owned and local Long Beach business enterprises to compete successfully in supplying products and services for the city. The city does so through outreach, conducting business workshops, and contacting businesses through trade fairs and local, minority, and women business associations.

A bid from a Long Beach business for providing materials, equipment, supplies and non-professional services to the city will be reduced by 10%. The maximum preference under this provision is not to exceed $10,000 for any bid. A bidder must have a current, valid business license from the City of Long Beach showing a place of business within the city limits. In addition, a bidder must have a current, valid seller's permit (sales tax permit) showing a place of business within the City of Long Beach.

The city's Purchasing Division maintains a database of suppliers for all types of goods and services purchased by the city. Suppliers in the database have an increased probability of being notified of bids, although there is no guarantee that such a supplier will receive a bid notice. However,

[119] For more information see: https://www.longbeach.gov/finance/business-info/purchasing-division/doing-business-with-us/

registering with **BidsOneLine™** and regular visits to the website does provide participating companies with a current list of open bids.

- A current list of bids can be found at www.longbeach.gov/purchasing.

Prospective companies can register their businesses on the City of Long Beach Vendor Portal with **PlanetBids™**.

- PlanetBids™ Portal: https://www.planetbids.com/portal/portal.cfm?CompanyID=15810.

PlanetBids™ is a web-based bid management system that facilitates business with the city. Some benefits of registering a company on PlanetBids™ include the ability to:

- Maintain a company profile as a new or existing bidder.
- Receive automatic email notifications for selected bid opportunities based on product/service types.
- Receive automatic addendum notifications as a bid participant.
- Register the business through the City of Long Beach Vendor Portal with PlanetBids™

All companies doing business with the City of Long Beach must have a business license in Long Beach.

- Long Beach Business License: https://www.longbeach.gov/finance/business-license/.

More information on the City's purchasing procedures, policies and personnel can be found at www.longbeach.gov/purchasing.

Culver City[120]

Culver City's Purchasing Division is responsible for the procurement of goods and services for all city departments, divisions, and offices.

In order for a company to participate in providing the goods and services to Culver City a business should:

1) Register through Culver City's Vendor Portal with **PlanetBids™** to receive email notifications for selected opportunities based on product or service types.
2) Review current RFPs and bids. A company should regularly visit the Culver City RFP/Bid webpage to obtain a current list of RFPs and bids:
    - The Culver City RFP/Bid webpage can be found at: https://www.planetbids.com/portal/portal.cfm?CompanyID=39483&access
3) Keep in contact with Culver City's Purchasing Office Staff who can explain the city's purchasing policies and procedures and help to add a business to the city's bid notification system.
    - Email: purchasing@culvercity.org
    - Phone: (310) 253-6550

[120] For more information see: https://www.culvercity.org/Services/Business-Resources/Become-a-City-Vendor

Santa Monica[121][122]

The City of Santa Monica seeks vendors to provide goods and services to the city. The city's **Bidding Thresholds** website includes a definition of each type and the dollar amounts determining when Council's approval is required.

- Building Thresholds website: https://finance.smgov.net/doing-business/procurement/competitive-bidding-thresholds.

The City of Santa Monica's commitment to the highest ethical standards in procurement is outlined in its **Procurement Code of Ethics.**

- Procurement Code of Ethics: https://finance.smgov.net/Media/Default/doing-business/with-santa-monica/ProcurementCodeOfEthics.pdf.

The City of Santa Monica contracts with **ProcureNow** to manage its purchasing process. **ProcureNow** registration is a prospective company's first step to participating in City of Santa Monica bid opportunities.

- Prospective companies should register with **ProcureNow** at https://secure.procurenow.com/portal/santa-monica-ca.

The **ProcureNow** site also allows companies and the public to view a general description of bid opportunities, prospective bidders, and award information without registering.

Prospective companies must **register** as a vendor and activate a **ProcureNow** account for the following:

- To download private bid information package documents
- Submit a question
- Acknowledge addenda
- Submit a bid electronically
- Receive email notifications about bid opportunities.

After registering with **ProcureNow** the following steps should be taken by a prospective company to submit a bid or proposal to the City of Santa Monica.

1) Identify Required Documents

The city requires certain documentation depending on the type and/or dollar amount of contract or proposal.

[121] For more information see: https://www.smgov.net/Departments/PublicWorks/ContentCivEng.aspx?id=8729

[122] For more information see: https://finance.smgov.net/doing-business/procurement/overview

- Information regarding these forms of documentation can be found at https://finance.smgov.net/doing-business/procurement/vendor-forms.

2) Submit a Bid

Each bidding package provides information on how and where to submit a bid. A prospective company should check these details, and make sure to allow sufficient time for delivery. A prospective company can call or email the city contact listed on the bid information package to verify that the city has received a bid before the deadline.

3) Award Process

The city will then review all submissions according to the process described for each bid/proposal. The contract will be awarded to the Best Bidder (for goods or contractual services) or Best Qualified Person or Firm (for professional services). The lowest bidder may or may not receive the contract award.

The final approval processes depend on the type of service being bid on (professional services or goods/contractual services) and on the dollar amount of the contract. City staff has the ability to award an **informal** bid or proposal without City Council approval. This means that the process may move more quickly as staff can execute the contract with the approval of the City Manager.
A formal bid or proposal requires City Council approval. Staff will prepare a report recommending the award which will move forward after the Council's approval.

At any time during the process, a prospective company can contact the **Procurement Division** with questions:

- Procurement Division
  Phone: (310) 458-8241
  Email: Procurement@smgov.net

To inquire about a Public Works project, a prospective company should reach out directly to the division bidding the project (as specified on the Notice Inviting Bids page of the Request for Bids).

- Engineering & Street Services Division
  1685 Main Street, Mail Stop 15
  Santa Monica, CA 90401
  sm.engineering@santamonica.gov

  (310) 458-8721

- Architecture Services Division
  1437 4th Street, Suite 300
  Santa Monica, CA 90401
  architecture@santamonica.gov

  (310) 458-2205

- Water Resources Division
  1212 5th Street, 3rd Floor

Santa Monica, CA 90401
thomas.poon@santamonica.gov

(310) 458-8975

Closing Remarks

While there is no public service that aggregates all Request for Proposal (RFP)/Request for Information (RFI) opportunities to be pushed regularly, there are private services that do so that companies can subscribe to. One such service is called Integrated Marketing Systems (IMS): https://www.imsinfo.com/. IMS offers advance notice of RFP/Request for Quote (RFQ) leads and bid opportunities in the public sector in one central location.

In most cases, it is not a requirement that a company be registered locally where a bid is being submitted. However, there is always a chance that local presence by a company may play an informal role in the selection process. It is important that relationships with a government authority or agency are established before submitting large project bids. While not a formal requirement for selection, relationships increase the probability of success. Furthermore, having local knowledge of the communities that a company wishes to serve will increase the chances of a successful bid. In addition, knowledge of the community being served will increase the quality of service provided, further creating opportunities to do business in that community in the future.

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