



# The Greening of the Los Angeles Economy

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# The Greening of the Los Angeles Economy

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# Abstract

The *Greening of the Los Angeles County Economy* report, commissioned in 2008 by the U.S. Economic Development Administration and conducted by the LAEDC, examines the Los Angeles region's \$500 billion economy with the goal of evaluating the challenges and opportunities that arise from greening the economy.

The focus on Los Angeles County includes an analysis of the region's overall greening potential to determine those areas where job creation is most promising and where a leadership position by the county business community is immediately visible.

Aimed at recommendations to protect the environment while preserving or improving the economy, the report identifies the potential for Los Angeles-based firms to serve the domestic market for green products and services and examines the possibility of creating new green-oriented industries. The report's recommendations are categorized into three key areas: green businesses and green jobs, business assistance, and the regulatory environment.





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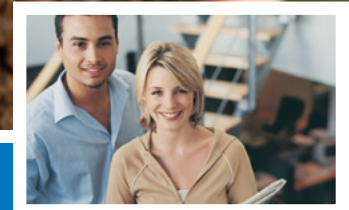
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## Executive Summary



When discussing the “Greening” of the Los Angeles County economy, we must first ask: “What does it mean to go green?” Going “green” is the process of adopting (more) sustainable practices and products that use resources in the most efficient manner possible, resulting in lower resource consumption, fewer emissions, and less waste. In general, greening the economy requires individuals and businesses to consider the long-term consequences of their actions. For our purposes, “green” is divided into two main categories: cleaning the environment and using resources more sustainably.

### **We expect Los Angeles County to be at the forefront of the greening of the global economy for several reasons.**

- With a population of more than 10 million, Los Angeles County presents a large market for green goods and services and, by itself, can create enough demand to influence greening trends.
- The L.A. region’s general prosperity means that it is better positioned than many emerging economies to afford the often more expensive up-front costs associated with greening.
- The state of California places a high priority on “greening” relative to other regions. Several pieces of legislation, executive orders, and administrative rules from the past five years convey the State’s commitment to greening the economy (e.g., Assembly Bill 32, Senate Bill 375, Renewables Portfolio Standard, etc.).
- There is a broad commitment to green policies in the state as Californians have consistently supported efforts to clean up and protect the environment. Likewise, business leaders have typically shared those commitments and/or pursued greening for the potential cost savings.
- Key public and private sector leaders have identified the greening of the economy as a source of current and future employment.
- The breadth of Los Angeles County’s economy and its established role as an international trade hub ensures that just about every developing green trend will be relevant here.

By virtue of the diversity and size of its economy alone, Los Angeles County will be one of the largest markets in the world for green products, technologies, and services. In this report, we focus on the implications for the \$500 billion economy in Los Angeles County and the challenges and opportunities that will arise from its greening. Specifically, this report provides an overview of each of Los Angeles County’s key export-oriented and populating-serving industry clusters (24 in all), including examples of regulations that impact cluster-specific businesses and other entities as well as best practices that offer additional opportunities to “green” each cluster. Rather than measuring green jobs, we focus on describing the scale of potential market opportunities.



## Greening Los Angeles County's Existing Industry Clusters

In this report, we look at the impact on Los Angeles County's existing firms. We discuss the effect of greening on the region's 15 export-oriented industry clusters and nine population-serving industry clusters. Within each cluster section, we provide an overview of the industry cluster's status in the L.A. County economy, including a forecast of the cluster's employment growth; an analysis on the cluster's potential vulnerability to green-related cost increases; specific examples of regulations that are driving its greening; and examples of green practices adopted by firms within that cluster.

### ► Export-Oriented Industry Clusters

- Automotive Manufacturing and Wholesaling
- Entertainment
- Fashion Design, Manufacturing and Wholesaling
- Financial Services
- Food Products Manufacturing and Wholesaling
- Furniture and Home Furnishings
- Goods Movement
- Health Services and Biomedical
- Higher Education
- Jewelry Manufacturing and Wholesaling
- Materials and Machinery
- Professional and Business Services
- Technology
- Tourism and Hospitality
- Wholesale Trade and Logistics

### ► Population-Serving Clusters

- Construction
- Food and Beverages
- Government
- Membership Organizations and Associations
- Real Estate
- Repair and Maintenance
- Retail
- Utilities
- Waste Management

## Recommendations

The final section of the report contains our conclusion and recommendations for private, public, and nonprofit sectors, which are based on extensive research, including interviews with businesses in various industry sectors and responses to our survey gauging the impact of greening. The recommendations focus on the dual purpose of California's greening efforts to protect the environment and preserve (or improve) the economy. In brief, our recommendations for *Greening the L.A. Economy* are as follows:

### ► Attracting, Growing, and Retaining Green Businesses and Green Jobs

- Implement the 52 recommendations outlined in the *Los Angeles County Strategic Plan for Economic Development* as a first step for both job attraction and retention.
- Act quickly to take advantage of California's first-mover status within the United States.
- Adopt bold policies (focusing on incentives versus mandates) that signal a serious intent to attract green businesses.
- Position the region as a center for the green economy.
- Play to the region's strengths.
- Be cautious with green-related training programs and ensure they are carefully matched with demand.

### ► Assisting Existing Businesses

- Expand efforts to help firms seeking to adopt green practices.
- Provide multiple financing mechanisms for those willing to adopt green practices.

### ► Creating a Better Regulatory Environment

- Aim for regulatory certainty, clarity, simplicity, and flexibility.
- Implement green regulations with the twin goals of creating a healthy environment and a vibrant economy.
- Explore ways to allow global emissions reductions to offset local emissions.
- Rely on markets—not unfunded mandates—to the fullest extent possible when developing regulations.
- City governments and the County should adopt policies that encourage early implementation of cost-effective green measures.
- Ensure that regulations are not working at cross purposes.





### Conclusion

The largest impact of greening the Los Angeles County economy, measured by the number of businesses and jobs affected, will come from existing firms in multiple industry clusters adapting to regulatory requirements; higher costs for transportation and power; and new market opportunities. The job impact will not necessarily be high, since all major industry clusters in Los Angeles can adopt cost-effective greening practices that have been successfully adopted by similar firms and organizations.

It is important to keep in mind that the greening of the Los Angeles County economy will not be a panacea for high unemployment. The combination of state and local green regulations and the size of the local economy will create an enormous market for firms producing green-related goods and services, but this does not guarantee that the region will be a great place to produce those goods and services. Attracting firms that can serve the L.A. market from outside the area will be challenging; and intense global competition will make it harder still to develop a new export-oriented industry cluster based on green products and services.

This report should serve as a tool to aid public officials and local, regional, and state policymakers in decision-making regarding the greening of our economy. Government regulation remains one of the key drivers of greening efforts, so elected officials and regulators must keep in mind the positive and negative impacts that the regulatory environment can have on our local businesses. Moving forward, regulations must serve the joint goals of minimizing costs and maximizing environmental and economic co-benefits.



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## Section I – Introduction

### The Greening of the L.A. Economy

Thanks in part to the strong environmental tradition in the Los Angeles region, California has led the nation on environmental protection. In 1947, the first Air Pollution Control District in the United States was established in Los Angeles—long before the national environmental movement took place. Twenty years later, following the Santa Barbara oil spill in 1969, the California Air Resources Board was formed to address air quality and create industry standards throughout the Golden State. Both of these events demonstrated the region's and the State's commitment to protecting the environment. Since then, California has enacted rules and regulations covering everything from stringent standards for vehicle emissions to public notice requirements for toxic chemicals. The results are reflected in per capita electricity consumption: consumption in California is among the lowest in the country and has remained roughly flat since 1980 while the national average has risen by about 40 percent. The improvements are visible in Los Angeles, where the air quality is significantly better than it was in the 1970s despite the addition of several million more vehicles.

In 2006, California Governor Arnold Schwarzenegger signed into law Assembly Bill (AB) 32, which requires a series of measures targeting an overall reduction in greenhouse gas emissions to 1990 levels by the year 2020, with an additional reduction to 80 percent below 1990 levels by 2050.

AB 32 is joined by a variety of state and local measures, such as the adoption of green building codes, the passage of low impact development ordinances, and the promotion of drought-resistant landscaping. Among the most prominent are Senate Bill (SB) 375, California's Renewable Portfolio Standard (RPS), and the Clean Air Action Plan (CAAP) at the San Pedro Bay Ports—the

nation's largest port complex. SB 375 seeks to lower emissions by reducing vehicle miles traveled through land use policy. RPS requires utilities to reach a minimum share of their power from renewable resources. (Recently, RPS was updated to include municipal utilities in addition to investor-owned utilities.) The Ports of Los Angeles and Long Beach, collectively the San Pedro Ports, have through CAAP embarked on multibillion dollar programs aimed at reducing diesel particulate matter and other harmful emissions from port-related activity.

These laws, regulations, and programs serve as both the backdrop and motivation for a green revolution that promises to transform the economy—creating some new industries, hurting others, and at least touching the operations of all the rest.

Here, we focus on the implications for the \$500 billion economy in Los Angeles County and the challenges and opportunities that will arise from its greening. In the rest of this introduction, we discuss our definitions, our approach to the study, and the driving forces behind the greening of Los Angeles County's economy.

In the second section, with what we believe to be the most important implications of greening, we examine the impact on Los Angeles County's existing firms and approximately four million employees. We consider, in turn, the 15 export-oriented industry clusters that are key drivers of the county's economy, as well as the nine population-serving industry clusters that are significant sources of employment or that will be greatly affected by greening. Overlap exists, as some of the most promising green market opportunities fall within these industry clusters.

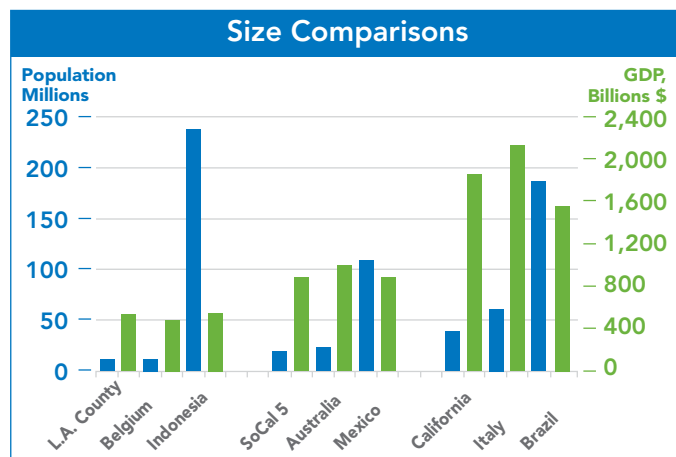
We conclude the report with recommendations for elected and public officials and regulators.



### Why L.A.?

We expect Los Angeles County to be at the forefront of the greening of the global economy for several reasons. First, with a population exceeding 18.6 million, the Southern California region presents a large market for green goods and services and, by itself, can create enough demand to influence greening trends.

Second, the region's prosperity means that it is better positioned than many emerging economies to afford the often expensive up-front costs associated with greening. For example, the five-county region of Los Angeles, Orange, Riverside, San Bernardino, and Ventura had an economy slightly larger than Mexico's and almost as large as Australia's.



Also, another indicator of the size of the economy is provided by the Bureau of Labor Statistics Consumer Expenditure Survey, 2008-2009, which reveals that the Los Angeles Metropolitan Statistical Area contains 5.1 million households with an average before-tax income of \$68,749.

Additionally, spending measured by taxable sales is considerable. In 2009, the California Board of Equalization reports taxable sales of \$112.7 billion in Los Angeles County; \$214.2 billion in five-county Southern California region; and \$456.5 billion statewide in 2009. The next figure breaks out the share of this spending in four sectors that will be affected by green trends toward greater efficiency: household appliances and electronics, building materials, motor vehicles, and office supplies. Redirecting even a small slice of these transactions toward greener products would generate a market worth billions of dollars annually.

### Taxable Sales by Type of Business, 2008

	L.A. County (\$ millions)	SoCal 5 (\$ millions)	CA (\$ millions)
Appliance, TV and other Electronics Stores	2,213	4,008	8,197
Building Materials	5,999	10,072	21,762
New Car Dealers	8,163	15,948	31,906
Office Supplies, and Station/Computer Software Stores	2,101	4,670	8,982

Source: boe.ca.gov

Third, the state of California places a high priority on greening relative to other regions. Even a partial list of legislation and executive orders from the past five years conveys the government's commitment to greening the economy: The California Global Warming Solutions Act of 2006 (AB 32), Million Solar Roofs initiative (SB 1) (2006), the Solar Water Heating and Efficiency Act of 2007 (SB 1470), the Electricity Greenhouse Gas Performance Standard (SB 1368) (2006), Alternative Fuels and Vehicles Technologies (AB 118) (2007), the Waste Heat and Carbon Emissions Reductions Act (AB 1613) (2007), the Comprehensive Energy Efficiency Program for Existing Residential and Nonresidential Buildings (AB 758) (2009), and Renewables Portfolio Standard (SBX1 2) (2011). Local governments in L.A. County have added their own targets for renewable power generated by municipal utilities, reductions in port-related emissions, green building codes, and other initiatives encouraging or mandating sustainability and a cleaner environment.

Overall, government policies encouraging or mandating greening will shift at least some of the spending power sustained by the local, regional, and state economies into new markets for green-related goods and services.

Fourth, the government action reflects a broad commitment to green policies in the state. Ordinary Californians have consistently supported efforts to clean up and protect the environment. Based on responses to our own survey and comments made in our focus groups, business leaders share these concerns. Many businesses are also interested in pursuing green for the potential cost savings. And people in both the public and private sectors are looking to the greening of the economy as a potential source of employment.

Finally, the breadth of Los Angeles County's economy, led by its 15 export-oriented industry clusters and its established role as an international trade hub, ensure that just about every developing green trend will be relevant here.



### The Meaning of “Green”

Going “green” is the process of adopting (more) sustainable practices and products that use resources in the most efficient manner possible, resulting in lower resource consumption, fewer emissions, and less waste.

In general, greening the economy requires individuals to consider the long-term consequences of their actions. For our purposes, “green” relates to two things: cleaning the environment and using resources more sustainably. Clean technologies and practices reduce or reverse our impact on the environment, while sustainable practices involve using resources more efficiently. These two goals are intertwined and many green projects and practices address these twin goals.

Cleaning efforts reduce the pollutants and waste products that we introduce into the environment. One goal of cleaning is to rein in greenhouse gas (GHG) emissions that cause the atmosphere to retain more of the sun’s heat, including carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), chlorofluorocarbons (CFCs), and hydrofluorocarbons (HFCs). Another goal of cleaning the atmosphere is to control chemicals that have non-warming, negative effects. Diesel particulate matter (PM) is a contributor to smog and its inhalation has been linked to health problems such as breathing difficulties, cardiovascular disease, and lung cancer. Nitrogen oxides (NO<sub>x</sub>) and sulfur oxides (SO<sub>x</sub>) are other pollutants that reduce air quality, act as greenhouse gases, and also contribute to smog and acid rain. Solid waste (garbage) is also a problem as landfills can leach harmful chemicals into the soil and groundwater, and decaying organic waste is a major source of methane emissions. Solid waste, particularly plastics, also accumulates in “garbage patches” in the oceans.

Cleaning the environment of these pollutants and waste products can occur in several ways. Emissions can be reduced outright, or they can be emitted and then dealt with or offset later. One way of reducing emissions is to make engines and facilities more eco-friendly; for example, a more efficient car uses less gas per trip and thus emits less CO<sub>2</sub>. Emissions can also be reduced by extending the life cycle of goods; for example, if cars last longer, then fewer cars must be manufactured, the factory produces less waste, and fewer old cars enter the junkyard. Dealing with emissions after-the-fact can be done by capturing them on-site, as with catalytic converters or industrial scrubbers, or by purchasing carbon offsets. Solid waste can be reduced in several ways as well. Using fewer disposable products and packaging would cause less trash to be produced

and recycling can sort waste for remanufacturing, reprocessing, and reuse. The nature of waste can also be changed to have a smaller impact; for example, using biodegradable materials instead of petrochemical-based plastics reduces the amount of problematic waste.

Sustainability is the other problem to be tackled by greening. Currently, the majority of the world’s energy comes from non-renewable fossil fuels, the combustion of which contributes to greenhouse gases. Other key natural resources are currently consumed beyond our ability to renew them. In many resource industries, such as logging, farming, fishing, and mining, production cannot continue at its current level indefinitely.

If the sustainability of these natural resources is not addressed, then eventually they will be exhausted. With respect to natural resources, greening refers to either replacing what we use or using more efficiently what we have. Resources can also be recaptured from recycled waste. Renewable natural resources can be used “greenly” by allowing natural stocks to replenish.

The greening of our energy supply involves harnessing renewable electricity from sources such as solar, wind, hydroelectric, geothermal, and biofuel technologies. It also involves wasting less energy; this can be as complicated as installing smart grid systems or as simple as turning the lights off when leaving a room or replacing energy-inefficient household appliances.

Of course, there are also powerful barriers and economic incentives working against the shift to a cleaner, more sustainable economy. For example, using products with longer life cycles may be good for the environment, but it is not always an obvious win for firms. Upgrading equipment may be viewed as an unaffordable investment, particularly if the more efficient or cleaner equipment is more expensive than that which is currently in use.

Greener inputs, such as sustainably harvested wood products and less toxic chemicals may have a host of real or perceived shortcomings, including higher cost, unproven performance, uncertain supply, and incompatibility with existing regulations or certifications. Low carbon alternatives for some products are not yet available, notably aviation fuel and cement. Many technologies, such as carbon capture and sequestration remain unproven (and possibly uneconomical) at scale. And as long as there is little-to-no cost to negative externalities such as carbon emissions, polluting often makes good business sense. Firms rightly fear being penalized for doing the right thing if it means they are subject to higher costs than their competitors.

*Going “green” is the process of adopting (more) sustainable practices and products that use resources in the most efficient manner possible, resulting in lower resource consumption, fewer emissions, and less waste.*





### The Difficulty of Measuring Green Jobs

Defining the meaning of green is relatively straightforward, yet there is little agreement on what constitutes a “green job.” The question of methodology—identifying green jobs and green businesses—poses the largest problem in measuring the green economy.<sup>1</sup>

Consider, for example, a facility manufacturing a green product such as wind turbines. Should all of the jobs at the facility be counted as green ones, including the janitors, accountants and administrative assistants? Or should just the workers on the factory floor be counted? The issue becomes more complicated if the wind turbine operation is part of a larger company primarily engaged in another activity that is not unambiguously green. Just counting the employment in the wind turbine division is one possible solution, but it leaves open the treatment of shared resources, such as human resources and marketing departments.

Focusing on occupations does not necessarily solve the problem either, since a job can also be partially related to green activities. For example, a roofer might learn new skills to install solar panels for some jobs but may also continue taking regular roofing jobs.

It is impossible to precisely forecast the number of jobs that will be created by greening the economy. Many discussions of greening do not even attempt to address measurement. As pointed out by San Mateo-based Collaborative Economics, “more often than not, green products and practices are contained in the same industry categories as conventional products and practices,” which “precludes an economic analysis based primarily on tracking business and employment growth by industry code.”<sup>2</sup> Collaborative Economics chose to “impute”<sup>3</sup> values based on their own modeling of North American Industry Classification System (NAICS) codes. Another report makes similar estimates based on NAICS codes and use of input-output modeling.<sup>4</sup>

We chose a different tactic. Rather than measuring green jobs in this report, we focus on describing the scale of potential market opportunities.

### There is More to Green than Electric Cars and Solar Panels

Greening the economy will be marked by two trends: the emergence of new industries and the transformation of existing ones. Both trends are illuminated by comparisons with the information technology (IT) revolution.

Greening efforts will be driven by new green technologies, processes, products, and services (taken together, “new products”). These new products will be developed and sold by green startups or new branches of existing companies. These businesses may meet demand induced by government regulation and market forces around the world. Firms marketing new products globally can drive export growth. Finally, green firms may benefit from locating near one another in clusters in order to synergize their labor pools, attract suppliers, leverage the services of support clusters (e.g., lawyers and accountants), and exchange ideas.

Just as the IT boom of the past 30 years has seen the rise of world leading hardware and software firms such as Microsoft, Apple, Intel, Dell, and Cisco—followed by the emergence of internet powerhouses such as Amazon, Google, and Facebook—many observers anticipate a similar process wherein clean technology giants emerge from the green revolution, along with clusters of firms in new industries.

The employment and growth potential of such firms has sparked interest from policymakers, who hope to create the green equivalent of Silicon Valley, and venture capitalists who seek the profitable investments that may arise. Regions are competing to form new green clusters based on supportive policy for startups, tax breaks, nearby academia, a strong financial community, and access to a qualified labor force. A few regions around the world may capture a first-mover advantage by developing strong green technology clusters immediately.<sup>5</sup> These cities might then become hubs for the green economy and would profit from export growth, new jobs, construction, and tax revenues.

The second key trend of the green revolution will be its impact on existing businesses across industries. For most firms outside the energy sector, greening will revolve around integrating green practices and green products into their current business plans. For example, workers will be trained to use green methods and tools, but they will mostly continue to do what they did before. Utilities across the nation will provide their existing services more efficiently. And each individual will make personal decisions such as using public transportation or installing new insulation at home. These collective efforts represent some of the best ways to reduce emissions and conserve resources.

The IT analogy is again illustrative for describing the expected adoption of green products and behavior. As computers and other electronics have moved into every home and office, workers have been trained in their use and buildings have been built or retrofitted to accommodate them. Green practices will be similarly widespread.



The comparison to a disruptive technology, such as IT, also suggests an important corollary: some firms, particularly those that rely heavily on fossil fuels and have a large carbon footprint, may be in for an experience similar to that of typewriter manufacturers, travel agents, encyclopedia publishers, and newspaper businesses if they do not adapt.

However, there are also upsides to disruptive innovation. For example, a boom in residential solar panels could be very profitable for roofers and electricians who install them.

### What's Driving Green?

There appear to be four motivations driving organizations to adopt green practices: compliance with government regulations, anticipated cost savings, possible market opportunities, and concern based on moral or public relations imperatives.

#### ► Government Regulation

Government regulation is one of the primary drivers of green practices because it carries the weight of law. Some regulations have more motivating power than others; those with legal consequences can force action, while those that are merely recommendations may be disregarded unless there is some other driving motivation to comply. A drawback of regulation as a source of motivation is that it typically implies compelled action (in contrast to the other three motivators in which an organization *wants* to adopt the green practices). Anyone required to carry out a course of action they are uninterested in will typically consider all possible alternatives. This might extend to non-compliance if the penalty is a fine that is smaller than the cost of taking environmental action. Cost calculations will include initial investments, other transition costs, and ongoing operating costs related to compliance. Other responses might include moving to a location with less strict regulation, outsourcing the regulated activity, discontinuing the regulated product line, or closing shop entirely.

#### ► Cost Savings

Saving money is a powerful motivator and many businesses have embraced green practices primarily to cut costs. In order to take advantage of cost savings, firms must first be aware of the amount of money they stand to save. To this end, energy efficiency auditors and the power utilities are offering programs to spread awareness of the savings that many firms may be overlooking.

Cost savings need to be attainable, sufficiently large, and collectible in order to act as a motivator. The primary barrier for most green strategies is the size of the initial investment. Even

if a green strategy may save money in the long run, companies must be willing and able to invest capital in the project at the outset. This can be partially addressed via incentives in the form of subsidies from the government and utilities, or with loans from banks looking to expand their lending.

The amount of future savings must be sufficiently large and certain to justify initial spending. The certainty of a savings stream can be questioned in several ways: will changes in regulation or technology render the investment obsolete? Will the upgrades fail to perform as expected? Will the new process require a change in reliable business operations and possibly entail employee training? Even if an opportunity to save money satisfies the above concerns, it must also be collectible. Many environmental decisions lie in the hands of renters to make, but the savings would accrue to their landlords. In such cases, there is no savings incentive for the renter.

Finally, as with any investment, a cost savings strategy is subject to a discount rate for financial planning purposes. This rate could be high if the savings are variable or difficult to predict. Furthermore, a business must be around to collect future savings. Firms that are struggling to survive cannot be sure they will realize a savings stream which pays out over the course of several years; therefore, the motivating power of potential savings will be commensurately lower for such firms.

#### ► Market Opportunities

Making money is also a powerful motivator. Some businesses will be presented with new market opportunities because of greening. A firm may introduce a green line of products or services in response to market demand (e.g., installing efficient building insulation) or to government incentives (e.g., subsidies for solar panels or hybrid cars). When considering a green market opportunity, businesses will estimate the size of the potential market, degree of competition in the market, and the availability, quality, and cost of substitute products. Firms must also consider whether a local presence is needed to serve the market and whether competition could come from overseas. In other words, could they locate in a more business friendly region and still serve Southern California? While Los Angeles would benefit from greater access to green goods and services, the region would especially benefit from additional employment if new firms were to locate here.

#### ► "Right Thing to Do"

When we asked organizations to explain why they had adopted green practices, a surprising number of firms said their primary or sole motivation was that it was the right thing to do. Many of these firms are undoubtedly sincere, though they may also



be motivated by a desire to project a positive public image. Consumers may reward green firms with their business and avoid firms that neglect the environment.

Moral and public relations motivations are more likely to lead to action if they are paired with one or more of the other motivators. Ultimately, the level of genuine concern for the environment is much less important than the end result; a CEO does not have to believe passionately in environmental causes to find greening worthwhile.

### ► The Dynamics of Greening

As businesses transform their products and processes in response to the motivating factors that drive greening initiatives, new, and perhaps unanticipated, opportunities and roadblocks will emerge. We are aware that the innovative and inventive responses of businesses will yield scenarios that lie outside the scope of this report. For example, the pioneering spirit and visionary entrepreneurship that gave us the original electric vehicle over a hundred years ago will now produce solutions to some of our most complex and compelling issues, such as greenhouse gas emissions. Given the dynamic nature of greening, this report serves as a snapshot in time and reflects conditions prevailing at the time of research. We intend to further explore and monitor advances as they unfold, in particular in those industry clusters which are at the leading edge of innovation and evolution, as we pursue our understanding and comprehension of the greening revolution.

## Report Layout

### ► Section II – Industry Clusters

In addition to creating some new, exclusively green jobs, greening will permeate the entire economy. By virtue of numbers, the most significant effects of greening will take place in existing industries. Given this, in the Industry Clusters section of the report, we begin with a review of each industry cluster's position in the Los Angeles County economy. In this review, we assess the prospects for each cluster's employment growth based on the cluster's relative size, its expected rate of growth, its prospects for the future in the face of greening, and the expected growth of individual industries within the cluster. Thereafter, we discuss general green practices adopted by firms choosing to green their operations that have broad applicability

across industry clusters, as well as cluster-specific best practices that offer additional opportunities for "greening." Finally, we supply examples of regulations that are likely to impact cluster-specific businesses and other entities.

### ► Section III – Conclusion

The final section of the report contains our conclusion and sets forth recommendations for public officials based on extensive research, including interviews with businesses and the government based on extensive research, including interviews with businesses in a variety of industry sectors and responses to our survey gauging the impact of greening. The recommendations focus on the dual purpose of California's greening efforts—to protect the environment while preserving or improving the economy.

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<sup>2</sup>Henton, Doug, Melville, John, Grose, Tracey, & Maor, Gabrielle. "Clean Technology and the Green Economy." California Economic Strategy Panel; Collaborative Economics. Mar. 2008. Pg. 7.

<sup>3</sup>Ibid. Pg. 16.

<sup>4</sup>Pollin, Robert, Heintz, James, & Garrett-Peltier, Heidi. "The Economic Benefits of Investing in Clean Energy." University of Massachusetts, Amherst Political Economy Research Institute. June 2009.

<sup>5</sup>Ong, Paul M., & Patraporn, Rita Varisa. "The Economic Development Potential of the Green Sector." UC Los Angeles: The Ralph and Goldy Lewis Center for Regional Policy Studies. 2006. Pg. 19.

## Section II – Industry Clusters



## Section II – Industry Clusters

### Choosing to Go Green

In this section of the report, we discuss general strategies for reducing energy consumption and using resources more efficiently. Not all of the strategies will apply to all industries, or even to all firms within an industry. The strategies do, however, represent actual steps that have been implemented across multiple industries by firms locally, statewide, or globally. As such, many of the measures described here can be applied by any business, regardless of industry, firm size, or location. Industry-specific strategies, and examples of firms that have applied these general strategies, can be found in the cluster sections that follow.

#### ► Planning, Measurement, & Reporting

Planning, tracking progress, and evaluating results are standard procedures for any mission critical business process or unit. The importance of these activities is heightened by the need to integrate and coordinate companywide greening efforts, particularly across multiple units or locations. Most importantly, planning is critical because there is typically not enough information to recommend one-size-fits-all green practices. Upgrading to more energy-efficient refrigerators, for example, may be cost-effective, but the potential savings vary depending on a firm's refrigeration needs and the relative (in)efficiency of the refrigerators being replaced.

#### Planning

Many of the firms that have successfully implemented green measures seem to have transitioned from treating greening as “something else we do” to making sure “everything we do is green.” Components of the planning process include: defining motives for greening; establishing goals; evaluating possible steps and timelines; and deciding how to measure and report progress.

Large firms have an advantage because dedicating the same percentage of revenues to greening goes so much further. One U.S. bank with more than 100,000 employees nationwide has 40 teams dedicated to developing and rolling out green practices—meaning it has more green teams than many L.A. firms have employees. Firms with multiple locations can also experiment with various greening strategies at one site before rolling out the most promising ones firm-wide.

Smaller firms may have to rely more heavily on copying practices that other firms have already successfully implemented. (Originality is not a prerequisite for greening; following the leaders saves on research, planning, and testing costs while offering similar savings.) The strategies described here and in the industry sections were collected from government agencies, utilities, industry associations, and directly from the firms that implemented them. Many of these sources offer additional information and, in the case of utilities, assistance for firms seeking to go green.





### Measurement

Measuring and tracking a firm's consumption of energy, water, and other important resources, as well as its emissions and its generation of waste, can make it easier to identify profitable and effective green strategies. It also creates a baseline against which goals and improvement options can be developed and evaluated.

The most comprehensive metric for tracking greening (and the yardstick for AB 32) is emissions of carbon dioxide (CO<sub>2</sub>) and other gases with a high global warming potential (such as methane), measured in tons of carbon dioxide equivalent (CO<sub>2</sub>e). A particular firm's emissions can be separated into three categories, based on their source: Scope 1 emissions, which are produced by the company directly (e.g., by company-owned vehicles); Scope 2 emissions, which are those produced by the generation of electricity consumed by the company; and Scope 3 emissions, which are indirectly attributable to the company (e.g., by the vehicles of the company's suppliers).

Measuring all Scope 1 emissions is not yet required in most industries, though some industries are affected by rules governing particular gases, such as nitrogen oxides emissions. A comprehensive Scope 1 assessment may require dedicated personnel or the help of a consultant, depending on the industry, scale, and complexity of a firm's operations, and provides an accurate picture of which areas might offer the largest potential for emissions reductions. Scope 2 emissions can be more easily estimated based on information provided by one's utility. Scope 3 emissions are extremely difficult to measure and few firms even make the attempt, yet it may suggest an avenue for reducing emissions for firms whose direct emissions offer little opportunity for reduction (such as cement production). Measuring all three types of emissions will become much more common if there is a specific cost associated with a unit of emissions, as in a cap-and-trade system.

Emissions measurement as a prelude to reductions is important for the environment and for regulators charged with protecting it. Yet, a comparatively simple accounting of resources consumed can serve as an effective proxy for emissions. Measuring resource consumption provides a clear link to expenditures and thus potential savings. Moreover, examining a firm's resource consumption may include the environmental impact of items not necessarily associated with direct emissions, such as the consumption of water, wood products, and chemical cleaning agents.

Businesses can also measure their environmental impact by tracking their waste products, including the weight or volume of trash; recyclable goods such as paper, plastics, metals, and biomass; and hazardous or toxic materials that may require special disposal.

Measuring the emissions and resource consumption can aid in setting benchmarks to chart progress, identify targets, and tally savings. Most firms set benchmarks based on their own historic performance; some substitute (or add) benchmarks based on firm size or industry averages. The more rigorous the quantification of greening efforts, the more useful they will be for internal planning for future reductions and the more credible the results will be when shared.

### Reporting

Transparency and accountability add credibility to a firm's green efforts and may translate into a better public image; both are enhanced by publicly defining benchmarks and goals in advance and then reporting on progress. Using widely accepted standards of measurement and reporting, combined with third party verification or audits when publishing environmental data, can help firms dispel the public perception that the activities are merely "green washing," i.e. superficial activities undertaken to create the appearance that a firm is committed to greening. Publishing accounts of the firm's experience greening its operations—good and bad—also helps spread knowledge and best practices, further advancing the transition to a greener economy.

### ► Facility Construction and Management

A green building is not necessarily more expensive than an equivalent traditional building. Since many design options, including many features of Leadership in Energy and Environmental Design (LEED), are difficult or impossible to implement once a building has been constructed, green design should be considered as early as possible during construction planning.

### Construction

Many irreversible choices such as choosing a location, adding architectural features, choosing materials, and disposing of existing ones have a huge impact on a building's lifetime environmental impact.

The most comprehensive construction strategy is to pursue LEED certification. The LEED point system rewards a wide range of green strategies and offers flexibility based on individual site concerns, while still maintaining a high standard. Buildings seeking LEED certification will consider most or all of the following green building practices with respect to site selection and preparation, building design and construction, on-site renewable energy, and wastewater reduction or reuse.

Site selection is a good time to consider encouraging greener commuting by locating near public transportation access points and offering conveniences such as bike racks or shuttles to





### ► Facility Construction and Management (continued)

encourage non-car commuting. Similarly, choosing to redevelop an existing site can lower the amount of site preparation, particularly if the location is already connected to utility and sewer lines. This can reduce the need for “earth-moving” equipment, which lowers the net emissions attributable to the building.

During planning, existing landscape features can be incorporated into designs, which is another way to reduce emissions from using heavy equipment. Considerations at this point include: making plans to allow water to percolate into the water table on-site (reducing local erosion and lessening the burden on storm drains and water treatment facilities); using native plants to reduce irrigation and maintenance needs; and taking steps to reduce heat island effects by incorporating vegetation or light-colored surfaces.

The choice of building materials can contribute significantly to a building’s lifetime environmental profile. Using recycled, renewable, and environmentally friendly resources in the design and construction phase reduces a building’s environmental footprint and boosts demand for sustainable materials. Material selection has lasting repercussions up to and including the environmental impact of disposing of the building many decades later when it reaches the end of its useful life.

Incorporating green elements during the building’s design can help reduce the need for artificial lighting, heating, ventilation, and air conditioning, lowering a building’s operating costs and environmental impact. For example, natural light provided by windows and skylights is free, and can be supplemented by high-efficiency lights connected to automatic sensors. This can replace most lighting needs during daylight hours when implemented properly. Similarly, heat can be provided by coloring surfaces black, and cooling can be aided by coloring surfaces white. Proper insulation can prevent systems designed to keep one area warm and another cool from working at cross purposes. And simple solutions, such as provisions for venting a building in the early morning to bring in cold air, thus lowering the building’s temperature naturally, can reduce energy consumption.

Planning to incorporate on-site renewable power generation, perhaps through the installation of solar panels, can help minimize a building’s carbon footprint. It may also reduce peak energy demand, which lowers capacity requirements for utilities, thus reducing the need for new power plants. The installation of on-site electricity generation is often subsidized by the state or utilities. For example, California offers subsidies and tax-based financing for solar panel installation, and utilities offer advantageous rates to companies that take steps to reduce their peak demand.

New buildings can also be designed to capture stormwater and minimize water use and wastewater generation. The largest use of water is typically for landscape irrigation, so using local, drought-tolerant plants can reduce water consumption significantly in Southern California. Controlling the method of irrigation, for example by using a drip system or irrigating only at night, reduces the amount of water that evaporates instead of being used. Ambitious facilities can consider a gray water system to divert wastewater from the building for landscaping purposes. Additionally, using low-flow plumbing fixtures to reduce waste can reduce a building’s water demand and are required in many cities.

### Facility management

By retrofitting or replacing aging equipment, upgrading building features, and adopting green practices, sites can significantly improve their environmental performance and often save money in the process. LEED offers a separate certification system for existing buildings that requires implementing strategies for lighting; water; Heating, Ventilation, and Air Conditioning (HVAC); refrigeration; airborne Volatile Organic Compounds (VOCs); automated systems; and waste.

The simplest green lighting strategy is to replace older, inefficient bulbs and fixtures with newer alternatives. Incandescent lighting is less efficient than fluorescent, which in turn is less efficient than LED. More efficient lighting choices also generate less heat, which reduces the load on air conditioning systems. By installing motion-sensing controls on lights in seldom-used areas, offices can avoid keeping the lights on all the time. Buildings can also use more natural light, which may be as simple as removing blinds and other window shades or as involved as installing new windows or skylights.

Existing buildings seeking to reduce water consumption should conduct a survey of their current water use to discover where cuts can be made most easily. By replacing inefficient plumbing fixtures with low-flow models, indoor water use can be significantly reduced. Sites can also redesign their landscaping with drought-tolerant plants that require less water.

Electricity consumption for heating, ventilation, and air conditioning can be reduced most easily by widening the range of acceptable indoor temperatures. Adopting slightly warmer temperatures in the summer and modestly colder ones in the winter can significantly reduce demand on air conditioners and heaters. Other passive approaches to building temperature management might include opening windows for ventilation. To reduce heat absorption, building managers can color roofs white or cover them with plants. When the ambient outdoor temperature is undesirably hot or cold, the building envelope should be well sealed (by keeping doors closed and replacing old seals) to prevent temperature leaks.



### ► Facility Construction and Management (continued)

The impact from refrigerants, which are almost always chemicals with high global warming potential, can be minimized with regular inspections of equipment for leaks, proper end of life disposal, and, where possible, the use of less damaging chemicals. Upgrading refrigerators to newer models can greatly improve energy efficiency and may be subsidized by energy utilities. For commercial display cases, using units with doors and replacing incandescent or fluorescent interior lights (which emit heat) with Light-Emitting Diodes (LEDs) (which do not) can further reduce power consumption. Refrigerators also operate more efficiently when they are kept at nearly full capacity.

Indoor air quality can be improved by using low-VOC, non-hazardous supplies. Materials such as paint, cleaning products, and new carpets release harmful chemicals into the air. There are green alternatives for these products that do not release VOCs, allowing the building to be reoccupied immediately rather than requiring time for the air to be flushed out.

Installing automatic control systems can make it easier to collect data to track consumption patterns and may also significantly improve energy efficiency. For example, lighting can be linked to sensors to reduce artificial lighting when natural light is entering the building. Most heating and air conditioning systems already operate somewhat automatically, but these systems can be improved to allow for a wider range of acceptable temperatures and even to open and close the building envelope in response to ambient outdoor temperatures.

Finally, firms can reduce the waste they generate by reducing, reusing and recycling. Reducing resource use prevents waste at the source. For example, printers can be set to print double-sided by default, and discarded printouts can be used as scrap paper. Many supplies can be reused rather than disposed of, and items that must be discarded should be recycled to divert waste from landfills.

### ► Transportation

Moving goods and people from place to place is one of the largest sources of greenhouse gas emissions, yet it is vital to daily life and the operation of a modern economy. Transportation can be made greener by adopting strategies that reduce fuel consumption, including using more efficient vehicles (such as high mileage internal combustion engines, hybrids, and electric vehicles); using vehicles more efficiently (such as reducing vehicle miles traveled through clever planning and logistics); and using vehicles less frequently (such as by substituting a video conference for a trip).

#### Using efficient vehicles

The most straightforward way to decrease fuel consumption is to increase fuel efficiency. Fleet operators can achieve higher efficiency in several ways. New vehicles have higher efficiency ratings, so owners can phase out older models. Proper maintenance and some upgrades can maintain or even increase fuel efficiency. Switching fuels may also improve efficiency. For example, biodiesel, natural gas, fuel cells, and electricity are all potential alternatives to traditional fuels that may help reduce vehicle emissions.

#### Using vehicles efficiently

Sometimes it is possible to reduce vehicle emissions, even if the vehicles used are no more fuel efficient. To achieve this, one strategy is to invest in logistics to ensure that the fewest possible trips are used for a given task. This might be accomplished through better route and schedule planning to ensure that trucks carry goods in two directions, rather than delivering goods and returning empty, or by designing space-efficient packaging, so that more goods fit into each load. Another way to increase vehicle efficiency is to teach drivers fuel-efficient driving techniques, such as reducing idling, accelerating slowly, and traveling at steady, slower highway speeds. Finally, new technology applications may be introduced soon that allow drivers to choose the best route, using real-time traffic and fuel-consumption data.

#### Using vehicles less

Air travel generates significant emissions, and chartered or corporate flights can generate particularly high emissions per passenger. By reducing the need for such trips or offsetting the associated emissions, firms can reduce their carbon footprint. (Booking commercial flights instead of using corporate jets yields significant greenhouse gas emissions savings.) Businesses can also consider using video and/or net conferencing in lieu of face-to-face meetings, eliminating the need for business trips. Employees can sometimes telecommute instead of coming to the office in person, reducing commuting activity associated with the company. Firms that cannot avoid business travel can purchase carbon offsets in proportion to their transportation-related emissions.

### ► Employee Participation

Employee support is vital to any company-wide greening campaign. Employees at all levels can incorporate greening into their daily activities, though doing so may require forming new habits and breaking old ones. Employees can also be encouraged to use alternative forms of transportation to reduce the carbon associated with a company's employee base. Finally, employees can bring green practices from work into their own homes.



### ► Employee Participation (continued)

#### Green leadership

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A concerted effort by executives lends official status to company greening efforts and emphasizes its importance as one of the company's goals. It also holds executives accountable for the company's environmental performance.

#### Organization-wide greening

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Greening can be effectively planned in small groups, but effective implementation may require making greening a priority throughout an organization. Many aspects of greening are dependent on individuals making environmentally friendly decisions (such as turning off a light or driving less aggressively) part of their workday routine. Engaging everyone in the organization's greening efforts can help reinforce new procedures long enough for them to develop into habits. It can also be a source of good ideas as the people closest to a process may have insights into how to incorporate efficiency improvements with the least disruption.

#### Commuting

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For many organizations, their most significant source of greenhouse gas emissions will be from their employees commuting to and from work. Encouraging employees to use alternative commuting methods can thus help reduce an organization's carbon footprint. Public transportation is highly fuel-efficient compared to placing one car per commuter on the road. Carpooling achieves a similar goal. Large companies such as those in the entertainment, healthcare, and education sector in Los Angeles County can offer their own pooled transportation option or transportation management associations (TMAs) can be formed. For example, Google operates a shuttle service to pick up and drop off employees in some areas, as do several motion picture studios in Los Angeles. Companies can also encourage employees to bike or walk to work by offering bike racks, showers, and lockers.

An organization can also eliminate some employee trips altogether through strategies such as telecommuting and flexible work schedules. Popular flex schedules include four-day workweeks comprised of ten hour days and biweekly schedules of slightly less than nine hours per day and every second Friday off.

## Section II – Industry Clusters



### ► Industry Clusters

In the pages that follow, we take a closer look at each of the 24 industry clusters that have been identified as key drivers of the regional economy. Fifteen of the clusters are export-oriented, and an additional nine are generally considered population-serving industry clusters. Definitions of the clusters are derived from those established by the Kyser Center for Economic Research; however, some adjustments have been made to more accurately account for our population-serving clusters.

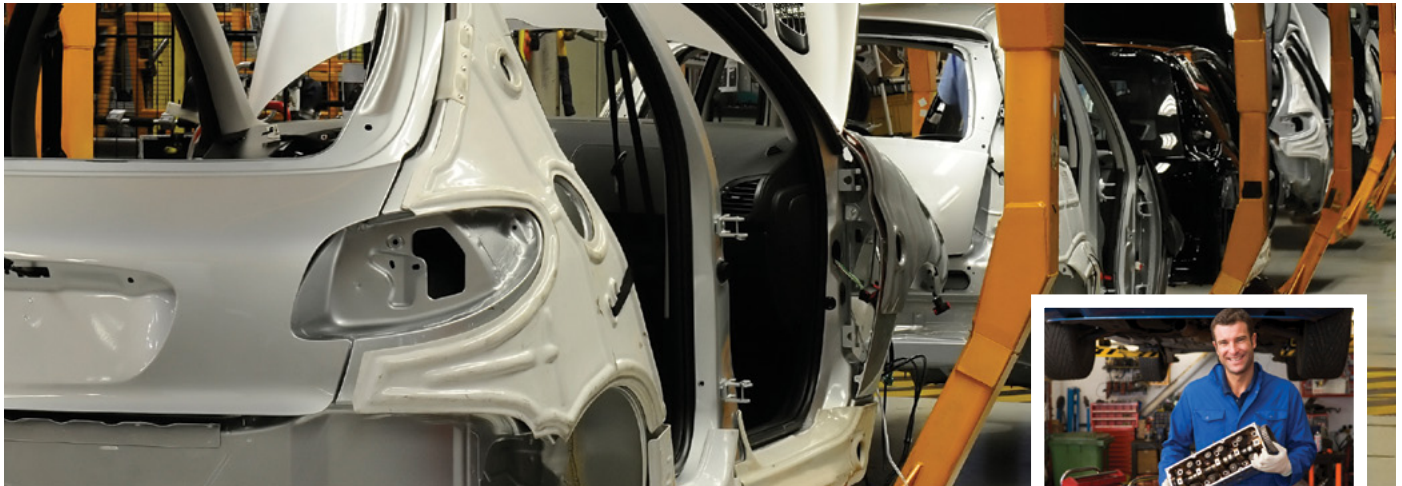
Employment in each industry cluster for 1999 and 2009 is shown below, as well as the change in employment over the ten year period. The clusters are listed in descending order of employment in 2009.

Cluster Employment in Los Angeles County						
	1999		2009		1999 to 2009	
	Employment	% of total	Employment	% of total	Employment Change	% Change
Health Services and Biomedical	341,774	8.4	368,423	9.4	26,649	7.8
Professional and Business Services	251,313	6.2	245,699	6.3	-5,614	-2.2
Entertainment	234,580	5.8	239,416	6.1	4,836	2.1
Wholesale Trade	151,498	3.7	144,749	3.7	-6,749	-4.5
Technology	188,479	4.7	144,004	3.7	-44,475	-23.6
Higher Education	107,945	2.7	130,672	3.3	61,148	21.1
Materials and Machinery	159,804	3.9	105,684	2.7	-54,120	-33.9
Goods Movement	119,411	2.9	102,175	2.6	-17,236	-14.4
Financial Services	88,237	2.2	95,488	2.4	7,251	8.2
Fashion Design, Manufacturing, Wholesaling	143,286	3.5	93,349	2.4	-49,937	-34.9
Tourism and Hospitality	85,481	2.1	78,493	2.0	-6,988	-8.2
Food Products Manufacturing and Wholesaling	63,040	1.6	61,675	1.6	-1,365	-2.2
Furniture and Home Furnishings	57,021	1.4	28,739	0.7	-28,282	-49.6
Automotive Manufacturing and Wholesaling	19,868	0.5	20,068	0.5	200	1.0
Jewelry Manufacturing and Wholesaling	9,588	0.2	5,745	0.1	-3,843	-40.1
<b>Export-Oriented Clusters Total</b>	<b>2,021,325</b>	<b>49.9</b>	<b>1,864,379</b>	<b>47.5</b>	<b>-156,946</b>	<b>-7.8</b>
Governments	465,207	11.5	485,121	12.3	19,914	4.3
Retail Trade	384,270	9.5	387,871	9.9	3,601	0.9
Food Services and Drinking Places	241,502	6.0	276,873	7.0	35,371	14.6
Construction	129,959	3.2	116,626	3.0	-13,333	-10.3
Real Estate	50,187	1.2	52,694	1.3	2,507	5.0
Membership Organizations and Associations	34,799	0.9	38,426	1.0	3,627	10.4
Repair and Maintenance	41,841	1.0	36,686	0.9	-5,155	-12.3
Utilities	27,415	0.7	30,781	0.8	3,366	12.3
Waste Management & Remediation Services	9,067	0.2	9,343	0.2	276	3.0
<b>Population-Serving Clusters Total</b>	<b>1,384,247</b>	<b>34.2</b>	<b>1,434,421</b>	<b>36.5</b>	<b>50,174</b>	<b>3.6</b>
<b>Other industries</b>	<b>643,610</b>	<b>15.9</b>	<b>629,453</b>	<b>16.0</b>	<b>-14,157</b>	<b>-2.2</b>
<b>Total *</b>	<b>4,049,182</b>	<b>100.0</b>	<b>3,928,253</b>	<b>100.0</b>	<b>-120,929</b>	<b>-3.0</b>

\*May not sum due to rounding Source: LAEDC

In 2009, there were 3,928,253 jobs in Los Angeles County. Of these, 47.5 percent, or 1,864,379, were employed in export-oriented industry clusters and 36.5 percent were employed in the nine population-serving clusters. Almost 121,000 jobs were lost between 1999 and 2009.

Individual industry clusters are presented on the following pages, in alphabetical order.



# Automotive Manufacturing and Wholesaling

## Cluster Overview

Southern California has long been reliant upon the automobile. The geographic expanse of Los Angeles County and its spread out population means drivers spend large amounts of time behind the wheel.

The county has a long business history with the automobile. Los Angeles was the American beachhead for the Japanese auto companies' arrival into North America. Toyota arrived in 1957, followed shortly thereafter by Honda, Nissan, and others. Both Honda and Toyota have U.S. sales and marketing headquarters in Torrance, with other design, test, and development units throughout the Southland area.

Locally, Pasadena's Art Center College of Design is world renowned for its auto design program. Seven other local colleges offer automotive technical training ensuring a steady supply of designers, mechanics, and other auto-related professionals.

In 2009, more than 20,000 people were at work in the county's auto industry cluster, with more than 9,500 employed in vehicle body and parts manufacturing and another 10,500 employed in vehicles and automotive parts wholesale.

Although the industry has been important to the county, investment in infrastructure and delivery of improved public transportation systems are expected to offer commuters acceptable substitutes to driving alone and may reduce automobile demand.

At the same time, the emergence of electric vehicles (EVs) may motivate the replacement of some of the existing gas-powered vehicle fleet in the county. To the extent that component parts or replacement parts may be made by existing firms in the automotive parts and aerospace parts manufacturing industries, employment at these firms may benefit.

### Industry Roster

- **Motor Vehicle Body and Trailer Manufacturing**
- **Motor Vehicle Manufacturing**
- **Motor Vehicle Parts Manufacturing**
- **Motor Vehicles and Parts Wholesale**

2010-2020

### Employment Prospects



The employment outlook for the automotive manufacturing and wholesaling cluster is poor. The cluster is expected to add 500 jobs by 2020, an increase of only 2.5 percent over current employment. There is no reason to expect an increase in motor vehicles wholesaling employment, and growth in manufacturing employment will be minimal. The impact of greening on this industry cluster will be through the substitution toward fuel-efficient vehicles, but this substitution is unlikely to generate additional employment.

Source: LAEDC





## ESTABLISHMENTS

2009  
**1,111**  
0.3% of county total

1999  
**1,116**  
0.4% of county total



## EMPLOYMENT

2009  
**20,068 Jobs**  
0.5% of county total

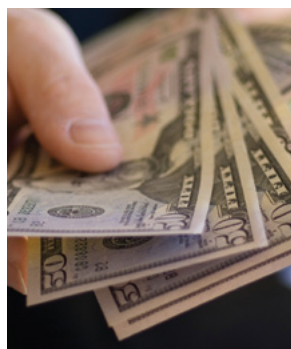
1999  
**19,868 Jobs**  
0.5% of county total



## ANNUAL PAYROLL

2009  
**\$1,149 Million**  
0.6% of county total

1999 (in 2009 dollars)  
**\$1,227 Million**  
0.6% of county total

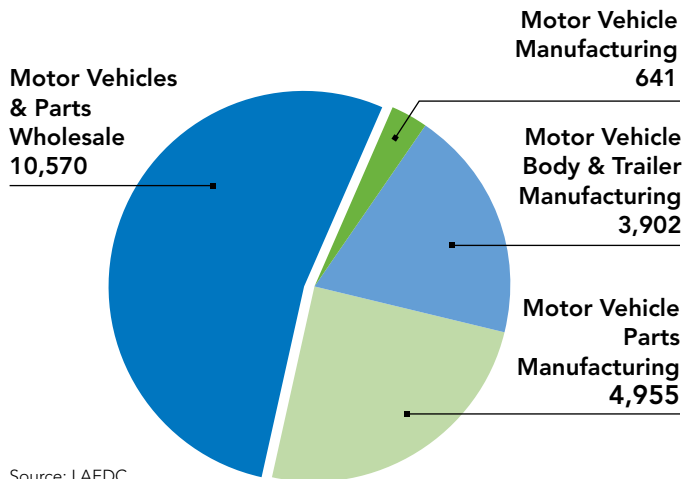


## OUTPUT

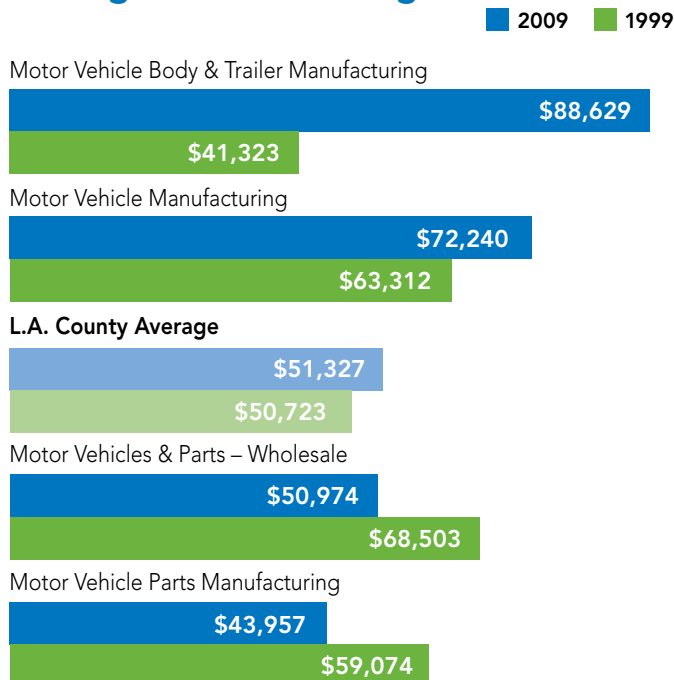
2009  
**\$6.8 Billion**  
0.8% of county total

Source: LAEDC

## Employment by Industry (2009)



## Average Annual Earnings (in 2009 dollars)



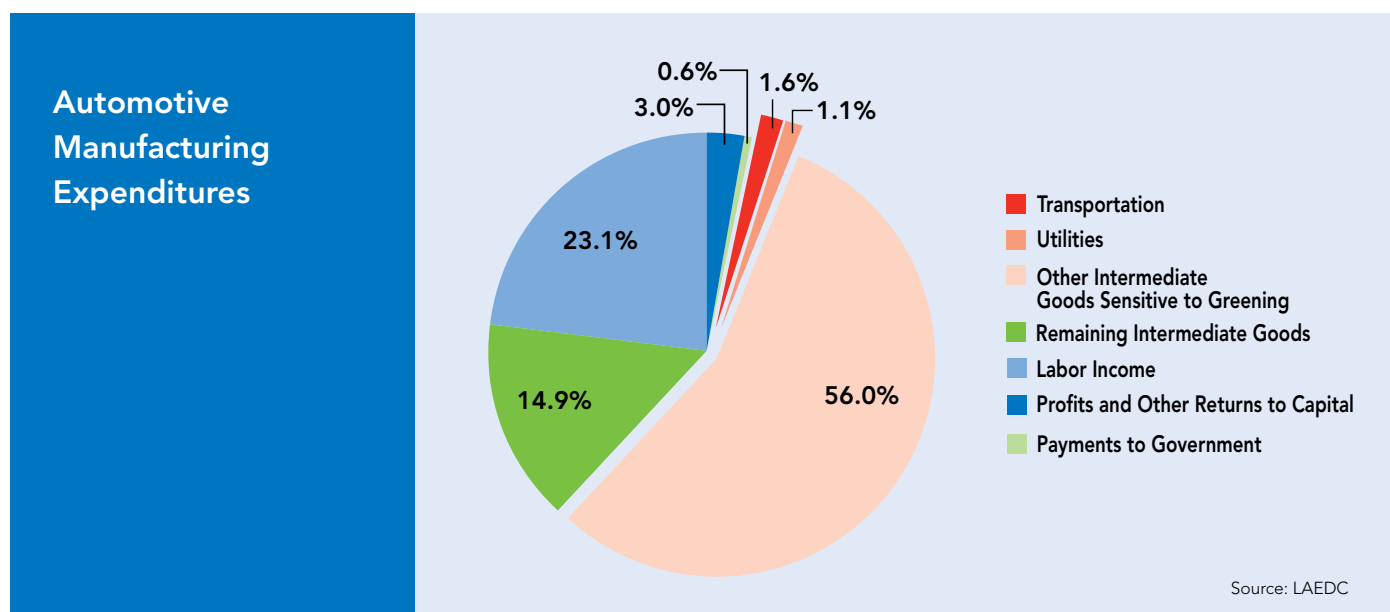
*Like other manufacturers, firms in automotive manufacturing will be adopting green practices primarily for potential cost savings.*



## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for automotive manufacturing,<sup>†</sup> with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in automotive manufacturing in Los Angeles County spent on average \$10,387 per employee on utilities and transportation, while generating \$385,917 in output per employee.
- Around half of automotive firms' expenditures are directed toward the purchase of metal products, plastics, rubber, and electronics.
- Should electricity prices increase, metal product manufacturing may become more expensive in the U.S. Responsible mining practices may lead to slightly higher prices for metals as well. These vulnerabilities may decrease as automakers use less metal in their designs.
- Should petroleum prices increase, derived petrochemical products such as plastics and synthetic rubber may become more expensive.
- To increase fleet-wide fuel efficiency, automakers are using lighter, more expensive materials which may or may not be price-sensitive to greening.

<sup>†</sup>This industry group includes NAICS codes 3361-3. This definition does not include all businesses that fall within our automotive manufacturing and wholesaling cluster.





## Things to Consider

Manufacturers in this cluster could leave the region and/or the state if they believe that compliance with green regulations at their facilities is too onerous. Their products would still have to meet many of the state's environmental laws, notably emissions requirements, but could be produced elsewhere and shipped to Los Angeles, as is the case with almost all motor vehicles sold in the market.

Expansion by successful local firms into new product lines, particularly the parts and components for more efficient vehicles and alternative fuel vehicles, represents the region's most promising path into the expanding market for cleaner transportation.

## Examples of Regulations Driving the Greening of the Automotive Manufacturing and Wholesaling Cluster

- ▶ The City of Los Angeles has an Electric Vehicle Permitting Program, which helps residential customers within the City's boundaries go from "permit to plug in" for home electric vehicle chargers in under seven (7) days.<sup>1</sup>
- ▶ AB 1229 (Nation) (2005) required the California Air Resources Board (CARB) to redesign its Smog Index Label, which is now affixed to the window of each new car sold in the State of California. These labels include scores ranging from 1 (worst) to 10 (best/cleanest) for Smog and Global Warming<sup>2</sup> and are available on the [www.DriveClean.ca.gov](http://www.DriveClean.ca.gov) site.
- ▶ CARB's Low-Emission Vehicle (LEV) Program sets emission reduction standards for automobiles. CARB adopted its first set of LEV standards in 1990 with the first set of standards running from 1994 through 2003. LEV II Standards ran from 2004 through 2010, and a new set of standards, LEV III, is being developed to establish even more "stringent emission standards for new passenger vehicles."<sup>3, 4</sup>
- ▶ SB 375 (Steinberg) (2008) is an implementation measure of AB 32, which requires the development of regional GHG emission reduction targets for passenger vehicles. Each of the State's metropolitan planning organizations, e.g., the Southern California Association of Governments (SCAG) for Los Angeles County, are required to prepare Sustainable Community Strategies demonstrating how the region plans to meet the set GHG reduction targets through an integrated approach to land use, housing, and transportation planning.<sup>5</sup>
- ▶ In 2003, the U.S. Environmental Protection Agency (EPA) established emission regulations for surface coating of automobiles and light-duty trucks. Specifically, coating includes paints, stains, sealers, topcoat, basecoats, primers, inks, and adhesives—items used frequently in the automotive and manufacturing cluster.<sup>6</sup>
- ▶ The Significant New Alternatives Policy (SNAP) from the EPA sets forth substitutes for the ozone-depleting chemicals that the EPA is phasing out. These alternatives are meant to reduce overall risk to human health and the environment. Alternatives exist in several common uses of the automotive manufacturing and wholesaling cluster, including adhesives, coatings, and inks.<sup>7</sup>



## Specific Market Opportunity: Transportation

The greening of vehicles and transportation services such as goods movement, parcel delivery, airlines, and public transportation in Los Angeles County will offer major market opportunities. Manufacturers of fuel efficient cars and light trucks, buses, rail cars, and heavy trucks will be major beneficiaries, though most of these firms will likely be located elsewhere. Within the county, the employment impact of the shift to greener transportation may be greatest in other areas of green demand, such as construction and green materials manufacturing.

### ► How big is the market demand?

Manufacturers of greener vehicles for personal use, goods movement, and transit services will find a large and ready market. Fuel efficient vehicles and hybrids are already popular in California. One in 20 new cars sold in California is a hybrid, and their share of sales is growing; additionally, one in five hybrids sold in the U.S. is sold in California.

Los Angeles County is one of the largest passenger vehicle markets in the world, with more than 5.8 million registered automobiles. Economic growth and population increases will supplement demand created by the necessity of replacing aging vehicles. Many of the new vehicles will be low-and-zero-emission models due to the requirements of California's Clean Car Standards (AB 1493).

Los Angeles is also home to a large truck fleet serving the goods movement industry. International trade, particularly at the ports, is a significant driver of demand for trucks. Combined, the Ports of Los Angeles and Long Beach handled 14.1 million Twenty-foot Equivalent Units (TEU) in 2010, the most of any port complex in the Western hemisphere. The volume dropped with the recession, but growth is expected to resume and is forecasted to triple by 2040. Higher cargo volume will add to the demand already created by the Clean Air Action Plan, which banned older trucks in favor of newer, cleaner ones for hauling containers to and from the harbor.

**Los Angeles County is one of the largest passenger vehicle markets in the world, with more than 5.8 million registered automobiles in 2010.**

Much of the port cargo (and domestic freight as well) travels between Southern California and other parts of the continent via rail. The railroads have introduced cleaner locomotives (including hybrids) for use in the local rail yards. Demand for

such locomotives is expected to grow as train traffic rises in tandem with international trade.

Further demand will be generated as truck fleets serving the distribution and delivery needs of a growing regional market with more than 18 million people are replaced with more efficient ones as companies green their fleets.

Regional transportation agencies are expanding their fleets, often by selecting cleaner vehicles such as buses powered by natural gas. L.A. Metro is also engaged in a multibillion dollar expansion of the regional rail network. The rolling stock (rail cars) and buses for the 12 transit projects comprising the proposed 30/10 (America Fast Forward) program alone will exceed one billion dollars.<sup>†</sup>

### ► What is the employment opportunity?

Manufacturing the vehicles that will be used to green the transportation sector in L.A. County will support many thousands, perhaps even tens of thousands of jobs. Sales of more efficient, cleaner cars, light trucks, heavy duty trucks, buses and locomotives, and ordinary light and heavy rail cars for transit lines will generate billions of dollars in sales annually. The value of the sales will rise as hybrids, electric, and other green vehicles constitute an increasing share of total sales in each category, but employment is unlikely to be affected.

However, manufacturing greener vehicles will not necessarily create additional employment unless it changes the underlying demand for transportation. For the most part, greener vehicle purchases will be substitutes for similar purchases of less efficient models. Unless the production process for the new vehicles results in a significant change in productivity per worker, roughly the same number of workers will be involved. The composition of the workforce may shift if new or existing firms use the introduction of more efficient, cleaner models to take market share from incumbents.

<sup>†</sup>30/10 (also known as America Fast Forward) fast tracks twelve transit projects under Measure R to be completed within ten years rather than thirty years.



## Specific Market Opportunity: Transportation (continued)

### ► Does L.A. County have a comparative advantage?

For all transportation services, the region has a powerful advantage since a local presence is required to serve the market. For the production of green vehicles, the size and importance of the market work in the county's favor.

Vehicle manufacturers may be willing to establish local production facilities to attract orders from large buyers. An order for buses or rail cars from L.A. Metro, for example, will have a noticeable impact on a firm's revenues. Firms may also be attracted by the presence of so many "early adopters" of new technology who provide a pool of potential buyers for the latest products.

Los Angeles County also has some related strengths. Most of the world's major automotive firms have design studios in Southern California, and the region has a strong presence in the production of aftermarket automotive parts. Producers of hybrids and electric vehicles may be able to draw on the county's expertise in engineering, computer parts, electronic equipment, and industries that require complementary skills, such as aerospace. Firms can also draw on the county's excellent research institutions.

Some of the new entrants to the electric car market, such as Shenzhen-based BYD, have already indicated an interest in establishing production in the county.

### ► What are the key challenges?

The transportation market is highly competitive, and Los Angeles County will be an attractive market for firms manufacturing green cars, light trucks, buses, rail cars, and heavy trucks. However, the vehicles do not need to be manufactured in the county in order to be sold here. There are no major automotive manufacturing facilities in Southern California, and the region is currently not a significant producer of heavy trucks, buses, or rail cars.

Many of the same factors that led vehicle manufacturers to locate their production facilities outside the region despite the large local market will continue to apply as greener vehicles are adopted.

### ► Conclusion

To the extent that greening leads to the expansion of transportation services, such as public transit, it will generate a modest increase in local employment. Greening most transportation services, however, will increase demand for cleaner, more energy efficient vehicles without significantly altering employment.

L.A. County faces fierce competition in attracting new facilities producing greener vehicles. With few jobs in vehicle production currently, the region is less vulnerable to employment dislocations if the adoption of new technology leads to shifts in market share or changes in productivity (and thus demand for labor).

The greatest local employment impact from greening the transportation sector is likely to be in construction (due to the expansion of the transit system) and in supporting infrastructure.



## Applying Green Practices

Opportunities exist for greening automotive manufacturing and wholesaling operations, manufacturing processes, and research and development.

### ► Facilities

Automotive manufacturing and wholesaling can green their operations by pursuing LEED certification for their production and dealer distribution facilities. Large manufacturing facilities would be ideal for solar panel roof installations, and recycling should be undertaken at every opportunity to divert waste related to production. Looking to new and greener technologies to bring their product to market can help to successfully reduce their GHG emissions. For example, Toyota Motor Company now commissions the MV Auriga Leader, which is the world's first solar-powered auto transport shipping vessel and uses returnable metal shipping containers, for the distribution of their parts.

Energy expenditures account for a relatively small share of production costs, so efficiency upgrades are likely to have only incremental results. That being said, opportunities exist in painting systems, welding processes, ventilation systems, curing ovens, boiler replacements/upgrades, and high-efficiency motors. Replacing aged equipment with more modern, energy efficient models can reduce energy usage, but they are often capital intensive.

Painting systems are one of the largest uses of electricity in automotive manufacturing, accounting for an estimated 27 to 50 percent, because they require the steam generation for paint booths and high heat in the curing ovens used in the drying process. Less energy is required by low VOC powder coats in painting systems.

Other operational measures that can be undertaken with little upfront cost include varying ventilation speed and reducing the air flow of the facilities during pauses in production.

### ► Renewable Energy

Automotive manufacturing facilities may use captured landfill gas if their geographic location permits. External combustion boilers, which have typically been powered by coal, can use this landfill gas or be replaced with natural gas powered equipment instead, as Daimler-Chrysler has done at a number of their assembly plants. Ford, GM, BMW, and DaimlerChrysler currently employ the use of landfill gas at their facilities where this is a viable option to reduce the release of nitrogen oxides, carbon monoxide, and sulfur dioxide emitted during production.

### ► Materials

Greener manufacturing can be achieved through the use of alternative materials that are renewable and eco-friendly, such as bio-plastics and natural and organic fabrics.

Low VOC powder coats have been a major developmental success in this industry. They rely on electrostatic attraction between the powder and the metal for surface coating. Powder paints require more heat for curing, but entail less energy in their manufacture and do not use solvents. As a result, they eliminate the need for ventilation, pollution control measures, and equipment cleaning associated with solvent use. A capital intensive transition to equipment other than that which is used for solvent based coatings is required.

### ► Waste

End of Life Vehicle (ELV) recovery and recycling is another way to reduce the impact that automotive manufacturing and wholesaling have on the environment. Automotive recycling includes the dismantling of inoperable vehicles with the proper disposal and recycling of all hazardous fluids. Reusable parts are serviced and inventoried for sale, while the remaining vehicle materials are recycled as scrap (e.g. the body). The United States Council for Automotive Research (USCAR) released a statement in 2007 and again in 2008 that 95 percent of inoperable vehicles have been successfully recovered through ELV recovery, with 84 percent of their materials by weight being successfully recycled.

Michael E. Wilson, CEO of the Automotive Recyclers Association (ARA), estimates that "On an annual basis recycling automobiles in the U.S. provides enough steel to produce almost 13 million new vehicles, saves an estimated 85 million barrels of oil, and reduces greenhouse gases associated with the manufacturing of new or replacement automobile parts." ARA represents over 4,500 auto recyclers in the U.S. and in fourteen other countries globally.

Modern day recyclers use computer and satellite communication systems not only to track their own inventory, but to link to fellow recyclers' inventory across the world, to provide fast and efficient customer service and to get the most out of their inventories. In addition to offsetting the need for newly manufactured automotive parts, automotive recyclers offer reusable or refurbished parts for repair that can be up to 80 percent cheaper than new ones. They are also an invaluable



## Applying Green Practices (continued)

resource for automotive parts that are obsolete or notoriously difficult to find. The ARA launched their Green Recycled Parts site ([www.greenrecycledparts.com](http://www.greenrecycledparts.com)) this year, linking together consumers, repair facilities and insurance companies with automobile recyclers across the U.S.

### ► Research and Development

Research and development is a key area that automotive manufacturers have to further the greening movement. Advanced alternative fuel vehicle technology, whether it is related to plug-in hybrid vehicles, hydrogen fuel cell vehicles, electrical vehicles or natural gas hybrid vehicles, has the potential to ripple through other clusters with transportation and logistics components. Energy research in the form of next-generation batteries and ethanol production stemming from waste conversion technology rather than the current method of using food crops is also being undertaken here. Process and equipment development is also taking place in the areas of microwave heating for curing, new VOC scrubber systems and wet-on-wet painting.

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# Construction

## Cluster Overview

Construction is a large population-serving industry sector in Los Angeles County, providing more than 116,000 jobs in 2009. Industries in this sector include establishments involved in the construction of residential and nonresidential buildings or infrastructure projects, such as highways and utility systems, and firms providing specific components of construction projects such as masonry, plumbing, and electrical work.

Two-thirds of the employment in this sector consists of specialty trade contractors who build foundations; work with structural steel; add roofs; outfit structures with electrical, plumbing, and HVAC systems; and put the finishing touches on buildings with wall coverings, flooring, and tile work.

Construction, as a whole, will experience a relatively strong recovery after the devastating declines in 2008, 2009, and 2010. Federal stimulus funds used in the construction of many infrastructure projects will employ thousands of workers in highway, transit, infrastructure, water, and other projects.

As environmental awareness spreads throughout the economy, green building practices and the use of sustainable materials have become commonplace. The Leadership in Energy and Environmental Design (LEED) green building rating system, developed by the U.S. Green Building Council has become the nationally-accepted benchmark for the design, construction and operation of sustainable buildings.

This, along with federal, state, and local mandates regarding energy efficiency, has the potential to drive employment in retrofitting and efficiency implementations. Additionally, the aging of skilled craftsmen in specialty trades may provide opportunities for apprenticeships and new entrants

## Industry Roster

- **Construction of Buildings**
- **Heavy and Civil Engineering Construction**
- **Specialty Trade Contractors**

2010-2020

## Employment Prospects



The employment outlook for construction is fair. The sector is expected to add 11,000 jobs by 2020, which is an increase of less than 10 percent over current employment. This industry was severely impacted by the recession, with employment declines of 41,000 jobs between 2007 and 2009. Moreover, job losses continued into 2010. A strong recovery is expected, and the greening motivation for retrofitting, renovating and upgrading will provide opportunities for employment gains. Additionally, infrastructure investment and major capital improvement programs (such as those at the San Pedro Bay ports, LAX, local schools and hospitals) facilitated through federal stimulus funds and other funding mechanisms (such as Measure R) will drive employment for several years.

Source: LAEDC





## ESTABLISHMENTS

2009  
**13,603**  
3.2% of county total

1999  
**14,189**  
4.6% of county total



## EMPLOYMENT

2009  
**116,626 Jobs**  
3.0% of county total

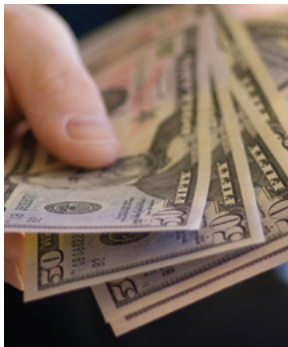
1999  
**129,959 Jobs**  
3.2% of county total



## ANNUAL PAYROLL

2009  
**\$6,260 Million**  
3.1% of county total

1999 (in 2009 dollars)  
**\$6,648 Million**  
3.2% of county total

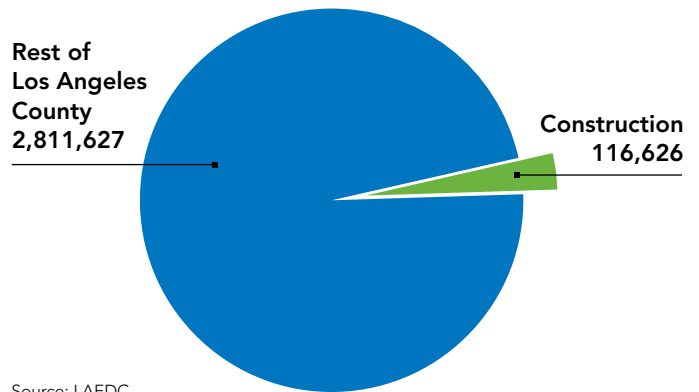


## OUTPUT

2009  
**\$26.1 Billion**  
2.9% of county total

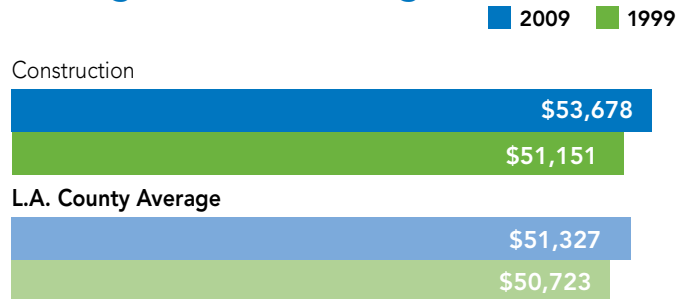
Source: LAEDC

## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)



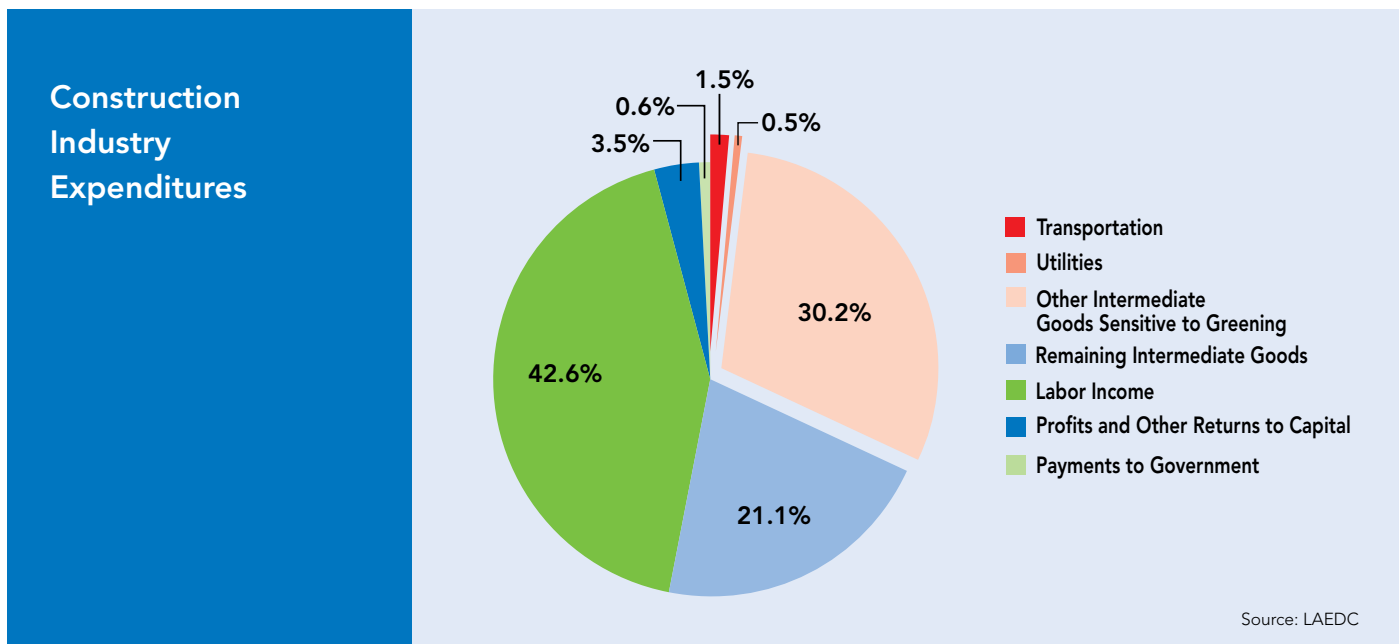
Source: CA EDD



## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the construction industry,<sup>†</sup> with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the construction industry cluster in Los Angeles County spent on average \$3,050 per employee on utilities and transportation, while generating \$152,160 in output per employee.
- Construction firms purchase significant amounts of diesel and gasoline, wood, metals, and concrete, all of which face environmental regulation. These products may become more expensive in the future due to green legislation, or construction firms may be forced to choose more expensive, environmentally-friendly materials.

*Firms in the construction industry will adopt green practices to both comply with state and local green building codes and because their customers will demand it for the potential cost savings from lower power consumption and to demonstrate their green principles. Greening will create lots of additional opportunities for firms engaged in retrofitting and upgrading the energy efficiency of existing structures.*

<sup>†</sup>This industry group includes NAICS code 23.



## Things to Consider

Firms in the construction industry cluster are predominantly local and have no choice but to adapt to green regulations in order to serve the Los Angeles County market. Within a decade, the notion of a “green construction” firm will lose meaning, as all firms will adopt the latest green building practices.

Employment in the construction industry cluster will benefit from billions of dollars in spending on transportation infrastructure projects motivated at least in part by greening of the economy.

Perhaps the most important green opportunity for firms in the construction industry is the retrofitting of existing structures. With more than 80 percent of the single family homes in L.A. County having been built before 1990 and more than 60 percent built before 1980, these older homes are substantially less energy efficient than newer ones. For example, an average single family home built to prevailing energy efficiency standards in 2006 uses 25 percent less energy than a home built just 16 years earlier, despite an increase in the average size of homes.<sup>1</sup> Moreover, retrofits

that reduce energy consumption and thus carbon emissions will appeal both to building owners seeking cost savings and government policymakers seeking to direct subsidies toward the most cost-effective carbon emission reduction strategies. For example, for a typical home built in the 1960s in California, the addition of a new furnace, tight duct system, air conditioner, and R-30 ceiling insulation would yield a reduction of 8.5 tons of carbon annually.<sup>2</sup> These improvements would typically cost between \$5,000 and \$10,000, but tax credits and incentives could lower these costs, making them a more affordable option for homeowners. Owners of older homes and other structures will probably care more about the potential savings represented by the drop in energy consumption implied by such a large reduction in carbon emissions, but the end result is the same.

## Examples of Regulations Driving the Greening of the Construction Cluster

- ▶ In January 2009, Los Angeles County's Green Building Program took effect, which pertains to new development in the unincorporated areas of Los Angeles County. The program included the following ordinances: Green Building, Drought-Tolerant Landscaping, and Low Impact Development. The Green Building Ordinance requires the use of construction materials and techniques that would improve the energy efficiency of a building and create fewer pollutants. The Drought-Tolerant Landscaping Ordinance requires that landscaping use specific plants that have low water needs. And, the low Impact Development Ordinance provides an approach to managing rainfall and stormwater runoff.<sup>3,4</sup>
- ▶ Effective January 1, 2011, the California Green Building Standards Code, referred to as CALGreen, requires that new buildings reduce water consumption, divert construction waste from landfills, increase building efficiencies, and utilize low-pollutant emitting materials.<sup>5</sup>
- ▶ The California Air Resources Board (CARB) has several regulations that affect the mobile equipment used in the construction industry, including CARB's In-Use Off-Road Diesel Vehicle Regulation, which aims to reduce diesel particulate matter and oxides of nitrogen emissions from existing off-road heavy duty diesel vehicles. Although some elements of this regulation have been delayed, reporting, labeling, and idling requirements are still in effect.<sup>6</sup>
- ▶ AB 811 (Levine) (2008) and AB 474 (Blumenfeld) (2009) set in place the State's Clean Energy Municipal Financing Law, which is designed to enable property owners to finance energy efficiency and renewable energy projects that are attached to the property. This is more commonly known as a property assessed clean energy (PACE) finance program.<sup>7</sup> Legal challenges have been mounted against the program, but there are efforts being made to restore the PACE program.<sup>8</sup>
- ▶ The United States Environmental Protection Agency (EPA) standards for nonroad diesel equipment—frequently used in industries such as agriculture and construction—and refineries went into effect in 2007. The nonroad diesel equipment regulation aims to reduce exhaust emissions from these types of vehicles by more than 90%, but the regulation only applies to future nonroad diesel engines. Refiners were also required to produce low-sulfur diesel fuel for use in this type of equipment to ensure the advancement of emission-control technologies, which can sometimes be damaged by sulfur.<sup>9</sup>
- ▶ Since nonroad diesel engine regulations only apply to new vehicles, the EPA has developed a Clean Construction USA incentive-based program as part of its overall National Clean Diesel Campaign to advance the reduction in emissions from nonroad diesel equipment. Clean Construction USA encourages proper maintenance of construction equipment, reduction of idling, the retrofitting of diesel engines with technologies verified by the EPA, replacement of older equipment, use of cleaner fuels, and the repowering of equipment (specifically replacement of engines). Grants and other funding are available on the EPA's website for this program.<sup>10</sup>



## Specific Marketing Opportunity: Construction and Renovation

Construction and renovation is one of the markets that will be most thoroughly transformed by the greening of the economy. The shift will be more significant than merely the incorporation of more recycled materials and sustainable products.

Today, green construction is a specialty item, often showcased in signature projects. Such projects are becoming more common: there are 222 LEED-certified buildings in the City of Los Angeles alone, and the number is growing. However, focusing on individual projects risks missing the underlying trend: in the near future there will be no such thing as “green” construction since *all* construction will conform to green standards.

### How big is the market demand?

To the extent that all construction will be carried out using green best practices, the market demand will encompass the entire construction industry, which is very large in Los Angeles County.

The L.A. Unified School District, for example, is spending more than \$20 billion in its ongoing capital improvement program on school construction and renovation. The gradual repayment of existing bonds and an eventual rise in assessed valuations will free up bonding capacity for additional construction. Los Angeles World Airports (LAWA) will spend at least \$5 billion modernizing the Los Angeles International Airport. The replacement of the Gerald Desmond Bridge at the Port of Long Beach will cost \$950 million. And hospitals around the county will spend several billion dollars modernizing, upgrading, or replacing facilities to meet seismic safety requirements. To varying degrees, all of these projects will incorporate green building practices.

Increasing the share of power sourced from renewable energy (and the necessary new transmission lines), will spur billions of dollars in investment. So will the environmentally motivated move to modify or replace power plants along the coast that use once-through cooling.

L.A. Metro will invest almost \$300 billion in transportation infrastructure projects through 2040, which will be motivated in part by environmental protection. In addition to reducing single occupant vehicle trips and the related emissions of greenhouse gases and other pollutants, Metro hopes to relieve an overburdened transportation system and accommodate the demands of a growing population.

Greening will also factor in major private investments, such as Burlington Northern Santa Fe’s Southern California Intermodal Gateway: a \$500-\$600 million new rail yard that will reduce emissions by shifting cargo from trucks to rail near the harbor.

**L.A. Metro will invest almost \$300 billion in transportation infrastructure projects through 2040, which will be motivated in part by environmental protection.**

Cleaner, more expensive power will stimulate a large potential market for energy efficiency improvements to existing structures. Los Angeles County has over three million housing units, including single family and multifamily homes; approximately one billion square feet of industrial space; and over 200 million square feet of office space. Many energy efficiency improvements are cost effective, have reasonable cost-recovery periods, and may qualify for subsidies from the state or utilities. Rising energy costs will make such improvements more attractive.

### What is the employment opportunity?

The billions of dollars spent on green-related construction will be a large source of employment. The L.A. Metro projects alone will sustain hundreds of thousands of jobs. (Note: This is a description of the cumulative full-time and part-time employment generated by the construction activity *not the number of new jobs that will be added in construction industry.*)

The employment prospects come with several provisos. First, the construction industry needs a steady flow of projects to maintain employment levels over time. It is difficult to say in advance for any particular project whether it will keep people who are already working employed or will pull additional workers into the field.

Second, we have not tried to disentangle purely green construction employment, such as the jobs associated with renovating buildings to improve energy efficiency, from construction projects for which green is one of several motivating factors.



## Specific Marketing Opportunity: Construction and Renovation (continued)

### ► Does L.A. County have a comparative advantage?

The chief advantage L.A. County has in the Construction and Renovation market derives from location. Barring unusual circumstances, construction and renovation companies generate employment in the markets where they work. Los Angeles County firms will have to compete with businesses based in adjacent counties, but they are unlikely to face competition from outside the region.

Local firms providing construction and renovation services will benefit from the green-related expertise at L.A. County's engineering and architecture firms.

### ► What are the key challenges?

Even with a sharp recession and lackluster recovery, there is still plenty of *potential* work. However, regulatory delays (e.g., furloughs slowing down the process), uncertainty (e.g., vagueness in statutes like the California Environmental Quality Act (CEQA), which leads to firms devoting substantial resources to develop "bullet-proof" environmental impact reports), and inconsistency (e.g., conflicting regulations among the various permitting authorities, such as local, state, and federal) have held up tens of billions of dollars of investment in areas as diverse as hospital construction, oil field redevelopment, and solar power development. The abuse of CEQA for non-environmental purposes is another source of delay.

### ► Conclusion

The widespread adoption of green building codes and interest in techniques that exceed these standards will mean that green techniques and practices will become standard operating procedures. The greening of the economy will prompt massive outlays for infrastructure projects and create additional work upgrading existing structures for energy efficiency.

## Applying Green Practices

A building's lifetime environmental impact is mostly determined at the time of construction. Before and during construction, it is possible to make energy efficiency and resource use decisions that are difficult or impossible to make once the building is finished. Though construction contractors do not have the ability to make decisions unilaterally, they are in a powerful position to suggest green building practices to their clients. By becoming knowledgeable about the costs and benefits of environmental building practices, construction firms can help their clients make informed decisions about their building's environmental impact and potential cost savings as well.

Construction firms can make important recommendations to their clients about the choice of materials, construction methods, design features, and other elements of a building. Clients may not be aware of the financial savings or environmental benefits of making green construction choices, or they may overestimate the cost of implementing such strategies. Free information on environmental construction practices can be found at the relevant Environmental Protection Agency (EPA) and California state websites.<sup>11,12</sup>

### ► LEED

The gold standard of green building best practices and certification is LEED. The LEED system encompasses all levels of construction-related greening activities, from site preparation and material sourcing to building design and management. The overall focus is on reducing a given building's environmental footprint, with respect to greenhouse gases as well as sustainability of materials and impact on the third-party verification process to ensure credibility.





By implementing this comprehensive system, any building project can be completed from an environmentally-conscious perspective at a relatively low associated price. Construction firms familiar with the LEED system can make informed recommendations to clients during the planning and building phases. Firms that plan to participate in LEED construction projects also can pursue LEED professional credentials by taking an examination administered by the U.S. Green Building Council.

### ► Materials

The choice of materials used in the building process can make a significant contribution to the greening of the construction industry cluster. Using green materials can help reduce the environmental impacts related to the extraction, transporting, processing, fabrication, and disposal of unsustainable or nonrenewable building materials and practices. In addition to benefiting the environment, green building materials may benefit building owners and tenants by lowering the costs of energy conservation measures and reducing maintenance costs over the life of the building. Examples of green building materials include wood from sustainable forests, blown-in insulation from recycled cellulose, dual pane low-E windows, solar attic fans, weather-controlled irrigation systems, sensor lighting, and the use of framing techniques that require less wood. Including these materials and processes in the construction process in Los Angeles County will lead to more efficient structures with a smaller carbon footprint.

### ► Waste and Recycling

Recovering and recycling building materials and architectural details from demolition sites not only diverts large amounts of waste from landfills, but these materials can also lower building costs and reduce emissions. Homeowners may be eligible to receive tax deductions for the donations of their house or materials for reuse. The Reuse People of America, a San Francisco Bay Area-based nonprofit organization, opened a building material reuse retail warehouse in the City of Los Angeles with funding awarded from the EPA. They sell reclaimed materials for cents on the dollar by using their own crews to salvage materials. Additionally, they donate 10 percent of their annual surplus to local non-profit organizations.

### ► Energy Star

Energy Star is a program for both homeowners and businesses to increase energy efficiency of products. Created in 1992 by the Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE), it established a strict energy performance rating system applicable to appliances and to buildings. To date more than 200,000 buildings carry the Energy

Star rating nationwide. Public and private organizations have partnered with the federal government under the Energy Star program; 1,600 manufacturers produce products that qualify to use the Energy Star label; 1,400 retailers bring Energy Star qualified products to market; and 8,400 builders construct new homes that qualify as Energy Star. It is estimated that in 2010, the Energy Star program helped Americans save nearly \$18 billion on their utility bills while reducing GHG emissions by an amount equal to the emissions of 33 million cars.

The Energy Star program is embarking on a whole-house retrofit program called the Home Performance with Energy Star (HPwES). In 2010, over 35,000 homes were improved via 35 locally-sponsored programs across more than 30 states, bringing the total number of homes improved with the assistance of HPwES to over 110,000.

### ► Retrofitting

The retrofitting of existing buildings is a key opportunity area for the construction industry to go green. Energy audits can help identify potential energy-efficient retrofits and renewable energy options which can result in cost savings over the life of the building and a reduction in its environmental impact.

There are several key areas in which the most common retrofitting measures fall: lighting retrofitting, plumbing fixture efficiency retrofitting, replacing appliances with more energy efficient models, solid waste management practices, green cleaning policies, drought resistant landscaping, and potable water use in landscape hydration. Renewable upgrades made to existing structures include the installation of occupancy sensors, weather-controlled irrigation systems, and solar roof installations.

Existing building owners may not have embraced the opportunities to retrofit their structures due to the perceived upfront costs associated with these efficiency measures. However, a short term approach to building repairs can result in a chain of quick-fixes that add up over the life cycle of the building, making it less cost effective in the long run. In addition to the long term cost savings, building owners and tenants can take advantage of different incentive programs, rebates, and tax breaks associated with the upfront cost of upgrades. For example, the Weatherization Assistance Program which is available through the U.S. Department of Energy was created in 1976 to assist households who lack the resources to invest in energy efficiency. It operates in all 50 states, the District of Columbia, Native American tribal territories, and U.S. Territories. Preferred eligibility is given to households that are low-income, elderly, disabled, or have children. The program estimates that 20 to 30 million families are eligible nationwide. All energy services are handled by local weatherization agencies.





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## Entertainment

### Cluster Overview

Long heralded as the entertainment capital of the world, Los Angeles County is home to major studios such as Disney, Fox, Paramount, Dreamworks, Sony/Columbia, NBC/ Universal, and Warner Bros. These media conglomerates along with scores of smaller studios, production companies and allied suppliers provide work for almost 240,000 people in Los Angeles County while generating over \$100 billion in economic activity.

Television, both broadcast and cable, is the true lifeblood of the entertainment industry in Los Angeles County. All five major broadcast networks have studio operations in the area. The recording industry also continues to play a pivotal role in L.A. County's economy with the presence of major studios and independent labels.

Many of the occupations in these industries can be cross-trained for other technology industries, such as software publishers, computer and electronic products manufacturing, internet publishing, and computer systems design. These industries have emerged as important, high-growth areas of the county economy.

Supporting the entertainment cluster are numerous trade unions, talent agencies, and professional services specializing in entertainment clientele.

In spite of increased competition from other states, these industries have shown growth recently, which has been helped in part by California's Film and Television Tax Credit program. The increased focus on protecting this signature industry cluster will help stabilize (and may improve) employment.

### Industry Roster

- Agents & Managers for Artists, Writers and Performers
- Audio and Video Media Reproduction
- Broadcasting (Radio, TV and Cable)
- Independent Artists, Writers & Performers
- Motion Picture and Video Distribution
- Motion Picture and Video Production
- Postproduction Services and Other Motion Picture and Video Industries
- Sound Recording Industries

### 2010-2020

### Employment Prospects



The employment outlook for the entertainment cluster is good. The cluster is expected to add 27,500 jobs by 2020—an increase of 11.6 percent over current employment. Most of this increase will be in the motion picture and sound recording industry. Fiscal challenges in other states have cooled their enthusiasm for tax subsidies, reducing competitive pressures and returning production to California. Greening and the shift to digital media will have significant impacts on this cluster. While digital replacement has affected the delivery of product, the explosion of digital media has increased demand for content, a product in which Los Angeles County has a competitive edge.

Source: LAEDC



## ESTABLISHMENTS

2009  
**15,055**  
3.6% of county total

1999  
**15,667**  
5.1% of county total



## EMPLOYMENT

2009  
**236,416 Jobs**  
6.1% of county total

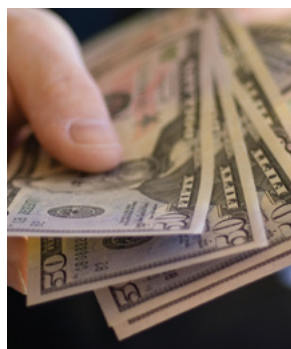
1999  
**234,580 Jobs**  
5.8% of county total



## ANNUAL PAYROLL

2009  
**\$31,380 Million**  
15.6% of county total

1999 (in 2009 dollars)  
**\$28,824 Million**  
14.0% of county total

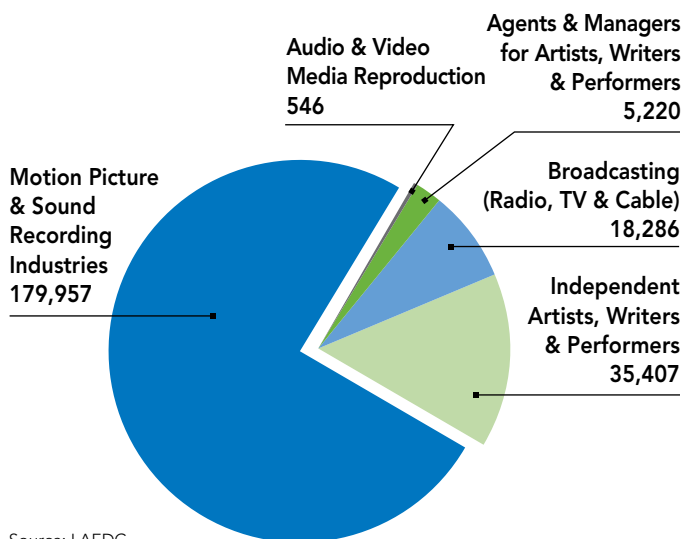


## OUTPUT

2009  
**\$95.2 Billion**  
10.7% of county total

Source: LAEDC

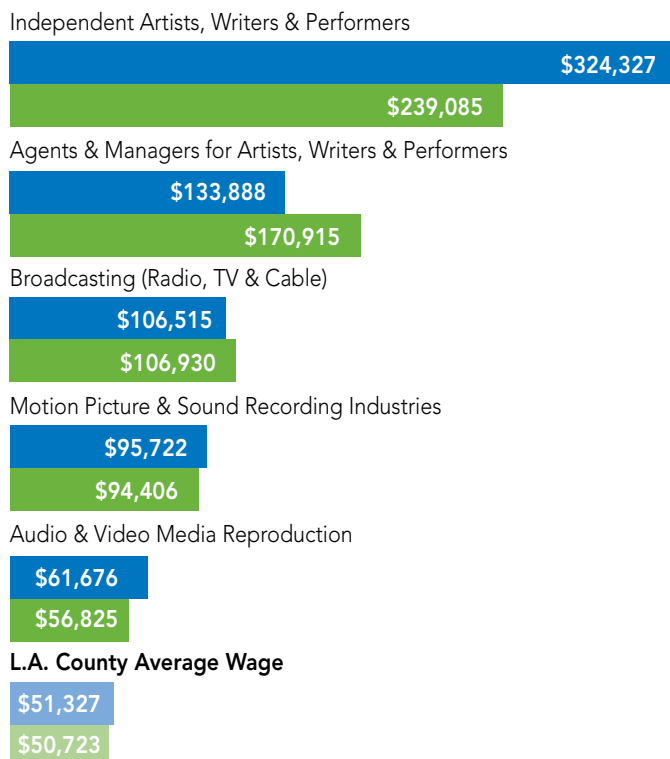
## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)

■ 2009 ■ 1999



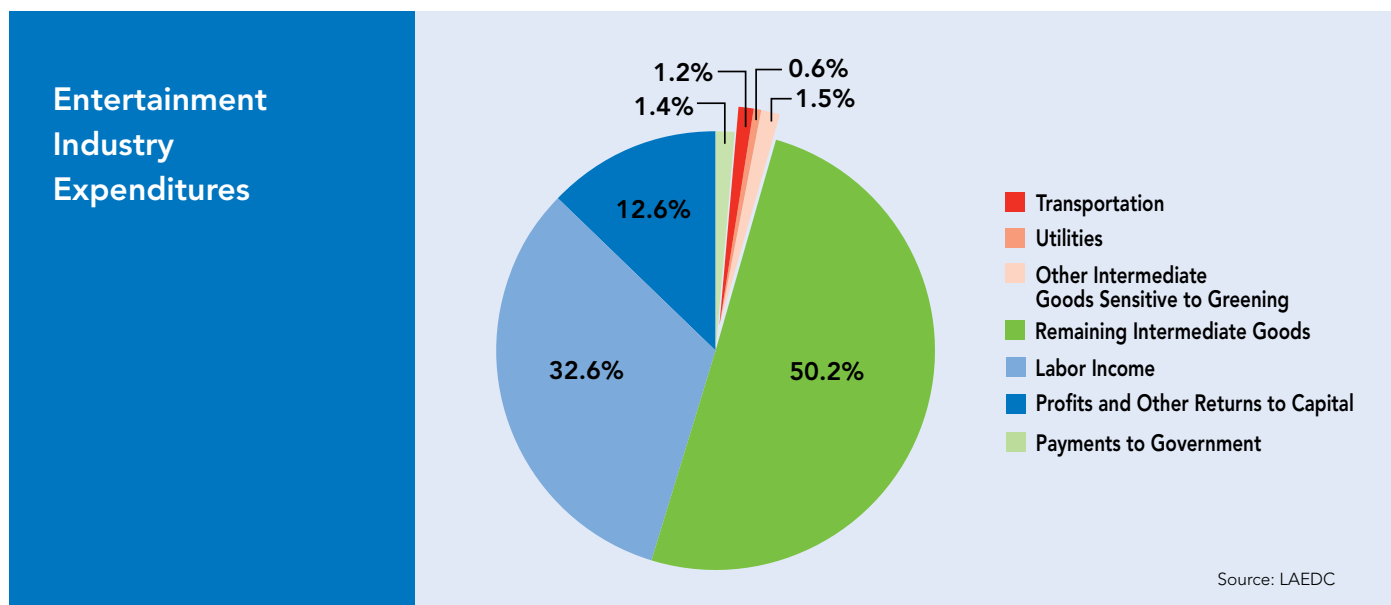
Source: CA EDD



## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the entertainment industry,<sup>†</sup> with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the entertainment industry in Los Angeles County spent on average \$6,480 per employee on utilities and transportation, while generating \$366,060 in output per employee.
- The vast majority of entertainment expenditures go towards service-based inputs, which are not price-sensitive to greening.
- Though only a small percentage of entertainment expenditures goes toward utilities and transportation, the absolute amount of this spending is significant (over \$1.2 billion total). Due to the size of the L.A. County entertainment industry, actions taken by these firms can make a significant impact on regional sustainability.

<sup>†</sup>This industry group includes NAICS codes 512 and 515. This definition does not include all businesses that fall within our entertainment cluster.



## Things to Consider

The motion picture and sound recording industry is highly mobile since each new production represents a fresh venture and an opportunity to compare the cost advantages of different locations. Independent artists, writers, performers and their agents, and managers are also mobile; their large numbers in Los Angeles act as a magnet for the motion picture industry, although individually they will leave the region to follow the work, if necessary. Post-production work is less mobile due to the investment in equipment, but it is less firmly rooted in Los Angeles now that high quality facilities have opened in other states and around the world. In the entertainment cluster, only the broadcast industry is meaningfully tied to the local market it serves. Fortunately for the local economy, green regulations seem unlikely to impose a substantial burden on the industry

and will be overshadowed in location decisions by other economic considerations such as film incentives, relative wages, and talent availability.

The major motion picture production studios are particularly well-positioned to drive the greening of the industry. As industry leaders, they can set the expectation that green best practices will be adopted on-set and on-location as part of standard operating procedures. They are also large employers, which sets them apart both within the industry and in the broader L.A. economy and gives them the necessary scale to consider greening options—such as commuter shuttles for industry workers—that are out of reach for smaller firms.

### Examples of Regulations Driving the Greening of the Entertainment Cluster

- ▶ The South Coast Air Quality Management District Rule 2202 requires employers who employ 250 or more people on a full or part-time basis for a consecutive six month period to implement an emission reduction program. Rule 2202 specifically aims to reduce mobile source emissions generated from employee commutes.<sup>1</sup>
- ▶ With the signing of AB 455 (Chu) (2003) and its subsequent amendments, collectively referred to as the Toxics in Packaging Prevention Act, packaging and packaging components containing cadmium, lead, mercury, or hexvalent chromium faced restrictions. The law affects all manufacturers, distributors, and resellers, regardless of where the packaging originated.<sup>2</sup>
- ▶ In 2007, the California Film Commission released its Green Resource Guide, which was designed to minimize the impact of productions on the environment. This guide provides links to green best practices established in the film industry, but it does not serve as a regulation rulebook. Instead, the guide offers suggestions such as labeling garbage cans as “landfill” to ignite a sense of responsibility, reusing old tapes, and stocking chlorine-free toilet paper.<sup>3</sup>
- ▶ The California Electronic Waste Recycling Act, established by SB 20 (Sher) (2003) and subsequently amended by SB 50 (Sher) (2004), gives the California Department of Toxic Substances Control additional authority in determining whether electronic devices constitute hazardous waste when discarded. The Act also requires retailers of covered electronic devices to collect a waste recycling fee, which helps fund a program for consumers to return, recycle, and ensure appropriate disposal of covered electronic devices, which are commonly used in the entertainment industry.<sup>4</sup>
- ▶ The Environmental Protection Agency (EPA), under the U.S. Resource Conservation and Recovery Act regulations, governs the safe management of hazardous waste, such as those generated by photo processing. The EPA has created a guidebook for businesses in this field, outlining ways in which they can comply with federal regulations and how their waste can be minimized voluntarily.<sup>5</sup>





## Specific Market Opportunity: Digital Replacement

Replacing paper products and physical media, such as DVDs and CDs, with electronic copies has had a large and beneficial environmental impact, but it has also disrupted the dominant business model in several major industries. For example, in the motion picture and publishing industries, the larger file sizes required for their content granted a temporary reprieve that has been steadily eroded by improvements to broadband speeds, physical storage capacity, and computing power.

Some of the content providers whose businesses have been most profoundly affected by digital replacement are disproportionately concentrated in Los Angeles County.

### ► How big is the market demand?

The rapid and widespread substitution of electronic for physical content is being driven more by price and convenience than by concern for the environment. The electronic versions of best-selling books, for example, are cheaper than their hardcover counterparts. Instead of entire albums, music fans can spend less by buying only those songs they want most at online music stores. Newspaper readers can browse the content of numerous publications without having to pay for any of it. And with the spread of smart phones and tablet computers, digital delivery provides immediate gratification just about everywhere.

Low cost and convenience are a powerful combination. We expect the adoption of digital replacement to continue until electronic versions comprise most of the market for books, newspapers, and magazines and replace physical DVDs and CDs entirely.

### ► What is the employment opportunity?

Digital replacement may prompt additional purchases of hardware such as telepresence equipment and electronic book readers and digital services for high speed wired and wireless delivery, but scaling up digital service provision would probably not require much of an increase in the workforce that provides those services today.

The larger employment implications are for the providers of digital content. The upending of their respective business models has seen significant declines in revenue. These losses have already translated into bankruptcies and job losses among the survivors in the newspaper industry and for “brick and mortar” entertainment rental companies, who rent Blu-rays, DVDs, and video games to consumers. If the content providers in the other industries cannot develop a business model that will allow them to earn at least as much revenue from digital content as they do from physical content, job losses will surely follow.

### ► Does L.A. County have a comparative advantage?

Los Angeles County is a world leader in many of the industries being disrupted by digital replacement. The motion picture and sound recording industry, in particular, is concentrated in the county: Los Angeles accounts for approximately 32.6 percent of industry employment nationwide and the major studios are based here. As the incumbents in these industries, the content providers in L.A. have the most to lose from the transition to digital delivery, but they are also in the best position to benefit. If they can devise profitable strategies, digital replacement may turn out to be an easier, more cost-effective means of delivering their content immediately to more people in more places.

### What are the key challenges?

The most pressing challenge is to devise business models that will allow firms to remain profitable once the digital delivery of content becomes the dominant sales channel.

The other major challenge is piracy, since making illegal digital copies is much easier than physical counterfeiting. Copying electronic files costs nothing and is almost instantaneous. File sharing via the internet adds an extra degree of anonymity and makes piracy more difficult to detect. People who would never contemplate stealing a physical copy of a DVD may be less concerned about downloading a pirated electronic copy.

### Conclusion

Digital replacement is good for the environment, but it is being driven by lower prices and greater convenience. The disruption to established business models has already caused job losses in newspaper publishing, the recording arts and music industry, and entertainment rental companies. The concentration of entertainment industry content providers in Los Angeles makes the county unusually vulnerable to job losses due to digital replacement.





## Applying Green Practices

Entertainment is one of the least energy-intensive of our industry clusters, allocating 1.8 percent of spending to transportation and utilities. The majority of the Entertainment cluster's emissions are attributable to consumed electricity, travel, and transportation of physical goods. The Entertainment industry in Southern California is dominated by several large companies, most of whom already have their greening efforts well underway.

### ► Disseminating Environmental Information

By leveraging their influence over consumer behavior, entertainment companies have the possibility to enact greater environmental change from solely within their own operations. Film and recording firms are in the business of not only distributing information but also shaping consumer taste and behavior. By promoting green practices and by setting a good example in their own companies, entertainment firms can help green best practices gain traction among the public.

For example, television companies can encourage green habits among their viewers. NBC schedules an annual Green Week, during which the network promotes various environmental causes and also incorporates green ideas into the storylines of its shows.<sup>6</sup> Disney encourages children to learn about environmental issues and make changes in their daily lives.<sup>7</sup> By promoting green activity, television networks can spread both awareness about and enthusiasm for greening.

### ► Facilities

Entertainment businesses can implement many green strategies at their facilities. For example, Sony Pictures Entertainment<sup>8</sup> has earned the International Organization for Standardization 1400 (ISO 1400) certification and has constructed a LEED building in Culver City. Sony, as a whole, is dedicated to reducing its CO<sub>2</sub> emissions and power consumption by 30 percent by 2016, using 2001 emissions and 2009 power consumption as baselines. Sony collects detailed statistics on its environmental impact in order to measure its progress toward this goal, which is a vital step for large companies serious about their greening efforts.

Studio buildings with large roofs are suitable for solar panel systems. Warner Brothers operates two LEED-certified buildings with rooftop solar power system generating 100 and 500 kilowatts, respectively.<sup>9</sup> Solar panels and energy-efficient retrofitting has saved Warner Brothers over \$1 million annually in electricity bills. Studios can also purchase carbon offsets to reduce emissions associated with their activities and products. For example, Warner Brothers purchased enough carbon offsets to make its 2005 film *Syriana* carbon neutral.<sup>10</sup>

### ► On-Set and On-Location

In order to feed, transport, and potentially house all cast and crew members, the recording process can consume significant resources. Studios can take several steps to reduce catering waste, such as providing reusable cups, plates, and utensils, and composting food waste. For example, Sony composts garbage on the lot. Rather than using sets a single time they can be reused for multiple episodes or other projects, and they can be broken down and recycled rather than thrown away at end of life. Simple measures, such as turning off diesel generators rather than idling them, help reduce emissions.

### ► Transportation

Studios can green their fleets by adopting fuel-efficient or alternative fuel vehicles. For example, Warner Brothers plans to spend \$7-\$8 million on low-emission vehicles over the next five years.<sup>11</sup>

*Greening by firms in the entertainment industry cluster will be driven by the importance of their public image and the desire for cost savings. The industry faces a profound challenge in adapting to the replacement of the physical delivery of content (DVDs, CDs) with electronic files—a green practice that has upended key elements in the industry's business model.*



Filming or recording on-location produces a significant amount of greenhouse gases, proportional to the distance traveled, the number of personnel, and the amount of materials that must be brought along. By reducing these three factors, studios can reduce the emissions associated with a given project.

The transportation of physical forms of media, such as DVDs and CDs, is another source of transportation emissions. To reduce transportation costs and packaging, Sony now sells DVDs in lighter materials to reduce weight and waste. Across the industry, transportation-related emissions and packaging waste are declining due to digital content delivery, which requires no physical product to be manufactured and shipped.

## ► Digital Media

As digital forms of media and entertainment become increasingly prevalent, physical forms are being displaced. Newspapers are now frequently read online, songs are downloaded directly to personal devices or streamed over the internet, and DVDs are being eclipsed with streaming content available on demand through cable services or subscription services such as Netflix. Though these new formats may negatively impact businesses within the entertainment cluster during the short term, as they develop new business models, these new methods of delivery have significant environmental benefits. Digital forms of media are more sustainable since they produce fewer emissions and consume less material during production, and because no physical transportation service is involved with bringing these goods to market.

## ► Bringing it all Together

The Warner Brothers movie *Valentine's Day* was produced using green practices across the board.<sup>12</sup> For the sets, they used recyclable materials and saved the sets for reuse rather than throwing them away. Cast and crew members were provided with steel bottles in lieu of plastic water bottles. By providing recyclable or biodegradable dishes and cutlery, 25 tons of waste was composted or recycled; by using solar or alternative power for lighting, vehicles, and generators, Warner Brothers estimates it averted 67 metric tons of CO<sub>2</sub>. Aside from the cost of renting solar generators, "the movie did not cost more to make," demonstrating that green best practices do not necessarily hurt the bottom line in film production.<sup>8</sup> The studio also produced a documentary describing the specific practices they adopted so that other filmmakers can follow their lead.

## ► NBC Universal's Evolution Plan

NBC Universal developed their Evolution Plan to address the growth of their facilities, including film and production studios, the Universal Studios theme park, and Universal CityWalk. In addition to their own facilities, the plan considers sustainability in both residential growth of local communities and private investment in local transit infrastructure.

NBC Universal's Studio Evolution will add 308,000 net new square feet of production facilities, 437,000 net new square feet of production support space (including post production facilities and producer bungalows), and 495,000 net new square feet of office space, including a child care center.

The Entertainment Evolution will add 146,000 net new square feet of attractions to Universal Studios and 39,000 net new square feet of restaurant and retail space to both the theme park and Universal CityWalk. Additionally, a new 500-room hotel is expected to be built at CityWalk.

The Universal Neighborhood Evolution Plan includes the development of a Leadership in Energy and Environmental Design–Neighborhood Development (LEED-ND), a walkable neighborhood comprised of 2,900 new residential units, consisting of lofts, townhomes, apartments and condominiums, on a 124-acre parcel of Universal's almost 400-acre studio property. NBC Universal believes that the solution to L.A.'s transit and housing problems can be found in locating residential communities next to business districts and work centers and linking them via transit. In addition to the new residential units, this development will include the construction of a Town Center with neighborhood-serving businesses such as restaurants and shops and 35 acres of public open space, such as parks, hiking trails and bike paths. A residential shuttle system will operate among the nearby Metro Station, CityWalk, surrounding studios, the Burbank Metrolink Station, Hollywood, and West Hollywood.

Marking the largest private investment into transportation in the San Fernando Valley in over 25 years, NBC Universal's Evolution includes a \$100 million investment into local and regional transit improvements, including a Transportation Demand Management program. In the fifty square miles surrounding Universal City, 139 intersections will be improved through measures such as upgrades, street widening, and signal synchronization. NBC Universal plans to work with CalTrans to improve speeds, safety, and congestion on five miles of the 101 Freeway, to improve the 134 and the 101 Freeway interchange, to reconfigure the northbound on-ramp to the 101 Freeway at Highland, and to assist in accessing over \$200 million in potential transportation funding for the San Fernando Valley.



## Applying Green Practices (continued)

Throughout the NBC Universal Evolution Plan, green is a major focus. NBC Universal is a pilot member in the LEED-ND. The planned development is a transit-oriented project linking residences with employment centers, featuring reduced energy and water consumption and waste generation through smart design, environmentally-friendly practices and technologies, and a comprehensive waste recycling program (both for construction and daily operations). Reclaimed water will be used for landscape irrigation, and trams operating throughout their properties will use cleaner-burning diesel technologies in an effort to reduce GHG emissions. Moreover, employees are encouraged to use alternative modes of transportation, including public transit, shuttles, flex cars, carpooling, or bicycling.

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<sup>4</sup>California Toxic Substances Control. *Electronic Waste*. N.D. Available from: <http://www.dtsc.ca.gov/HazardousWaste/EWaste/MoreInfo.cfm>. Last accessed on May 4, 2011.

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<sup>6</sup>NBC Universal. "Green Interacts Here." N.D. Available from: <http://nbc.com/green>. Last accessed on March 31, 2011.

<sup>7</sup>Disney. "Friends for Change Project Green." N.D. Available from: <http://disney.go.com/projectgreen>. Last accessed on March 31, 2011.

<sup>8</sup>Sony Pictures Entertainment. "A Greener World." 2011. Available from: <http://www.sonypictures.com/green>. Last accessed on March 31, 2011.

<sup>9</sup>Billingsley, Eric. "Warner Bros.: Changing Habits in Entertainment Biz." *San Fernando Valley Business Journal*. June 7, 2010. Available from: <http://sfvbj/news/2010/jun/07/warner-bros-changing-entertainment-biz>. Last accessed on March 31, 2011.

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<sup>11</sup>Billingsley, "Warner Bros.: Changing Habits in Entertainment Biz."

<sup>12</sup>Energy Boom. "'Valentine's Day' Movie Goes Green." February 11, 2010. Available from: <http://www.energyboom.com/emerging/valentines-day-movie-goes-green>. Last accessed on March 31, 2011.



# Fashion Design, Manufacturing and Wholesaling

## Cluster Overview

When it comes to style, Los Angeles County looks to the Fashion District located in downtown Los Angeles. At the intersection of Ninth and Los Angeles streets lie the fashion marts where designers display their latest creations, retailers negotiate prices for next spring's lines, and consumers flock to find bargains.

Centered in the 90-square blocks surrounding the fashion marts, over 93,300 workers are employed in this sector county-wide. This is the hub of the apparel industry on the West Coast.

The fashion industry workforce in Los Angeles County is more than twice the size of that found in New York's famed Fashion District. Big name designers like Forever 21, BCBG, American Apparel, Guess, True Religion, and 7 for all Mankind operate alongside small, independent shops.

Los Angeles County is also home to 26 companies that manufacture custom shoes and seven that manufacture handbags.

Supporting all this activity are many fashion education programs. The best known are the Fashion Institute of Design and Merchandising (FIDM) and the Otis College of Art and Design.

Although fashion design will continue to be drawn to Los Angeles and the Hollywood entertainment industry, low-cost competition from lower income countries in Asia and Latin America will drive the manufacturing industries of the fashion design, manufacturing and wholesaling cluster from the area. This decline over the medium- to long-term will more than offset any potential improvement in employment in fashion design.

## Industry Roster

- Apparel Manufacturing
- Apparel/Textile Wholesaling
- Fashion Designers
- Footwear Manufacturing
- Other Leather and Allied Product Manufacturing
- Textile Mills
- Toilet Preparations (Cosmetics, Perfumes, Creams, etc.)

## 2010-2020

## Employment Prospects



The employment outlook in the fashion design, manufacturing and wholesaling cluster is quite poor. The cluster is expected to experience an employment decline of 8.5 percent by 2020, a loss of 7,800 jobs. The industry faces continued competition from low-cost regions in Asia and Latin America. On-line markets for fashion may provide opportunities for wholesalers, but these will be related to the imports of fashion products not to the products of local manufacturers. The loss of jobs in this industry will be due to competitive pressures rather than to greening.

Source: LAEDC



## ESTABLISHMENTS

2009  
**5,690**  
1.4% of county total

1999  
**8,581**  
2.8% of county total



## EMPLOYMENT

2009  
**93,349 Jobs**  
2.4% of county total

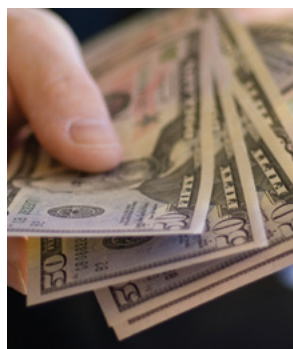
1999  
**143,286 Jobs**  
3.5% of county total



## ANNUAL PAYROLL

2009  
**\$3,507 Million**  
1.7% of county total

1999 (in 2009 dollars)  
**\$4,433 Million**  
2.2% of county total

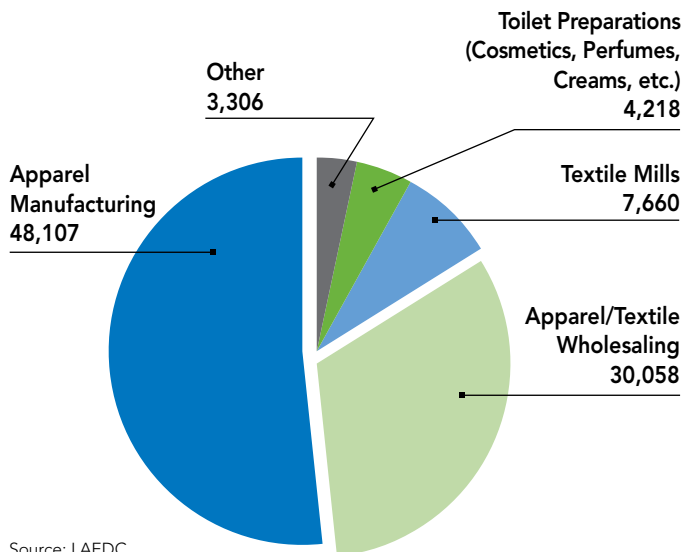


## OUTPUT

2009  
**\$17.2 Billion**  
1.9% of county total

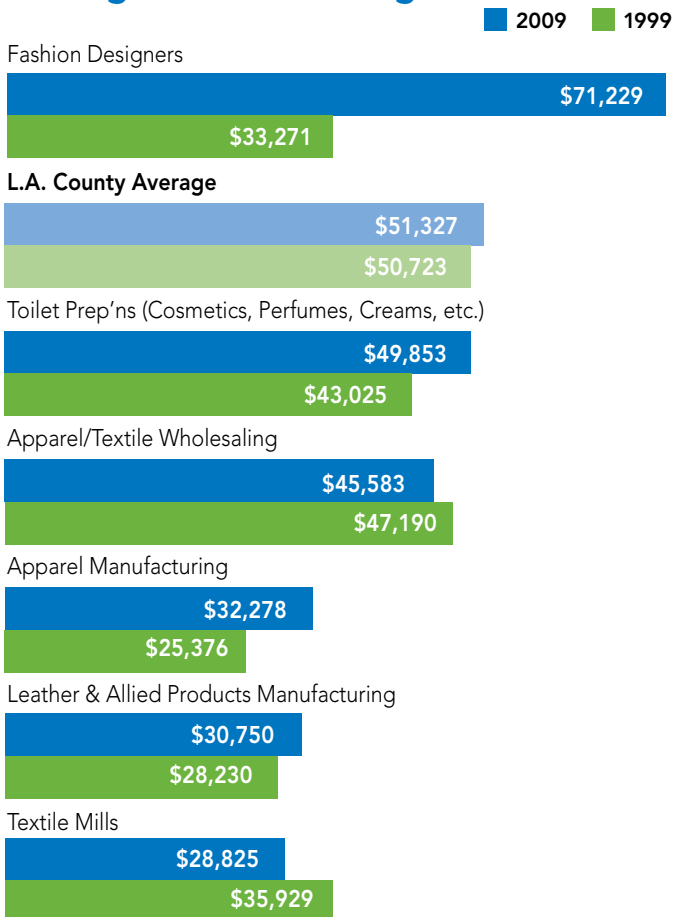
Source: LAEDC

## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)



Source: CA EDD

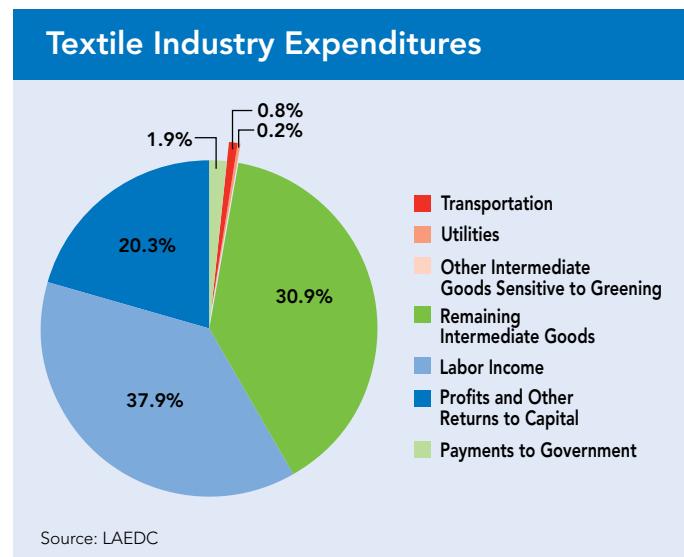
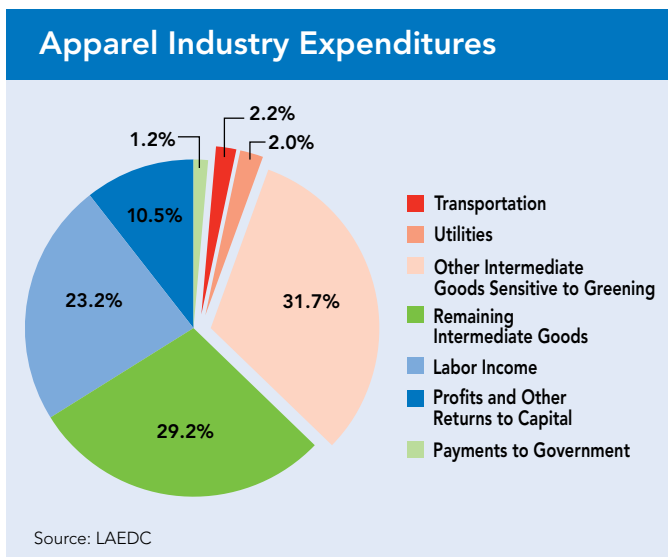




## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the apparel<sup>†</sup> and textiles<sup>§</sup> industry, with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the apparel industry in Los Angeles County spent on average \$7,305 per employee on utilities and transportation, while generating \$176,578 in output per employee.
- Around a quarter of apparel firms' expenditures go to textiles and other apparel inputs. Cotton prices are potentially sensitive to water shortages, and textile dyeing may face increased regulation due to pollution concerns. These issues could increase the price of Apparel firms' inputs.
- Apparel companies in Los Angeles already face stiff competition from overseas. By taking measures to reduce utility and transportation expenses, local firms may improve their competitive position.
- In 2008, firms in the textile industry in Los Angeles County spent on average \$11,168 per employee on utilities and transportation, while generating \$204,145 in output per employee.
- Textile businesses spend a significant portion of expenditures on textiles and dyes. Textile prices may be influenced by the cotton market, which is sensitive to water issues, and dyeing may be regulated locally due to pollution concerns.

<sup>†</sup>This industry group includes NAICS codes 315, 3162, and 3169. These definitions do not include all businesses that fall within our fashion cluster.

<sup>§</sup>This industry group includes NAICS codes 313 and 314.



## Things to Consider

The apparel industry faces constant pressure from lower cost operations outside the United States. One local denim manufacturer explained that anyone calling his firm for a quote would also obtain much lower bids from firms in China and other locations, such as Mexico. He sometimes loses to the lowest bidder, but he earns contracts based on superior quality control and flexibility made possible by a more adaptive and productive local workforce. Uncertainty about their continued viability in the face of constant competitive pressures will make it difficult for manufacturers in this cluster to justify even the most cost-effective investments in energy efficiency. Greening would not have to raise costs significantly to hasten the departure of an industry already losing jobs. The textile industry faces similar, perhaps stronger, competitive pressures, particularly from China. Yet, in one sense at least, the smaller textile industry is less vulnerable to greening than apparel manufacturing because of the shakeout that followed regulations and restrictions imposed decades ago on dyes and other chemicals.

Apparel and textile wholesaling has a significant local presence because of the importation of goods from Asia through the Ports of Los Angeles and Long Beach, and is thus unlikely to relocate out of the region to avoid higher costs associated with greening. Fashion design is more flexible in its location, but the cost of greening the industry will be low and outweighed by intangibles such as the local culture and interactions with the entertainment industry cluster which draw designers to Los Angeles.

## Examples of Regulations Driving the Greening of the Fashion Design, Manufacturing and Wholesaling Cluster

- ▶ Rule 1103 from the South Coast Air Quality Management District aims to reduce volatile organic compound (VOC) emissions from pharmaceuticals and cosmetics manufacturing operations. Manufacturing operators must follow specific limitations on VOC emissions while also keeping daily records on items such as the types and amounts of compounds in use.<sup>1</sup>
- ▶ The 2003 Toxics in Packaging Prevention Act set restrictions on packaging and packaging components containing certain toxics, such as lead and mercury.<sup>2</sup>
- ▶ In 2003 (and through subsequent amendments), the U.S. Environmental Protection Agency (EPA) established regulations to reduce toxic air emissions from industrial facilities that print, coat, and dye fabrics and other textiles. The EPA establishes these National Emissions Standards for Hazardous Air Pollutants (NESHAP) under the Clean Air Act.<sup>3</sup>
- ▶ The U.S. Resource Conservation and Recovery Act applies to many components of waste for textile manufacturers. The EPA has put together a process manual for determining whether textile manufacturers are subject to RCRA requirements; the first of these requirements is determining whether a facility produces hazardous waste and, if so, how much waste is generated.<sup>4</sup>



## Applying Green Practices

Apparel companies allocate an average of 4.1 percent of total spending to transportation and utilities. Fashion firms generally operate on a low-margin, high-volume basis in which small reductions in cost are essential for profitability. As a result, the green best practices that yield cost savings due to efficiency gains may be particularly important to apparel manufacturers.

### ► Transportation

Fashion companies can reduce their environmental impact by seeking the most sustainable methods for transporting their products from manufacturing facilities to their final market. Firms can use more efficient logistics, and firms that produce clothing domestically can avoid the emissions associated with shipping goods halfway across the world. For example, all of American Apparel's operations are based in Los Angeles, which reduces the need for long distance shipping, at least for sales to the Southern California market.<sup>5</sup>

### ► Facilities

Fashion companies can adopt many of the building management strategies listed in the "Choosing to Go Green" section of this report. LEED certified facilities can be used as can the retrofitting of light fixtures and the use of other energy efficient units. One way manufacturers can reduce their facilities' carbon footprint is by generating electricity on-site. For example, American Apparel generates 15 percent of the electricity for their downtown location using rooftop solar panels.<sup>6</sup>

### ► Waste

Apparel manufacturers can apply several strategies for reducing the impact of the clothing they produce. During the production process, designers can find ways to minimize leftover scraps of fabric or find other uses for these scraps. Fashion schools such as Parsons the New School for Design are training designers to maximize the efficiency of their patterns.<sup>7</sup> American Apparel arranges its cuts to minimize gaps, and ranks its clothing items by fabric efficiency. The company makes use of scraps for small items such as hair accessories or underwear, and passes on unusable scraps to its janitorial staff. Any leftover scraps are recycled and not sent to landfills.<sup>8</sup> Another strategy is to reuse cardboard boxes instead of recycling them which requires chemicals and the operations of machines where both have an environmental impact of their own.

*Firms in fashion design and manufacturing will adopt green practices primarily for the cost savings opportunities, though uncertainty about their survival in Los Angeles amid global competition may limit their willingness to invest.*

## Sources

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<sup>4</sup>United States Environmental Protection Agency. *RCRA in Focus: Textile Manufacturing*. N.D. Available from: <http://www.epa.gov/osw/inforesources/pubs/infocus/k02028.pdf>. Last accessed on May 4, 2011.

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<sup>6</sup>American Apparel. "Sustainability." 2011. Available from: <http://americanapparel.net/verticalintergration/sustainability.html>. Last accessed on March 31, 2011.

<sup>7</sup>Rosenblum, Stephanie. "Fashion Tries on Zero Waste Design." *New York Times*. August 13, 2010. Available from: <http://www.nytimes.com/2010/08/15/fashion/15waste.html>. Last accessed on March 31, 2011.

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# Financial Services

## Cluster Overview

Banking and major financial services employ 95,500 people in the county. Big name institutions such as Bank of America, Wells Fargo, Union Bank, and JP Morgan Chase all have sizable operations located here. A number of regional banks also are headquartered in L.A. County including City National Bank, East West Bank, and Cathay Bank. In addition, there are savings and loan associations, such as One West Bank, headquartered in the county.

Asset management is a significant contributor to the field. The three largest private equity firms headquartered in Los Angeles County in 2009 were Oaktree Capital Management LLC, Leonard Green and Partners LP, and Pacific Coast Capital Partners, LLC (PCCP LLC). Together, their assets totaled nearly \$27.0 billion. Venture capital investments in the Los Angeles and Orange County area totaled more than \$1.64 billion in 2010.

While mortgage and real estate markets are still in realignment nationally, these sub-segments constitute a significant portion of employment and economic activity within the cluster locally. Insurance companies, investment firms, leasing and finance companies, credit and collection services all contribute to the vitality of this sector.

Financial activities are expected to bounce back as the recovery takes hold and as the housing market stabilizes.

### Industry Roster

- Credit Intermediation and Related Activities
- Funds, Trusts and Other Financial Vehicles
- Monetary Authorities – Central Bank
- Securities and Financial Investments and Related Activities

### 2010-2020

### Employment Prospects



The employment outlook for the financial services cluster is fair. The cluster is expected to add 7,500 jobs by 2020, an increase of 7.8 percent over current employment. This sector experienced a severe downturn during the recession but will recover once liquidity returns to the marketplace. This is generally a cyclical industry and greening is unlikely to have a significant employment impact.

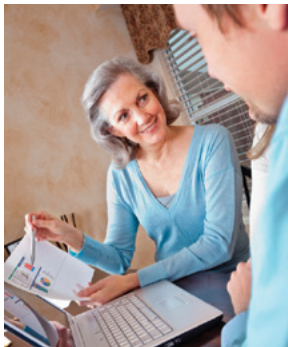
Source: LAEDC



## ESTABLISHMENTS

2009  
**7,626**  
1.8% of county total

1999  
**5,927**  
1.9% of county total



## EMPLOYMENT

2009  
**95,488 Jobs**  
2.4% of county total

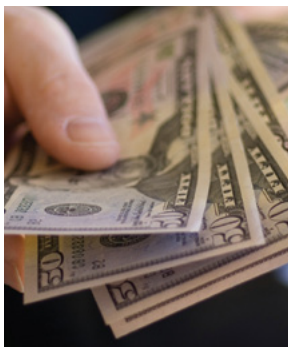
1999  
**88,237 Jobs**  
2.2% of county total



## ANNUAL PAYROLL

2009  
**\$8,890 Million**  
4.4% of county total

1999 (in 2009 dollars)  
**\$8,340 Million**  
4.1% of county total

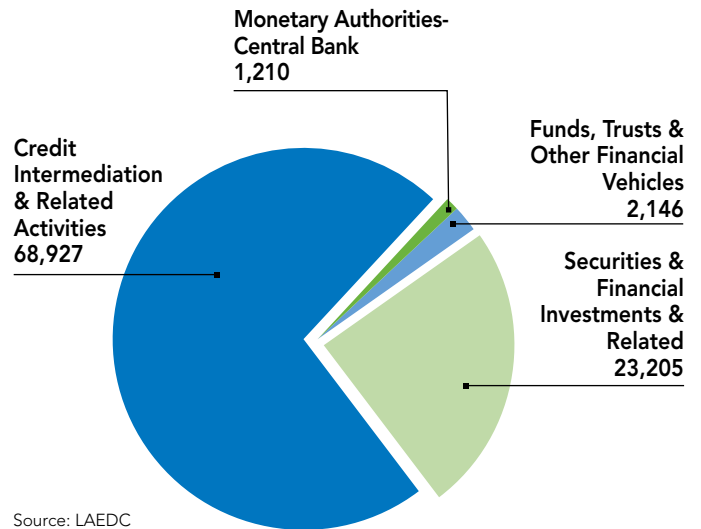


## OUTPUT

2009  
**\$41.3 Billion**  
4.7% of county total

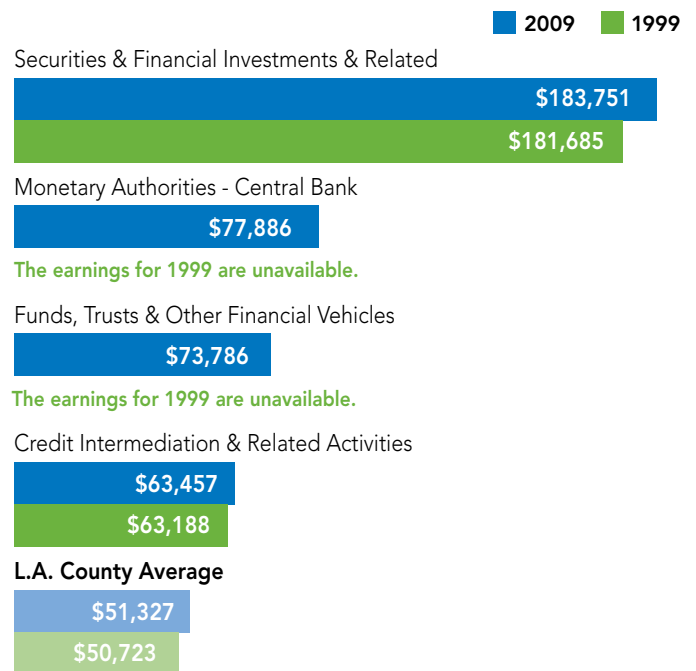
Source: LAEDC

## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)



Source: CA EDD

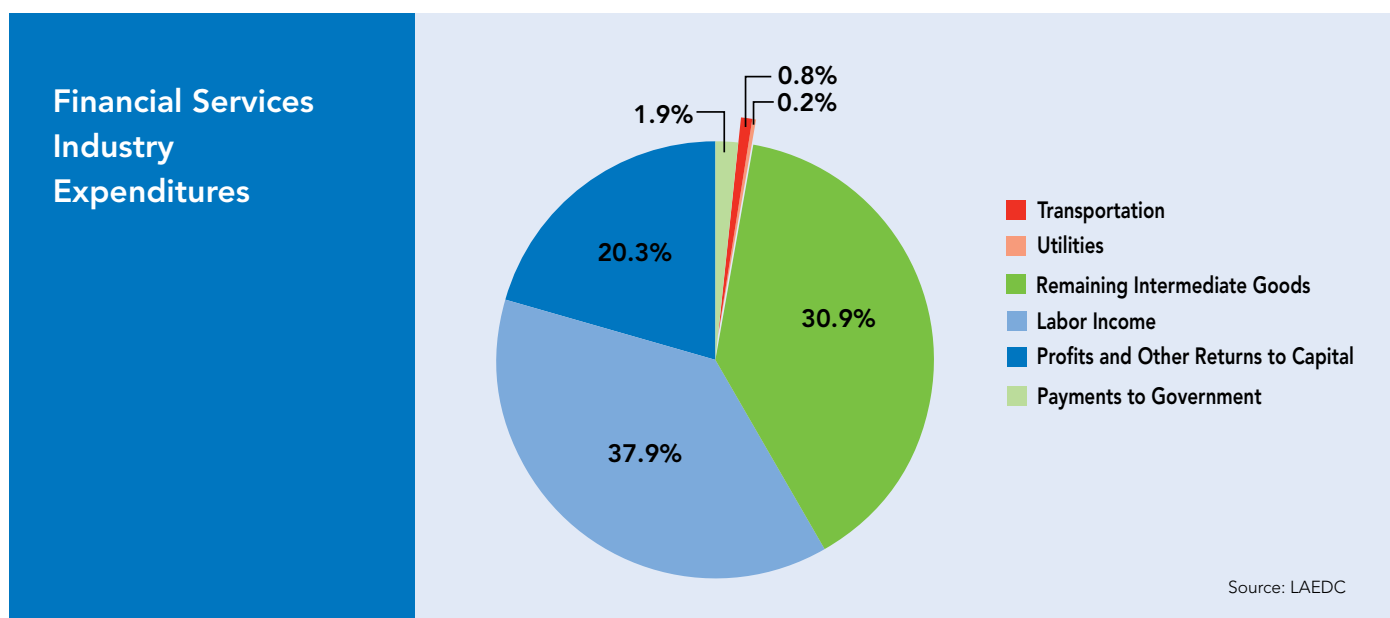




## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the financial services industry cluster,<sup>†</sup> with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the financial services cluster in Los Angeles County spent on average \$2,497 per employee on utilities and transportation, while generating \$256,746 in output per employee.
- The vast majority of financial services expenditures go toward service-based inputs, which are not price-sensitive to greening.

*Greening will create opportunities for firms in financial services that can deliver creative financing options for businesses in other sectors seeking to make cost-saving investments.*

<sup>†</sup>This industry group includes NAICS codes 521-3 and 525.



## Things to Consider

The customer-facing operations of firms in the industries comprising the financial services cluster will not have much opportunity to leave the state if the cost of greening becomes burdensome. Many of the national firms have already relocated back-office operations, call centers, and other business units that do not need to be physically present in California to lower cost states. Some firms, such as asset managers and others in the cluster that have less need to be located in California in order to serve the Los Angeles market, have more flexibility in their response. Overall, however, financial services firms face a minimal burden from greening the economy and any firm directly serving the local market will face the same burden as its competitors.

Financial services firms will have the opportunity to participate in the market for green opportunities either as investors or financiers. For example, City National Bank (CNB) devised a creative solution that allowed Cal Cartage, a transloading firm, to help its independent truckers meet the Port of Long Beach requirements for cleaner trucks under the Clean Air Action Plan. On their own, the independent truckers could not afford to lease the new trucks. Neither they nor Cal Cartage made sufficient profits for state tax credits to be useful. Cal Cartage brought its credit rating and the tax credits to the table. CNB used the tax credits but rolled the savings back into the deal. The combination of the proceeds from the tax credits and the Cal Cartage backing enabled CNB to lend to the independent truckers at a rate that substantially lowered their monthly payments. The truckers purchased new vehicles with an affordable payment; CNB was able to add millions of dollars in loans with an acceptable combination of risk and return to its portfolio; Cal Cartage made sure its operations would comply with the Clean Air Action Plan; and the region is enjoying cleaner air with fewer diesel particulate emissions.

## Examples of Regulations Driving the Greening of the Financial Services Cluster

- ▶ On-Bill Financing (OBF) is a utility-based method of energy efficiency financing, which allows customers to upgrade their property through payments on their monthly utility bill. Southern California Edison has provided \$16 million in funds for OBF, and \$6.3 million in projects have been waitlisted due to the popularity of the program.<sup>1</sup>
- ▶ While not yet a formal rule, the South Coast Air Quality Management District (AQMD) Proposed Rule 2301 seeks to mitigate the growth in emissions (e.g., new vehicle trips, construction activity, etc.) from new residential, commercial, industrial, and institutional development and redevelopment projects.<sup>2</sup>
- ▶ AB 811 (Levine) (2008) and AB 474 (Blumenfield) (2009) set in place the State's Clean Energy Municipal Financing Law, which enables property owners to finance energy efficiency and renewable energy projects that are attached to the property. Commonly known as a property assessed clean energy (PACE) finance program, the statute has faced legal challenges and other hurdles.<sup>3</sup> However, efforts are underway to restore the program.<sup>4</sup>
- ▶ With an effective regulation date planned for the end of 2011, the proposed cap-and-trade program by the California Air Resources Board (CARB) aims to meet AB 32 GHG goals by setting limits on GHG emissions for sectors while also allowing tradable permits to emit GHGs.<sup>5,6</sup>



## Applying Green Practices

Of all the industry clusters defined in this report, financial services spends the smallest percentage of total outlays on emissions-intensive purchases. Financial institutions certainly can help the environment by promoting green practices around the office. However, the cluster's most important contribution to greening will likely come from incorporating environmental qualifications when analyzing projects to be financed.

### ► Operations

Financial institutions can set goals to reduce their GHG emissions. Most of the emissions in the financial services cluster stem from energy consumption; therefore measures that reduce consumption are the best way to reduce emissions. These might include: more efficient data centers; office space optimization; the early adoption of new energy efficient technologies; more efficient office equipment, such as laptops and desktop computers; improved energy management systems and technology; pursuing the measures needed for LEED certification for office buildings (including lighting retrofitting and the use of more energy efficient appliances and HVAC units); and employee training to encourage energy-conscious behavior (including using alternative methods of transportation to the workplace and recycling).

### ► Facilities

Banks can apply many of the general best practices relevant to the greening of buildings and office management. For example, City National Bank automatically shuts down all computers after hours, saving over 1.2 million kilowatt-hour (kWh) annually. They also spend more than \$650,000 annually to subsidize employee public transportation and operate 22 videoconferencing sites to reduce the need for business-related travel. To reduce waste generation, City National Bank has eliminated over eight million printed pages through electronic documentation. The firm has also achieved LEED certification at its building in San Francisco.<sup>7</sup> Bank of America Tower at One Bryant Park is pursuing a Platinum LEED certification. The building is equipped to conserve about 3.4 million gallons of water every year and has a 5.1 megawatt cogeneration system that will produce approximately 70 percent its annual energy requirements.

### ► Financing Renewable Energy

In 2007, Bank of America began a 10-year, \$20 billion business initiative to address climate change with lending, investments, capital markets activity, philanthropy, and its own business operations. As part of this effort, Bank of America initiated a \$55

million program to encourage energy efficiency improvements to older buildings, which includes \$50 million in low-cost, long-term loans and \$5 million in grants to help with staffing, training, reserves, and marketing. These funds will be offered to Community Development Financial Institutions (CDFIs) that specialize in financing the upfront investment costs for building owners to make energy efficient retrofits. Additionally, Bank of America will be using a third party consultant to gather pre- and post-retrofit data and to analyze and report on the outcome of the programs. It is expected that the reduced energy costs will create the cash flow necessary to repay the loan.

The former Ford Assembly Plant in Richmond, California, designed by Albert Kahn, was once the largest automobile assembly plant on the West Coast. Now named Ford Point, it has been rehabilitated to house sustainable product manufacturers. Bank of America contributed to its rehabilitation, which includes green design elements and solar panels, through several equity products totaling \$13.8 million. These equity products included: a tax credit equity investment (for revitalizing urban communities); a new markets tax credit equity investment (for revitalizing low-income communities); and a solar tax credit equity investment (for purchasing and installing solar equipment).

East West Bank has launched their Go Green initiative promoting clean technology in California. It includes partnering with companies to finance green projects in line with the company's goals, in addition to a community program in partnership with Southern California Edison (SCE), encouraging both consumers and small businesses in California to make energy efficient choices in order to conserve energy and reduce energy related costs.

The East West Bank has also partnered with Mitsubishi Electric to install 3,536 Mitsubishi Electric photovoltaic solar modules over 90,000 square feet at the Port of West Sacramento. The 637 kW DC solar PV system will be installed on the rooftops of two rice warehouse buildings and is expected to cut electricity costs by \$20,000 annually. The bank is providing the construction loan and the long term financing needed for the PV project.



This solar project is one of the measures being undertaken by the port to help mitigate the impact of their operations on the environment.

### ► Carbon Credits

A way for firms in the financial services cluster to reduce their GHG emissions is to purchase carbon credits. For example, BofA Merrill Lynch announced a 10-year Certified Emissions Reductions (CERs) agreement with Nuru Energy, an organization that applies market strategies to achieving philanthropic goals. Nuru Energy, funded by the World Bank in 2008 and operating in the eastern portion of Africa and in India, plans to replace the kerosene lamps being used in off-grid rural households with rechargeable light emitting diode (LED) lighting, making them available through microfinance institutions (MFIs). These carbon credits are eligible for BofA Merrill Lynch's compliance with the European Union's Emissions Trading System (EU ETS).

### ► Paper Waste

Paper is the second largest component of California's commercial waste stream, and nearly 60 percent of all recycled office paper originates from commercial sources. Many measures can be deployed to ensure a reduction in paper waste, such as: double-sided printing; the use of electronic formats, e-mail forms, document transmittals, and faxes; the utilization of the document preview option; the reprinting of only pages that have been edited rather than the entire document; and the provision of copier trays to reuse one-sided paper. In the financial services cluster, banks can significantly reduce the amount of waste they generate by keeping paperless records and minimizing the use of paper except when necessary. Firms can apply this strategy to customer records as well as internal documents. For example, Bank of America and Wells Fargo ATMs now accept checks without using envelopes<sup>8</sup>

### ► Environmental Due Diligence

By analyzing environmental risk factors, financial firms can improve the quality of their due diligence, which means to discover the true costs and benefits of potential financing projects. All industries face growing pressure, from both a legal and a public relations perspective, to respect environmental concerns. While this can be a costly requirement, it is also costly to undo environmental harm, as the 2010 oil spill crisis illustrates. By examining projects from an environmental perspective, financiers can avoid backing potential environmental disasters.

There are several voluntary organizations already in place to help financial firms perform environmental risk management. For example, the Equator Principles provide insights into measuring social and environmental costs and benefits.<sup>9</sup> Another organization, Carbon Principles, focuses on concerns related to financing electric power projects.<sup>10</sup> Such organizations help their already substantial membership networks share best practices related to environmental analysis. The majority of large banks already adhere to one or more of these sets of principles.

## Sources

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- <sup>2</sup>South Coast Air Quality Management District. "Proposed Rule 2301 – Control of Emissions from New or Redevelopment Projects." South Coast Air Quality Management District. October 9, 2009. Available from: <http://www.aqmd.gov/rules/proposed/2301/index.html>. Last accessed on April 21, 2011.
- <sup>3</sup>Renewable Funding. "CaliforniaFIRST." *Renewable Funding*. N.D. Available from: <https://www.renewfund.com/node/220>. Last accessed on April 18, 2011.
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- <sup>10</sup>The Carbon Principles. 2009. Available from: [www.carbonprinciples.org](http://www.carbonprinciples.org). Last accessed on March 31, 2011.



# Food and Beverages

## Cluster Overview

The food and beverage industry sector is vast in Los Angeles County, offering a wide variety of options for patrons as well as employment opportunities for residents. It is the third largest population-serving cluster in Los Angeles County with 276,900 jobs in over 16,300 establishments.

Establishments in this cluster are classified according to the level of service provided. Drinking places are primarily establishments that serve alcoholic beverages. Full-service restaurants have wait staff table service where patrons pay at the conclusion of their dining experience. Limited-service eating places are those where customers pay before eating and have no wait staff, as is the case in fast food restaurants. Finally, specialty food service includes other food service contractors, caterers, and mobile food services which are increasingly common in Los Angeles County.

The food and beverages cluster is intertwined with the history of the entertainment industry in Los Angeles. Many family operations have been passed down from generation to generation to become cultural icons: Tam O'Shanter was opened in 1922; Pink's Hot Dogs in 1939; the Pacific Dining Car in 1923; and the San Antonio Winery in 1917. Many establishments, in addition to being featured in television and movie productions, are known for their famous patrons, and as a result are favorite paparazzi hangouts.

Gourmet mobile food trucks are the latest trend to be embraced by the residents of Los Angeles County. The Kogi Korean BBQ Truck started the fad and has developed a cult following which stalks their mobile locations via Twitter.

As an industry that grows with the population, employment prospects remain good, although wages are low.

## Industry Roster

- **Drinking Places (Alcoholic Beverages)**
- **Full-Service Restaurants**
- **Limited-Service Eating Places**
- **Special Food Services**

2010-2020

## Employment Prospects



The employment outlook in the food and beverages cluster is good. The cluster is expected to add 33,000 jobs by 2020, an increase of twelve percent over current employment. This is a population-serving industry, and in spite of increasing utility costs, transportation costs and greening regulations, its growth will at least parallel population growth provided household incomes keep pace.

Source: LAEDC





## ESTABLISHMENTS

2009  
**16,338**  
3.9% of county total

1999  
**15,381**  
5.6% of county total



## EMPLOYMENT

2009  
**276,873 Jobs**  
7.0% of county total

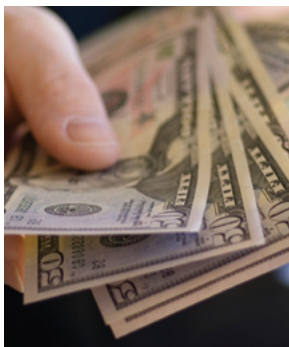
1999  
**241,502 Jobs**  
6.6% of county total



## ANNUAL PAYROLL

2009  
**\$4,909 Million**  
2.4% of county total

1999 (in 2009 dollars)  
**\$4,303 Million**  
2.1% of county total

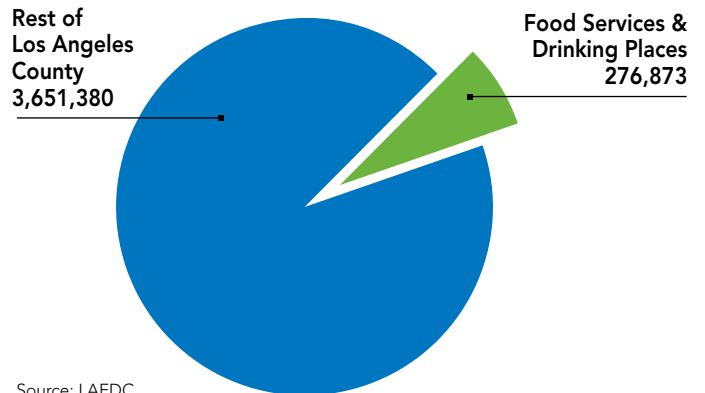


## OUTPUT

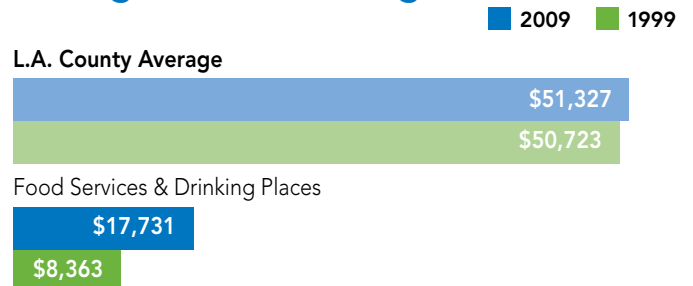
2009  
**\$20.9 Billion**  
2.4% of county total

Source: LAEDC

## Employment by Industry (2009)



## Average Annual Earnings (in 2009 dollars)

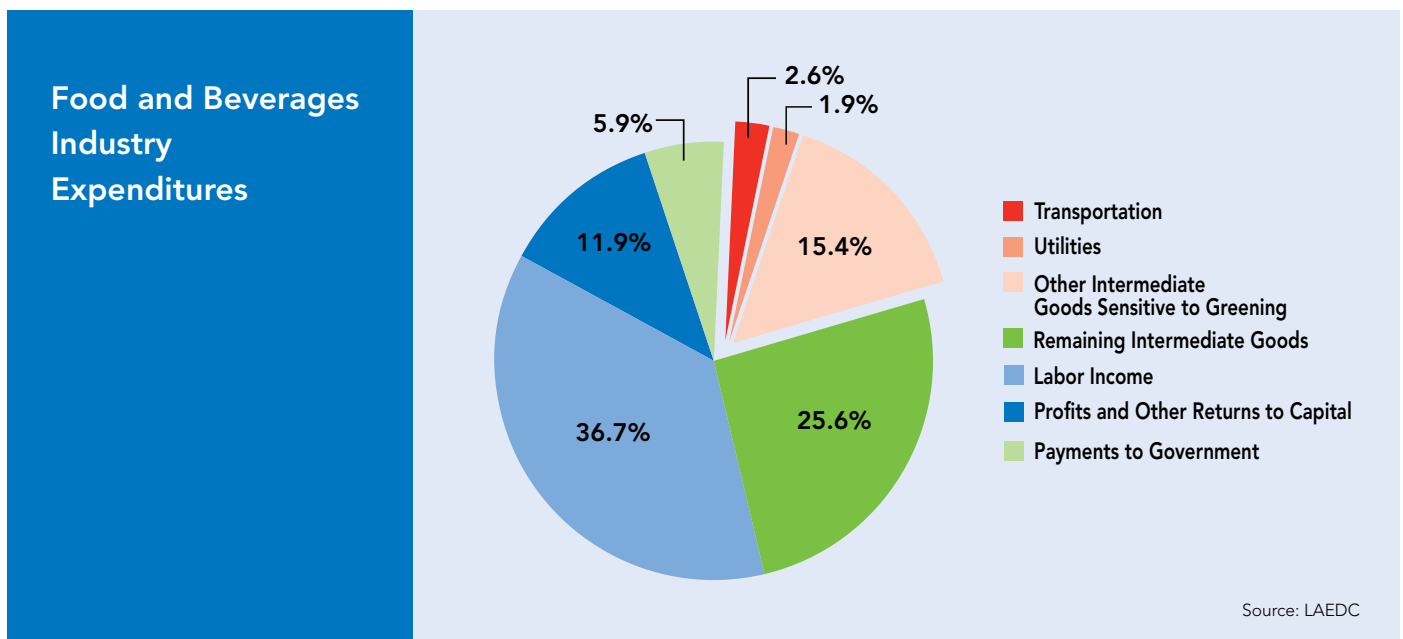




## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the food services industry,<sup>†</sup> with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the food and beverages industry cluster in Los Angeles County spent on average \$2,888 per employee on utilities and transportation, while generating \$63,883 in output per employee.
- Food service businesses spend most of their expenditures on service-based inputs, which are not price-sensitive to greening.

<sup>†</sup>This industry group includes NAICS code 722.



### Things to Consider

The food and beverages industry cluster is comprised of population-serving firms that must be located locally in order to serve the Los Angeles County market. All firms in this cluster will face similar cost pressures due to the greening of the economy. Firms in this industry cluster will help create demand for green products and services, such as energy-efficient ovens or

commercial refrigerators, and they may be indirect participants in green opportunity areas, such as more comprehensive recycling programs and the possible conversion of food waste to energy. Overall, firms in this cluster will have limited opportunities to sell their own green services or products.

### Examples of Regulations Driving the Greening of the Food and Beverages Cluster

- ▶ The South Coast Air Quality Management District (AQMD) Proposed Rule 2301 aims to mitigate the growth in emissions (e.g., new vehicle trips, construction activity, etc.) that arise from new residential, commercial, industrial, and institutional development and redevelopment projects.<sup>1</sup>
- ▶ The Los Angeles County Green Building Program became effective in 2009, which applies to new development in the unincorporated areas of Los Angeles County. The Green Building Program included ordinances on Drought-Tolerant Landscaping, Green Building, and Low Impact Development. The Drought-Tolerant Landscaping Ordinance requires that landscaping use specific plants with low water needs. The Green Building Ordinance requires the use of construction materials and techniques to improve the energy efficiency of a building and generate fewer pollutants. And, the Low Impact Development Ordinance provides a way to manage rainfall and stormwater runoff.<sup>2,3</sup>
- ▶ While several efforts to eliminate the use of plastic bags have failed, some efforts have been implemented, like those in the City of Santa Monica.<sup>4</sup>
- ▶ As part of the California Air Resources Board (CARB) scoping plan for AB 32, the Mandatory Commercial Recycling Measure aims to achieve a reduction in GHG emissions of five million metric tons of carbon dioxide equivalents. To achieve this, the measure sets a path to recycle an additional two to three million tons of materials of commercial waste on annual basis.<sup>5</sup>
- ▶ In 2008, Governor Arnold Schwarzenegger issued an Executive Order declaring a statewide drought. This order ignited statewide conservation efforts and other creative solutions to address water supply and demand. Some of these efforts included the use of tiered water rate structures and drought-tolerant landscaping.<sup>6</sup>
- ▶ The U.S. Environmental Protection Agency's (EPA) phaseout of the production and import of ozone-depleting substances (or ODS) is in Class II, which consists of hydrochlorofluorocarbons (or HCFCs). The most widely used HCFCs are in refrigerants, and the more common commercial and industrial uses include retail food refrigeration and cold storage warehouses.<sup>7</sup> The schedule of ODS phaseouts can be found in the Montreal Protocol.
- ▶ Under the EPA Pretreatment Program, operators of publicly owned treatment works (POTWs)—which collect, transport, and treat wastewater from homes, commercial buildings, and industrial facilities—are responsible for implementing standards to control pollutants from users whose waste can interfere with a treatment process. Discharges of fats, oils, and grease from food service establishments represent a large source of waste that often interferes (creates blockages) with the treatment of waste at these types of facilities.<sup>8</sup>



### Applying Green Practices

Restaurants and drinking places have some of the most intuitive and profitable options for going green. Food service establishments spend almost three percent of their total outlays on utilities. By reducing electricity and water consumption, restaurants can cut these costs and improve the bottom line. Most of the strategies available for cutting these expenditures are quite simple and inexpensive to implement.

#### ► Electricity

Restaurants can significantly cut electricity used for lighting, air conditioning, kitchen appliances, and water heaters. Old equipment can be replaced with Energy Star certified products, often with rebates available at the time of purchase. These appliances often pay for themselves within a few years. Electrical equipment can also be used more intelligently to reduce costs. By keeping refrigerators and freezers full, minimizing hot water use, and turning off lights and appliances when they are not needed, restaurants can further reduce electricity use. Restaurants can offset the effect of the electricity they consume by purchasing renewable power or buying carbon credits. For example, the restaurant chain Burgerville purchases wind power credits equal to 100 percent of its electricity.<sup>9</sup>

#### ► Water

Water-saving measures are easy to implement. Running dishwashers only with full loads ensures that hot water is not wasted on unfilled capacity. Restaurants can reduce water use in their sinks by soaking dishes in water and thawing foods in the refrigerator rather than running hot water over them continuously. Low-flow fixtures installed in bathrooms and kitchens can have a significant effect at reducing water consumption.

#### ► Waste

Restaurants can be significant generators of food and packaging waste. Waste can be significantly reduced by using reusable dishes instead of disposable products. By sorting out recyclables, and organic waste for composting, restaurants can divert reusable waste away from landfills. By using recycled products, restaurants can reduce the amount of waste entering landfills. For example, McDonald's packaging materials are made from 63 percent recycled paper.<sup>10</sup>

Local public waste authorities can also implement programs which help to meet their waste diversion goals and reduce the impact on the environment. The Contra Costa Solid Waste Authority has a Food Recycling Project in place (started in November 2008) focusing on diverting commercial food waste from landfills and converting it into renewable energy. Rather than using composting, the food waste from restaurants, grocery stores and even institutional facilities is anaerobically digested into methane gas by equipment usually used to process sewage. This methane is then used to power a water treatment plant, with any excess sold to PG&E. The solid byproduct of this process is used for non-food agricultural purposes as it improves the physical properties of soil, such as its aeration and water filtration ability and its water and nutrient holding capacity. The City of Atlanta implemented a pilot Zero Waste Zone program in 2008. This program identifies three waste products commonly associated with food and beverage operations that can be reused or recycled. These are: spent grease, which can be used as bio-fuel; common recyclables, such as paper, metals, glass and plastic; and food and other organics, which mostly consist of kitchen scraps and spoiled food that can be composted at permitted sites.<sup>11</sup>

Restaurants can also reduce their waste production by converting used cooking oil into biodiesel. Burgerville recycles all of its oil this way—in 2007, the company recycled 53,000 gallons of oil, producing 39,750 gallons of biodiesel.<sup>12</sup> The cafeteria system of Georgetown University also converts 100 percent of its used cooking oil.<sup>12</sup>

*Firms in the food service industry cluster will mostly be affected indirectly by the greening of the economy, though customer demands could hasten the adoption of green practices.*



## ► Sourcing

Another method of greening available to food and beverage operations is through the sourcing of products used in food and beverage preparation. Natural, organic ingredients don't use toxic chemicals in the growing process and locally sourced ingredients reduce emissions related to transport and contribute to sustainability. Chipotle uses natural and hormone-free meats and poultry, and between 25 to 30 percent of their beans are organic. Peet's Coffee and Tea sells and serves both free trade and organic coffees, incorporating both environmental and social responsibility into their operations.

## ► Certification

Restaurants adopting a comprehensive greening strategy can pursue LEED certifications, which can help reduce costs and project a green image to customers. For example, McDonald's has achieved LEED Platinum certification at its corporate headquarters, and several of its pilot restaurants in the U.S. and Canada have achieved LEED certification as well.<sup>13</sup>

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# Food Products Manufacturing and Wholesaling

## Cluster Overview

While Los Angeles County was once California's largest agricultural county, today the emphasis falls less on growing crops and raising livestock than on preparing and marketing these products to ship to both domestic markets and a growing international clientele.

With a nearly ideal growing climate, significant nursery and landscaping activity exists within the county. The Antelope Valley, in the northern reaches of the county, continues to be a major producer of alfalfa, root vegetables and tree fruits, employing over 1,400 workers.

Another 60,000 people work in food processing, wholesaling foodstuffs, cut flowers, and fresh-grown produce throughout the county. Key employers in this segment include: Farmer John, a well-known meat packer in Vernon, famous for their "Dodger Dogs" served at Dodger Stadium; Nestlé Foods, with USA headquarters in Glendale; and Sunkist Growers, the famed citrus cooperative with executive offices in the San Fernando Valley.

Scores of farmers' markets in cities throughout the county offer fresh produce that is grown locally. Growing in popularity as shoppers buy locally-grown fresh produce, farmers' markets have proliferated throughout the county and region.

Still, employment in food processing industries is expected to continue to decline, with the exception of bakeries and tortilla manufacturing, which grows with the population.

## Industry Roster

- Beverage and Tobacco Products Manufacturing
- Farm Products (Raw) Wholesaling
- Fish and Seafood Merchant Wholesalers
- Food Manufacturing
- Fruit and Tree Nut Farming
- Fruit and Vegetable Merchant Wholesalers
- Meat and Meat Product Merchant Wholesalers
- Poultry Product Merchant Wholesalers
- Vegetable and Melon Farming

2010-2020

## Employment Prospects



The employment outlook for the food products manufacturing and wholesaling cluster is mixed. The cluster is expected to add 1,500 jobs by 2020, an increase of only 2.4 percent. While food manufacturing is a large industry, much of which will continue to be based locally to serve the large market, increasing utility costs, transportation costs and greening regulations are likely to be a drag on employment growth.

Source: LAEDC



## ESTABLISHMENTS

2009  
**1,800**  
0.4% of county total

1999  
**2,201**  
0.7% of county total



## EMPLOYMENT

2009  
**61,675 Jobs**  
1.6% of county total

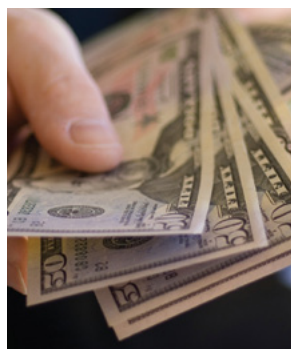
1999  
**63,040 Jobs**  
1.6% of county total



## ANNUAL PAYROLL

2009  
**\$2,796 Million**  
1.4% of county total

1999 (in 2009 dollars)  
**\$2,927 Million**  
1.4% of county total

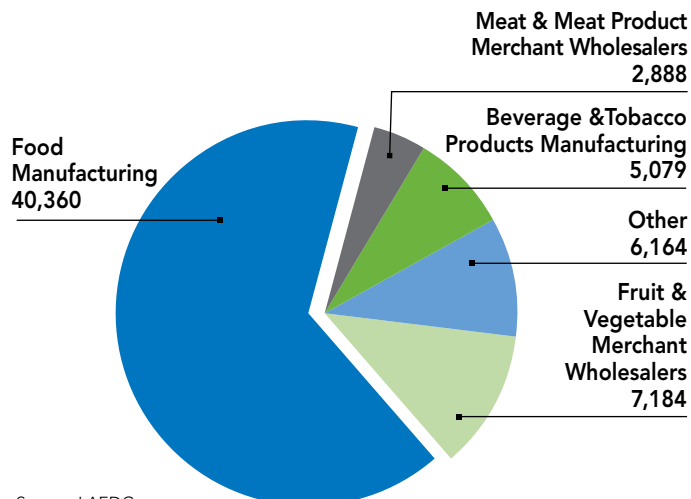


## OUTPUT

2009  
**\$26.9 Billion**  
3.0% of county total

Source: LAEDC

## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)



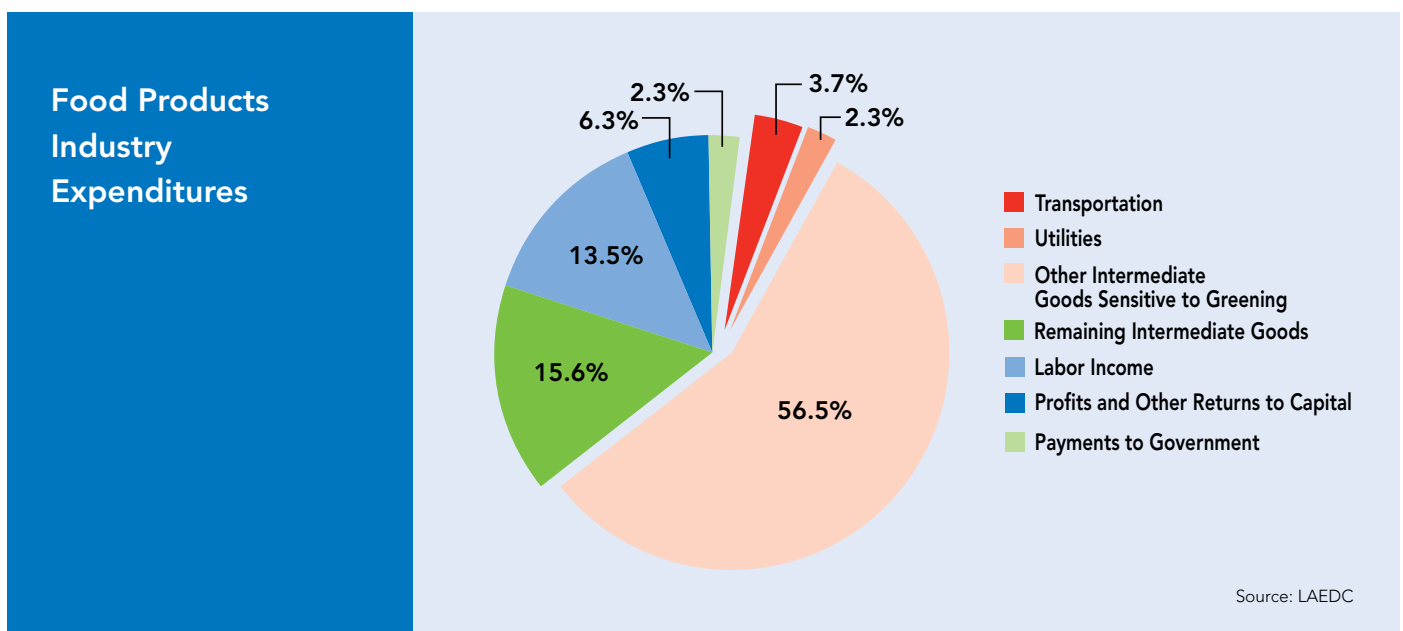
Source: CA EDD



## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the food products industry,<sup>†</sup> with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the food products industry in Los Angeles County spent on average \$28,933 per employee on utilities and transportation, while generating \$484,163 in output per employee.
- The food products industry is somewhat vulnerable to increases in utility and transportation costs.
- This industry cluster is also exposed to the prices of agricultural goods and other manufactured foods, which may increase due to water supply limitations and fuel prices.

*Firms in the food products manufacturing and wholesaling industry cluster will adopt green practices to control costs and to comply with government regulations.*

<sup>†</sup>This industry group includes NAICS codes 3112-9 and 312. This definition does not include all businesses that fall within our food products manufacturing and wholesaling cluster.



## Things to Consider

The wholesale industries in the food products manufacturing and wholesaling cluster are comprised of population-serving firms that need to be in the Los Angeles region to serve the local market and thus have little ability to relocate to avoid green-related cost increases while retaining their current customers. Beverage manufacturers are less constrained, but the economics of transporting heavy, low-weight-to-value products favor remaining in close proximity to the large Los Angeles market. Food product manufacturers have greater flexibility, though they may be limited by factors such as the length and cost of the cold chain required for frozen and highly perishable products.

Many food product manufacturers are smaller firms that may not have the resources to fully examine the greening options applicable to their operations. In focus groups we conducted,

firms expressed concern about year-based rules, i.e., those that require the installation of equipment manufactured after a particular year. Such rules make enforcement simpler and less expensive because it requires confirming the age of the equipment rather than testing emissions, yet, they make no allowance for older equipment that has been sufficiently well maintained or upgraded to meet the desired emissions standard. Such subtleties are important when it could mean the difference between replacing a piece of equipment that costs tens of thousands of dollars. Another common complaint is centered on regulations designed to reduce emissions from diesel trucks. Many smaller food and beverage manufacturers operate a few diesel trucks in order to distribute their products, but, because they are small and cannot spread the costs over a number of truck assets, they find the cost of the required upgrades prohibitive.

## Examples of Regulations Driving the Greening of the Food Products Manufacturing and Wholesaling Cluster

- ▶ For nearly three years, the State of California was declared to be in a statewide drought by an Executive Order issued by Governor Arnold Schwarzenegger in June 2008. This directive prompted statewide conservation efforts and innovative solutions to increase water supply/decrease water demand. Some of these efforts included the use of tiered water rate structures and drought-tolerant landscaping.<sup>1</sup>
- ▶ The California Air Resources Board (CARB) has an On-Road Heavy-Duty Diesel Vehicles (In-Use) Regulation, which requires retrofitting of heavy duty trucks to ensure each truck has 2010 model engines by 2023.<sup>2</sup> Agricultural vehicles have specific provisions that are not as stringent.<sup>3</sup>
- ▶ Through AB 455 (Chu) (2003) and subsequent amendments, which are more commonly referred to as the Toxics in Packaging Prevention Act, packaging and packaging components containing cadmium, lead, mercury, or hexavalent chromium faced significant limitations. The law affects all manufacturers, distributors, and resellers, regardless of where the packaging originated.<sup>4</sup>
- ▶ In 2004, the U.S. Environmental Protection Agency (EPA) established wastewater discharge limits for the Meat and Poultry Products industry. Specifically, this rule reduces conventional pollutants, ammonia, and nitrogen from being discharged into waters.<sup>5</sup>
- ▶ The Federal Food, Drug, and Cosmetic Act authorized the EPA to set maximum limits for pesticide residues on food. The EPA makes findings that the level is “safe,” meaning that the exposure from the level of residue will not cause harm.<sup>6</sup>
- ▶ In 2001, the EPA issued a final rule limiting the emissions of toxic air pollutants from vegetable oil production. At the time of its adoption, the rule was expected to reduce emissions of hexane by 6,800 tons per year and smog-forming VOCs by 10,600 tons per year.<sup>7</sup>
- ▶ The standards established by the EPA for nonroad diesel equipment—commonly used in industries such as agriculture and construction—and refineries went into effect in 2007. The nonroad diesel equipment regulation aims to reduce exhaust emissions from these types of vehicles by more than 90 percent, but the regulation only applies to future nonroad diesel engines. Refiners were also required to produce low-sulfur diesel fuel for use in this type of equipment to ensure the advancement of emission-control technologies, which can sometimes be damaged by sulfur.<sup>8</sup>



## Applying Green Practices

Food product manufacturers can adopt many of the strategies employed by all industries with large manufacturing facilities. Firms in this industry may be able to reduce expenditures significantly by greening. Particular concerns for this industry cluster include the combined need for heat generation and refrigeration. Many food products manufacturers produce a highly perishable product, resulting in an intricate cold chain that may be sensitive to energy supply interruptions. Furthermore, many food products are heavy or bulky and thus expensive to transport.

### ► Building

Food product manufacturers can apply many building-related environmental measures. Energy efficiency at a food product manufacturing facility starts before the first brick is laid. Before constructing their Rancho Cucamonga, CA facility, Mission Foods consulted with Southern California Edison regarding energy issues and chose to enroll in the Savings by Design program, which is available throughout California. As a result, they received not only design assistance but also financial incentives to implement energy efficiency strategies.<sup>9, 10</sup>

In addition to decreasing emissions, energy efficiency measures at a manufacturer's facility can decrease costs significantly. "Through a combination of capital investments and \$30,000 in rebates from Pacific Gas & Electric (PG&E), S. Martinelli & Co. cut its annual electricity use 13 percent in 2005, compared to 2004. Retrofits to highbay lighting, installation of an EMS (energy management system), and upgrades to two compressed air systems alone save more than 700,000 kilowatt-hours annually, reducing utility costs by about \$86,000."<sup>11</sup>

### ► Heating, Ventilation, and Air Conditioning

Many food product manufacturing processes generate significant heat as a by-product. This excess heat can be harnessed to satisfy building heating requirements by running excess steam through heat exchangers in the building's heating system. Air conditioning is another concern for many food products manufacturers. The Martinelli's factory in Watsonville, California, is designed so that all steam lines are well-insulated and none of them pass through refrigerated areas. Intelligent use of insulation and building design reduces energy requirements by keeping the hot areas warm and the cold areas cool.<sup>12</sup>

### ► Lighting

Food product manufacturing facilities often have significant square footage. Such buildings can benefit from efficient bay lighting installations or skylights in large areas. Infrequently used rooms and hallways can be equipped with motion-sensor light switches and efficient lighting. This is especially effective in refrigerated areas because efficient light sources generate less heat. Mission Foods and Anthony Industries have implemented these measures and saved significantly on energy costs.<sup>13</sup>

### ► Green Energy

Food manufacturers can also green their energy supply by producing their own energy in a green way or by buying green energy. For example, the Nestlé factory in Solon, Ohio is located near a landfill methane capture facility. Rather than being flared off, this gas is captured and ultimately used to power the factory's boilers, which produce steam for the manufacturing process and for general building heating.<sup>14</sup> Green energy can also be produced using rooftop solar panels. Sierra Nevada Brewing Co.'s facility in Chico, CA produces most of its own power with a 1.4 megawatt (MW) rooftop solar array and a 1.2 MW fuel cell plant.<sup>15</sup>

### ► Energy Use

A food manufacturing facility's machinery and processes can also be optimized for efficiency. Sara Lee's bakery in Sacramento, CA contracted an efficiency consultant to analyze energy use in its air compressor system.<sup>16</sup> By reducing leaks and using existing equipment more appropriately, the bakery realized savings of \$50,000 per year for a one-time cost of \$27,000 after an \$11,000 rebate from the Sacramento Municipal Utility District.





Energy efficiency is easier to achieve if energy use is actively monitored. Large consumers of electricity like food manufacturers can often take advantage of variable pricing and peak reduction schemes offered by utilities. While shutting off or reducing power for hours at a time may seem unthinkable to many manufacturers of perishable goods, Martinelli's has managed to do so effectively. Their Watsonville facility schedule is pressing and bottling one day ahead of time; when PG&E notifies the facility of expected peak usage, Martinelli's simply scales back or pauses its operations for a few hours, and employees transition to other activities. Because of this flexibility, Martinelli's has access to cheaper power. Furthermore, the data gathered from this exercise provide real-time insights into the facility's energy use. The success of this plan has led the company to expand the system to its neighboring facility.

## ► Transportation

Food manufacturers can reduce their emissions by applying green best practices throughout their logistics operations. Firms can both improve the fuel efficiency of their fleet and use trucking capacity more efficiently. By loading each trailer more completely and by reducing the number of miles traveled hauling empty trailers, logisticians can deliver more goods using less fuel. One way to do this is to design space-efficient packaging. For example, Nestlé's Stouffer's product line has been redesigned with more efficient paperboard packaging. This simple strategy saves the company an estimated 206,000 gallons of fuel annually, as well as 4.7 million pounds of wood for pallets.

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# Furniture and Home Furnishings

## Cluster Overview

More than 28,700 people work for furniture companies in Los Angeles County, with many of them in design roles as most furniture production now takes place overseas.

The California Market Center is the hub of Los Angeles County's style industries, including furniture. In the nearby Los Angeles Mart Design Center, more than 1,000 premium product lines are housed in 724,000 square feet of furniture, accessories, and gift products. On the Westside, the Pacific Design Center is home to 130 unique showrooms featuring 2,200 product lines. These wholesale facilities are aimed at interior designers and retail buyers but, quite naturally, a number a number of furniture stores and design studios have clustered around these centers.

Supporting this industry are the many educational institutions that graduate designers, artists, and illustrators. Los Angeles County hosts several furniture design programs at local colleges and universities, including the Art Center College of Design in Pasadena and Otis College of Art and Design.

This sector is also widely supported by the entertainment industry for its movie sets and television and commercial productions, many of which require customized designs.

Although design and wholesale employment will remain stable in the medium- to long-term, the loss of manufacturing employment to lower-cost locations will outweigh any other gains.

## Industry Roster

- Electric Lighting Fixtures
- Furniture and Home Furnishings Manufacturing
- Furniture and Home Furnishings Wholesale
- Textile Furnishings Mills

## 2010-2020

## Employment Prospects



The employment outlook in the furniture and home furnishings cluster is poor. The cluster is expected to experience an employment decline of 11 percent by 2020, a loss of 3,100 jobs. Competitive pressures from around the world will continue to threaten the regional outlook for these industries. On-line markets provide opportunities for wholesalers, but these will be related to the imports of furniture products not to the products of local manufacturers. The loss of jobs in this industry will be due to competitive pressures rather than to greening.

Source: LAEDC



## ESTABLISHMENTS

2009  
**1,657**  
0.4% of county total

1999  
**2,206**  
0.7% of county total



## EMPLOYMENT

2009  
**28,739 Jobs**  
0.7% of county total

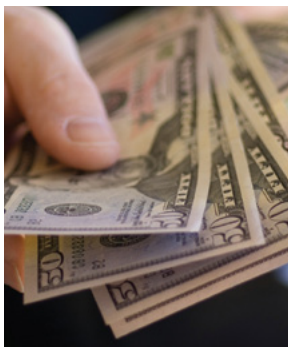
1999  
**57,021 Jobs**  
1.4% of county total



## ANNUAL PAYROLL

2009  
**\$1,142 Million**  
0.6% of county total

1999 (in 2009 dollars)  
**\$2,157 Million**  
1.1% of county total

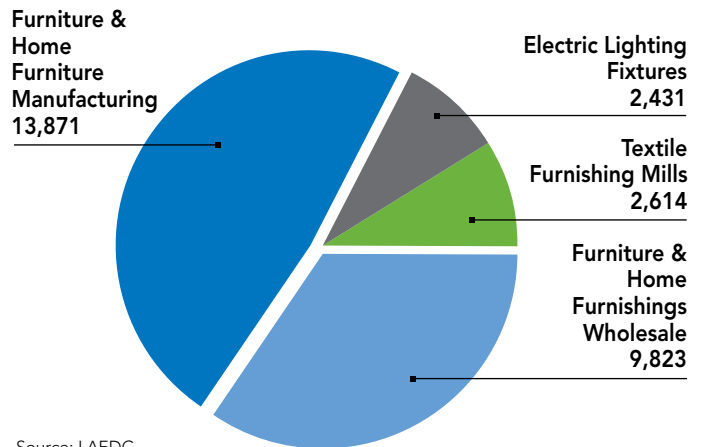


## OUTPUT

2009  
**\$6.0 Billion**  
0.7% of county total

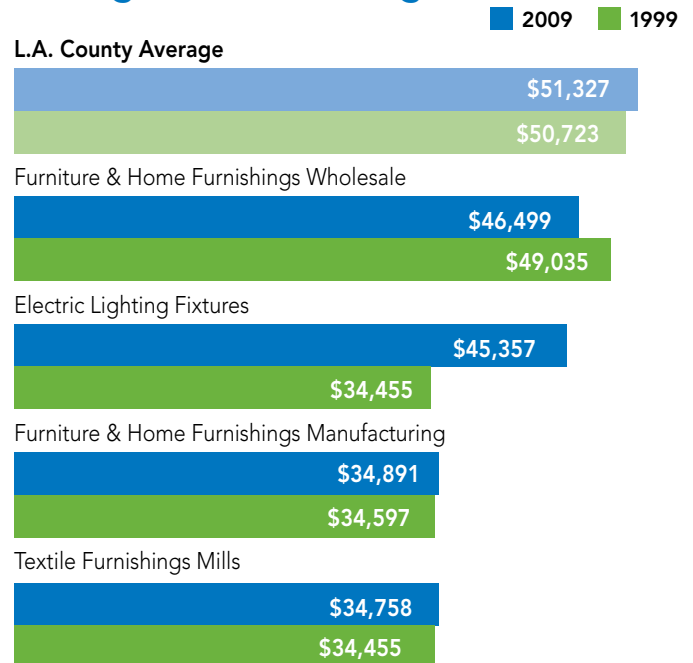
Source: LAEDC

## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)



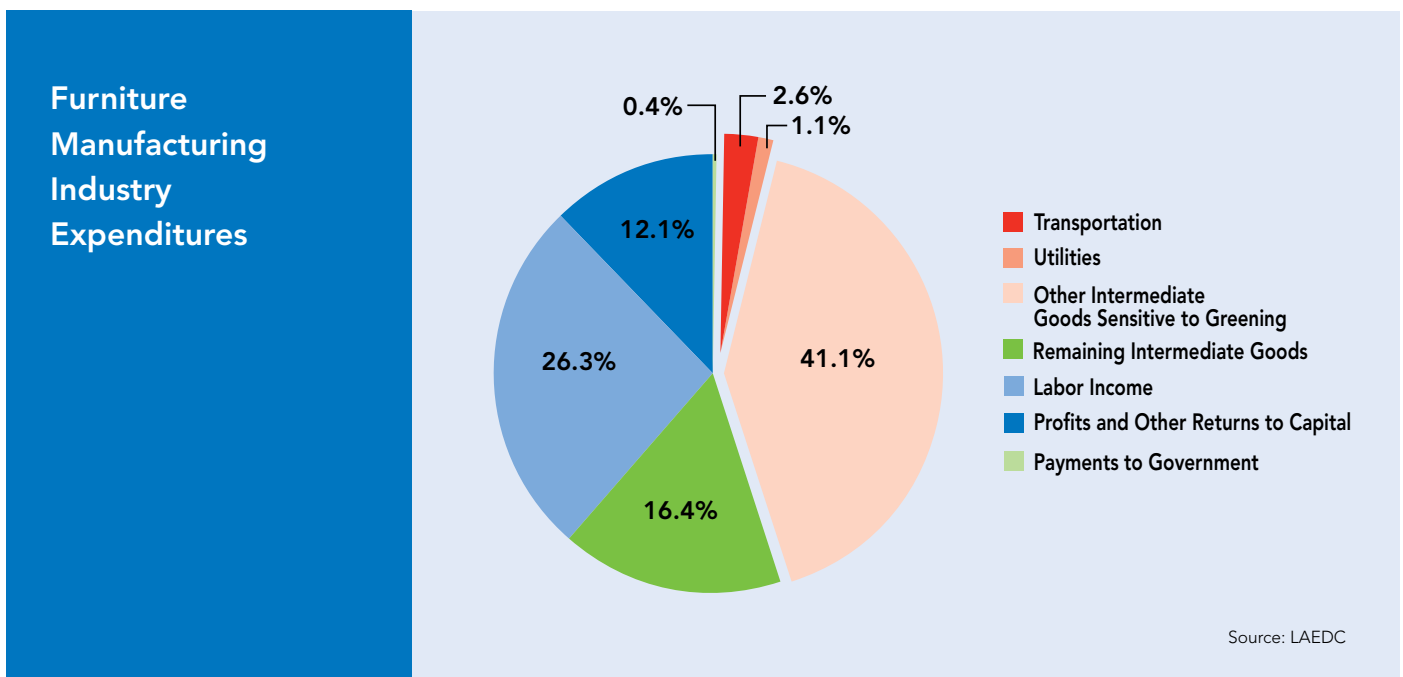
Source: CA EDD



## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the furniture industry,<sup>†</sup> with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the furniture manufacturing industry in Los Angeles County spent on average \$6,111 per employee on utilities and transportation, while generating \$166,824 in output per employee.
- Most furniture businesses allocate a significant portion of expenditures to wood, metals, fabrics, and petroleum-based products such as plastics and rubber. The price of these inputs may increase due to sustainability regulation or voluntary sustainable purchasing by furniture manufacturers.

<sup>†</sup>This industry group includes NAICS code 337. This definition does include all businesses that fall within our furniture cluster.



### Things to Consider

The wholesale industries in the furniture and home furnishings cluster include many firms that are in the Los Angeles region to serve the local market and thus have little ability to relocate to avoid green-related cost increases while retaining their current customers. Manufacturers in the cluster, on the other hand, are less constrained and face considerable competition from suppliers in low cost countries with more lenient environmental regulations.

The entire industry cluster was hurt by the recession and the prolonged collapse of the housing market. Even worse, local furniture manufacturers found themselves losing out to foreign competitors for larger contracts. Their business often consists of two segments: small orders generated by customers at local stores and larger orders, such as sofas for all of the rooms in a new

hotel in Las Vegas. The former cannot be sourced from China if the order is to be filled within several days, but the latter order can easily be placed far enough in advance that the shipping time is not a factor. The competitive pressure from overseas manufacturers will have a greater impact on local manufacturers than any requirements to green the business.

Firms in the furniture and home furnishings cluster may, for example, be able to participate and benefit from the green materials opportunity sector if consumers can be convinced to care about the origins of the wood used in their furniture and, if necessary, to pay more for products made from sustainably harvested wood.

### Examples of Regulations Driving the Greening of the Furniture and Home Furnishings Cluster

- ▶ The objective of Rule 1136 from the South Coast Air Quality Management District (AQMD) is to reduce volatile organic compounds (VOC) emissions by limiting its application of coatings and surface preparation of wood products, such as cabinets and furniture.<sup>1</sup>
- ▶ The California Air Resources Board (CARB) approved an airborne toxic control measure rule in 2008 to reduce formaldehyde (which is used in the production of wood binding adhesives and resins, among other uses) emissions from composite wood products, such as furniture and fiberboard.<sup>2</sup>
- ▶ To achieve the goals set out by the CARB scoping plan for AB 32, the Mandatory Commercial Recycling Measure sets forth a path to recycle an additional two to three million tons of materials of commercial waste on annual basis.<sup>3</sup> The measure hopes to reduce GHG emissions by five million metric tons of carbon dioxide equivalents.
- ▶ The U.S. Environmental Protection Agency (EPA) established regulations to reduce toxic air emissions from industrial facilities that print, coat, and dye fabrics and other textiles. The EPA establishes National Emissions Standards for Hazardous Air Pollutants (NESHAP) under the authority of the Clean Air Act.<sup>4</sup>
- ▶ The EPA's Significant New Alternatives Policy (SNAP) has established substitutes for the ozone-depleting chemicals that they are phasing out. These alternatives are meant to reduce overall risk to human health and the environment. Alternatives exist in several areas that are affected in the Furniture and Home Furnishings Cluster, specifically in the area of chair cushions and bedding.<sup>5</sup>
- ▶ Most furniture manufacturers and refinishers generate hazardous waste, which means that they are regulated under the EPA through the Resource Conservation and Recovery Act. The EPA has produced an RCRA compliance guide that provides manufacturers and refinishers with an overview of regulations that affect this cluster and ways in which they can reduce their waste.<sup>6</sup>





## Applying Green Practices

Furniture and home furnishings companies can reduce their environmental impact in several ways. These firms can reduce their consumption of electricity and fuel through efficiency gains. By purchasing environmentally-responsible raw materials, furniture makers can reduce demand for non-renewable resources and support the nascent market for sustainable alternatives. Manufacturers can reduce their contribution to the waste stream by designing their products with the entire life cycle in mind.

### ► Facilities

Furniture manufacturers and vendors can apply a wide range of green practices to their building management and to their day-to-day operations. For example, IKEA has adopted a wide range of strategies to increase the efficiency of their facilities, including efficient lighting, automatic controls for lights and air conditioning, improved insulation, and rooftop solar panels. The company's short-term goal is to reduce energy use by 25 percent compared to 2005 usage, and its long-term goal is to use 100 percent renewable energy at all facilities.<sup>7</sup> For a detailed list of other strategies relevant to building management, see the "Choosing to Go Green" portion of this report.

### ► Waste

Most furniture companies produce a large amount of waste while manufacturing and shipping products. Companies in this industry can consider reusing pallets and packing materials as much as possible before disposing of them. When unable to reuse materials, these companies can divert waste from landfills by sorting recyclables. Furniture companies can recycle a surprising amount of their trash – for example, IKEA recycles 75 to 80 percent of its waste.<sup>8</sup>

Another way furniture manufacturers can reduce waste generation is to make their furniture longer-lasting. If a customer buys one high-quality product instead of two relatively disposable items, then fewer raw materials are consumed. Brook Furniture Rental takes this approach to durability and also repairs and refurbishes furniture to extend its life cycle.<sup>9</sup>

### ► Products

Furniture manufacturers can reduce their impact on natural resources by constructing their products with sustainable materials. One way to ensure wood supplies are sourced sustainably is to use Forest Stewardship Council (FSC) certified wood.<sup>10</sup> The FSC traces wood from its source to verify its sustainability, making it a simple matter for furniture companies to buy sustainably. Another option for sustainable furniture construction is to use recycled materials. Serta uses as much as 95 percent recycled metal in its mattress springs.<sup>11</sup> Manufacturers can also use recycled material to produce fibers and stuffing; for example, Unifi uses recycled material instead of petroleum to produce polyester.<sup>12</sup> In order to achieve an aged or antique look, manufacturers can use recycled wood or metal. For example, Turning House Furniture uses old wooden beams and floorboards for their aesthetic value and to reduce demand for fresh lumber.<sup>13</sup>

### ► Transportation

Furniture can be bulky and difficult to transport. However, utilizing more efficient transportation means fewer truck trips and less fuel burned. To reduce the carbon footprint of their truck fleets, furniture companies can ship furniture in compact loads. An example of this is IKEA's disassembled furniture, which is packed flat in boxes to optimize transportation and storage space. Sometimes consumers treat such disassembled furniture as "disposable"; emission reductions from transportation can be undone if customers frequently replace broken or unwanted items with freshly-manufactured ones. However, there does not need to be a dichotomy between durability and ease of transportation.

*Firms in the furniture cluster will apply green practices for the cost savings and to present an environmentally conscious image to their customers.*



## Consumer Education

Though some green strategies can save money, sustainably produced furniture is often more expensive to make. By educating consumers, furniture companies may be able to increase demand for pricier environmentally responsible products. Standards organizations can also educate consumers – for example, the FSC provides manufacturers with labels for sustainably-produced wood products, and the European Union (EU) is considering its own green label for wood furniture.<sup>14,15</sup> Furniture companies can learn more about the business of green furniture through the Sustainable Furnishings Council, which also provides a green furniture label as well as market research on consumer preferences for sustainable goods.<sup>16</sup>

## Just-In-Time Production

Just-In-Time (JIT) production is a minimum waste production process that takes into consideration time and resources in addition to materials. Toyota was the first to develop this method of production in the 1970s, and it is widely used today. The main outcomes of JIT production (such as the return on investment, waste reduction, improved product quality, and efficiency of production) are consistent with today's green movement. The major drivers of JIT production are continuous improvement and waste elimination. Continuous improvements include measures such as devising systems to identify problems, striving for simpler systems, spending less time moving materials and parts, and undertaking preventative maintenance. Waste elimination includes eliminating the seven types of waste that can occur in production: overproduction; wait time; transportation; processing; inventory; waste of motion; and product defects.

A local example of a company who employs JIT production is the Ortho Mattress factory and distribution center in La Mirada, California. Five years ago, Ortho Mattress, Inc. had outsourced some of its manufacturing to Asia. When the International Trade Commission enacted a tariff against imported mattresses in 2009, outsourcing became more expensive for Ortho Mattress, Inc.; this in conjunction with quality concerns over component products, currency fluctuations, and shipping costs led Ortho Mattress, Inc. to repatriate their production to La Mirada last year. Ortho Mattress, Inc. uses the JIT production and decided to house production and distribution under one roof, helping to eliminate duplicated operational costs, eliminating the additional waste resulting from the increased transportation of their goods, and decreasing wait times.

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## Goods Movement

### Cluster Overview

Gateway to the Pacific Rim, the Ports of Long Beach and Los Angeles are key economic drivers in the local and regional economy. Ranked number one in the nation and seventh in the world, the twin ports handle more than two-and-a-half times the volume of containerized shipments than their closest rival, New York/New Jersey. Total two-way trade through the San Pedro Ports in 2010, via all types of sea vessels, was \$326.3 billion.

With a strong port infrastructure, main lines for both the Burlington Northern Santa Fe and Union Pacific railroads, and an excellent highway system extending throughout the west and across the nation, Los Angeles County is unrivaled in containerized traffic with over 14.1 million twenty foot equivalent containers transiting the port in 2010.

Los Angeles International Airport (LAX) is another key link in Los Angeles County's international trade. LAX handles high-value products, such as medical instruments, electronics, and perishables. In 2010, the total value of two-way trade commodities moving through LAX totaled \$79.3 billion. LAX is served by 30 international carriers out of the Tom Bradley International Terminal and all major air freight lines.

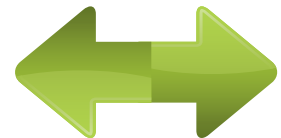
Both the Ports of Los Angeles and Long Beach have enacted Clean Truck Programs to reduce their environmental impact in and around the region.

### Industry Roster

- Air Freight Transportation
- Commercial Transportation Equipment Rental and Leasing
- Couriers and Express Delivery Services
- Deep Sea Freight Transportation
- Freight Property and Casualty Insurance
- Freight Transportation Arrangement
- General and Specialized Freight Trucking
- Line Haul Railroads
- Pipeline Transportation
- Railroad Rolling Stock Manufacturing
- Ship Building and Repairing
- Support Activities for Transportation

2010-2020

### Employment Prospects



The employment outlook for the goods movement cluster is not good. The cluster is expected to add only 3,100 jobs by 2020, an increase of less than three percent over current employment. The outlook is based on poor prospects for consumer spending after the current recovery and increased competition from other water-borne ports, including the expected opening of the Panama Canal expansion. Additionally, any growth that would occur in the industry regionally is more likely to accrue to neighboring counties.

Source: LAEDC

## Goods Movement



### ESTABLISHMENTS

2009  
**3,359**  
0.8% of county total

1999  
**3,627**  
1.2% of county total



### EMPLOYMENT

2009  
**102,175 Jobs**  
2.6% of county total

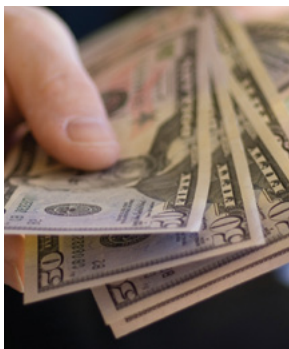
1999  
**119,411 Jobs**  
2.9% of county total



### ANNUAL PAYROLL

2009  
**\$5,394 Million**  
2.7% of county total

1999 (in 2009 dollars)  
**\$6,275 Million**  
3.1% of county total

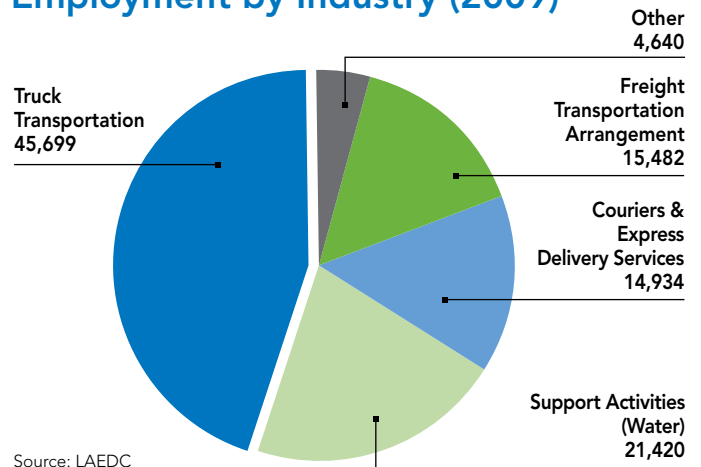


### OUTPUT

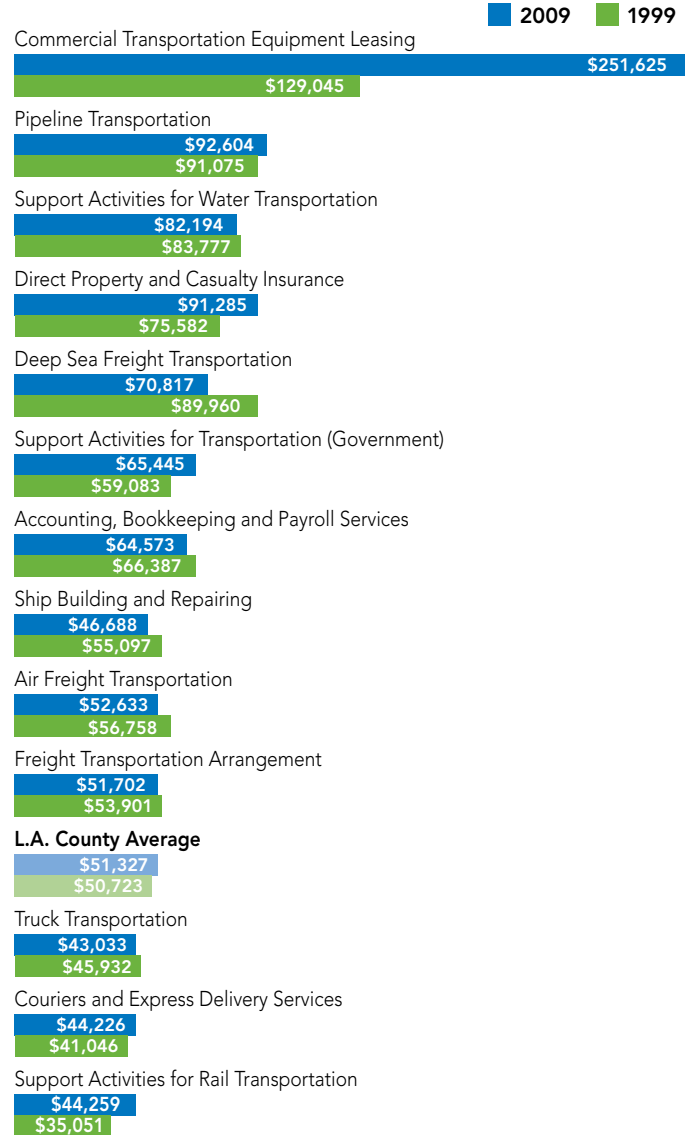
2009  
**\$17.0 Billion**  
1.9% of county total

Source: LAEDC

## Employment by Industry (2009)



## Average Annual Earnings (in 2009 dollars)



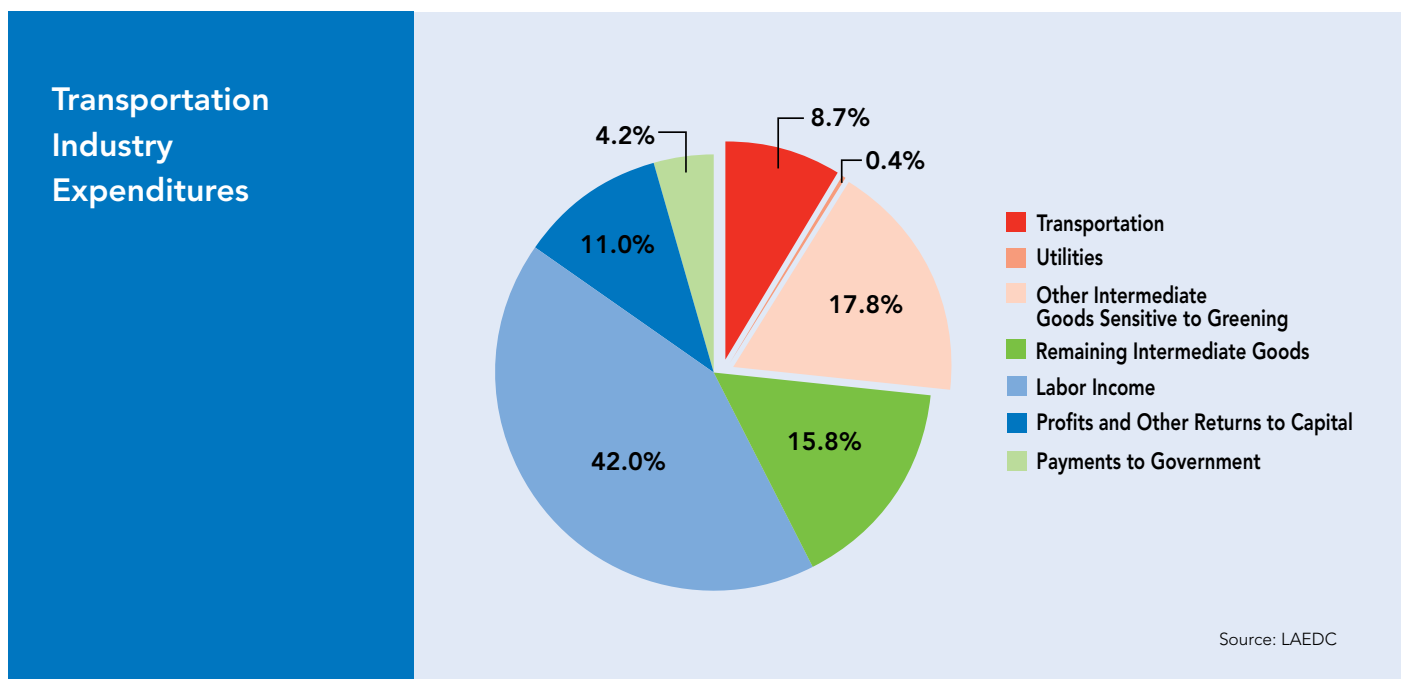
Source: CA EDD



## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the transportation industry,<sup>†</sup> with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the transportation industry in Los Angeles County spent on average \$14,183 per employee on utilities and transportation, while generating \$156,696 in output per employee.
- Transportation businesses allocate a significant percentage of expenditures to fuel and to other transportation companies. The transportation industry is also vulnerable to vehicle emissions and fuel efficiency regulations.

<sup>†</sup>This industry group includes NAICS code 48. This definition does include all businesses that fall within our goods movement cluster.





### Things to Consider

In the goods movement industry cluster, it may be helpful to draw a distinction between firms meeting the needs of the large local population and industrial base, including imports and exports, and firms involved with the movement of goods passing through the region, particularly international trade moving through the local ports. The distinction is based on the location of the customers of goods movement firms; however, many goods movement firms are involved in both types of markets.

Goods movement firms whose customers are primarily based in Los Angeles County can be treated as location-dependent, population-serving businesses that do not have the option of relocating to avoid greening their businesses. The cost of upgrading their transportation fleets to more efficient vehicles will increase costs in the industry which will ultimately be passed along to consumers. The size of these transition costs may create challenges, particularly for smaller firms.

Firms handling the flow of international goods moving through the region to and from the rest of the United States, on the other hand, have some flexibility in their response to operating

challenges created by green regulations. The widening of the Panama Canal, for example, makes the Gulf Coast and East Coast ports a viable alternative for cargo from Asia. Canadian ports on the West Coast are also positioning themselves as alternative routes for the same cargo. Upgrading to less polluting equipment, such as the cleaner trucks required by the ports' Clean Air Action Plan is a significant cost. A greater threat is posed by the multi-year delays caused by environmental reviews of infrastructure projects intended to increase capacity. Failure to make such infrastructure investments would hamper growth in the handling of international trade. In addition, firms that see their future growth taking place near alternative ports may give a lower priority to investment in energy efficiency and other green practices in Los Angeles.

Overall, the goods movement cluster is one of the most significant sources of demand in Los Angeles County for green products and services, particularly cleaner vehicles. The demand may be sufficient to attract providers of cleaner vehicles to the area.

*The adoption of green practices in the goods movement cluster will be driven primarily by regulatory compliance, notably regulations governing emissions from diesel engines and the Ports' Clean Air Action Plan. The resulting cost increases, along with higher energy costs, are one of the primary reasons that greening will mean higher costs throughout the economy.*



### Examples of Regulations Driving the Greening of the Goods Movement Cluster

- ▶ On November 22, 2010, the Ports of Los Angeles and Long Beach approved an updated San Pedro Bay Ports Clean Air Action Plan (CAAP) to “integrate common goals for air quality in the South Coast Air Basin.”<sup>1</sup> The updated CAAP includes the addition of the San Pedro Bay Standards, which will be used to measure the plan’s progress and effectiveness going forward. These standards set forth an aggressive plan to meet several goals of the California Air Resources Board, including the reduction of health risk impacts and the reduction of emissions, both relative to 2005 levels. The CAAP, which was originally enacted in 2006, aims to reduce air pollution of ships, trains, trucks and other heavy machinery that are used in moving goods at the ports.<sup>2</sup>
- ▶ By 2023, the On-Road Heavy-Duty Diesel Vehicles (In-Use) Regulation by the California Air Resources Board (CARB) will require heavy duty truck retrofitting to ensure each truck has 2010 model engines.<sup>3</sup> Agricultural vehicles have specific provisions that are not as stringent.<sup>4</sup>
- ▶ In January 2007, the California Department of Business, Transportation & Housing and the California Environmental Protection Agency released California’s Goods Movement Action Plan, which outlines ways in which the goods movement industry and infrastructure can be improved and expanded so as to generate jobs; increase mobility and relieve traffic congestion; enhance public and port safety; improve air quality and protect public health; and improve California’s quality of life.<sup>5</sup>
- ▶ As an implementation measure of AB 32, SB 375 (Steinberg) (2008) requires the development of regional GHG emission reduction targets for passenger vehicles. To reach this, each of the State’s metropolitan planning organizations, e.g., the Southern California Association of Governments (SCAG) for Los Angeles County, are required to prepare Sustainable Community Strategies demonstrating how the region plans to meet the set GHG reduction targets through an approach that integrates land use, housing, and transportation planning.<sup>6</sup>
- ▶ As a way to meet AB 32’s GHG goals, CARB’s proposed cap-and-trade program will set limits on GHG emissions for sectors while also enabling tradable permits (allowances) to emit GHGs. The effective date planned for the regulation is the end of 2011.<sup>7, 8</sup>
- ▶ Effective in Model Year 2007, heavy duty engines and vehicles became subject to new emission standards from the U.S. Environmental Protection Agency (EPA). Similar to the nonroad diesel equipment standards, to ensure effectiveness of advanced technology, the EPA also reduced the level of sulfur that can be used in diesel fuel.<sup>9</sup>
- ▶ The EPA has developed a Clean Ports USA incentive-based program to encourage the reduction of emissions from existing diesel engines and nonroad equipment at ports. The program offers best practices and guidelines for what can be done to “green” the nation’s ports while also offering grants and other funding opportunities to advance this goal.<sup>10</sup>



## Applying Green Practices

Goods movement is transportation, which, by definition, means companies in this industry are big emitters. By making vehicles, facilities, and logistics models more efficient, these companies can continue to provide their essential services while reducing their carbon footprint.

### ► Facilities

Goods movement companies can take advantage of many general best practices related to building construction and maintenance. Lighting, HVAC, and other systems can be upgraded to increase energy efficiency, often saving money in the long run. On-site alternative energy generation is also a possibility; solar power is especially viable at facilities with large roofs. For example, FedEx's solar installations at sites in Oakland, Whittier, and Fontana generate 80, 40 and 50 percent of the facilities' respective energy.<sup>11</sup> The United Parcel Services (UPS) Palm Springs facility derives 80 percent of its electricity from its solar installation.<sup>12</sup>

### ► Vehicle Fleet

Upgrading or replacing vehicles is perhaps the best way for goods movement firms to reduce their carbon footprints. Replacing old vehicles before their useful life is through can be costly, but increased fuel efficiency can save money over time. Many firms are taking steps to address their vehicle emissions. FedEx operates 330 hybrid trucks, each of which achieves 42 percent better fuel economy, emits 25 percent less greenhouse gas and 96 percent less particulate matter than normal trucks.<sup>13</sup> FedEx also operates 19 all electric trucks and numerous alternative energy and electric support vehicles, forklifts, airport cargo movers, and other similar vehicles.

UPS has a decades-long history of purchasing the most efficient planes and of replacing planes ahead of schedule in favor of more fuel-efficient models.<sup>14</sup> For example, in the 1980s they purchased 757s instead of 727s for a 30 percent fuel efficiency gain, and in recent years they replaced 747-200s with 747-400s for a 20 percent efficiency gain over a 2005 baseline.

Airlines are also upgrading their plane fleets. Several carriers, such as Southwest, Delta, Alaska, and American Airlines, are installing winglets, or bent wing tips, on their planes for fuel efficiency. American Airlines is replacing over 80 MD-80 aircraft with 737s, which use 35 percent less fuel.<sup>15</sup> Alaska Airlines is also replacing their MD-80 aircraft with 737s, estimating an 18 percent fuel savings.<sup>16</sup> Lufthansa is replacing its fleet with 146 new planes over the next six years to improve efficiency.<sup>17</sup>

Rail operators, while significantly more efficient than air cargo or trucking companies, can also improve the efficiency of their vehicles. BNSF is replacing older locomotives with new ones that are 15 percent more fuel-efficient, leading to a fleet-wide efficiency gain of 7.7 percent since 1999.<sup>18</sup> BNSF has also installed idle-control devices on 70 percent of its locomotives to reduce fuel waste.<sup>19</sup> Union Pacific is taking aim at its trains' particulate matter emissions as well as greenhouse gases. According to CARB, Union Pacific will decrease particulate matter emissions by 80 percent from 2005 to 2015.<sup>20</sup>

### ► Logistics

Efficient logistic scheduling is another way for goods movement companies to reduce emissions. Firms in this industry are already known for their efficiency in delivering goods on schedule. By placing comparable importance on the total fuel burned to deliver cargo, goods movers can make routing decisions that are cost efficient, timely, and environmentally friendly. Many firms in this industry are already applying this strategy with good results. According to their Corporate Sustainability Report (CSR) report, FedEx Express has improved total fleet miles per gallon within the U.S. by 13.7 percent since 2005, saving 45 million gallons of fuel, which equates to enough for approximately 45,000 hours of flight time in a 737.<sup>21</sup> UPS incorporates fuel saving details into its truck routing, such as minimizing red lights and left turns that contribute to idling time.

Airlines are planning their routes more efficiently as well. Southwest Airlines is spending \$175 million over six years on new systems and pilot training with the goal of making routes more efficient; in 2009, this program saved 8.5 million gallons of jet fuel.<sup>22</sup> Part of Southwest's strategy was to adjust flight speeds and altitudes, which saved 4.8 million gallons of fuel over a 10-month period in 2009. Emirates Airlines uses a flight planning system that can alter routes to take advantage of wind patterns; on a flight from Dubai to Sydney, one Emirates flight saved 8,040 kg of fuel (approximately 2.5 hours of flight in a 737) and shaved 43 minutes off the flight time.<sup>23</sup> Singapore Airlines has implemented a "Continuous Descent Approach" on cargo flights, in which planes descend gradually rather than in steps. The pilot flight of the Aspire (Asia & Pacific Initiative to Reduce Emissions) Program



### Applying Green Practices (continued)

was a fuel efficient flight from Los Angeles to Singapore that saved 10,686 kg of fuel and 33,769 kg of carbon emissions. Alaska Airlines also uses a gradual descent approach.<sup>24</sup>

Goods movers can also increase the efficiency of operations in yards. Union Pacific's intermodal yard at the Ports of Los Angeles and Long Beach is undergoing a \$400 million Intermodal Container Transfer Facility modernization process that is expected to double its capacity, decrease its overall size, and reduce emissions by 74 percent.<sup>25</sup> At its Southern California intermodal facilities, BNSF began introducing natural gas trucks in 2009 which reduce nitrogen oxide and particulate matter emissions by 90 percent compared to diesel vehicles.<sup>26</sup> BNSF is also reducing idling among its intermodal truck fleet.<sup>27</sup>

#### ► Planning and Measurement

For an industry that precisely tracks and schedules its operations, applying the same rigor to emissions should come naturally. In order to manage a company's carbon footprint, it must first be measured. This allows companies to define benchmarks and set goals for themselves. For example, UPS voluntarily measures its Scope 1, 2 and 3 emissions and publishes the results in its CSR reports.<sup>28</sup> This allows UPS to pinpoint areas for further improvement, and to specify exact goals for itself. One of their main goals is to reduce CO<sub>2</sub> emissions in pounds per available ton mile by 42 percent by 2020, using 1990 as a benchmark year, or 20 percent using 2005 as a benchmark. FedEx also aims to reduce greenhouse gas emissions from FedEx Express global air operations by 20 percent per available ton mile by 2020, using 2005 as a benchmark.<sup>29</sup>

#### ► Recycling

Many goods movers are already ahead of the game in recycling their products. Both FedEx and UPS package and parcel containers are made from recyclable content and are recyclable themselves, and some can be used multiple times.

#### ► Clean Air Action Plan Update (CAAP Update)

Building upon the CAAP of 2006, the San Pedro Bay Ports released an updated CAAP in 2010 with new goals to reduce emissions over the next decade. The 2006 plan set short-term goals from 2006 through 2011. The update sets a series of longer term goals: planning goals through 2013; emissions reduction goals for the year 2014 (Diesel Particulate Matter emissions by 72 percent, NOx emissions by 22 percent, and SOx

emissions by 93 percent below 2005 levels); and more stringent emissions reduction goals for the year 2023 (DPM emissions by 77 percent, NOx emissions by 59 percent, and SOx emissions by 92 percent). An additional goal is a "health-risk reduction standard," reducing the population-weighted residential cancer risk of port-related DPM emissions by 85 percent by 2020. The aggressive goals set forth in the CAAP Update go beyond what current technologies and strategies can achieve. This is done in order to challenge the ports to develop the necessary means to meet these aggressive clean air and health goals.

#### ► Clean Trucks Program

The Clean Trucks Program imposed progressive restrictions on drayage trucks in order to reduce the negative impact that these heavy emitters had on the air quality of the San Pedro ports. These restrictions began in 2008, with the ban of all pre-1989 trucks from entering the port complex; this followed the banning of all 1989-1993 trucks and non-retrofitted 1994-2003 trucks in 2010; and finally the banning of all trucks that do not meet the 2007 Federal Clean Truck Emissions Standards as of January 1, 2012. The Port of Los Angeles has estimated that the operation of 6,600 clean trucks will reduce more than 30 tons of diesel particulate matter emitted by trucks per year at the Port, and equates to removing the particulate matter emissions of nearly 200,000 automobiles from our Southern California highways over the course of one year. As of 2009, the Port of Los Angeles had invested \$110,000,000 into their Clean Truck Program and successfully reduced PM emissions by 70 percent and NOx emissions by 50 percent since 2005. Moreover, local manufacturers of green vehicles and their component parts may be well-placed to capture this emerging market, offering potential job creation opportunities.

#### ► Ocean-Going Vessel Strategies

Due to the use of bunker fuel by cargo ships, ocean-going vessels are the single largest source of air pollution at the Port of Long Beach and the Port of Los Angeles. Bunker fuel, which is highly polluting, has been responsible for the majority of the sulfur oxide emissions in Southern California. Sulfur oxide contributes to the formation of hazardous particulate matter (PM). As a result, the San Pedro ports have adopted several ocean-going vessel strategies to reduce emissions at the ports, including ocean-going speed reduction, ocean-going fuel requirements, and shore power/cold ironing.



A voluntary Vessel Speed Reduction (VSR) Program was established in 2001 to reduce NO<sub>x</sub> emissions from ocean-going vessels by decreasing their speed at 20 nautical miles from Point Fermin as they approach or leave the ports. As of 2006, the VSR Program is included as one of the control measures in the CAAP, setting the goal that 100 percent of ocean-going vessels reduce their speeds at 40 nautical miles from Point Fermin. Although the compliance rate has increased every year since the original voluntary VSR was implemented in 2001, the latest Vessel Speed Reduction Program compliance data for the Port of Los Angeles (released in 2011 by the Marine Exchange of Southern California) shows that the 100 percent goal has not yet been met. Compliance with the VSR Program at the 20 mile mark is much higher than at the 40 mile mark—with 17 versus 38 companies out of a total of 75 companies listed that had a compliance rate under 100 percent.

In 2009, the California Air Resources Board required the use of low-sulfur fuel in the main propulsion engines of cargo vessels within 24 nautical miles of the California coast. The CAAP also requires the ports to step up ocean-going vessel emission reductions by setting limits on the sulfur content in the fuel used. Cargo vessel operators are required to use a cleaner-burning, low-sulfur fuel in their main engines when passing within 40 miles of San Pedro Bay, and in their main and auxiliary engines while at berth. In doing so, sulfur oxides will be reduced by 11 percent and particulate matter (PM) by nine percent. Leading up to the CARB requirement, the ports implemented a Low-Sulfur Fuel Incentive Program to accelerate the switch from bunker fuel to the more costly, low-sulfur distillate fuel. To qualify for the incentive program, the ships were required to participate in the voluntary Vessel Speed Reduction Program, limiting speeds to 12 knots during the switch to low-sulfur fuel. The incentive program cost the Port of Los Angeles as much as \$8.6 million and the Port of Long Beach as much as \$9.9 million annually.

Alternative Maritime Power™ (AMP) is an air quality program focusing on reducing emissions from docked container vessels. The Port of Los Angeles was the first in the world to use AMP technology (also known as “cold ironing”) for in-service container ships. Vessels at berth had traditionally been powered by diesel, but AMP-equipped vessels can “plug in” to shore-side electrical power. Depending upon the vessel size, it is estimated that AMP reduces NO<sub>x</sub> by one ton and reduces sulfur oxide (SO<sub>x</sub>) emissions by more than a half a ton for every day the ship is plugged in at berth.

### Land Use Siting

Land use siting can be a tool used to protect residents from diesel emission sources such as the ports and their drayage and rail facilities. CARB recommends that new land uses that are likely to serve “sensitive” individuals (i.e., children or seniors), such as schools, libraries, and senior/child daycare centers, should be located at least 1,000 feet away from major goods movement service centers and rail yards or directly downwind of the port complex itself. In this manner, surrounding jurisdictions can reduce their residents’ exposure to harmful diesel PM emissions. An added benefit is the reduced noise exposure that results from locating these population-serving facilities away from noisy goods movement centers. Other community and environmental organizations recommend even larger distances of 1,500 feet. There are many challenges to successfully managing residential exposure to areas with concentrations of low air quality. For example: sites in areas with compromised air quality are typically more affordable; existing facilities will be difficult to relocate due to size and cost constraints; and school siting is undertaken by school districts and the state government, so local and regional governments are not involved in the process. Despite these challenges, land use policy can be an effective way to mitigate off-port community impacts and protect public health.





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# Government

## Cluster Overview

The government industry cluster includes all activities funded by public sources, with the exception of public utilities, higher education, and transportation support activities, which are included in other industry clusters.

Employment in all areas of government work in Los Angeles County numbered over 485,000 jobs in 2009.

Public administration primarily includes the overseeing of government programs and activities at the federal, state, and local level which are not performed by the private sector. At the federal level, there are 21,100 employees in public administration in Los Angeles County. State government employment in public administration accounts for 12,900 jobs, but the largest share, over 129,700 workers, is employed by local governments.

Government activities with significant levels of employment in Los Angeles County that are not classified as public administration fall into the following classifications: educational services, which include primarily elementary and secondary schools; public health care and social assistance; public arts; transportation and warehousing; other services; and parks and recreation. Total employment in these industries reached 320,300 jobs in 2009.

Employment prospects within government sectors will be restricted by budget constraints at all levels of the government. At best, employment will grow at a rate to match population growth.

### Industry Roster

- **Federal, State and Local Government:**
  - Administrative and Support and Waste Management and Remediation Services
  - Business, Computer & Management, Technical and Trade and Other Schools
  - Elementary and Secondary Schools
  - Health Care and Social Assistance
  - Leisure and Hospitality
  - Professional, Scientific, and Technical Services
  - Scenic and Sightseeing Transportation
  - Transit and Ground Passenger Transportation
  - Warehousing and Storage Information
- **Public Administration**

### 2010-2020

### Employment Prospects



The employment outlook for the Government cluster is mixed. The cluster is expected to add 14,000 jobs by 2020, an increase of less than three percent over current employment. The tightening fiscal environment will limit the growth of employment even though this is population-serving cluster. Greening is not expected to have a significant impact on public employment.

Source: LAEDC



## ESTABLISHMENTS

2009  
**2,865**  
0.7% of county total

1999  
**3,332**  
1.1% of county total



## EMPLOYMENT

2009  
**485,121 Jobs**  
12.3% of county total

1999  
**465,207 Jobs**  
11.5% of county total



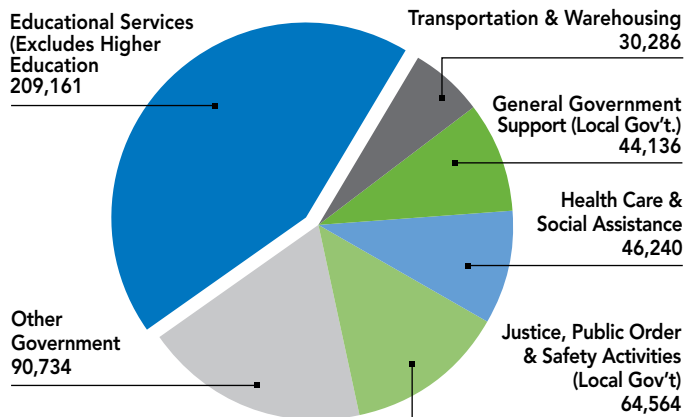
## ANNUAL PAYROLL

2009  
**\$27,769 Million**  
13.8% of county total

1999 (in 2009 dollars)  
**\$24,971 Million**  
12.2% of county total

Source: LAEDC

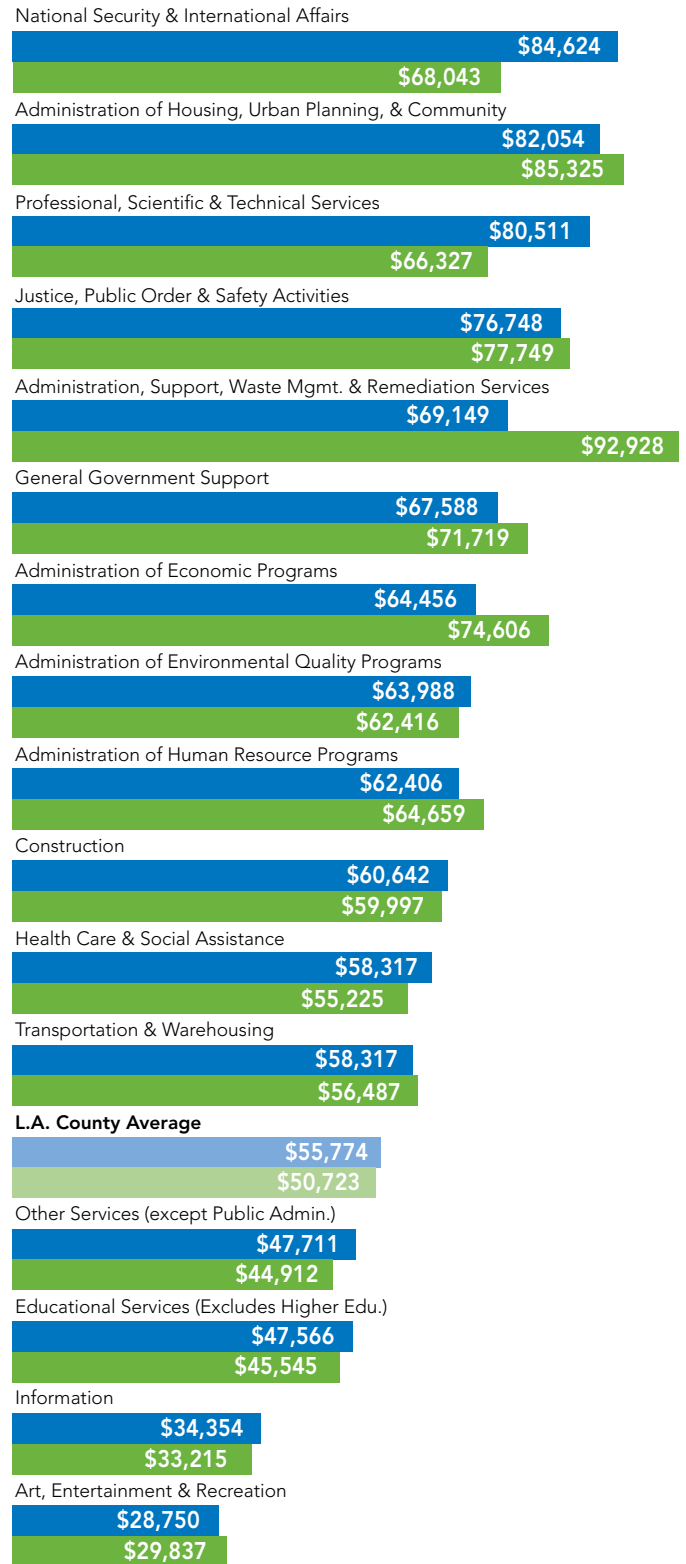
## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)

■ 2009 ■ 1999



Source: CA EDD



## Potential Cost Increases

Governments purchase a variety of goods and services for ongoing operations, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.

### Examples of Regulations Driving the Greening of the Government Cluster

- ▶ In January 2009, Los Angeles County's Green Building Program went into effect, mandating green statutes for new development in the unincorporated areas of Los Angeles County. The Green Building Ordinance requires the use of construction materials and techniques that would improve the energy efficiency of a building and create fewer pollutants. The Low Impact Development Ordinance seeks to manage rainfall and stormwater runoff. Lastly, the Drought-Tolerant Landscaping Ordinance requires that landscaping use specific plants that have low water needs.<sup>1,2</sup>
- ▶ SB 375 (Steinberg) (2008) is an implementation measure of AB 32, which requires the development of regional GHG emission reduction targets for passenger vehicles. Each of the State's metropolitan planning organizations, e.g., the Southern California Association of Governments (SCAG) for Los Angeles County, are required to prepare Sustainable Community Strategies demonstrating how the region plans to meet the set GHG reduction targets through an integrated approach to land use, housing, and transportation planning.<sup>3</sup>
- ▶ The California Green Building Standards Code, which is referred to as CALGreen, became effective in January 2011 and requires that new buildings reduce water consumption, divert construction waste from landfills, increase building efficiencies, and utilize low-pollutant emitting materials.<sup>4</sup>
- ▶ Prompted in part by the 2008 Executive Order declaring a statewide drought, conservation efforts and innovative solutions to increase water supply/decrease water demand were pursued. Some of these efforts included the use of tiered water rate structures and drought-tolerant landscaping.<sup>5</sup>
- ▶ On April 12, 2011, Governor Jerry Brown signed into law SBX1 2 (Simitian) (2011), which requires that 33% of the state's electricity (provided by both public and investor-owned utilities) must come from renewable sources by December 31, 2020.<sup>6</sup>
- ▶ As a program under the U.S. National Clean Diesel Campaign, the Environmental Protection Agency's (EPA) Clean School Bus Program (a public-private partnership) aims to reduce diesel exhaust exposure and air pollution. While the EPA has set emission standards in both 2004 and 2007 for Heavy Duty Vehicles (which includes school buses) to reduce diesel emissions from newly manufactured engines, the Clean School Bus program seeks to accelerate the reduction of children's exposure to air pollutants from diesel school buses.<sup>7</sup>
- ▶ President Barack Obama signed Executive Order 13514 on October 8, 2009, which set forth a policy that federal agencies must conserve and protect water resources; increase energy efficiency; eliminate waste; recycle; prevent pollution; measure, report, and reduce GHG emissions, among other directives.<sup>8</sup>
- ▶ In 1993, the EPA created the Environmentally Preferable Purchasing Program (EPPP) to assist federal officials in making purchasing decisions "with the environment in mind." Subsequent regulations, federal laws, and executive orders have mandated that federal agencies must use sustainable practices when purchasing products as well as services. With a purchase power of approximately \$350 billion for goods and services annually, the EPPP seeks to minimize environmental impacts while also increasing the availability of "green" products.<sup>9</sup>



## Things to Consider

Federal, state, and local government regulations are one of the key drivers behind the greening of the Los Angeles County economy across various industries. Government purchases will also be a significant contributor to the local demand for green goods and services since the combined operations of local, state, and federal governments account for 12.3 percent of all employment in the county, more than in any industry cluster. Government policies, programs, and subsidies will shape the emerging green market opportunities, particularly in energy

production, transmission or consumption, construction, transportation, green materials manufacturing, and waste management. Conservation of nonrenewable resources and increased use and promotion of renewable assets is another strong step taken by all governmental agencies toward greening the L.A. economy. The effective implementation of government greening policies will help to minimize the environmental impacts on both a regional and global scale.

## Applying Green Practices

Federal, state, and local agencies have been relatively proactive in greening. Government entities employ many people and operate many facilities in Southern California, so their role in greening is significant. During the current era of tightening budgets, governments can reduce their costs by using electricity, fuel, and water more efficiently.

### ► Buildings

The government has been an early adopter of green building management best practices. Government entities operate many facilities in Southern California, and, as a result, any system-wide building mandates make a large impact.

In addition to the state government, county and city governments are also instituting green building requirements. Los Angeles County has adopted a Green Building Program applicable to all development constructed as of January 1, 2009, including a LEED Silver requirement for buildings over 10,000 sq. ft.<sup>10</sup> Our survey found 27 of the 88 cities in Los Angeles County, representing over 60 percent of the population, have adopted green standards for city buildings, using either LEED or other criteria. For example, Long Beach's Green Building Policy requires new construction and expansion projects over 7,500 sq. ft. to achieve LEED Silver designation, and encourages private developers to adopt the same approach.<sup>11</sup> The City of Calabasas requires all new or significantly remodeled non-residential buildings to achieve LEED certification.<sup>12</sup> The City of Los Angeles has passed the Green Jobs Ordinance, aimed at retrofitting over 1,000 city-owned buildings of over 7,500 sq. ft. or built before 1978.<sup>13</sup>

Southern California governments can also learn from out-of-state and foreign examples. The Canadian government requires all new government office buildings to meet LEED-Canada Gold standards.<sup>14</sup> The city of Houston is spending \$23 million to retrofit 19 buildings, expecting to realize \$1.8 million annually due to associated efficiency gains. The city's construction contractor, Schneider Electric, guarantees Houston will realize these gains, and promises to pay the difference if it does not.<sup>15</sup> In 2005 the city of Portland, Oregon instructed all city facilities to install green roofs, with plants covering at least 70 percent of the roof. In 2008, Portland began investigating suitable privately-owned buildings and offering partial funding to building managers who adopted the program voluntarily. So far the program has been successful.<sup>16</sup>

### ► Vehicle Fleets

Governments can help reduce greenhouse gas emissions by greening their vehicle fleets. Culver City has adopted many vehicle efficiency measures, including a compressed natural gas (CNG) fuel system for much of its fleet; the city's fleet was named the #1 Government Green Fleet in North America for 2009.<sup>17,18</sup>

*To the fullest extent possible, governments should lead by example in adopting applicable green practices. There may be added urgency to do so, at least for the most cost-effective strategies, given the current budgetary constraints at all levels of government.*





Santa Clarita's transit department operates a fleet of 91 buses, 40 percent of which are fueled by CNG, and ridership has increased almost 600 percent since 1991, meaning fewer cars are on the road.<sup>19</sup> The City of Los Angeles operates 4,184 alternative fuel vehicles out of a total fleet of 15,700, and the city has installed related infrastructure such as electric vehicle charging stations around the city that will be available to private users once plug-in electric vehicles enter the market.<sup>20</sup>

### ► Energy Efficiency

In addition to building-related efficiency measures, city governments can pursue other energy efficiency achievements. For example, the City of Los Angeles is installing LEDs into 140,000 street lights over the course of five years. The city expects the LEDs to save 40 percent of street light electricity, representing \$48 million over seven years. The energy savings will reduce emissions by 40,500 tons of CO<sub>2</sub> annually, the equivalent of taking 6,700 passenger vehicles off the road for a year. Old lights had a lifespan of four to six years, while LEDs have a life span of 10 to 12 years, so the city will save on replacement costs as well.<sup>21</sup>

### ► Procurement

Governments make significant purchases in the course of its operations. Governments can use their market power to reward green companies by making environmental friendliness a priority when choosing suppliers. The Los Angeles County Board of Supervisors adopted a countywide policy in 2007 instructing all departments to implement green procurement initiatives.<sup>22</sup> This program lays out a system of guidelines for departments to follow when making purchases. The Canadian government adopted similar requirements nationwide in 2006.<sup>23</sup>

### ► Clean Fuel Program

L.A. Metro was the first transportation agency in the nation to adopt an aggressive clean fuel program when it purchased 196 clean compressed natural gas (CNG) buses in 1994. As of 2010, the size of Metro's CNG bus fleet numbered over 2,500 buses, representing 99 percent of their entire fleet. Metro's clean-air bus fleet is the largest alternative fuel transit fleet in the U.S., accounting for 30 percent of all CNG buses operating nationwide. With the L.A. Metro bus fleet travelling 98 million miles annually, the annual estimated reduction in air pollution resulting from its clean air bus fleet in 2010 was roughly 59 million pounds of particulate matter, or more than 152,000 pounds per day. Metro has continued its aggressive changeover to alternative fuel vehicles. In January 2011, the last diesel bus in the fleet directly operated by Metro was retired, making it the first major transit agency in the world to operate only alternative clean fueled buses. Metro will continue to support its clean air bus fleet through 2015 with the addition of 700 conventional low emission 40-foot advanced transit buses that are also fueled by CNG.

In addition to their clean-air bus fleet, Metro's green program also includes energy saving strategies employed in their operations to cut energy costs, such as: energy saving devices, recycling, and the sustainable building and retrofitting of transit facilities. In aggregate, solar panels, LED lights, recycling, and other energy efficient features have helped Metro to reduce their operating costs in excess of \$1 million annually. In 2010, the use of solar panels alone reduced Metro's carbon footprint by 16,500 metric tons, which is the equivalent of removing 3,200 passenger vehicles from the road.



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## Health Services and Biomedical

### Cluster Overview

The health services and biomedical industry cluster employed over 368,000 workers in 2009. More than 136,700 of these jobs are in hospitals, with medical equipment makers, and in R&D activities. Another 166,600 provide ambulatory care in doctor and dentist offices throughout the county.

Health care is about more than treating the ill. It also involves conducting research into finding the causes and developing the cures to solve many of our chronic health problems.

Los Angeles County is home to some of the nation's finest research and teaching hospitals including the University of California Los Angeles (UCLA) Medical Center, University of Southern California's (USC) Keck School of Medicine, the City of Hope, Cedars-Sinai Hospital, Los Amigos National

Rehabilitation Center, the Doheny and Stein Eye Institutes, and a number of other specialized research facilities, such as the Los Angeles Biomedical Research Institute. In fiscal year 2010, \$869 million of National Institutes of Health (NIH) financial support flowed into Los Angeles County.

Medical instruments and pharmaceuticals were among the most valuable products moved through LAX in 2010; total two-way trade was valued at \$11.4 billion.

The health care sector will see robust growth in coming years as the population ages, as the population grows, and as technology improvements expand the opportunity for medical intervention. Many occupations, however, particularly in-home health care, offer low wages.

### Industry Roster

- Ambulatory Health Care Services
- Electromedical and Therapeutic Apparatus Manufacturing
- Hospitals
- Medical Equipment and Supplies Manufacturing
- Nursing and Residential Care Facilities
- Pharmaceutical and Medicine Manufacturing
- Scientific Research and Development in Life Sciences

### 2010-2020

### Employment Prospects



The employment outlook for the health services and biomedical cluster is very good. The cluster is expected to add 90,000 jobs by 2020, an increase of more than 24 percent over current employment. The aging of the population, advances in medical technology and the relative wealth of households enabling the purchase of higher levels of health care services all contribute to the expected growth in the cluster. Greening is not expected to have a significant impact on employment.

Source: LAEDC



## ESTABLISHMENTS

2009  
**22,663**  
5.4% of county total

1999  
**21,275**  
6.9% of county total



## EMPLOYMENT

2009  
**368,423 Jobs**  
9.4% of county total

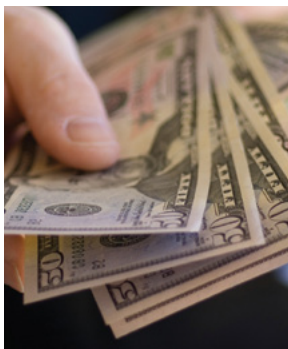
1999  
**341,774 Jobs**  
8.4% of county total



## ANNUAL PAYROLL

2009  
**\$20,116 Million**  
10.0% of county total

1999 (in 2009 dollars)  
**\$17,245 Million**  
8.4% of county total

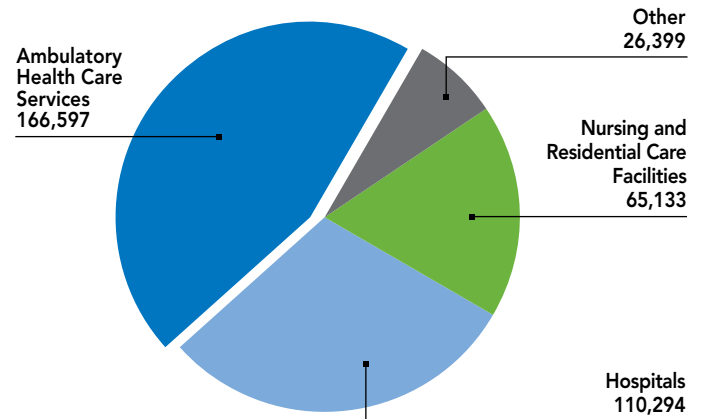


## OUTPUT

2009  
**\$62.2 Billion**  
7.0% of county total

Source: LAEDC

## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)

■ 2009 ■ 1999

Electromedical & Therapeutical Apparatus Manufacturing



Scientific Research & Development—Life Sciences



Hospitals



Medical Equipment & Supplies Manufacturing



Pharmaceutical & Medicine Manufacturing



Ambulatory Health Care Services



L.A. County Average



Nursing & Residential Care Facilities



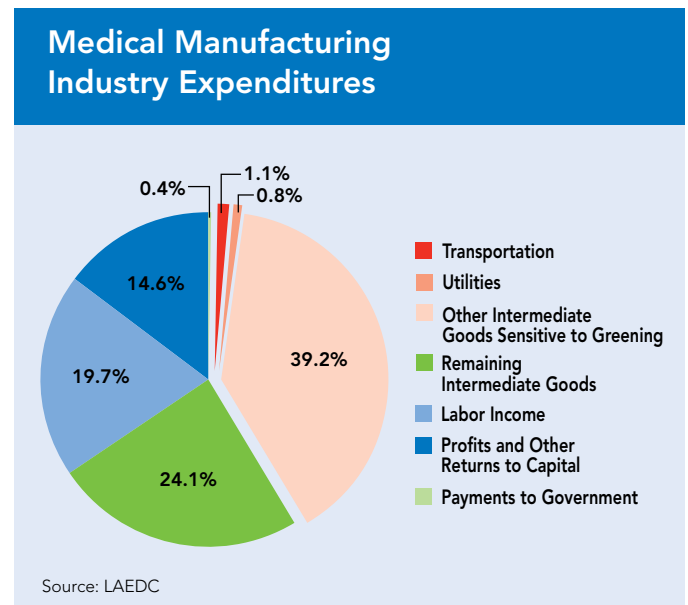
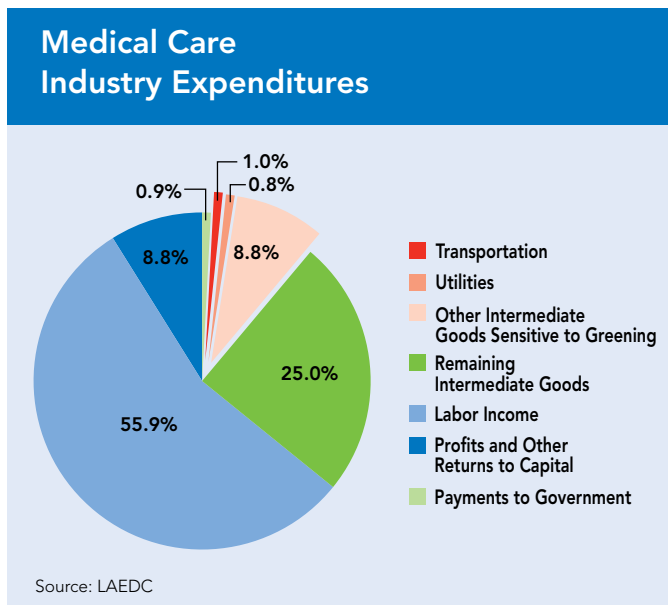
Source: CA EDD



## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the medical care<sup>†</sup> and medical manufacturing industries,<sup>§</sup> with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the medical care industry in Los Angeles County spent on average \$1,978 per employee on utilities and transportation, while generating \$112,610 in output per employee.
- Medical care businesses spend most of their expenditures on service-based inputs, which are not price-sensitive to greening.
- Though only a small percentage of medical care expenditures goes to utilities and transportation, the absolute amount of this spending is significant (over \$750 million total). Due to the size of the Los Angeles County medical care industry, actions taken by these firms can make a significant impact on regional sustainability.
- In 2008, firms in the medical manufacturing industry in Los Angeles County spent on average \$10,833 per employee on utilities and transportation, while generating \$578,555 in output per employee.
- Medical manufacturing businesses allocate almost a quarter of expenditures to chemical products, many of which are derived from petroleum. Medical manufacturers may be vulnerable to increases in the price of oil.

<sup>†</sup>This industry group includes NAICS codes 621, 622, and 623.

<sup>§</sup>This industry group includes NAICS codes 325411, 325412, 334510, and 3391.





## Things to Consider

From a green perspective, the health services and biomedical cluster consists of two groups. In one group are the hospitals, ambulatory health care services, and nursing and residential care facilities, which account for more than 90 percent of the employment in the cluster. This first group is population-serving and thus does not have the option of relocating to avoid the costs of greening. State mandates, such as seismic upgrades for hospitals, the growing number of uninsured patients, and funding and reimbursement issues related to Medi-Cal, Medicare, and Medicaid, will have a more substantial fiscal impact on this segment of the health services and biomedical cluster than greening.

In the second group are manufacturers of pharmaceuticals, medical devices and medical equipment as well as firms and organizations engaged in scientific research and development. These firms have considerable flexibility in their response to green regulations and do not need to be present in the local market in order to sell their products. Indeed, many of the

products from industries in this segment of the health services and biomedical cluster have a high value-to-weight ratio, making shipment by air a viable option. Such firms may respond to green regulations by shifting some or all of their operations out of the state. Firms engaged in research and development have even more flexibility in their location choices than do manufacturers.

The region does offer many advantages, such as the presence of a large, skilled workforce and proximity to leading research institutions and hospitals. It is not clear what specific market opportunities exist for this cluster, but medical device manufacturers may participate in the shift to paperless medical records, which might be considered a variation on digital replacement. Some of these firms may find that their existing workforce and skills can be applied in unexpected ways in emerging green fields.

## Examples of Regulations Driving the Greening of the Health Services and Biomedical Cluster

- ▶ Pursuant to Rule 1103 from the South Coast Air Quality Management District, pharmaceutical and cosmetic manufacturing operators must follow specific limitations to reduce volatile organic compound (VOC) emissions while also keeping daily records on items such as the types and amounts of compounds in use.<sup>1</sup>
- ▶ The federal Electronic Health Record Incentive Program, established by the American Recovery and Reinvestment Act of 2009, will enable eligible Medi-Cal providers and hospitals to receive incentive payments to assist in the purchase, installation, and use of electronic health records.<sup>2</sup> Regular updates on this can be found on the State's Health Information and Technology Exchange website: <http://www.ehealth.ca.gov>.
- ▶ The Environmental Protection Agency's (EPA) National Emission Standards for Pharmaceuticals Production were first proposed in 1997 and more recently amended in 2005. The EPA is authorized to establish these standards under the Clean Air Act; specifically, the EPA establishes National Emission Standards for Hazardous Air Pollutants (more commonly referred to as NESHAP), and pharmaceuticals is one such industry affected by these standards. The purpose of these standards for the pharmaceutical industry is to reduce toxic air pollutants from the manufacturing of pharmaceutical products.<sup>3,4</sup>
- ▶ The EPA is proposing a rule that would add hazardous pharmaceutical wastes to the federal universal waste program, thereby making it easier for waste-generators to collect and properly dispose of these items.<sup>5</sup>
- ▶ The EPA plans to propose a rule in 2011, with an effective date of 2012, to reduce mercury discharges into the environment from dental amalgam (e.g., fillings). Currently, most dental offices discharge this type of waste to municipal wastewater treatment facilities. The EPA estimates that approximately 3.7 tons of mercury is sent to these treatment facilities by dentists each year. In December 2008, the EPA (through its Office of Water) signed an agreement with the American Dental Association and the National Association of Clean Water Agencies, which established a Voluntary Dental Amalgam Discharge Reduction Program.<sup>6</sup>



### Applying Green Practices

The U.S. health industry is one of the largest sectors of the economy, and it is growing quickly. Health services and biomedical firms allocate 1.8 percent of their total spending to transportation and utilities, which is a relatively low percentage compared to other industries. However, this modest fraction adds up due to the size of the health industry, and, by one estimate, accounts for eight percent of all U.S. greenhouse gas emissions. This figure may increase as the health industry continues to grow; on the other hand, efficiency gains in this large industry can significantly reduce national emissions.

U.S. hospitals have room for improvement. According to Practice Greenhealth, hospitals in the U.S. use approximately twice the energy as office buildings of the same size, and roughly twice the amount of comparable European hospitals.<sup>7,8</sup> Health service providers and biomedical product manufacturers can reduce their impact on the environment by eliminating waste and redundancies. However, high resource consumption is often justifiable in the healthcare industry because the price of failure is measured in lives, not dollars or tons of CO<sub>2</sub>. Nonetheless, the impulse to spare no expense, monetary or environmental, could be tempered with an increased regard for efficiency. In the long run, responsible resource use contributes to the industry's goal of promoting a healthy society.

#### ► Facilities

Health care facilities and medical product manufacturers can reduce their environmental impact by applying common green strategies related to construction and building maintenance. Several organizations have compiled best practices idiosyncratic to the health industry: the American Society of Healthcare Engineering (ASHE), the Green Guide for Health Care, Practice Greenhealth, and Deloitte are some examples.<sup>9,10,11,12</sup> These resources outline specific ways that firms in the health industry can reduce their environmental impact and often save money by doing so.

For example, between 2000 and 2007, Pfizer spent approximately \$60 million on energy conservation projects at its facilities around the world, including a LEED-certified facility in New Haven, CT.<sup>13</sup> During this period, Pfizer reduced its carbon emissions by 20 percent on an absolute basis, or 35 percent

per \$1 million of revenue and reduced GHG emissions another 14% from 2007 through 2009. According to a study by Deloitte, Kaiser Permanente has used ecologically sustainable materials for 29 million square feet in new construction, preventing the release of 70 billion pounds of air pollutants annually and saving more than \$10 million per year through energy conservation strategies over a five year period.<sup>14</sup> Subsidies can also defray the cost of new energy efficient equipment. Tri-City Medical Center in Oceanside spent \$210,000 on energy-efficient lighting but received a \$46,000 rebate from the California Public Utilities Commission.

#### ► Inpatient vs. Outpatient

Health care facilities generate significant emissions. These facilities can become more efficient by applying the green practices described above. However, there will always be a baseline level of environmental impact associated with caring for patients on-site. By favoring outpatient care when appropriate, health care providers can reduce the need for large and costly medical facilities. Furthermore, health service providers can reduce transportation-related emissions by requiring fewer on-site appointments or dealing with patients remotely, for example by conducting scheduled phone appointments.<sup>15</sup>

#### ► Pharmaceutical and Medical Device Waste

Britain's National Health Services has introduced a comprehensive sustainability strategy.<sup>16</sup> They began by assessing their own carbon footprint, and they found that 30 percent of their emissions were attributable to purchased pharmaceuticals and medical devices, compared to 22 percent

*The constant battle against rising costs in the health industry will underpin the adoption of cost-saving green practices.*



## Applying Green Practices (continued)

attributable to building energy use and 16 percent to all forms of travel.<sup>17</sup> While pharmaceuticals and medical devices are essential to health care, they are often used excessively or wastefully. Many pharmaceuticals are perishable; although overstocking drugs helps prevent shortages in times of increased demand, it also generates waste which may require special disposal. Medical devices can also contribute to waste – for example, in the extreme case, National Health Services (NHS) facilities in Britain use nail clippers only once to prevent the one-in-ten million chance of spreading mad cow disease.<sup>18</sup> A single-use policy makes sense for products like syringes, but not all devices need to be treated as such. By reducing the amount of pharmaceutical and medical device waste, health care providers can reduce their environmental impact and cut costs as well.

### ► Electronic Records

Making the leap to electronic records is one of the most daunting but necessary changes facing the health care industry. Many health care providers have not yet done so due to hurdles such as cost, complexity, and information privacy. However, the

benefits from doing so are significant and diverse. Paperless record-keeping provides obvious environmental benefits in addition to efficiency gains. The current health care system generates mountains of paperwork every year; this wastes resources, increases labor for medical staff, and creates the possibility for loss of medical information. Kaiser Permanente's HealthConnect system has successfully streamlined operations throughout the company.<sup>19</sup> Furthermore, patients have secure access to their results online and can contact their physicians over the internet, reducing the need for in-person visits.

### ► Hazardous Waste

Health care facilities can generate hazardous waste due to pharmaceuticals, medical devices, and electronics. Proper disposal can divert these materials from landfills. According to Deloitte, Kaiser Permanente eliminated 630,000 grams of mercury (about 1,430 pounds) from its overall system through responsible disposal methods. The organization now procures mercury-free products where available, leaving Kaiser 95 percent mercury-free.<sup>20</sup>

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# Higher Education

## Cluster Overview

Los Angeles County is a major center for higher education. It is home to some of the nation's finest universities. There are approximately 120 accredited institutions in Los Angeles County that confer associates, bachelors, and graduate degrees. Each year, these schools graduate tens of thousands of students.

L.A. County is home to three world-class research universities, California Institute of Technology (Caltech), University of California-Los Angeles, and University of Southern California. In 2010, these three research universities alone received more than \$2.06 billion in research funding from federal agencies, including the Department of Defense, United States Department of Agriculture (USDA), National Aeronautics and Space Administration (NASA), Department of Health and Human Services (HHS), and National Institutes of Health.

Six campuses of the California State University (CSU) system are found in the county, along with Pepperdine, Loyola Marymount, Woodbury, the Claremont Colleges, the Art Center College of Design, California Institute of the Arts, the Colburn School for Performing Arts, and the Otis College of Art and Design. Also, L.A. County is home to the nation's largest community college district, Los Angeles Community College District (LACCD).

More than 97,000 jobs are supplied by four-year colleges and universities in the county, and 26,700 teachers and staff members work in the area's extensive community college system. The region also has many well-respected trade schools with specialized programs that offer unique training grounds for employees.

Increasingly competitive pressure for job seekers will motivate the acquisition of higher levels of education, leading to promising employment prospects for this sector.

## Industry Roster

- **Business and Computer and Management Training (Private)**
- **Colleges and Universities (Private)**
- **Colleges and Universities (Public)**
- **Junior Colleges (Private)**
- **Junior Colleges (Public)**
- **Technical and Trade Schools (Private)**

2010-2020

## Employment Prospects



The employment outlook for higher education is good. The cluster is expected to add 16,800 jobs by 2020, an increase of almost 13 percent over current employment. Much of this growth will occur in private colleges and universities, but technical and trade schools and community colleges will also add jobs as the population expands and as new training programs become available. Community colleges will be constrained by continuing fiscal challenges, so we would expect some substitution towards private institutions.

Source: LAEDC





## ESTABLISHMENTS

2009  
**1,583**  
0.4% of county total

1999  
**1,721**  
0.6% of county total



## EMPLOYMENT

2009  
**130,672 Jobs**  
3.3% of county total

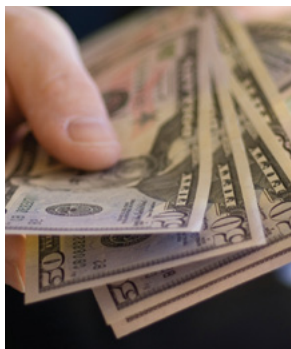
1999  
**107,945 Jobs**  
2.7% of county total



## ANNUAL PAYROLL

2009  
**\$6,492 Million**  
3.2% of county total

1999 (in 2009 dollars)  
**\$5,133 Million**  
2.5% of county total

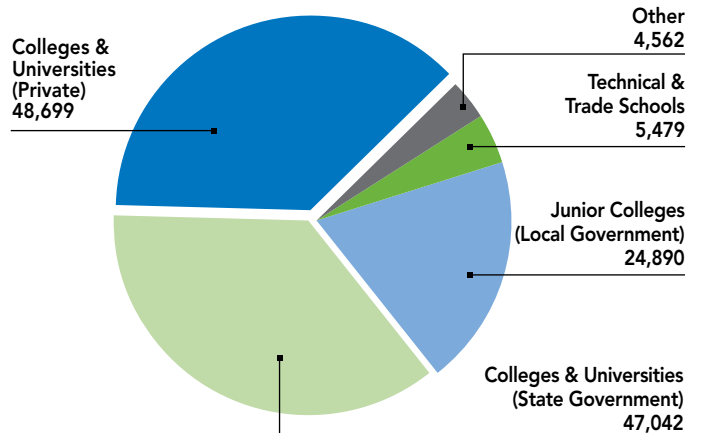


## OUTPUT

2009  
**\$13.6 Billion**  
1.5% of county total

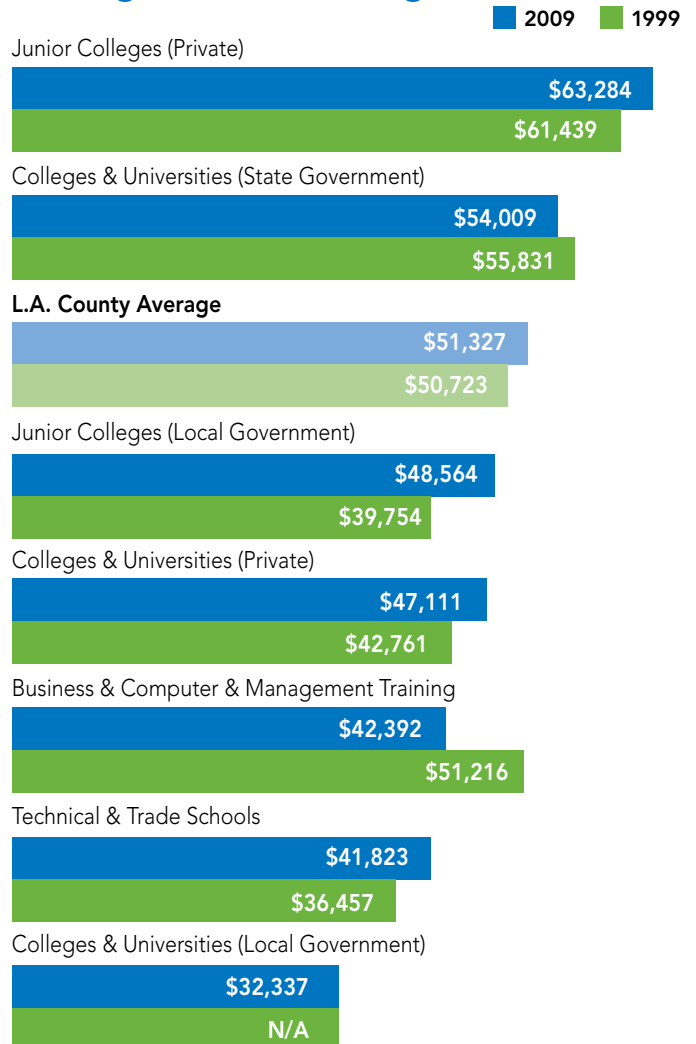
Source: LAEDC

## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)



Source: CA EDD





### Potential Cost Increases

Higher education purchases a variety of goods and services for ongoing operations, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.

### Things to Consider

Universities, colleges, technical and trade schools, and business, management, and computer training programs will not relocate to avoid greening because they serve a specific geographic market or have a long-established presence in their current location. On the contrary, many organizations within this cluster have taken to greening their own operations with zeal. The University of California, Los Angeles, for example, has found that investments in energy efficiency on campus have paid for themselves even more quickly than initially anticipated. Their experience has been shared by the California Institute of Technology, which withdrew funds from its endowment to fund energy efficiency programs on campus after initial projects confirmed that the annual energy savings would quickly repay the investment as well as offer a better rate of return.

Organizations in the higher education cluster will add to the regional demand for green goods and services in almost all of the nine opportunity areas identified in section two of the report, particularly green vehicles, construction, green materials manufacturing, and green energy. They will be key participants in the education and training as well as the research and development opportunity areas, and the presence of major research centers will make the region even more attractive to firms engaged in green materials manufacturing.

### Examples of Regulations Driving the Greening of the Higher Education Cluster

- ▶ Effective January 2011, CALGreen—the California Green Building Standards Code—requires that new buildings reduce water consumption, divert construction waste from landfills, increase building efficiencies, and utilize low-pollutant emitting materials.<sup>1</sup>
- ▶ SB 48 (Alquist) (2009) requires that all publishers of textbooks that are offered for sale at public or private postsecondary schools be made available—“to the extent practicable”—in electronic format.<sup>2</sup>
- ▶ Following a directive signed by then Governor Arnold Schwarzenegger, California state and local agencies took steps to curb a three year drought by seeking solutions to growing water demand and water supply issues. Some of these efforts included the use of tiered water rate structures and drought-tolerant landscaping.<sup>3</sup>
- ▶ The development of regional GHG emission reduction targets for passenger vehicles was mandated through SB 375 (Steinberg) (2008)—an implementation measure of AB 32. Each of the State’s metropolitan planning organizations, e.g., the Southern California Association of Governments (SCAG) for Los Angeles County, are required to prepare Sustainable Community Strategies to demonstrate how the region plans to meet the set GHG reduction targets through an integrated approach to land use, housing, and transportation planning.<sup>4</sup>



### Specific Market Opportunity: Education and Training

The greening of the economy will require many workers to learn new skills and modify existing ones. Most of this learning will occur in existing education programs (modified to include green-related changes) and through on-the-job training.

#### ► How big is the market demand?

At first glance, the market for education and training appears boundless. The greening of the economy will permeate all sectors and many workers will have to learn new skills and upgrade existing ones. However, the market size for entirely new training and education programs that are explicitly green is likely to be small.

Most of the demand for green-related education and training will be met by existing programs and on-the-job training. Architecture programs, for example, will incorporate green building design into the currently required coursework and develop new courses if warranted by the material. Similarly, construction workers may learn about working with environmentally friendly building materials through apprentice programs.

Moreover, many green areas of the economy will create only minimal demand for additional training. Solar power facilities, for example, do not require that many workers for their operation; the skills required are not radically different than those required for electric utility workers; and only a limited number of large-scale solar facilities will be built in Los Angeles County.

#### ► What is the employment opportunity?

The education professionals who teach in a variety of fields ranging from environmental studies and engineering to architecture and automotive repair and maintenance will have to keep their skills current so that they can prepare students to work with the various green-related changes in their respective fields. The need for additional education personnel will be limited, though green-related changes may prompt workers in some fields to undertake additional training, which could generate a modest need for additional educators.

#### ► Does L.A. County have a comparative advantage?

For those education opportunities that exist, Los Angeles County is well-positioned to capture the market for green education and training. California's commitment to greening has made it a leader in the nation. The size and breadth of the local economy, with its approximately four million workers and 15 export-oriented clusters, combined with the region's strength in post-secondary education (approximately 120 accredited institutions and the nation's largest community college district, Los Angeles Community College District, are located here), make it a logical place for green-related education and training.

#### ► What are the key challenges?

Since green training should be matched to industry needs and employment opportunities, the primary challenge will be to restrain widespread enthusiasm for developing new training programs for green jobs beyond potential demand.

#### ► Conclusion

Existing education and training programs will be modified, some profoundly, by green-related changes. Nonetheless, there is not much potential for an incremental increase in regional employment or economic activity in this area.

In the rush to embrace greening, educators need to focus on actual demand and whether the training needs might be best met by changing the curriculum of existing education and training programs.



### Applying Green Practices

In implementing greening strategies, campus policy-makers have two important advantages in effecting greening strategies. First, small changes rolled out across an entire campus can add up to produce large results. Second, students and employees who learn green practices from schools are likely to adopt these strategies as personal habits for life. Thus colleges and universities are in a position to spread green practices well beyond the campus.

#### ► Buildings

Campuses have extensive office and classroom space, residential facilities, and dining areas. Yet, a single building management team is responsible for making the environmental choices normally left to individuals. With the ability to mandate efficiency measures for thousands of people, campus managers can quickly implement strategies that can take decades to gain acceptance in the general population. For example, 95 percent of UCLA's lighting fixtures are energy-efficient, 87 percent of its paper is made from at least 30 percent recycled content, and 100 percent of its computers are Energy Star.<sup>5</sup> By using bulk purchasing, campus managers may even be able to get special pricing on items like compact fluorescent lights (CFLs), low-flow faucets, and recycled paper products to further enhance the cost savings of such appliances. Large schools can offer green campus transportation to avoid the problems associated with street traffic. Campuses can also plant water-efficient landscaping on a wide scale.

Schools can encompass all building-related aspects of greening by pursuing LEED certification for new and existing building projects. LEED provides a rigorous framework for greening, and it rewards successful projects with a highly-regarded certification. Many schools have already met with success by doing so. For example, the CSU campuses operate over 25 buildings that are either LEED-certified or are actively pursuing LEED designation.<sup>6</sup> The University of California (UC) system has a total of 32 LEED certifications, and all future UC construction projects will conform to LEED principles.<sup>7</sup>

#### ► Green Power Generation

Large campuses that consume significant amounts of electricity can take advantage of the economies of scale related to power generation. In addition to solar installations, which many types of buildings can use, large schools can take advantage of other green power generation options such as high-efficiency gas generators. Excess hot water from such facilities can be used for cogeneration heating systems and other needs. For example, Caltech operates a 12.5 MW natural gas plant that provides approximately 80 percent of campus electricity needs and also produces useful steam.<sup>8</sup> Caltech is also building a 1.3 MW solar installation on top of campus parking structures and buildings.<sup>9</sup>

UCLA also uses a natural gas cogeneration system. In addition to providing over 70 percent of campus electricity, the system supplies almost 100 percent of heating and cooling needs. UCLA sources around seven percent of its natural gas from Mountaingate Landfill's gas capture system.<sup>10</sup>

#### ► Waste

California colleges have been implementing recycling and composting programs for years with great results. Schools can improve their waste statistics by encouraging good habits among students and employees and also by providing convenient receptacles. Nine of ten UC campuses have met their goal of diverting at least 50 percent of municipal waste from landfills, compared to a national average of around 30 percent.<sup>11</sup> UCLA has set further goals of 75 percent waste diversion by 2012, and 100 percent by 2020.<sup>12</sup>

*Greening the economy will create additional opportunities for research; institutions of higher learning will be among the leading adopters of green best practices based on their long-term outlook and desire to reduce operating costs; and these institutions will help spread green practices throughout the economy through specific green-related course offerings and the practical example they will set for their students.*



## Applying Green Practices (continued)

### ► Transportation

Schools can encourage their students and faculty to use alternative forms of transportation. UCLA provides a campus shuttle system and conveniences for bicyclists such as bike racks, showers, and a bike rental system. Through its carpool and vanpool system, UCLA has reduced the amount of employees driving alone to work from over 70 percent to 53 percent (compared to a Los Angeles average of 74 percent).<sup>13</sup>

### ► Organizations

Schools are in a unique position to spread information about greening. By educating students and faculty about the importance of green behavior in everyday life, colleges can create a more knowledgeable campus population. Several organizations make it easy for schools to adopt this approach. The Green Campus Program organizes student-institution relations by funding several internship positions at participating schools and holding conferences for sharing campus greening practices.<sup>14</sup> The purpose

of these internships is to increase awareness of and participation in green issues; for example, the Green Campus Program has distributed over 16,000 CFLs to students.<sup>15</sup> More than 15 major universities in California currently participate in the Green Campus Program. The Association for the Advancement of Sustainability in Higher Education is an organization that shares green best practices relevant to universities.<sup>16</sup> The UC and CSU systems have their own websites for aggregating green success stories from their respective campuses.<sup>17,18</sup> For example, the UC sustainability website lists examples of green-related courses that students can enroll in.<sup>19</sup>

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# Jewelry Manufacturing and Wholesaling

## Cluster Overview

The Jewelry District in Los Angeles County is home to almost 850 jewelry wholesaling establishments and is recognized as one of the nation's largest suppliers of jewelry, gems, and watches. Employment in the jewelry manufacturing and wholesaling industry cluster in Los Angeles County numbered 5,745 in 2009.

The District hosts a thriving market for custom designs and the import and export of precious stones and metals. In 2010, the total value of two-way trade for gems, jewelry, and precious watches through the combined Ports of Los Angeles and Long Beach and through Los Angeles International Airport was valued at nearly \$6.1 billion.

Many of the custom-made designs are destined for stores along the fabled Rodeo Drive in Beverly Hills. This short, three-block stretch of shops includes some of the most famous names in the jewelry business. Tiffany, Cartier, Van Cleef and Arpels, and Harry Winston all have salons here.

As an industry with specialized craftsmen producing items for discretionary purchase, employment prospects are not promising. The industry is expected to remain stable over the medium- to long-term.

### Industry Roster

- Jewelry Manufacturing
- Jewelry Wholesaling

2010-2020

### Employment Prospects



The employment outlook for the jewelry cluster is poor. The cluster is expected to experience an employment decline of five percent by 2020, a loss of 300 jobs. Widespread adoption of computer-aided design and rapid prototyping will shorten the product cycle and reduce employment. The industry is already well-regulated in Los Angeles County, and the loss of jobs will likely be due more to the changing industry than to greening.

Source: LAEDC

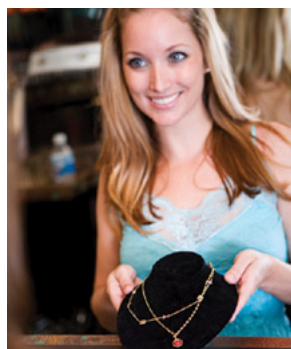




## ESTABLISHMENTS

2009  
**1,051**  
0.2% of county total

1999  
**1,199**  
0.4% of county total



## EMPLOYMENT

2009  
**5,745 Jobs**  
0.1% of county total

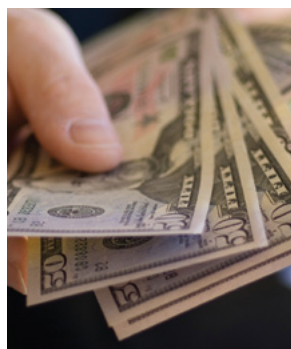
1999  
**9,588 Jobs**  
0.2% of county total



## ANNUAL PAYROLL

2009  
**\$251 Million**  
0.1% of county total

1999 (in 2009 dollars)  
**\$392 Million**  
0.2% of county total

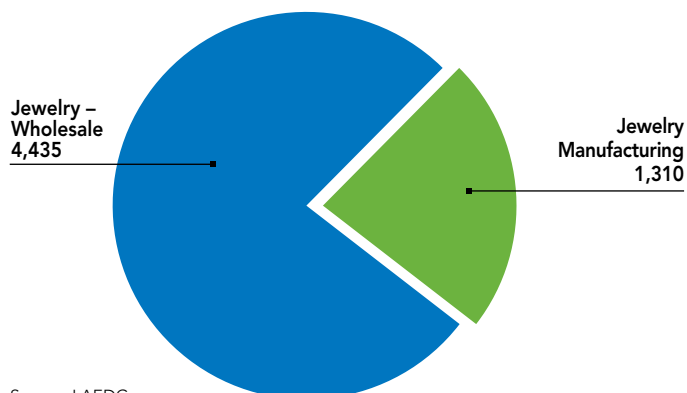


## OUTPUT

2009  
**\$1.0 Billion**  
0.1% of county total

Source: LAEDC

## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)

■ 2009 ■ 1999

### L.A. County Average



### Jewelry - Wholesale



### Jewelry Manufacturing



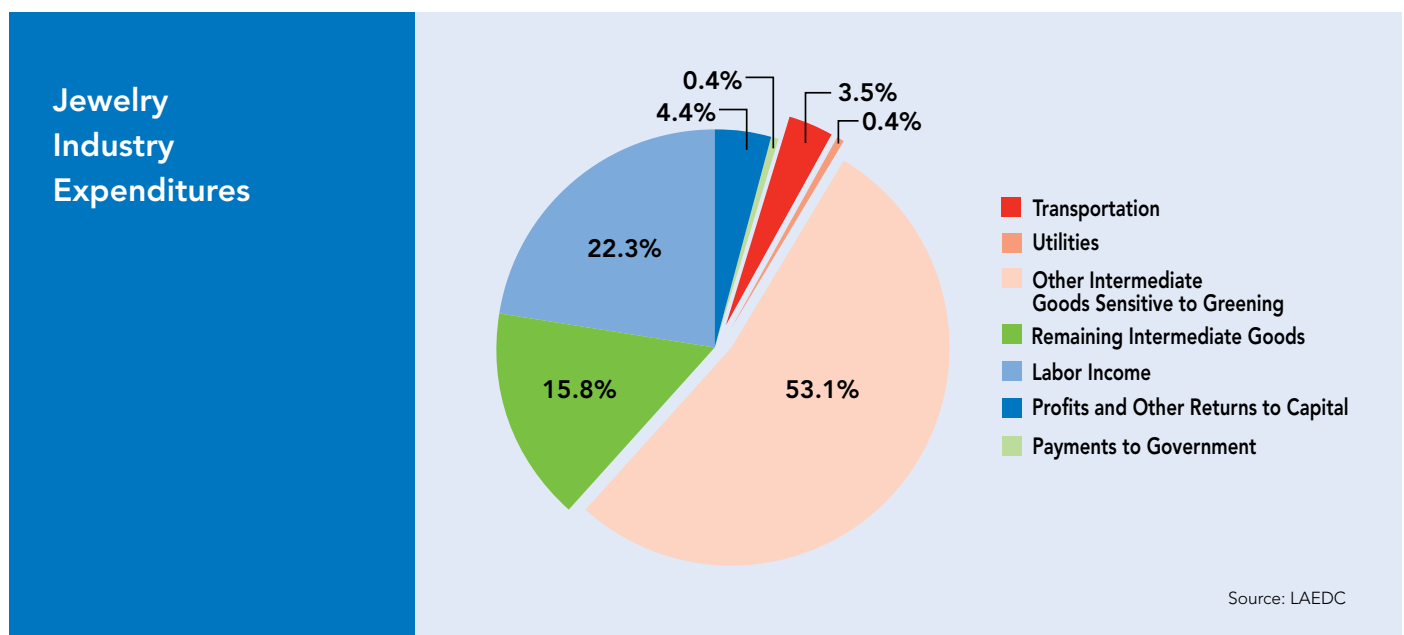
Source: CA EDD



## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the jewelry industry,<sup>†</sup> with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the jewelry industry in Los Angeles County spent on average \$9,323 per employee on utilities and transportation, while generating \$232,056 in output per employee.
- Jewelry businesses allocate a significant portion of expenditures to precious metals and stones. Firms in this industry are vulnerable to price swings in the global markets for these goods. Sustainable and ethical mining practices may increase the cost of these goods in the future as well.

*With limited opportunity for on-site green-related cost savings, response to the demands of their customers is the most likely catalyst for firms in the jewelry manufacturing industry to adopt green practices.*

<sup>†</sup>This industry group includes NAICS code 33991. This definition does not include all businesses that fall within our jewelry cluster.



## Things to Consider

Jewelry manufacturing is relatively flexible in its location, particularly since the products' combination of high value, compact size, and low weight makes overnight shipping a feasible option. Overall, however, greening costs in the jewelry cluster are likely to be low and significantly overshadowed by other factors, such as volatility in the price of precious metals and political instability, especially in West African countries.

### Examples of Regulations Driving the Greening of the Jewelry Manufacturing and Wholesaling Cluster

- ▶ AB 2901 (Brownley) (2008) amended California's Metal-Containing Jewelry law, which limits the amount of lead in jewelry and prohibits the manufacturing, shipping, selling, or offering of jewelry in California unless it meets certain criteria. Separate provisions exist for children's jewelry and body-piercing jewelry.<sup>1</sup> The law was initially created through AB 1681 (Pavley) (2006) and was previously called the Lead Containing Jewelry Law.
- ▶ Proposition 65 (1986), a voter-approved initiative, and AB 1756 (Committee on Budget) (2003) requires the State to publish a list of chemicals that are known to cause cancer, birth defects, or other reproductive issues. The measures also require businesses to notify Californians (through a warning) regarding the amount of chemicals in the products they purchase.<sup>2</sup>
- ▶ AB 455 (Chu) (2003) and the amendments that followed, collectively referred to as the Toxics in Packaging Prevention Act, placed restrictions on packaging and packaging components containing cadmium, lead, mercury, or hexavalent chromium. The law affects all manufacturers, distributors, and resellers, regardless of where the packaging originated.<sup>3</sup>
- ▶ In December 2010, the United States Environmental Protection Agency (EPA) established National Emissions Standards for Hazardous Air Pollutants (NESHAP) for gold ore processing and production facilities. Emissions from the processing and production of gold ore are a large source of total mercury air emissions. The final NESHAP will limit mercury emissions in four types of processes found at gold production facilities.<sup>4</sup>

## Applying Green Practices

In addition to greening their operations, jewelry manufacturers and vendors can promote sustainable sourcing of raw materials and reduce waste generation in the manufacturing process.

### ▶ Facilities

Jewelry manufacturers and wholesalers can apply simple greening practices at their offices and manufacturing facilities. For example, companies can install efficient lighting, low-flow plumbing fixtures, and efficient ventilation and air conditioning systems to reduce electricity use and save money.

### ▶ Sourcing

Techniques for mining, refining, and crafting precious metals and gems can be particularly harmful to the environment. For example, most gold is extracted by soaking piles of ore in a highly toxic cyanide solution. Thirty tons of ore must be treated in this manner to extract just one ounce of gold.<sup>5</sup> Once the gold is collected, the residual chemicals and spent ore are left in heaps or reservoirs, from which acids and heavy metals can leak into the environment for years or decades. Some locations in Europe and the Americas require mining companies to conduct a thorough clean-up, but site remediation and third party verification is voluntary in most of the world.

Jewelry manufacturers and wholesalers can avoid supporting this kind of environmental degradation by using metals with high recycled content. The process of recycling precious metals is much less harmful since no new ore is processed. Ute Decker, a London designer, uses 100 percent recycled silver for her jewelry; her supplier's prices are comparable and sometimes better than the broader silver market's.<sup>6</sup> Melissa Joy Manning Inc., a U.S. jewelry supplier, also uses 100 percent recycled metal. Manufacturers and vendors can support green practices by investigating the sources and production methods of their suppliers. Wal-Mart has set a long-term goal of sourcing 100 percent of its gold, silver and diamonds from sustainable suppliers, and a short-term goal of tracking 10 percent of its jewelry from source to store by 2010.<sup>7</sup>

To revolutionize jewelry design and manufacturing into a green one, members of the American Gem Trade Association (U.S. and Canadian jewelers) are committed to using only naturally mined and unaltered gemstones. The eco-friendly jewelry production process will decrease exposure of jewelers to harmful chemicals and radiation. It is particularly applicable to small and independent jewelers, who create and maintain thousands of jobs in the greater Los Angeles area.



## ► Waste Reduction

Jewelry manufacturers and wholesalers employ a wide range of toxic substances to produce and maintain their products. Many jewelers are not aware of how hazardous these chemicals are. The California government offers tips for using fewer chemicals, disposing of them properly, using alternative substances or techniques, and handling materials safely; this information is available in several languages.<sup>8,9</sup> The Society of American Silversmiths website provides a list of chemicals that jewelry manufacturers can substitute for more hazardous ones.<sup>10</sup> For example, jewelers can use lemon juice as pickling and baking soda as an acid neutralizer and abrasive.

## ► Consumer Education

Sustainable production methods are clearly important, but they may make such jewelry more expensive to bring to market. Where this is the case, sustainably produced jewelry will have a hard time competing on price with other jewelry. In order for green practices to take hold in the jewelry industry, consumers must be educated about the merits of sustainable production methods. If consumers understand and accept the justification for slightly higher prices, then demand for sustainable jewelry may rise and the industry will have another incentive to adopt responsible practices.

One of the best ways to spread knowledge about the merits of green jewelry production is to adopt an industry-wide green standardization system administered by a recognized authority. The jewelry industry currently lacks an international organization that tracks materials, sets standards, verifies claims, and holds companies accountable. By forming such an organization, the industry could offer credible proof to their consumers that their products are sustainable.

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<sup>9</sup>California Department of Toxic Substances Control. "Guidance for Jewelry Manufacturers Publications." 2007. Available from: [http://www.dtsc.ca.gov/PublicationsForms/jewelry\\_pubs.cfm](http://www.dtsc.ca.gov/PublicationsForms/jewelry_pubs.cfm). Last accessed on March 31, 2011.

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# Materials and Machinery

## Cluster Overview

Los Angeles County is the nation's number one manufacturing center in terms of employment. Currently, about 105,500 people are employed in the materials and machinery industry cluster. The firms in this cluster create the pieces, parts, and machines required to assemble the finished goods of manufacturers.

The county is known for its expertise in such advanced materials as composites, ceramics, polymers, and the latest innovations in nanomaterials. The presence of the aerospace industry has been a motivating factor in the research, development, and deployment of new materials and processes.

Precision components are also a specialty. Using advanced computer numerical controlled (CNC) machining tools, skilled tradesmen aided by mechanical engineers turn out unique components honed to the tightest tolerances.

The largest segment in this industry cluster is fabricated metal products. Often supplying key components for aircraft and military hardware, these shops work to exacting specifications and tight security. Fabricated metal products and machinery manufacturing employ 59,000 people in the county.

While employment in manufacturing as a whole has been in decline in Los Angeles County and nationwide, the continuing evolution of materials is providing new opportunities to offset some of the declines due to productivity gains. Employment in this industry cluster is still expected to experience losses in the future.

## Industry Roster

- Custom Compounding of Plastics Resins
- Fabricated Metal Products Manufacturing
- Machinery, Equipment and Supplies Wholesaling
- Machinery Manufacturing
- Metal Merchant Wholesaling
- Plastics Material and Resin Manufacturing
- Plastics Product Manufacturing
- Primary Metal Manufacturing

## 2010-2020

## Employment Prospects



The employment outlook for materials and machinery is poor. The cluster is expected to see job losses in the order of 6,400 by 2020, a six percent decline in employment over the decade. Improvements in processes will make the industry cluster more efficient, but these efficiencies will negatively impact employment. The industry's exposure to higher utility costs will also threaten its employment outlook.

Source: LAEDC





## ESTABLISHMENTS

2009  
**5,027**  
1.2% of county total

1999  
**6,910**  
2.2% of county total



## EMPLOYMENT

2009  
**105,684 Jobs**  
2.7% of county total

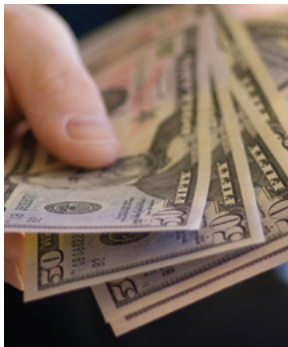
1999  
**159,804 Jobs**  
3.9% of county total



## ANNUAL PAYROLL

2009  
**\$5,486 Million**  
2.7% of county total

1999 (in 2009 dollars)  
**\$8,137 Million**  
4.0% of county total

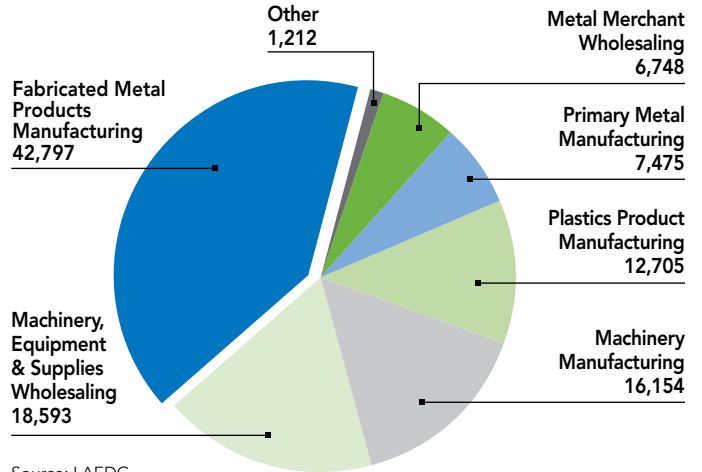


## OUTPUT

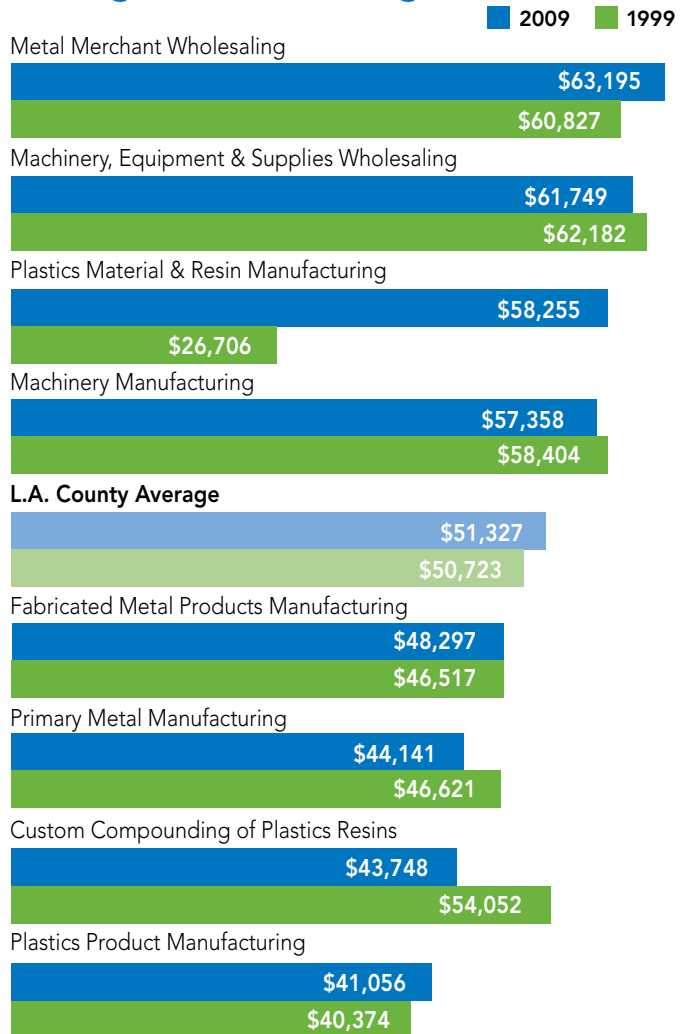
2009  
**\$29.7 Billion**  
3.3% of county total

Source: LAEDC

## Employment by Industry (2009)



## Average Annual Earnings (in 2009 dollars)



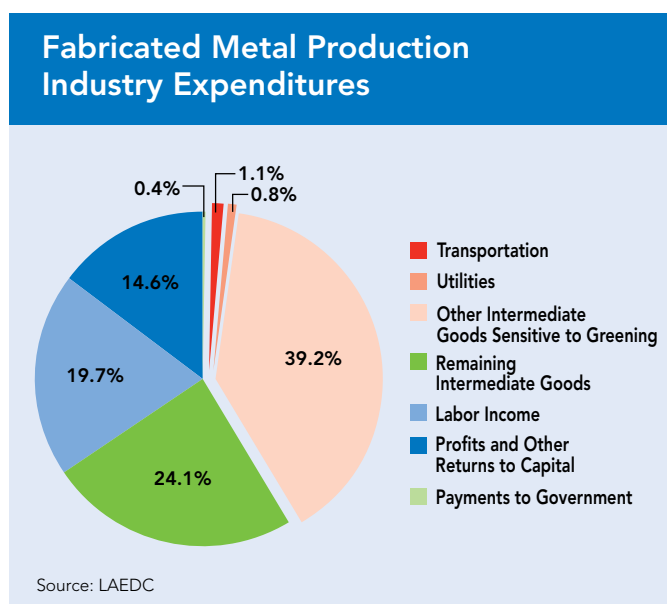
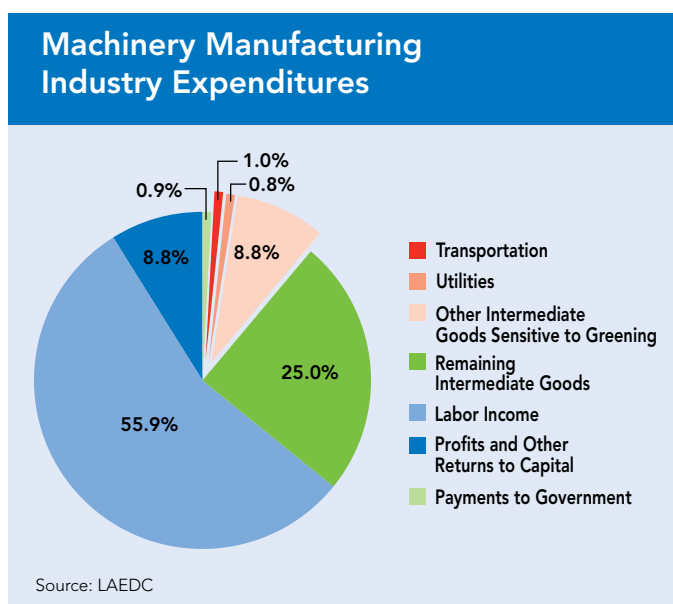
Source: CA EDD



## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the machinery manufacturing,<sup>†</sup> fabricated metal products,<sup>§</sup> and primary manufacturing<sup>‡</sup> industries, with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the machinery manufacturing industry in Los Angeles County spent on average \$9,621 per employee on utilities and transportation, while generating \$327,525 in output per employee.
- Machinery manufacturing businesses spend a significant portion of their total expenditures on metals and other manufactured metal products. These products may become more expensive in the future due to higher energy prices, stricter mining standards, and air quality concerns related to metals manufacturing.
- In 2008, firms in the fabricated metal production industry in Los Angeles County spent on average \$10,020 per employee on utilities and transportation, while generating \$248,773 in output per employee.
- Fabricated metal products manufacturing businesses spend a significant portion of their total expenditures on metals and other manufactured metal products. These products may become more expensive in the future due to higher energy prices, stricter mining standards, and air quality concerns related to metals manufacturing.
- Though only a small percentage of fabricated metal products manufacturing expenditures goes to utilities and transportation, these firms spend much of their budget on manufactured goods which may in turn be affected by greening.

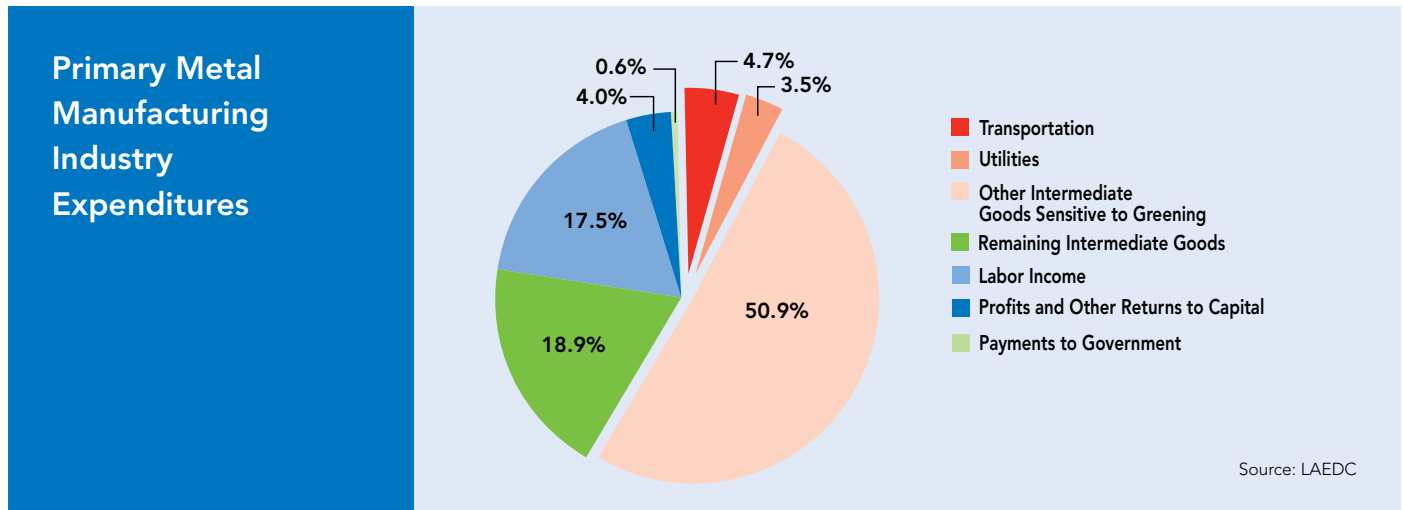
<sup>†</sup>This industry group includes NAICS code 331. These definitions do not include all businesses that fall within our materials and machinery cluster.

<sup>§</sup>This industry group includes NAICS code 332.

<sup>‡</sup>This industry group includes NAICS code 331.



## Potential Cost Increases (continued)



- In 2008, firms in the primary metal manufacturing industry in Los Angeles County spent on average \$44,627 per employee on utilities and transportation, while generating \$554,113 in output per employee.
- Primary metal manufacturing firms spend a significant portion of expenditures on metals and ores, the price of which may be sensitive to mining prices, emissions regulation, and sustainability concerns.
- Primary metal manufacturing businesses typically consume significant amounts of electricity in the course of refining and processing metals. Utility spending accounts for 4.7 percent of all expenditures by firms in this group, the highest share among the 29 industry groups we examined.
- There are many cost-saving energy efficiency strategies available to firms in this industry, but most firms have already picked the low-hanging fruit.

## Things to Consider

From a green perspective, the materials and machinery cluster consists of two groups: wholesalers and manufacturers. Firms in the machinery, equipment and supplies wholesaling, and metal merchant wholesaling industries are largely location-dependent in as much as they need to be located near their customers. This means that they do not have the option of relocating to avoid green regulations.

Manufacturers in the cluster include firms that make plastic products, machinery, fabricated metal products, and primary metals, i.e., the type of business that many people associate with the term “industrial.” Their operations tend to be more utility intensive; involve processes that create emissions subject to air quality and carbon emission reduction regulations; and

require inputs that may be energy intensive, subject to other environmental regulations, or both. In short, they are already subject to regulatory scrutiny. Absent investment in energy efficiency measures, their costs will rise. Manufacturing firms in this industry cluster are among the most likely to experience greening as burdensome and are most at risk for relocating.

Firms in the materials and machinery cluster will add to local demand for green products and services, particularly for green consulting and auditing as they seek compliance with the latest regulatory requirements. Retaining as many firms as possible in this cluster is critical given their potential role as suppliers to local green materials manufacturers.

***Firms in the materials and machinery cluster will adopt green practices as a defensive measure against rising costs.***



## Examples of Regulations Driving the Greening of the Materials and Machinery Cluster

- ▶ The purpose of the South Coast Air Quality Management District Rule 1124 is to reduce volatile organic compound (VOC) emissions associated with aerospace assembly and component manufacturing operations. The rule sets forth limits on the materials containing VOC, such as primers and adhesives, that can be used in the aforementioned assembly and manufacturing.<sup>1</sup>
- ▶ The South Coast Air Quality Management District (AQMD) Rule 1141 aims to reduce emissions from resin manufacturing. Resin is used as the basic component of plastics, and two of the requirements of Rule 1141 are that resin manufacturers reduce their emissions and keep daily records indicating the amount and type of each resin produced as well as daily volatile organic compound (VOC) emissions.<sup>2</sup>
- ▶ The State's proposed cap-and-trade program looks at meeting AB 32 GHG goals through setting limits on GHG emissions for sectors while also enabling tradable permits (allowances) to emit GHGs.<sup>3,4</sup>
- ▶ With the signing of AB 455 (Chu) (2003), referred to as the Toxics in Packaging Prevention Act, and subsequent amendments, packaging and packaging components containing cadmium, lead, mercury, or hexavalent chromium faced limitations as well as eliminations. The law affects all manufacturers, distributors, and resellers, regardless of where the packaging originated.<sup>5</sup>
- ▶ In 2001, the United States Environmental Protection Agency (EPA) set forth National Emission Standards for Hazardous Air Pollutants (NESHAP) to reduce toxic air pollutants from reinforced plastic composites production. The EPA sets NESHAP standards under the authority of the Clean Air Act.<sup>6,7</sup>
- ▶ The EPA finalized wastewater controls for Metal Products & Machinery in 2003, which established runoff limitations and performance standards for wastewater discharge from new and existing facilities.<sup>8</sup>

## Specific Market Opportunity: Green Materials Manufacturing

The broad green materials manufacturing market encompasses the production of all green-related manufactured products other than vehicles. Los Angeles County faces stiff global competition for these manufacturers and will struggle to attract new entrants to the area. However, the county's deep pool of local manufacturers remains a source of hope. The large number of such firms that have found an advantage to locating in Los Angeles County suggests that others may as well. Furthermore, local firms modifying their products or entering new markets comprise the county's most promising source of green materials manufacturers.

### ▶ How big is the market demand?

Virtually every product in the economy can be made greener in some way, whether in its production (through choice of raw materials or more efficient manufacturing processes) or in its design (to make it more energy-efficient, longer lasting, easier to recycle, etc.). The market for green materials includes everything from construction-related products, such as energy-efficient insulation, to biodegradable eating utensils. Green products will capture a growing share of total (taxable) sales in Los Angeles County, which exceeded \$112.7 billion in 2009.

### ▶ What is the employment opportunity?

Since almost every product could be greener, the potential seems limitless. Few new jobs will be created, however, by environmentally friendly improvements to existing products. Such changes will most likely be implemented by current producers. On the other hand, the production of purely green items, such as photovoltaic solar panels, wind turbines, and pillows made from shredded recycled plastic bottles will generate substantial employment, including the multiplier effects when the manufacturers purchase goods and services from their suppliers. Any employment gains may be offset by losses in other areas if the new (green) product replaces an existing one. Another consideration is the long term trend in manufacturing toward greater productivity (and fewer workers), which will almost certainly apply to green materials manufacturing as well.



## Does L.A. County have a comparative advantage?

L.A. County is the largest manufacturing center in the United States, employing over 388,000 and with workers in industries ranging from aerospace and apparel to electrical equipment, food manufacturing, and biomedical devices. Employment in manufacturing is lower than it was 15 years ago but output is higher, matching the national trend toward greater productivity. The continued strength in manufacturing in the region suggests two comparative advantages when it comes to green materials manufacturing.

First, despite the complaints about California being a difficult, high-cost place that is hostile to business, manufacturing firms in a variety of sectors find it profitable to locate in Los Angeles County, suggesting that for them, at least, the area offers an attractive place to do business. Depending on the business, one or more advantages might include proximity to a market that (including San Diego) is larger than the state of New York, particularly for bulky and high-weight-to-value items; a large and skilled workforce; infrastructure (including the ports, airports, freeway system, intermodal rail yards, and railways); world-class universities, etc.

Second, the large, established base of manufacturers in the county is the most likely source of green materials manufacturing operations. Many green businesses will grow out of existing firms, e.g., a product line might be tweaked, a complementary product might be added, or the firm might discover that its existing skills and expertise are applicable in an emerging field. For example, AeroVironment, an aerospace firm based in Monrovia, California that specializes in unmanned aircraft, has emerged as one of the leading manufacturers of electric vehicle charging stations.

## What are the key challenges?

There are three critical challenges to developing a major green materials manufacturing center in Los Angeles County: competition among green materials manufacturers, competition among regions courting such manufacturers, and regulation.

First, even with more manufacturing jobs than any other county in the nation, most of the manufactured items consumed in Los Angeles County, from cars to laser printers, are made somewhere else. The shift to more efficient or otherwise greener products and production processes is unlikely to fundamentally alter the underlying market considerations that have led manufacturers to export to the Los Angeles market rather than from it. Manufacturing employment in the county has been declining for years and this trend will be difficult to reverse.

Second, there is stiff global competition to attract green materials manufacturers. Numerous regions around the world have identified the greening of the economy as a strong candidate for employment growth and have offered incentives and subsidies, such as tax breaks, free or heavily subsidized land, high feed-in-tariffs, and programs favoring the purchase of green products. And firms that want to sell the products in the Los Angeles County market do not need to make them here.

Third, green materials manufacturers may find it difficult to locate in Los Angeles County if producing their greener product itself generates greenhouse gases or other emissions. Even if the widespread adoption of a product such as double-pane windows locally and abroad will lower overall emissions, the manufacturer may not be able to get the required permits to manufacture the product here.

*Green products will capture a growing share of total (taxable) sales in Los Angeles County, which exceeded \$112.7 billion in 2009.*

## Conclusion

Strong competition exists among green materials manufacturers and the regions seeking to host them. Los Angeles County faces an uphill climb in this area but may do well to the extent that firms in the many traditional manufacturing sectors in the area are able to modify their product lines to include or expand into green products.





## Applying Green Practices

Firms in materials and machinery can adopt many of the best practices employed by all industries with large manufacturing facilities. This industry cluster is particularly energy-intensive – the primary metals manufacturing, fabricated metal products manufacturing, and machinery manufacturing industries allocate 8.1 percent, 4.0 percent, and 2.9 percent of total spending, respectively, on transportation and utility costs. Particular concerns for this industry cluster include the importance of recycling, energy efficiency, and byproduct disposal. In addition, manufacturers can explore ways to improve the fuel efficiency of their logistics fleets.

### ► Recycling

Producing metal from recycled scrap is cheaper and cleaner than producing it from ore. Realizing this, metal manufacturers adopted this cost-effective greening strategy decades ago and have continued making efficiency improvements ever since. Recycling metals such as steel and aluminum can save over 75 percent of the energy needed to produce the same metal from ore. This also eliminates the environmental impact of mining and transporting millions of tons of ore. The success of this industry serves as a model for other materials manufacturers. Plastics can also be recycled, though the quality degrades with reuse. By promoting innovative uses for recycled plastic, plastic manufacturers can reduce petrochemical use as well as hedge against future rises in oil prices.

### ► Hazardous Material Disposal

Many appliances and other manufactured products now include traces of hazardous materials, though customers are not always aware of them. If such products are simply thrown out, the hazardous materials will enter the environment. To prevent

this, manufacturers of goods including dangerous materials are increasingly required to take responsibility for end-of-life disposal of their products or participate in fee programs that fund recycling and responsible disposal. By educating consumers about the importance of proper disposal, and by providing an easy means to do so, manufacturers can significantly reduce their overall environmental impact.

### ► Byproduct Use

Slag, fly ash, foundry sand, and other manufacturing byproducts often accumulate near refineries or in landfills. These materials can be harmful to the environment if they escape containment. However, they are heavy and difficult to dispose of properly. One way to do so is to incorporate them into concrete, which then can be used for normal construction purposes without loss of quality. By promoting such uses and developing new applications for these materials, manufacturers can reduce the environmental impact of their byproducts. New manufacturing processes and the widespread use of rapid prototyping will also reduce waste products.

### ► Gas Capture

In addition to generating greenhouse gas emissions indirectly by consuming electricity, some materials manufacturers also produce greenhouse gases directly as a result of chemical reactions related to production. Manufacturers producing significant levels of such gases will find these emissions regulated by the California Air Resources Board. Though the creation of these gases cannot be avoided without changing the production process entirely, manufacturers can pursue methods of capturing emissions before they are released to the atmosphere.

### ► Transportation

All firms in this industry cluster, whether manufacturers or wholesalers, have significant shipping needs. By making use of rail logistics, increasing truck fleet fuel economy, and ensuring trucks travel as full as possible, firms can save money and reduce transportation-related emissions.

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# Membership Organizations and Associations

## Cluster Overview

The private membership organization cluster consists of religious, grantmaking, civic, professional, and similar organizations. These organizations promote, support, and advocate for various causes in the interest of their members—religious, social, and political. They rely upon member dues, grants, and contributions for funding.

This cluster is categorized by type of interest into the following classifications: religious organizations, such as churches, synagogues and temples; grantmaking and giving services, such as foundations and charitable trusts; social advocacy organizations, such as environmental groups and humans rights advocacy groups; civic and social organizations, such as alumni associations and parent-teacher associations; and business, professional, labor, political, and similar organizations, such as chambers of commerce, trade associations, real estate boards, labor unions, political action committees, and homeowners associations.

More than 38,400 people work in this industry cluster, many in the business, professional, labor, and political organizations. Examples of this type of organization in Los Angeles County would include the entertainment industry associations such as the Screen Actors Guild, the Directors Guild of America, and the American Federation of Television and Radio Artists. It would also include the Service Employees International Union and the California Association of Realtors.

Membership groups will likely grow over the next decade, but at a rate somewhat smaller than the rate of growth in population.

### Industry Roster

- **Business, Professional, Labor, Political, and Similar Organizations**
- **Civic and Social Organizations**
- **Grantmaking and Giving Services**
- **Religious Organizations**
- **Social Advocacy Organizations**

2010-2020

### Employment Prospects



The employment outlook for membership organizations and associations is promising. As a population-serving cluster, it is expected to add 4,100 jobs by 2020, an increase of ten percent over current employment. Greening is not expected to have an impact on employment in this cluster.

Source: LAEDC



## ESTABLISHMENTS

2009  
**3,010**  
0.7% of county total

1999  
**3,253**  
1.1% of county total



## EMPLOYMENT

2009  
**38,426 Jobs**  
1.0% of county total

1999  
**34,799 Jobs**  
0.9% of county total



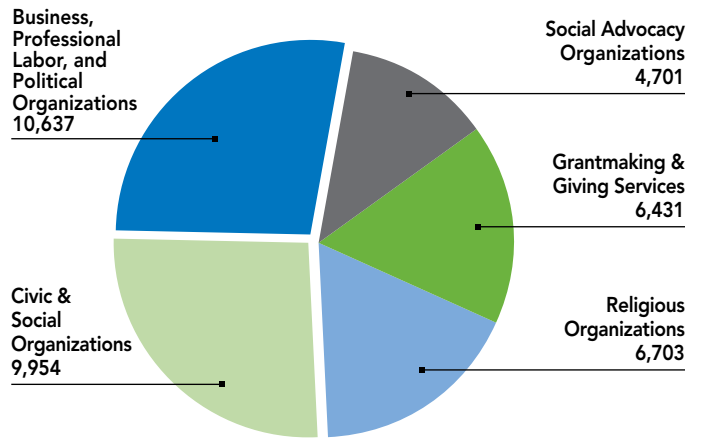
## ANNUAL PAYROLL

2009  
**\$1,502 Million**  
0.7% of county total

1999 (in 2009 dollars)  
**\$1,252 Million**  
0.6% of county total

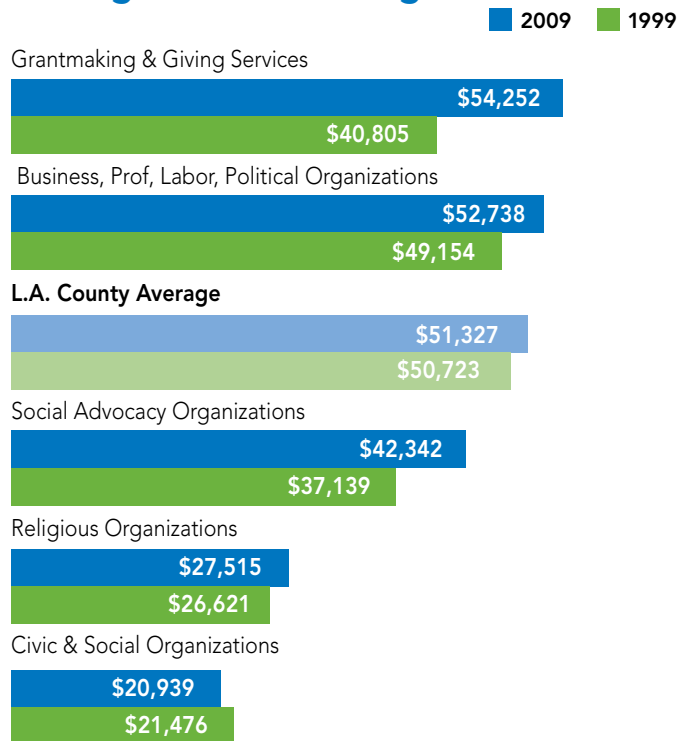
Source: LAEDC

## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)



Source: CA EDD



## Potential Cost Increases

Membership organizations and associations purchase a variety of goods and services for ongoing operations, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.

## Things to Consider

With the exception of national or regional headquarters, which could presumably be relocated out-of-state, membership organizations and associations are typically established to serve the population within a specific area. This makes them location dependent and thus unable or unlikely to exit the area in response to greening cost pressures. One of the larger cost pressures this cluster is likely to face is higher electricity bills, which is a problem that can be mitigated with various cost-effective energy-efficiency measures. Membership organizations make up just 0.7 percent of establishments and 1.0 percent of employment in L.A. County, so they will have a small—but additive—impact on the local demand for green products and services.

Membership organizations and associations may have a disproportionate impact on greening the regional economy. To the extent that such organizations embrace green best practices and act as informational conduits for wider dissemination of information on cost-effective green strategies, they will be a de facto participant in the education and training specific market opportunity previously identified. Grantmaking and giving services, in particular, may help foster the adoption of green best practices. The Weingart Foundation, for example, has adopted a clean vehicle policy for capital requests to support the purchase of vehicles. It prioritizes and, where appropriate, adds additional funds to defray higher costs to applications that commit to the purchase of vehicles that meet 2010 EPA emissions standards (for commercial trucks and buses); are certified for the US EPA SmartWay program (for heavy duty tractors and trailers); or are highly rated on the U.S. EPA's Green Vehicle Guide (for vans and minivans).<sup>1</sup>

## Examples of Regulations Driving the Greening of the Membership Organizations and Associations Cluster

- ▶ The South Coast Air Quality Management District (AQMD) Proposed Rule 2301, while not yet a formal rule, seeks to mitigate the growth in emissions (e.g., new vehicle trips, construction activity, etc.) from new residential, commercial, industrial, and institutional development and redevelopment projects.<sup>2</sup>
- ▶ The Los Angeles County Green Building Program (2009), which is made up of three ordinances, limits the impact of development on unincorporated areas of Los Angeles County. The Green Building Ordinance requires the use of construction materials and techniques that would improve the energy efficiency of a building and create fewer pollutants. The Drought-Tolerant Landscaping Ordinance requires that landscaping use specific plants that have low water needs. And the Low Impact Development Ordinance seeks to manage rainfall and stormwater runoff.<sup>3,4</sup>
- ▶ Governor Schwarzenegger's 2008 Executive Order declaring that the State of California was in a statewide drought prompted statewide conservation efforts and innovative solutions to increase water supply/decrease water demand, such as the use of tiered water rate structures and drought-tolerant landscaping.<sup>5</sup>

*Membership organizations will be particularly sensitive to the cost saving opportunities presented by greening their operations. The organizations comprising this cluster tend to have broad reach and cross-cutting membership, which makes them uniquely suited to promote their own adoption of green practices as a means of educating others and thus easing the wider transition to a cleaner economy.*





## Applying Green Practices

Membership organizations can help the environment by greening their own operations and by using their influence to encourage greening in other areas of the economy. Many green strategies can yield cost savings when implemented correctly, which is important for organizations on a tight budget. Furthermore, organizations that go green are serving the long-term interests of the community as a whole.

### ► Facilities

Membership organizations can adopt many green strategies which are inexpensive and easy to implement and can offer cost savings after an initial investment. For example, Hillside Organization, a foster care and child treatment organization, has adopted many office-related greening strategies such as using less paper, implementing a recycling program, upgrading to energy-efficient electronics and appliances, and using more drought-tolerant landscaping. These actions have yielded cost savings, which frees more of Hillside's budget for helping children.<sup>6</sup>

The Getty Center has also made greening a priority. The museum received one of the first LEED certifications for existing buildings, and currently holds LEED Silver status. The Getty supplements its extensive natural lighting with LED and fluorescent lights controlled by an automatic system, encourages carpooling among employees, and recycles a significant amount of its waste. Many of the landscaping choices are drought-tolerant, and the facility uses goats to clear brush on the surrounding grounds.<sup>7</sup>

### ► Fundraising

Membership organizations can also keep the environment in mind when planning fundraiser events. In addition to reducing waste, this can help project a green and efficient image to donors. The University of California, Santa Barbara offers a free guide with specific tips for green event planning.<sup>8</sup> There are also companies that specialize in green event planning, such as Waste Less Living, Inc.<sup>9</sup>

### ► Other Resources

Organizations seeking further information beyond what is provided in this report can look to industry-specific resources. GreenNonprofits has published a book, the *Nonprofit Guide to Going Green*, to help nonprofits and non-governmental organizations take a comprehensive approach to greening.<sup>10</sup> *Philanthropy News Digest* also offers a regular column on relevant greening issues.<sup>11</sup>

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# Professional and Business Services

## Cluster Overview

With a strong industrial base to support it, Los Angeles County is home to a wide range of professional, scientific, and technical services firms.

Four of the nation's top 10 engineering design firms—Jacobs, AECOM, Tetra Tech, and Parsons—have headquarters in Los Angeles County, as do a number of well known architectural firms. Many have extensive environmental expertise which is a growing market.

Over 18,500 legal, accounting, and business consulting firms are located in the county. Architectural and engineering firms and design services account for an additional 4,600 firms in the professional and business service cluster in the county.

Supporting these professional services are five local schools of architecture and nine engineering schools as well as graduate schools that generate a steady flow of highly-qualified professionals. In 2009, colleges and universities in Los Angeles County granted 31,559 students with a bachelor's degree or higher in fields related to this cluster.\*

Beyond these professional services, a number of support services including staffing firms, property management companies, consultancies, and a myriad of outsourcing agencies add nearly 78,500 additional jobs to the county's overall employment.

Environmental regulations and mandates are spurring demand for consulting in sustainability and environmental audit fields. Employment is expected to grow in this industry cluster over the next decade.

## Industry Roster

- Accounting, Tax Preparation and Bookkeeping
- Advertising and Related Services
- Architectural, Engineering and Related Services
- Business Support Services
- Design Services (Interior, Industrial and Graphic)
- Employment Placement Agencies
- Legal Services
- Management, Scientific and Technical Consulting
- Office Administrative Services
- Professional Employer Organizations

2010-2020

## Employment Prospects



The employment outlook for the professional and business services cluster is very good. The cluster is expected to add 37,600 jobs by 2020, an increase of fifteen percent over current employment.

Source: LAEDC

\*Includes: Architecture, business management, communications/journalism, CIS, engineering, law, math and statistics, natural resources and conservation, and social sciences.



## ESTABLISHMENTS

2009  
**28,683**  
6.8% of county total

1999  
**25,460**  
8.3% of county total



## EMPLOYMENT

2009  
**245,699 Jobs**  
6.3% of county total

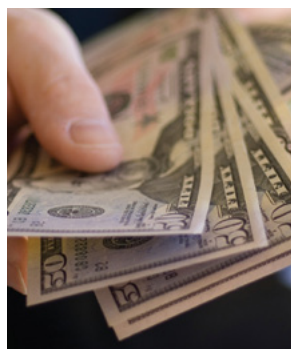
1999  
**251,313 Jobs**  
6.2% of county total



## ANNUAL PAYROLL

2009  
**\$18,333 Million**  
9.1% of county total

1999 (in 2009 dollars)  
**\$17,499 Million**  
8.5% of county total

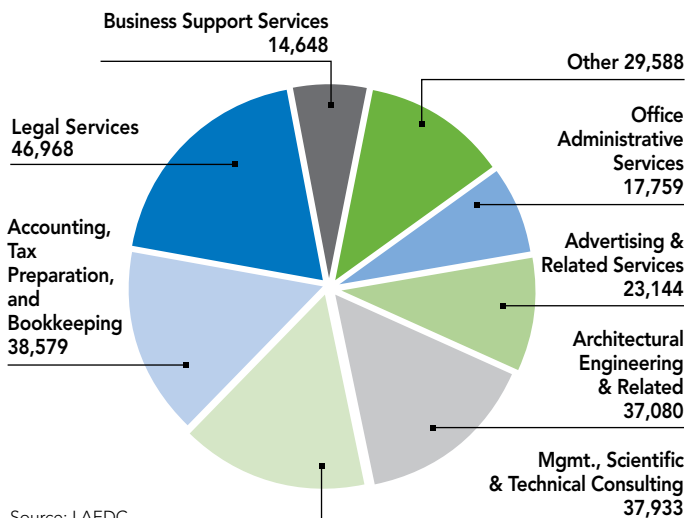


## OUTPUT

2009  
**\$58.0 Billion**  
6.5% of county total

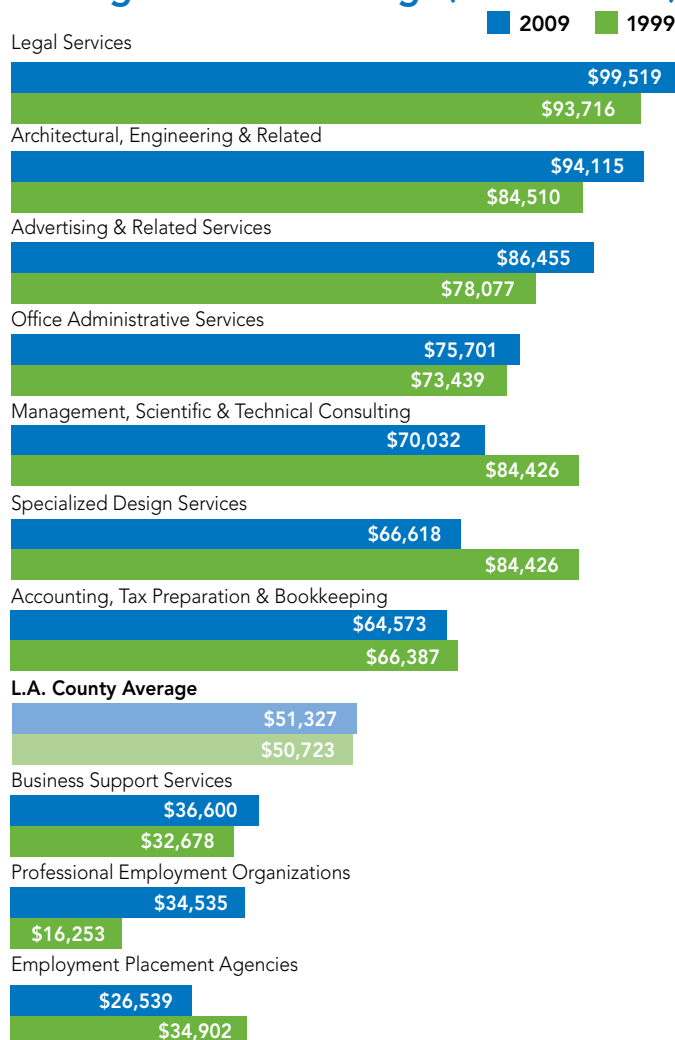
Source: LAEDC

## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)



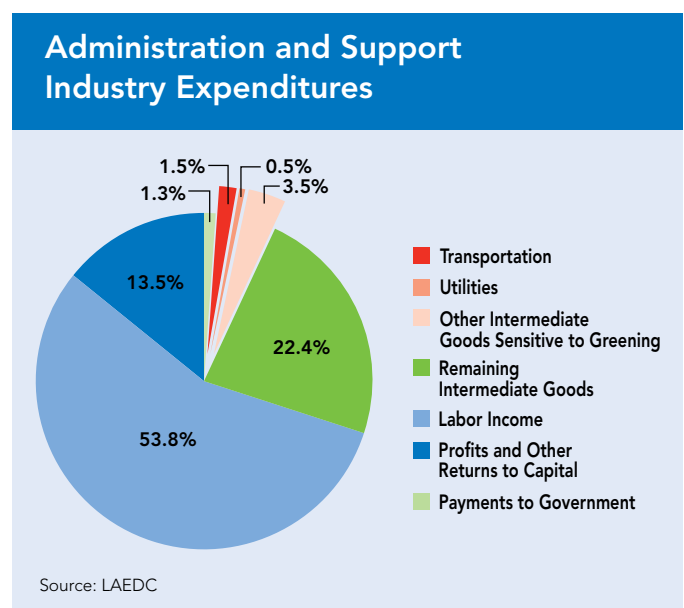
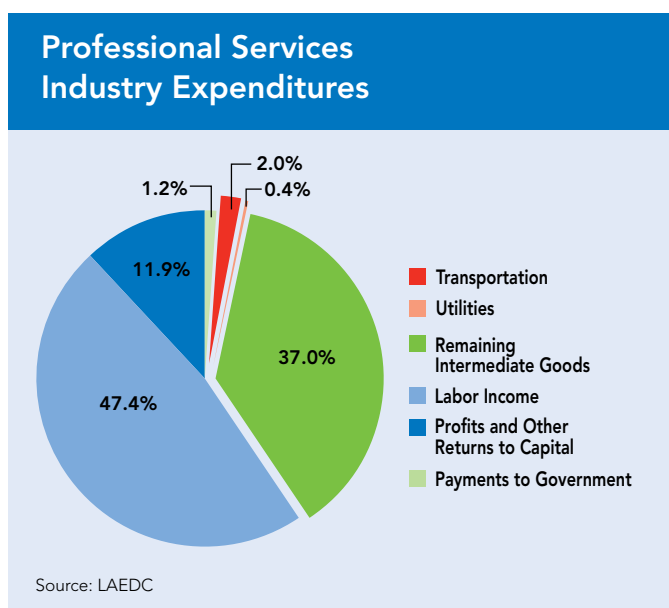
Source: CA EDD



## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the professional services<sup>†</sup> and administration and support<sup>§</sup> industries, with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the professional services industry in Los Angeles County spent on average \$3,978 per employee on utilities and transportation, while generating \$160,872 in output per employee.
- The vast majority of professional and business services expenditures go toward service-based inputs, which are not price-sensitive to greening.
- Though only a small percentage of professional and business services expenditures goes toward utilities and transportation, the absolute amount of this spending is significant (over \$1.3 billion to transportation and over \$250 million to utilities). By reducing travel expenditures, these firms can make a significant impact on sustainability.

- In 2008, firms in the administration and support industry in Los Angeles County spent on average \$1,285 per employee on utilities and transportation, while generating \$63,814 in output per employee.
- Firms in this industry do not face a significant threat from rising costs due to greening; however, some cost-saving efficiency strategies are available.

<sup>†</sup>This industry group includes NAICS codes 5411-4, 5416, 5418, 54191-3, and 54199.

<sup>§</sup>This industry group includes NAICS code 561.



## Things to Consider

Many of the industries in the professional and business services cluster are predominantly comprised of population-serving firms (such as business support services, office administrative services, accounting, tax preparation and book keeping, and legal services). Firms in these industries do not, for the most part, have the option of leaving the state to avoid the cost of greening.

The other industries in this cluster are a combination of population-serving and export-oriented firms, often within the same business, such as in: architectural, engineering and related services; advertising; design services; and management, scientific, and technical consulting services. Firms in these industries have flexibility in their location, at least with respect to their exported services, and could theoretically treat Los Angeles as another export market.

It is unlikely that firms in this cluster would leave the area to avoid greening their operations. With 6.8 percent of establishments in the county, firms in this group will contribute to the large local demand for green products and services, yet greening will impose minimal costs on individual firms within the industry. The firms in this cluster have a powerful incentive to remain in Los Angeles County to be close to their established client base. Most importantly, many of the firms should see additional demand for their services from the greening of the broader Los Angeles economy, particularly architectural, engineering, accounting, and consulting firms.

*Firms in the professional and business services industry cluster will adopt green practices in their own operations for the cost savings. Greening will be more important in this cluster as a source of opportunities for green-related consulting and services.*

## Examples of Regulations Driving the Greening of the Professional and Business Services Cluster

- ▶ Made up of three individual ordinances, Los Angeles County's Green Building Program (2009) limits the impact of development on unincorporated areas of Los Angeles County. The Green Building Ordinance requires the use of construction materials and techniques that would improve the energy efficiency of a building and create fewer pollutants. The Drought-Tolerant Landscaping Ordinance requires that landscaping use specific plants that have low water needs. And the Low Impact Development Ordinance seeks to manage rainfall and stormwater runoff.<sup>1,2</sup>
- ▶ CALGreen, the California Green Building Standards Code, requires that new buildings reduce water consumption, divert construction waste from landfills, increase building efficiencies, and utilize low-pollutant emitting materials. The state code has been in effect since January 1, 2011.<sup>3</sup>
- ▶ The goal of Proposed Rule 2301 from the South Coast Air Quality Management District (AQMD) is to mitigate the growth in emissions (e.g., new vehicle trips, construction activity, etc.) that occurs due to new residential, commercial, industrial, and institutional development and redevelopment projects.<sup>4</sup>
- ▶ In 2008, Governor Schwarzenegger issued an Executive Order declaring that the State of California was in a statewide drought. This order prompted statewide conservation efforts and innovative solutions to increase water supply/decrease water demand, such as the use of tiered water rate structures and drought-tolerant landscaping.<sup>5</sup>
- ▶ Directed at providing energy efficiency financing, On-Bill Financing (OBF) is a utility-based method that allows customers to improve their property through payments on their monthly utility bill. Southern California Edison has provided \$16 million in funds for OBF, and \$6.3 million in projects have been waitlisted due to the program's popularity.<sup>6</sup>
- ▶ The Mandatory Commercial Recycling Measure aims to achieve a reduction in GHG emissions of five million metric tons of carbon dioxide equivalents. The measure sets a path to recycle an additional two to three million tons of materials of commercial waste on an annual basis and is part of an overall effort by the California Air Resources Board (CARB) to curb GHG emissions.<sup>7</sup>



## Specific Market Opportunity: Green Consulting and Auditing

Los Angeles County is well-positioned to become a regional or even global center for green consulting and auditing. The transition to greener practices will likely lead many firms to consult specialists to ensure their compliance with a myriad of state and local regulations. They will also seek advice on how to reduce their emissions, strategies for reducing waste, and suggestions for improving energy efficiency. Organizations in sectors throughout the economy are likely to track their environmental impact, either voluntarily or because it is required by government mandate. The county is already strong in the various business sectors that will benefit most from such green-related consulting work, notably accounting, engineering, legal, and other professional services.

### ► How big is the market demand?

Greening will affect the entire economy, and many businesses will likely require professional services related to greening. Companies seeking to improve their efficiency and decrease their environmental impact already utilize such services. This market is likely to expand as formalized greening efforts become more common.

The size of the potential market is difficult to gauge because of the uncertainty surrounding regulations, which will most likely generate additional demand for green consulting services. For example, a cap-and-trade system that creates a market for tradable carbon credits would generate substantial demand.

*The county is home to major accounting, consulting, and engineering firms and one in five of all engineering, environmental consulting, and remediation establishments statewide.*

Demand would likely rise with the complexity of the proposed regulatory system, particularly if it allowed trading across industry sectors and state lines.

### ► What is the employment opportunity?

The scale of the employment opportunity will depend on the level of demand. At the very least, the greening of the economy will generate additional business for firms already engaged in similar work. Ultimately, the size of the opportunity is uncertain, and depends on policies adopted in California and the rest of the United States.

### ► Does L.A. County have a comparative advantage?

The professional and business services industry cluster is one of the largest in Los Angeles County. The county is home to major accounting, consulting, and engineering firms and one in five of all engineering, environmental consulting, and remediation establishments statewide.

Firms in the industry can draw on the many universities in the region that offer world-class programs in accounting, engineering, and sciences.

If other states or the federal government pass additional environmental regulations, or adopt California standards as their own, the firms developing consulting practices now will be well-positioned to export their green services.

### ► What are the key challenges?

The biggest hurdles are regulatory uncertainty (discussed above) and competition.

Los Angeles County is well-equipped to take advantage of opportunities in this market and could find itself competing with other professional hubs such as New York and London for the economic activity.

### ► Conclusion

Green consulting and auditing will definitely benefit from the shift to a cleaner, more efficient economy. The scale of the market opportunity is still taking shape but greening efforts will expand employment in the high-paying industries providing such services.





### Applying Green Practices

Professional and business services firms will green their own operations in standard ways. Aside from business travel, businesses in this industry cluster do not generate significant emissions or consume large amounts of natural resources. This industry cluster's largest contribution to greening the economy will probably involve offering technical knowledge and experience to other firms seeking to go green.

#### ► Independent Assurance

Firms with experience in independent auditing and verification services can participate in the greening process by offering independent assurance (unbiased verification of claims) of clients' greening efforts. Independent assurance services are currently offered by several large accounting firms, including PricewaterhouseCoopers, Deloitte, Ernst & Young, and KPMG. At present, most firms that publish details about their greening efforts do so voluntarily. Because such reporting is not mandatory, there is no standardized way to present results about emissions levels and other environmental impacts. It is possible that green reporting may become mandatory in the future. The U.S. Securities and Exchange Commission (SEC) already requires publicly listed companies to disclose the ways in which government regulations and climate change might impact their business.<sup>8</sup> In the meantime, firms that publish their efforts can gain credibility by seeking independent assurance and conforming to current attempts at standardization. Several organizations, such as the Global Reporting Initiative, the Carbon Disclosure Project, and the Climate Registry, provide frameworks for voluntary publication of environmental information.<sup>9,10,11</sup>

Professional and business services firms can gain valuable experience by participating in the reporting process. By offering independent assurance services early, firms can expand into a new market for their expertise and secure a good reputation among clients. Should such reporting become mandatory, green assurance will likely become an important business for experienced green auditors.

#### ► Consulting

Professional and business services firms with technical knowledge of green strategies can also offer their expertise as consultants. Many large firms in this industry cluster, including PricewaterhouseCoopers, Deloitte, Ernst & Young, KPMG (commonly referred to as the big four), and Accenture, offer green consulting services. Other firms with specialized knowledge, such as technical, legal, and engineering firms,

can incorporate greening advice into their normal repertoire of services as well. The greening process will require all Southern Californians to consider their environmental impact, and Professional and Business Services firms are well-positioned to offer green services to meet growing demand.

The "Sustainovation Group" of Haig Barret Management Consultants advises companies to adopt innovation-oriented processes to help meet sustainable objectives. In other words, their expertise is in bringing sustainability from a passive administrative reporting capacity (i.e. Corporate Sustainability Reporting) to one where areas with competitive advantage (such as finance, operations, product development, and marketing) can proactively drive innovation. Companies who pioneer sustainability in their industries not only establish themselves as the market leader, but they also move beyond operational sustainability efficiencies and into innovation of products, delivery systems, and materials recycling ahead of what green regulations may require.

#### ► Environmental Projects

Firms involved in other professional services, such as engineering, can also offer green services. Technical expertise in environmental issues can be sold as a service to clients who lack the means to undertake environmental projects themselves. For example, Parsons Corporation, an engineering and construction firm, provides a full range of hands-on environmental services.<sup>12</sup> Parsons both conducts environmental studies and takes the actions necessary to remediate various types of environmental damage. Demand for this kind of applied technical knowledge will likely grow as more businesses seek to minimize their environmental impact.

Several other local firms are well-positioned to fill this demand. Jacobs Engineering provides environmental investigation, restoration, engineering, construction, and site operations and maintenance services to both private and public sector clients around the world. Parsons Brinkerhoff's Environmental Services staff of over 4,800 employees includes 600 environmental scientists and engineers; its consulting expertise lies in



environmental planning, design, and construction management. AECOM provides environmental consulting services to public and private clients as well, employing skilled engineers, scientists, and project specialists to provide comprehensive environmental management services that meet client needs for feasibility, impact analysis, and operational compliance, in addition to remediation, restoration, and reuse of impacted property. Having won a preferred-supplier contract from Chevron in 2009, AECOM now provides environmental services for their global operations.

### Operations

Professional and business services firms looking to demonstrate their knowledge of green practices to clients can start by greening their own operations. Though only a small percentage of these firms' expenditures are dedicated to transportation and utilities, these expenditures are significant in an absolute sense—the professional and business services industry spent the fourth most on transportation of all the industries we analyzed. Firms in this industry may schedule a significant amount of air travel, which is a particularly expensive and carbon-intensive method of transportation. These firms can also realize cost savings and efficiency gains from adopting green practices in their buildings.

For example, PricewaterhouseCoopers initiated their in-house greening by conducting a carbon footprint analysis and then pinpointing areas for improvement.<sup>13</sup>

In addition to reducing transportation spending, video conferencing offers increased efficiency and flexibility because no time is wasted while employees are in transit or fatigued from travel. Ernst & Young also adopted video conferencing, reducing overall air miles by 18 percent and 27 percent in two separate years.<sup>14</sup> They also reduced paper purchases by 19 percent, and more than 10 percent of their building square footage is LEED-certified.

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<sup>3</sup>California Building Standards Commission. "CALGreen." *California Building Standards Commission*. March 3, 2011. Available from: <http://www.bsc.ca.gov/CALGreen/default.htm>. Last accessed on April 18, 2011.

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## Real Estate

### Cluster Overview

Los Angeles County has a land area of over 4,000 square miles with a population density of 2,300 people per square mile. As of 2009, the county had almost 3.4 million single and multi-family housing units in addition to its commercial and industrial properties.

The real estate cluster services the needs of both the residents and the property owners in the county, and it is categorized into three types of activity: lessors of real estate, offices of real estate agents and brokers, and activities related to real estate. This population-serving cluster employed over 52,600 people in 2009.

Lessors of real estate include those who lease residential units, single family homes, and multi-family units, and those who lease nonresidential buildings such as pier rental, commercial, retail and warehouse space. Another activity included here is the leasing of mini-warehouses and self storage facilities. These activities employed roughly 6,100 people in the county in 2009.

Offices of real estate agents and brokers deal in the buying, selling or renting of both residential and commercial properties for others. These activities employed over 11,300 individuals throughout Los Angeles County in 2009.

Activities related to real estate mostly include commercial and residential property management and appraisal services, and other services such as escrow offices and listing services. Over 25,300 people were employed in these activities in Los Angeles County in 2009.

This cluster experienced a sharp downturn as a result of the financial crisis and the implosion of the housing market. We expect a moderate recovery over the next decade as credit conditions improve.

### Industry Roster

- Activities Related to Real Estate
- Lessors of Real Estate
- Offices of Real Estate Agents and Brokers

2010-2020

### Employment Prospects



The employment outlook for real estate is good. After severe declines during the recession, growth is expected to resume in this population-serving cluster, which will add 6,800 jobs by 2020, a 13 percent increase over current employment. Greening is not expected to have a significant impact on employment in this industry.

Source: LAEDC



## ESTABLISHMENTS

2009  
**9,922**  
2.4% of county total

1999  
**9,757**  
3.2% of county total



## EMPLOYMENT

2009  
**52,694 Jobs**  
1.3% of county total

1999  
**50,187 Jobs**  
1.2% of county total



## ANNUAL PAYROLL

2009  
**\$2,672 Million**  
1.3% of county total

1999 (in 2009 dollars)  
**\$2,341 Million**  
1.1% of county total

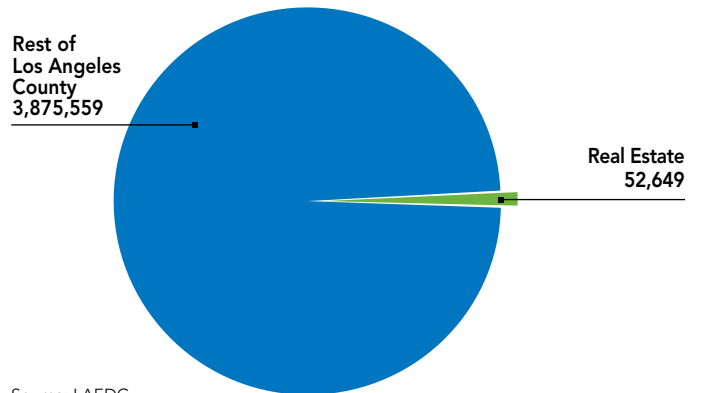


## OUTPUT

2009  
**\$50.1 Billion**  
5.6% of county total

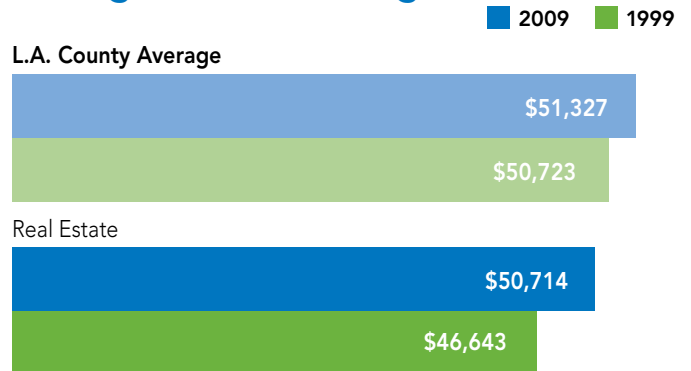
Source: LAEDC

## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)



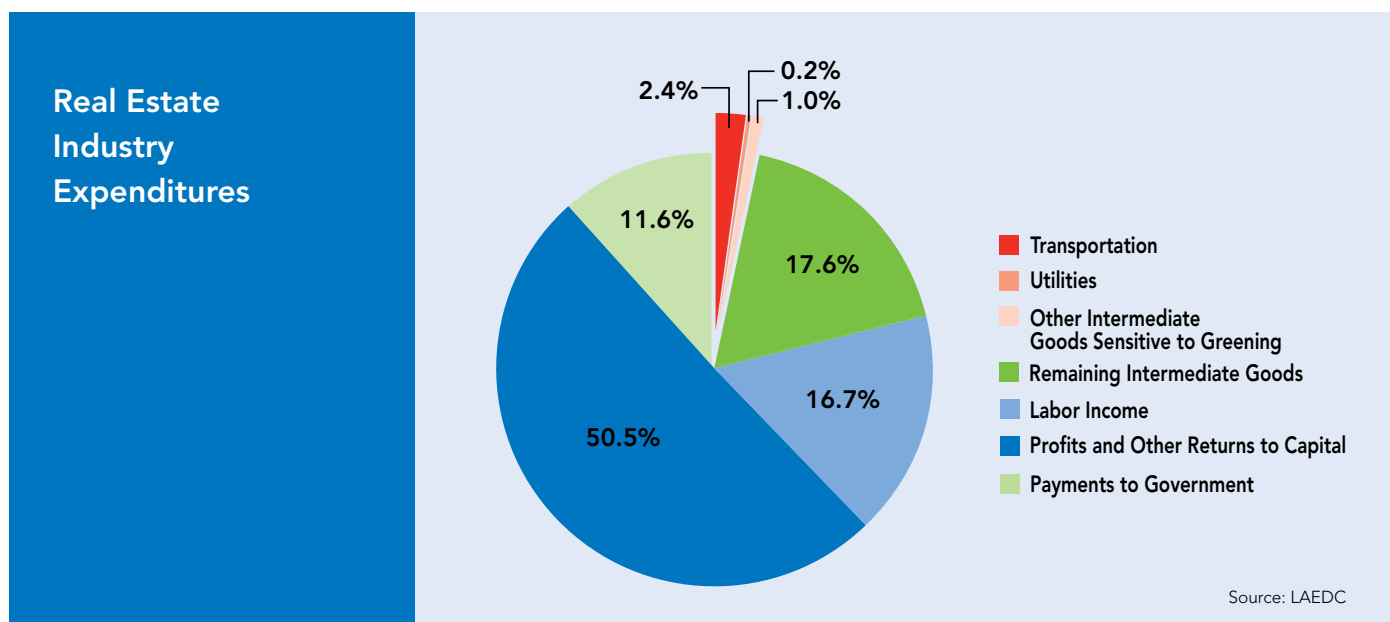
Source: CA EDD



## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the real estate industry,<sup>†</sup> with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the real estate industry in Los Angeles County spent on average \$4,884 per employee on utilities and on transportation, while generating \$385,917 in output per employee.
- The majority of real estate expenditures go toward service-based inputs, payments to employees, the repayment of debt, and payments to equity holders, which are not price-sensitive to greening.
- Though only a small percentage of real estate expenditures goes to utilities and transportation, the absolute amount of this spending is significant (over \$1.2 billion to utilities). By reducing energy use in their buildings, these firms can make a significant impact on sustainability.

<sup>†</sup>This industry group includes NAICS code 531.





## Things to Consider

Firms in the real estate cluster serve populations within a particular geographic territory and thus require a local presence. They do not have the option of relocating to avoid greening their businesses. Real estate agents and brokers may feel the need to purchase more fuel efficient vehicles to meet the evolving expectations of their clients, but volatile fuel prices are likely to be a greater financial burden.

This cluster will have a disproportionate impact on the local demand for green products and services due to the inclusion of property management firms, which likely have a considerable sway over decisions to invest in energy efficiency and other green-motivated upgrades of existing commercial, industrial, and multi-family residential properties. These greening activities have the potential to add considerable demand for green-related consulting and auditing, construction and renovation, and green materials manufacturing.

*Firms in the real estate industry will adopt green practices for the cost savings, though some cost-effective strategies may not be implemented in cases where the lessor pays for the improvement but the savings accrue to the lessee.*

## Examples of Regulations Driving the Greening of the Real Estate Services Cluster

- ▶ Effective January 2009, the Los Angeles County Green Building Program serves as a guide to new development in the unincorporated areas of Los Angeles County. The program included the following ordinances: Green Building, Drought-Tolerant Landscaping, and Low Impact Development. The Green Building Ordinance requires the use of construction materials and techniques that would improve the energy efficiency of a building and create fewer pollutants. The Drought-Tolerant Landscaping Ordinance requires that landscaping use specific plants that have low water needs. Finally, the Low Impact Development Ordinance provides an approach to managing rainfall and stormwater runoff.<sup>1,2</sup>
- ▶ CALGreen, California's new Green Building Standards Code, sets forth requirements for new buildings to reduce water consumption, divert construction waste from landfills, increase building efficiencies, and utilize low-pollutant emitting materials.<sup>3</sup>
- ▶ The South Coast Air Quality Management District (AQMD) Proposed Rule 2301 seeks to mitigate the growth in emissions (e.g., new vehicle trips, construction activity, etc.) from new residential, commercial, industrial, and institutional development and redevelopment projects.<sup>4</sup>
- ▶ On-Bill Financing (OBF), which is a utility-based method of energy efficiency financing, allows customers to upgrade their property through payments on their monthly utility bill. Southern California Edison's program for OBF has provided \$16 million in funds, and \$6.3 million in projects have been waitlisted due to the popularity of the program.<sup>5</sup>
- ▶ California's Clean Energy Municipal Financing Law, set in place through AB 811 (Levine) (2008) and AB 474 (Blumenfeld) (2009), enables property owners to finance energy efficiency and renewable energy projects that are attached to the property—more commonly known as a property assessed clean energy (PACE) finance program.<sup>6</sup> Legal challenges have been mounted against the program, but there are efforts being done to restore the PACE program.<sup>7</sup>
- ▶ AB 1103 (Saldana) (2007) requires electric and gas utilities to maintain records of energy consumption of nonresidential buildings (who are required to disclose) in a format compatible to the U.S. EPA's Energy Star Portfolio Manager.



## Applying Green Practices

Real estate companies can best go green by implementing green practices at the buildings they own and manage. These firms can adopt the building management best practices listed in the generalized section of this report and ask their tenants to do the same. While firms in all industries can apply building management strategies, they are especially important for real estate firms because such issues represent the core operations of real estate management.

### ► Facilities

Real Estate firms can save money by improving the efficiency of their buildings. For example, Douglas, Emmett and Company, a real estate investment and management firm in Santa Monica, has reduced energy consumption by 16 percent at 32 of its high-rise buildings, saving 66 million kWhs and \$7.5 million over four years.<sup>8</sup> Arden Realty, a real estate investment trust (REIT) located in Los Angeles, uses EPA benchmarks at all of their buildings and has reduced electricity use by 41 million kWh annually, enough to power over 3,900 homes.<sup>9</sup> Real estate firms can also implement green strategies when constructing new facilities. By working with construction contractors to earn LEED certification, building owners can improve their environmental status, save money, and publicize their accomplishments.

### ► Operations

Real estate companies can adopt green practices in their operations through shared workstations for employees, the adoption of remote workstations for employees who are mobile, and the elimination of duplicate offices for executives.

### ► Transportation

Companies engaged in real estate activities can incentivize public transit and alternative forms of transportation for employees, such as walking or biking, through tax-free transportation benefits approved by the Internal Revenue Service (IRS). Pre-tax dollars are used to purchase monthly transit or vanpool passes and parking expenses incurred as a result of their employment. Alternate forms of transportation will reduce emissions, lessen traffic congestion, and ease limited

parking availability. Larger companies included in the real estate cluster can offer their employees a pooled transportation option to reduce their carbon footprint from commuting to and from the office, or a shuttle service that transports them from parking centers to their place of work. Telecommuting and flexible work schedules, such as the 9/80 schedule adopted by Los Angeles County employees or the 4/10 schedule that employees of the South Coast Air Quality Management District (AQMD) have, can also help to achieve this goal.

### ► Greening the Multiple Listing Service

The Multiple Listing Service (MLS) is a database used by the real estate industry; it serves as a directory of listings for all available properties represented by brokers who are members of both the MLS system and of the U.S. National Association of Realtors (NAR). MLS serves as a means to connect the brokers representing sellers with brokers representing prospective buyers. Since MLS systems have numerous fields detailing property characteristics, the real estate cluster could have MLS systems identify energy efficient/sustainable green features and certifications in their data selection fields. This will assist agents and their prospective buyers to search for sustainable properties and allows builders and sellers to market their investments as green. Some examples of green features include: electric vehicle charging equipment, energy recovery ventilators, locally sourced building materials, low flow faucets, photovoltaics, recycled building materials, smart (electric) meters, solar electricity, turbines, wind generators, windmills, energy efficient windows (greenhouse, double pane, Low-e, etc.), Energy Star appliances, and a location near public transit.

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<sup>3</sup>California Building Standards Commission. "CALGreen." *California Building Standards Commission*. March 3, 2011. Available from: <http://www.bsc.ca.gov/CALGreen/default.htm>. Last accessed on April 18, 2011.

<sup>4</sup>South Coast Air Quality Management District. "Proposed Rule 2301 – Control of Emissions from New or Redevelopment Projects." *South Coast Air Quality Management District*. October 9, 2009. Available from: <http://www.aqmd.gov/rules/proposed/2301/index.html>. Last accessed on April 21, 2011.

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<sup>8</sup>Green California. "Members of the Real Estate Leadership Council." *State of California Department of General Services*. 2008. Available from: <http://www.green.ca.gov/RealEstateLeadershipCouncil/members.htm>. Last accessed on March 31, 2011.

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## Repair and Maintenance

### Cluster Overview

The population-serving repair and maintenance cluster restores machinery, equipment, and other products to working order and provides maintenance and service on such products to ensure that they work efficiently and as a preventative measure to avoid disrepair. More than 36,600 individuals worked in this sector in Los Angeles County in 2009.

Most industries within this cluster provide services to both businesses and to individual households. Establishments are categorized based on the type of activity performed and the skills required for that activity. The main activities within this cluster are: automotive repair and maintenance; electronic and precision equipment repair and maintenance; personal and household goods repair and maintenance; and commercial and industrial machinery and equipment repair and maintenance. Approximately 75 percent of the employment in this cluster is in automotive repair and maintenance.

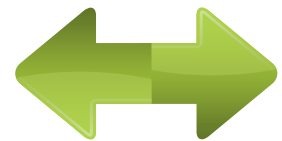
This industry may see some improvement in employment prospects over the next decade as new environmental regulations and mandates motivate the retrofit of existing vehicles and equipment. This may be especially true for highly-technical industrial equipment—the upgrading or replacement of which is needed to meet new standards.

### Industry Roster

- **Automotive Repair and Maintenance**
- **Commercial and Industrial Machinery and Equipment Repair and Maintenance**
- **Electronic and Precision Equipment Repair and Maintenance**
- **Personal and Household Goods Repair and Maintenance**

2010-2020

### Employment Prospects



The employment outlook in the repair and maintenance cluster is mixed. The industry is expected to add only 200 jobs by 2020, an increase of less than one percent over current employment. Although opportunities will arise in the repair, retrofit, and upgrade of existing equipment, industrial machinery, and automobiles from greening, it is not certain that these jobs will accrue to this industry.

Source: LAEDC



## ESTABLISHMENTS

2009  
**6,070**  
1.4% of county total

1999  
**7,884**  
2.5% of county total



## EMPLOYMENT

2009  
**36,686 Jobs**  
0.9% of county total

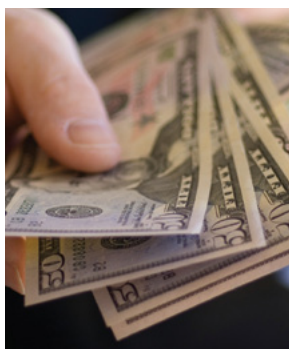
1999  
**41,841 Jobs**  
1.0% of county total



## ANNUAL PAYROLL

2009  
**\$1,204 Million**  
0.6% of county total

1999 (in 2009 dollars)  
**\$1,463 Million**  
0.7% of county total

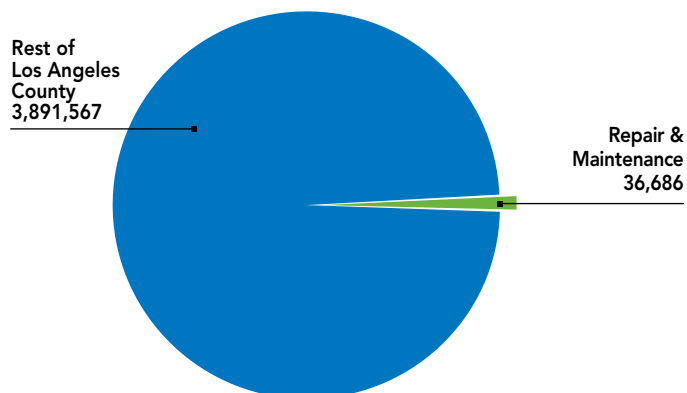


## OUTPUT

2009  
**\$7.8 Billion**  
0.9% of county total

Source: LAEDC

## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)

■ 2009 ■ 1999

### L.A. County Average



### Repair & Maintenance



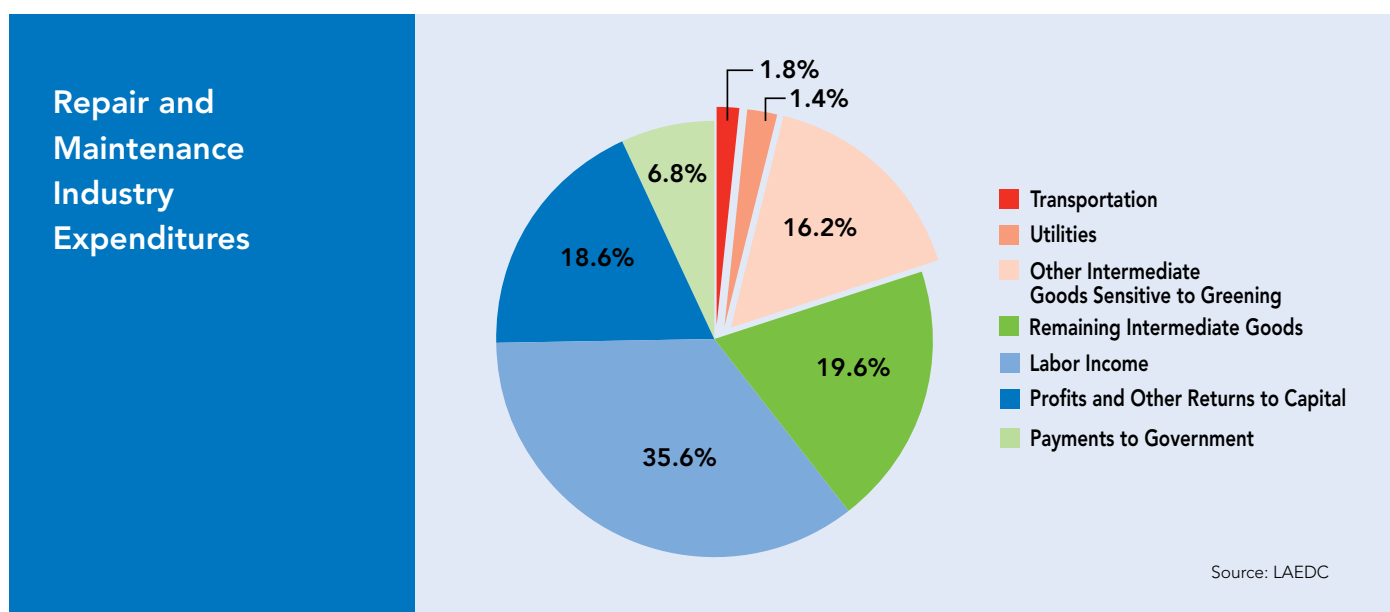
Source: CA EDD



## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the repair and maintenance industry,<sup>†</sup> with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the repair and maintenance cluster in Los Angeles County spent on average \$3,572 per employee on utilities and transportation, while generating \$113,783 in output per employee.
- In general, repair and maintenance businesses allocate a small percentage of expenditures to environmentally-sensitive inputs, and are thus not very threatened by greening. However, some firms in this industry may have to invest in equipment and training to comply with new regulations, for example those governing vehicle emissions.

*Firms in the repair and maintenance cluster will adopt green practices in their own operations to comply with government regulations (particularly those governing waste disposal and recycling) and for the cost savings. Greening will have a significant impact in this industry by increasing the need for training to keep current with changing technologies and standards.*

<sup>†</sup>This industry group includes NAICS code 811.





### Things to Consider

Firms in the repair and maintenance cluster have to remain in the area in order to serve their customers and thus cannot relocate to avoid green regulations. This cluster accounts for 1.4 percent of establishments and 0.9 percent of employment in Los Angeles County. Its contribution to the demand for green products and services, which will likely be limited to green equipment manufacturers and waste management, may be even smaller than suggested by these shares.

Greening will affect firms in the cluster, which are engaged in the repair and maintenance of automobiles, as well as commercial, industrial, and household goods, machinery, and equipment, by changing the types of products they work on, such as electric vehicles. Such changes will require new or expanded skills for the technicians doing the work, but is not expected to increase the overall demand for such workers.

### Examples of Regulations Driving the Greening of the Repair and Maintenance Cluster

- ▶ AB 2289 (Eng) (2010) requires the use of onboard diagnostic systems for model year 2000 or newer vehicles beginning January 1, 2013. The bill provided for referee inspections for vehicles that present prohibitive or unusual inspection circumstances. Additionally the bill implements fines up to \$5,000 for licensees, contractors, or fleet owners for a violation of these requirements.
- ▶ Effective in 2014, SB 346 (Kehoe and Simitian) (2010) prohibits the sale of any motor vehicle brake friction materials containing copper and other toxic chemicals. The bill requires the Department of Toxic Substance Control to adopt regulations to establish a procedure to evaluate chemicals of concern. The bill subjects manufacturers who are in violation of these provisions to a civil fine of up to \$10,000 per violation.
- ▶ In 2009, the California Air Resources Board (CARB) adopted comprehensive regulations to reduce greenhouse gases from commercial and industrial refrigeration systems. The regulation affects supermarkets and grocery stores, food and beverage processors, cold storage warehouses, and industrial process cooling.
- ▶ In 2010, CARB approved and implemented a tire pressure program that requires automotive service providers to check and inflate the tires on each vehicle to recommended settings, at the time of performing any maintenance or service.<sup>1</sup>
- ▶ In November 2010, CARB approved Resolution 10-40, which reduces the use of certain volatile compounds in common household aerosol cleaning products, including grill cleaner, metal polish, spot remover, and home insecticides. The resolution is an attempt to meet federal clean air standards and will become fully effective in December 2013.<sup>2</sup>
- ▶ Typically, automotive repair and maintenance establishments generate hazardous waste, which is generally governed by the EPA under the Resource Conservation and Recovery Act. Common hazardous wastes produced by this cluster include: trichloroethylene, which is generated during car and parts washing; paint removal; waste oils; and battery acids. Through RCRA, the EPA has created Used Oil Management Standards, which requires basic storage requirements and encourages used oil recycling.<sup>3</sup>



### Applying Green Practices

Repair and maintenance companies can contribute to greening in several ways. Whereas most people must dispose of hazardous materials only infrequently, businesses in this industry deal with such materials in the course of daily operations. As a result, these companies are positioned to properly dispose of a great deal of harmful chemicals that would otherwise enter the environment. Some repair and maintenance businesses may be able to offer green services by retrofitting equipment to be more environmentally friendly.

#### ► Hazardous Materials

Repair and maintenance companies often deal with hazardous materials. In the short term, proper disposal may seem to be an unnecessary burden; however, it often takes many times more effort to clean up hazardous materials than it does to handle them properly in the first place. There are six S.A.F.E. (Solvents, Automotive, Flammables, and Electronics) sites around Los Angeles where residents and businesses can safely dispose of these hazardous materials. In addition there are over 2,000 used oil collection sites in Los Angeles County. Further education is required in order to make the general public aware of these locations and their services.

Pennzoil is one company that is taking the initiative to divert hazardous materials from landfills. During a routine oil change, Pennzoil recycles any used motor oil, oil filters, antifreeze, transmission fluids, and other vehicle byproducts.

A related concern for repair and maintenance companies is end-of-life product disposal. By educating employees as to which products require special disposal, companies can ensure hazardous materials are not inadvertently added to the normal waste stream. Because of their weight, lead-acid batteries represent the largest quantity of waste generated from vehicle maintenance facilities. Battery recyclers pay between \$1.00 and \$1.50 per battery (or \$0.20 to \$0.40 per pound, wet or dry). The batteries are rebuilt or processed to recover lead. On average, 20 percent of batteries can be rebuilt.<sup>4</sup>

#### ► Waste

A common waste product in automotive repair and maintenance operations is used tires. These can be sold, retreaded or recycled. Shredded tires can create Tire Derived Aggregate (TDA), which is used in civil engineering applications such as backfill for retaining walls or vibration damping material on railway lines. Ground rubber tires, also called crumb rubber, can be used for asphalt (Rubber Modified Asphalt) or can be molded into products like moveable speed bumps. It is also commonly used to pave recreational areas such as athletic fields

and playgrounds given its shock-absorption ability. The use of recycled metal scrap, another waste product of this cluster, instead of virgin iron ore can reduce energy use, air pollution, water use, and the pollution and waste associated with the mining process.

An automotive repair shop with service and maintenance activities is likely to produce significant hazardous waste. Therefore, it is important that the facility identify and properly manage hazardous waste to protect itself, its employees, its customers and others in the community, and the environment. It is important for every facility to identify those waste products created during maintenance and repair that are hazardous.

Another important aspect of greening the auto repair shops in Los Angeles County is recycling and storage of used oil, cardboards, paper, and various metals, including the storage, recycling, and proper disposal of used batteries.

Auto repair and maintenance establishments can also distribute reusable bags and other advertising materials with their logo promoting non-hazardous water-based paints.

#### ► Facilities

Opportunities exist for the greening of facilities in the repair and maintenance cluster. Lighting retrofits and the use of high efficiency equipment whenever possible will help to reduce energy consumption. By law, operations with underground storage tanks for petroleum products must be monitored monthly for leaks, and spill prevention and control measures must be in place. Automotive painting shops can opt to use low VOC paints and solvents along with measures to minimize overspray. Automotive repair shops can continue to retrofit motor vehicle air conditioning with EPA-approved alternative refrigerants with less ozone depleting, global warming, flammable, and toxic characteristics.



### Applying Green Practices (continued)

Timed heating and air conditioning systems, added skylights, and roof windows at auto repair and maintenance firms will considerably lower monthly electric bills of these firms by approximately half, typically ranging from \$500 to \$2,500 a month.

Other operational measures that can be undertaken with little upfront cost include varying ventilation speed and reducing the air flow of facilities during pauses in production.

Energy and water conservation measures are also important in greening auto repair and maintenance shops in Los Angeles County. Best practices include but are not limited to replacement of traditional faucets with low-flush hands-free devices, swapping old toilets with new low-flush or dual-flush ones, and installing motion detector light switches in bathrooms and hallways.

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## Retail Trade

### Cluster Overview

As the final step in the distribution of merchandise to the end user, retail trade thrives here in Los Angeles. It is the largest population-serving cluster in the county by employment.

Retail establishments sell a wide variety of finished goods. The three largest types of retail in Los Angeles County, in terms of employment combined, provided over 204,800 jobs in 2009, comprising just over half of all retail employment. These three were: food and beverage stores; general merchandise stores; and clothing and accessories stores.

Food and beverage stores include grocery stores; specialty food stores; and beer, wine, and liquor stores.

General merchandise stores include operations such as department stores, warehouse and supercenter stores, home and auto supply stores, and dollar stores.

Los Angeles County has many destination places famous for their shopping. It is no surprise, therefore, to find clothing and accessories stores rounding out the top three subsets of the retail trade cluster.

Other large employers in this cluster in Los Angeles County are automobile dealers, building materials and supplies dealers, and electronics and appliance stores. These three types of retail establishments employed an additional 63,600 people in 2009.

Some retail sectors will do better than others, such as nonstore retailers and general merchandise stores, but overall the retail sector is not expected to grow over the next decade.

### Industry Roster

- Building Material and Supplies Dealers
- Clothing and Clothing Accessories Stores
- Electronics and Appliance Stores
- Food and Beverage Stores
- Furniture and Home Furnishings Stores
- Gasoline Stations
- General Merchandise Stores
- Health and Personal Care Stores
- Miscellaneous Store Retailers
- Motor Vehicle and Parts Dealers
- Nonstore Retailers
- Sporting Goods, Hobby, Book, and Music Stores

2010-2020

### Employment Prospects



The employment outlook in retail trade is not promising. Although a population-serving industry, an expected structural change in the personal savings rate, the absence of housing equity, and the slow recovery in the housing market will act as drags on retail. In addition, the widespread adoption of electronic buying, which is less labor-intensive than brick-and-mortar retailing, will be reflected in slower employment growth. No significant increase in employment is expected.

Source: LAEDC



## ESTABLISHMENTS

2009  
**26,700**  
6.3% of county total

1999  
**30,819**  
10.0% of county total



## EMPLOYMENT

2009  
**387,871 Jobs**  
9.9% of county total

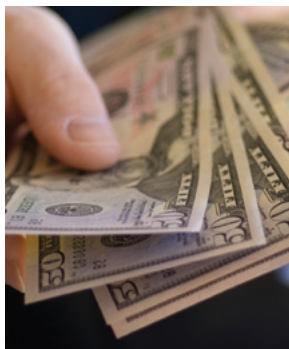
1999  
**384,270 Jobs**  
9.5% of county total



## ANNUAL PAYROLL

2009  
**\$11,726 Million**  
5.8% of county total

1999 (in 2009 dollars)  
**\$13,169 Million**  
6.4% of county total

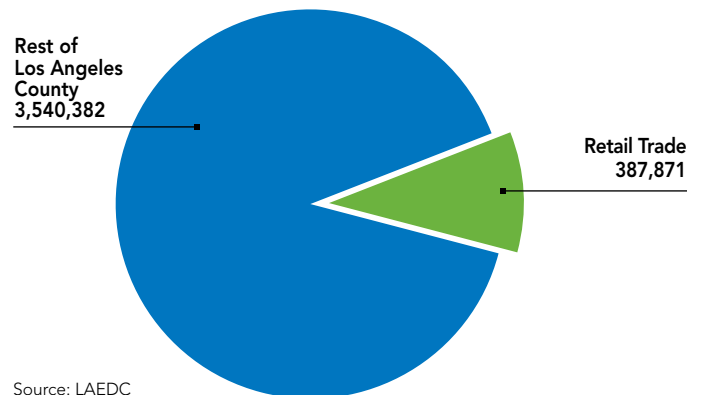


## OUTPUT

2009  
**\$35.8 Billion**  
4.0% of county total

Source: LAEDC

## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)

■ 2009 ■ 1999

### L.A. County Average



### Retail Trade



Source: CA EDD

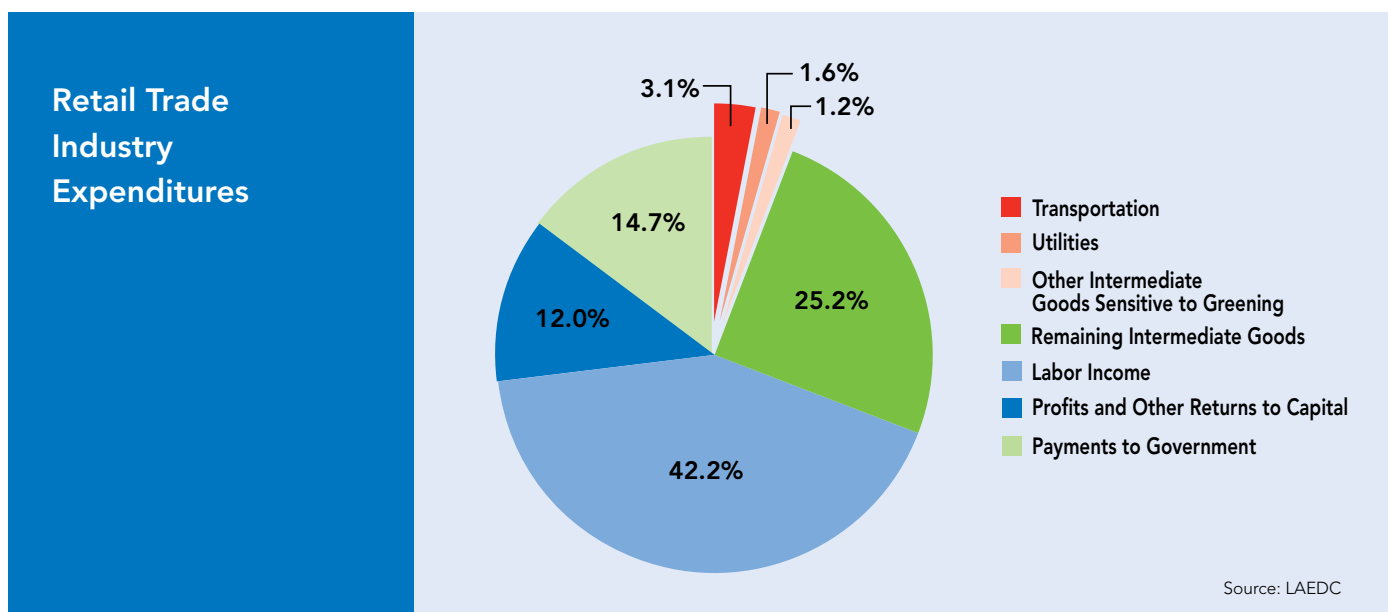




## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the retail industry,<sup>†</sup> with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the retail trade industry in Los Angeles County spent on average \$3,963 per employee on utilities and transportation, while generating \$83,921 in output per employee.
- The majority of retail expenditures go toward service-based inputs and payments to employees, which are not price-sensitive to greening.
- Though only a moderate percentage of retail expenditures goes to utilities and transportation, the absolute amount of this spending is significant (over \$2.1 billion to utilities). By making their buildings and fleets more efficient, these firms can make a significant impact on regional sustainability.

*Retail firms will adopt green practices primarily for the cost savings and to present an environmentally friendly image to their customers.*

<sup>†</sup>This industry group includes NAICS codes 44 and 45.



## Things to Consider

The retail trade cluster is comprised of population-serving firms that, for the most part, must be present within the market in order to serve Los Angeles County customers. Most firms will face similar cost pressures due to the greening of the economy. A separate challenge may be posed by the shift to internet-based retailing as firms without a physical presence in the state do not have to comply with its local and state environmental mandates nor the collection of California state and local sales

taxes. The latter is a bigger concern than the former, since for local retailers, the continued growth in online sales for some products, such as clothing, health and beauty items, and consumer electronics, means that this differential tax treatment (wherein out-of-state vendors are able to offer Californians the de facto ability to avoid the sales tax) will do more to hinder the ability of firms in these retail markets to compete than the impact of green regulations.

### Examples of Regulations Driving the Greening of the Retail Trade Cluster

- ▶ The elimination of plastic bags has been tried several times at the state and local level. Some efforts have been implemented, like those in the City of Santa Monica.<sup>1</sup>
- ▶ As an implementation measure of AB 32, SB 375 (Steinberg) (2008) requires the development of regional GHG emission reduction targets for passenger vehicles. Each of the State's metropolitan planning organizations, e.g., the Southern California Association of Governments (SCAG) for Los Angeles County, are required to prepare Sustainable Community Strategies demonstrating how the region plans to meet the set GHG reduction targets through an integrated approach to land use, housing, and transportation planning.<sup>2</sup>
- ▶ The On-Road Heavy-Duty Diesel Vehicles (In-Use) Regulation by the California Air Resources Board (CARB) requires the retrofitting of heavy duty trucks to ensure each truck has 2010 model engines by 2023.<sup>3</sup>
- ▶ AB 455 (Chu) (2003), the Toxics in Packaging Prevention Act, placed restrictions on packaging and packaging components containing cadmium, lead, mercury, or hexvalent chromium. These restrictions affect all manufacturers, distributors, and resellers, regardless of where the packaging originated.<sup>4</sup>
- ▶ In 1993, the EPA created the Environmentally Preferable Purchasing Program to assist federal officials in meeting requirements of purchasing products and services with the environment in mind. Through subsequent laws and Executive Orders, it became required that federal agencies use sustainable practices when buying products or services. With an annual purchase power of \$350 billion for goods and services annually, the Federal government aims to increase the availability of environmentally preferable products while simultaneously minimizing environmental impacts.<sup>5</sup>



## Applying Green Practices

Greening in retail trade resembles a scaled-up version of general greening strategies. Of all private sector industry clusters in Los Angeles, the retail trade industry cluster employs the most people and also operates a large logistics chain. Southern California retailers occupy an immense amount of building space and spend over \$2 billion annually on utilities and transportation, the second highest of all the industries we analyzed. As a result, any green measures implemented by the retail trade industry cluster as a whole will make a correspondingly large impact.

### Measurement and Benchmarking

A good way to start serious greening efforts is to measure current emissions and waste levels. By measuring its carbon footprint, a retailer can take the first step in identifying areas for improvement, creating meaningful benchmarks, and measuring progress. Though this process costs money and is not required, companies can gain valuable information about their business by conducting such measurements. For example, IKEA measures its Scope 1, 2 and 3 carbon footprint and has learned a great deal about the ultimate origins of its raw materials, practices of suppliers and contractors, and customer use of IKEA products.<sup>6</sup> IKEA uses this information to apply its greening efforts to the areas of its business where change is most needed and readily achievable.

### Greening Strategy

In general, retailers have no exotic energy-saving strategies available to them. Instead, the most promising approach for retailers may be to focus on aggressively rolling out simple strategies company-wide. Reductions in electricity use happen on the margin and in large quantity; retailers should be familiar with this approach, as it mirrors the general retail business model. However, small improvements do not necessarily mean insignificant savings – Kroger, the parent company of Ralphs and Food 4 Less, estimates that “\$1 spent on preventative maintenance can save up to \$9 in energy consumption down the road.”<sup>7</sup>

### Lighting

With respect to lighting, retailers can save the most energy by installing efficient lighting fixtures, using natural light, and turning off or turning down the lights at night. For example, most Costco stores use about 200 skylights that work in combination with interior lighting.<sup>8</sup> Furthermore, the lights are controlled by an automatic system that measures the intensity of incoming natural light and adjusts the interior lights accordingly. This system also turns lights on and off automatically based on a schedule set by the store manager, and it can be customized to accommodate longer business days or late night operations as needed.

### HVAC & Refrigeration

Southern California retailers can save energy by keeping their buildings well-sealed, especially during the summer months when air conditioners are in heavy use. Large facilities can reduce cooling needs by using white roof coverings, which reduces heat absorption.

Grocers can redesign refrigerated spaces to prevent loss of cold air while still keeping products accessible to customers. Open refrigerated shelves consume far more energy than refrigerated display cases with doors. Also, incandescent or fluorescent lights inside refrigerated areas generate significant amounts of heat, which places a constant burden on the refrigerator. This problem can be ameliorated by replacing such lights with light-emitting diode (LED) bulbs, which do not generate significantly less heat. Wal-Mart has converted refrigerator lights to LEDs at more than 500 stores since testing this method and finding it cost-effective.<sup>9</sup> The LED replacements are 70 percent more efficient than the fluorescent case lights they replaced, saving a single supercenter more than 90,000 kWh annually, or enough electricity to power almost eight homes.<sup>10</sup> Furthermore, LED refrigerator lights last significantly longer than fluorescent lights, reducing replacement costs.

### Business Practices

Retailers generally do not produce the goods they sell, and thus they cannot directly control the greenness of the products. However, some of the largest retailers carry their own store brands, which gives them greater say in how their consumer products and foods are produced. For example, Costco’s Kirkland Signature brand uses cube-shaped packages to make more efficient use of space, even for traditionally idiosyncratic packages such as milk containers.<sup>11</sup> These containers require fewer pallets, fewer truck trips, and less shelf space than non-stackable equivalents.

Large retailers can also use their influence with suppliers to encourage environmentally conscious decisions. Home Depot leverages its buying power to convince wood suppliers to use sustainably forested wood.<sup>12</sup> In its constant pursuit of efficiency, Wal-Mart advises its suppliers regarding efficiency strategies that can pass savings onto customers.



## Applying Green Practices (continued)

### Supply Chain

Retailers employ some of the largest truck fleets of all industry clusters. Common strategies include improving fleet fuel efficiency and loading trailers to a fuller capacity. Large retailers can use their extensive trucking operations to cut down on empty truck trips by coordinating logistics with their suppliers. For example, Wal-Mart has put this into practice at its British grocer, ASDA:

*"To reduce the number of miles driven, [Wal-Mart's British grocery subsidiary] ASDA developed initiatives to increase the number of backhauls and fronthauls they run. Backhauls enable ASDA to fill empty trucks traveling between the stores and distribution centers to collect shipments from suppliers for direct delivery to the distribution centers. In 2008, this initiative saved ASDA approximately 1.17 million miles in ASDA's supply chain, reducing almost one million empty miles for ASDA trucks alone. ASDA also uses a fronthaul initiative, in which suppliers deliver ASDA's goods, as opposed to an ASDA truck, in the event the suppliers' drivers are already headed to that destination. In 2008, this saved ASDA 1.4 million road miles. Total road mileage saved in 2008 through ASDA's logistics sustainability efforts was 8 million miles and eliminated the production of 10,222 tons of CO<sub>2</sub> from its trucks."<sup>13</sup>*

### Recycling and Waste Disposal

Retailers produce significant amounts of waste due to expired products, discarded packaging, and shipping waste. By composting and recycling, retailers can divert much of this waste from landfills. For example, from June 2007 to 2009, a Kroger pilot program in Ohio has composted 2,100 tons of expired and culled food, diverting a significant mass of garbage from landfills.<sup>14</sup> Other waste can be recycled and sometimes sold. For example, Costco recycled 240,000 tons of baled plastic wrap and paper fiber at its U.S. and Canadian stores in 2008.<sup>15</sup> These bales are produced at each store location and are carefully sorted to ensure high quality, which results in a higher price on the commodities market.

Another source of concern for retailers is the disposal of refrigerant chemicals. Refrigerators can contain high global warming-potential and ozone-depleting chemicals. These can leak over time or when the refrigerator is disposed of at end-of-life. By replacing refrigerators and disposing of old ones properly, grocers can reduce their emissions. Firms can also use refrigerators with less harmful refrigerants. For example, H-E-B, a Texas grocer, uses non-ozone depleting R-404a HFC in its refrigerators and R-410a in its air conditioning systems in new stores.<sup>16</sup> Musgrave, an Irish grocer, uses an ammonia-based refrigeration system, which has no carbon or ozone-depleting emissions beyond those from the electricity used to power it.<sup>17</sup>

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<sup>4</sup>California Department of Toxic Substances Control. "Toxics in Packaging." *California Department of Toxic Substances Control*. December 9, 2009. Available from: <http://www.dtsc.ca.gov/ToxicsInPackaging/index.cfm>. Last accessed on April 21, 2011.

<sup>5</sup>United States Environmental Protection Agency. "Basic Information." *Environmentally Preferable Purchasing (EPP)*. December 6, 2010. Available from: <http://www.epa.gov/epp/pubs/about/about.htm>. May 4, 2011.

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<sup>7</sup>Kroger Company. "Doing Our Part: Energy Conservation." 2011. Available from: [http://www.kroger.com/healthy\\_living/green\\_living/Pages/energy\\_conservation.aspx](http://www.kroger.com/healthy_living/green_living/Pages/energy_conservation.aspx). Last accessed on March 31, 2011.

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<sup>10</sup>Costco Wholesale Corp. "Corporate Sustainability Report."

<sup>11</sup>Ibid. pg. 33.

<sup>12</sup>The Home Depot. "Wood Purchasing Policy." 2010. Available from: [http://corporate.homedepot.com/wps/portal/Wood\\_Purchasing](http://corporate.homedepot.com/wps/portal/Wood_Purchasing). Last accessed on March 31, 2011.

<sup>13</sup>Wal-Mart Stores. "2009 Global Sustainability Report."

<sup>14</sup>Kroger Company. "Recycling Initiatives and Options." 2011. Available from: [http://www.kroger.com/healthy\\_living/green\\_living/Pages/recycling.aspx](http://www.kroger.com/healthy_living/green_living/Pages/recycling.aspx). Last accessed on March 31, 2011.

<sup>15</sup>Costco Wholesale Corp. "Corporate Sustainability Report." Page 28.

<sup>16</sup>H-E-B. Environment. N.D. Available from: <http://www.heb.com/sectionpage/about-us/community/environment/26501114>. Last accessed on May 6, 2011.

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# Technology

## Cluster Overview

With three world-class research universities, several private think tanks, a key NASA outpost and some of the nation's most important research and development facilities, Los Angeles County lays claim to a sizeable share of the high-tech marketplace.

Much of Southern California's advanced engineering and production is created from composites and electronics used in aerospace. In 2009, this segment employed over 144,000 people in Los Angeles County.

Legendary firms like Northrop Grumman, Boeing, and Lockheed Martin's Skunk Works all have major operations here. Other aviation firms such as Torrance's Robinson Helicopters and AeroVironment of Monrovia are representative of the kind of innovation for which Los Angeles County's aviation sector has become famous.

Pasadena's Jet Propulsion Laboratory specializes in robotic spacecraft, while nearby Idealab launches promising new companies from its technology incubators.

Additional technology incubators are growing adjacent to Los Angeles County research universities. They serve to assist start-up and early stage technology firms to launch into this energetic and vibrant field.

Advances in all areas of high technology products, processes, and materials make this one of the most promising clusters for employment in the next decade.

## Industry Roster

- **Business to Business Electronic Markets**
- **Computer Systems Design**
- **Data Processing and Hosting**
- **Internet Publishing and Web Search Portals**
- **Manufacturing**
  - Aerospace Products and Parts
  - Audio and Video Equipment
  - Communications Equipment
  - Computer and Peripheral Equipment
  - Magnetic and Optical Recording Media
  - Navigational, Measuring, Electromedical, and Control Instruments
  - Semiconductor and Other Electronic Component
- **R&D in Engineering and Physical Sciences**
- **Software Publishers**
- **Software Reproducing**

2010-2020

## Employment Prospects



The employment outlook in the technology cluster is good. The cluster is expected to add 18,700 jobs by 2020, an increase of 13 percent over current employment.

Source: LAEDC





## ESTABLISHMENTS

2009  
**5,657**  
1.3% of county total

1999  
**5,941**  
1.9% of county total



## EMPLOYMENT

2009  
**144,004 Jobs**  
3.7% of county total

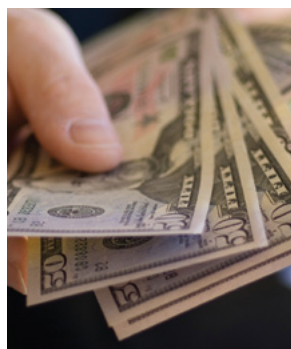
1999  
**188,479 Jobs**  
4.7% of county total



## ANNUAL PAYROLL

2009  
**\$13,187 Million**  
6.5% of county total

1999 (in 2009 dollars)  
**\$15,509 Million**  
7.6% of county total

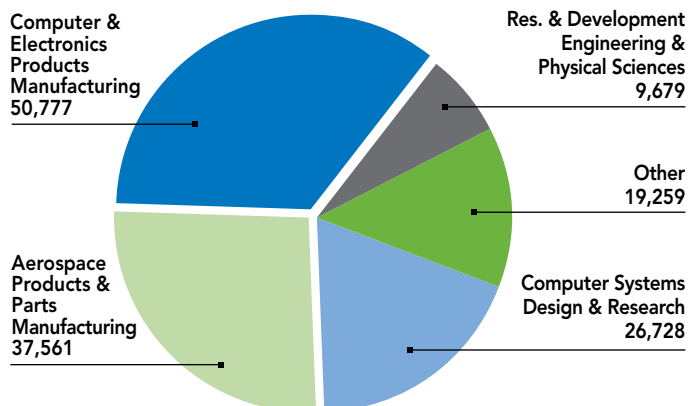


## OUTPUT

2009  
**\$57.7 Billion**  
4.0% of county total

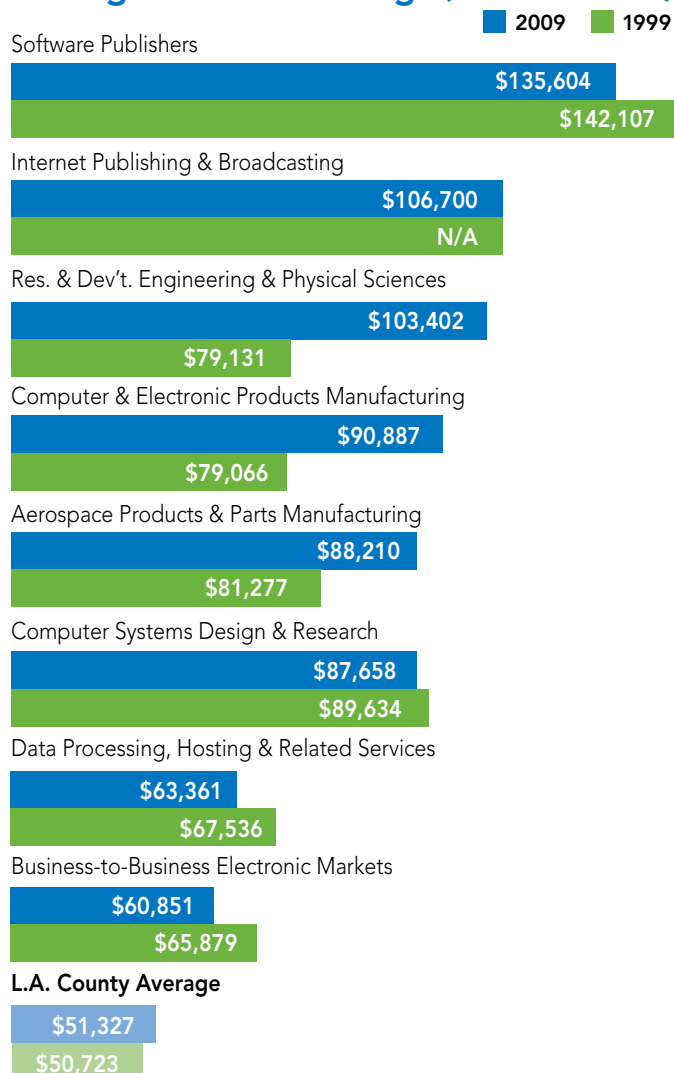
Source: LAEDC

## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)



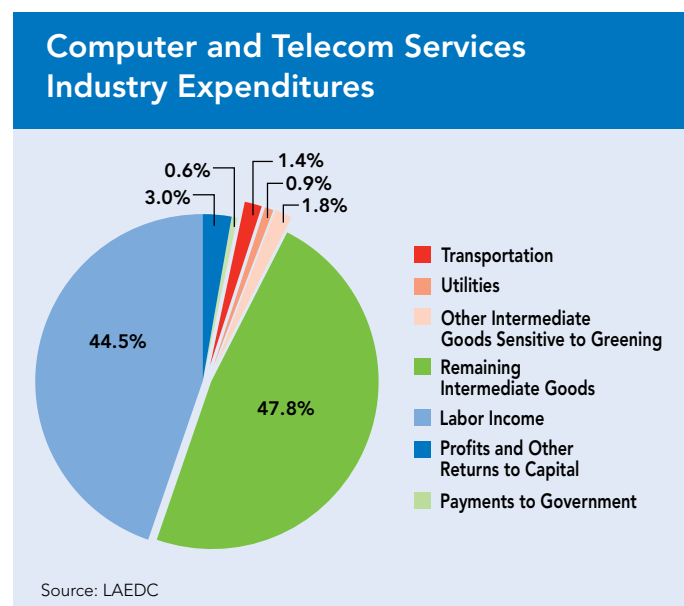
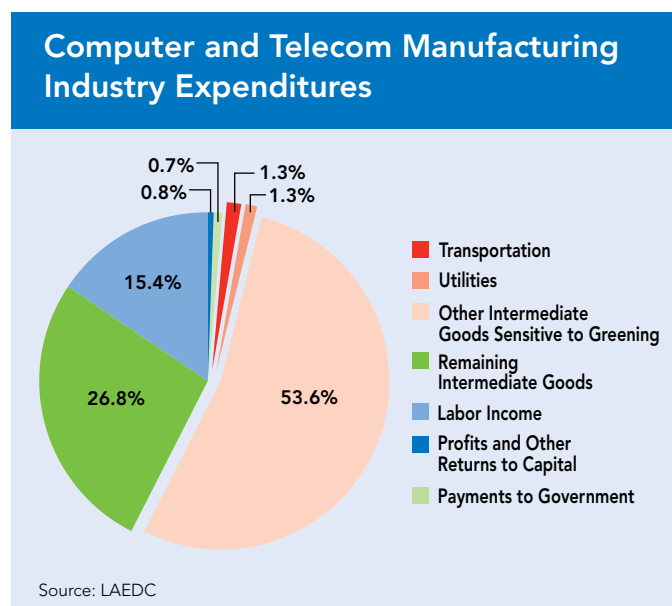
Source: CA EDD



## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the computer and telecom manufacturing,<sup>†</sup> computer and telecom services,<sup>§</sup> and aerospace<sup>‡</sup> industries, with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the computer and telecom manufacturing industry in Los Angeles County spent on average \$13,426 per employee on utilities and transportation, while generating \$505,836 in output per employee.
- Computer and telecom manufacturing firms manufacture electronics and purchase other electronic components as intermediate goods. Some electronics manufacturing processes can be detrimental to the environment, and California has enacted legislation making it more difficult to manufacture electronics than other states. Manufacturers who source electronics from California may face price increases due to green legislation or may purchase the same components from overseas instead.
- In 2008, firms in the computer and telecom services industry in Los Angeles County spent on average \$7,117 per employee on utilities and transportation, while generating \$310,945 in output per employee.
- The vast majority of computer and telecom services expenditures go toward service-based inputs, which are not price-sensitive to greening.

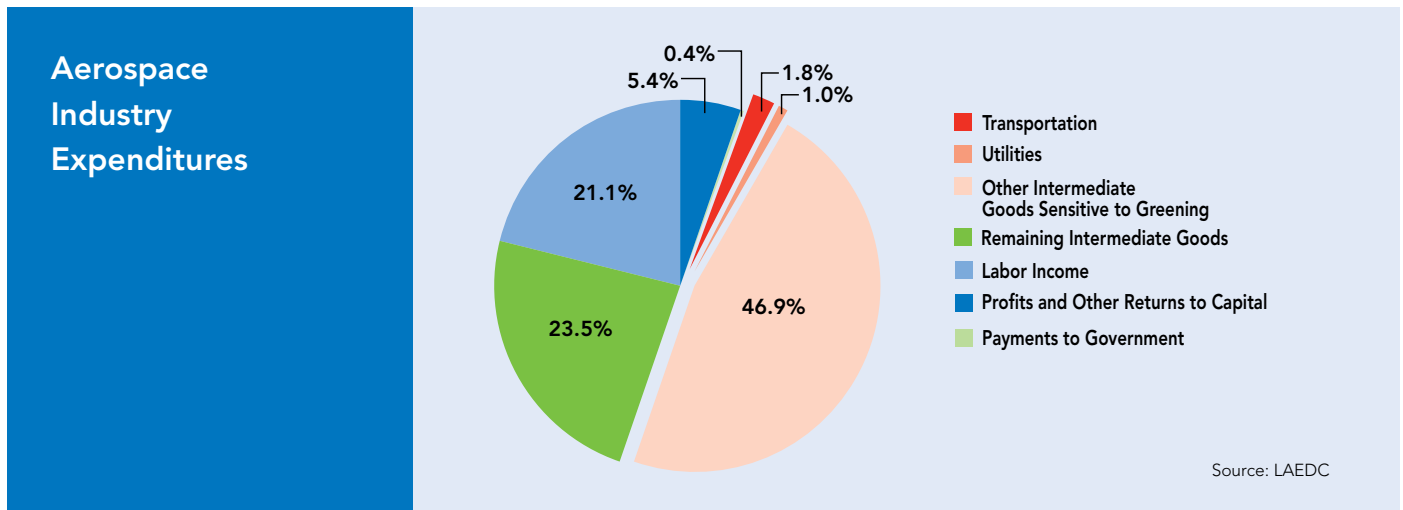
<sup>†</sup>This industry group includes NAICS codes 3341-3, 3344, and 3346. These definitions do not include all businesses that fall within our technology cluster.

<sup>§</sup>This industry group includes NAICS codes 5112, 517, 518, 51911-3, and 5415.

<sup>‡</sup>This industry group includes NAICS codes 3364 and 334511.



## Potential Cost Increases (Continued)



- In 2008, firms in the aerospace industry in Los Angeles County spent on average \$18,303 per employee on utilities and transportation, while generating \$651,642 in output per employee.
- Though only a small percentage of aerospace expenditures go to utilities and transportation, the absolute amount of this spending is significant (over \$1 billion total). Aerospace companies may be able to cut costs in these areas.
- Firms in this industry typically make significant expenditures on parts and equipment. The prices of some intermediate goods may increase due to higher electricity costs and greener manufacturing standards.

*Firms in the technology cluster will adopt green practices in their own operations for the cost savings, and in some cases, for regulatory compliance. The industry stands to be a major beneficiary of greening, as firms adapt their products to be more environmentally friendly and apply their expertise to green-related opportunities.*



## Things to Consider

Technology firms have considerable flexibility in their response to green regulations. Manufacturers in such industries as aerospace, computer and peripheral equipment, and communications equipment make products that can be shipped to customers from any location. Indeed, much of the output of these industries in Los Angeles is derived from sales outside the region. A firm's response to green regulations may therefore involve leaving the region or state, in whole or in part.

For example, a manufacturer of parts used in aircraft landing gear responded to California banning the degreaser used in one stage of its production process by packing up the small, lightweight parts and shipping them to Arizona where the chemical is still legal. The parts are then returned to Los Angeles for finishing. Other firms may decide that shifting their operations out of state makes more sense altogether. Software publishers and firms engaged in research and development in the physical, engineering, and life sciences have even more flexibility in their location choices than do manufacturers.

Technology firms may not need to locate in Los Angeles in order to serve the local market, but the region offers many advantages, such as the presence of a large, skilled workforce and proximity to leading research institutions. The Los Angeles Air Force Base, which administers billions of dollars in federal contracts each year, is another powerful draw for firms in the aerospace industry. To a much greater degree than in other clusters, the impact of greening will vary across industries and firms in the technology cluster depending on the circumstances of individual firms and the applicable regulations.

Keeping as many firms as possible in this cluster in Los Angeles is critical since they are one of the most likely sources of green-related job growth in the region, particularly in green materials manufacturing. Many of these firms will likely find that their existing workforce and skills can be used to modify existing products to be greener or may be applicable in new areas.

## Examples of Regulations Driving the Greening of the Technology Cluster

- ▶ The purpose of the South Coast Air Quality Management District Rule 1124 is to reduce volatile organic compound (VOC) emissions associated with aerospace assembly and component manufacturing operations. The rule sets forth limits on the materials containing VOC, such as primers and adhesives, that can be used in the aforementioned assembly and manufacturing.<sup>1</sup>
- ▶ The California Toxics in Packaging Prevention Act placed limitations on packaging and packaging components containing lead, cadmium, mercury, or hexvalent chromium. The law affects all manufacturers, distributors, and resellers, regardless of where the packaging originated.<sup>2</sup>
- ▶ The State of California places restrictions on the use of certain hazardous substances (referred to as RoHS) in electronic devices through a model similar to the European Union's Directive 2002/95/EC, which prohibits the selling of certain electrical and electronic equipment due to the level of lead, mercury, cadmium, or hexvalent chromium used in its production. Enabled through SB 20 (Sher) (2003) and SB 50 (Sher) (2004), RoHS applies to those who sell or offer to sell a covered electronic device in the state. SB 50 also requires retailers who sell a covered electronic device to collect a fee for electronic waste recycling.<sup>3</sup>
- ▶ The United States Environmental Protection Agency's (EPA) Significant New Alternatives Policy (SNAP) sets forth substitutes for the ozone-depleting chemicals that the EPA is phasing out. These alternatives are meant to reduce overall risk to human health and the environment. Alternatives exist in several areas that are affected in the Technology Cluster, including adhesives, coatings and inks.<sup>4</sup>
- ▶ The EPA, under the authority of the Clean Water Act, has established a National Pollutant Discharge Elimination System (NPDES) permit program to control water pollution through regulations of point sources. Industrial, municipal, and other types of facilities that discharge directly to surface waters require NPDES permits.<sup>5</sup>
- ▶ The Resource Conservation and Recovery Act authorizes the EPA to control hazardous waste from "cradle-to-grave"—including generation, transportation, treatment, storage, and disposal. Some commonly used hazardous wastes in the technology cluster include: spent process solutions containing lead and wastewater treatment sludge.<sup>6</sup>



### Specific Market Opportunity: Research and Development

Research and development will be an integral part of the greening of the Los Angeles County economy. The extent of the research that will be conducted in Los Angeles is unknown, but the county is well-positioned to compete in green-related fields based on the number and quality of research facilities in the county.

#### ► How big is the market demand?

The size of the research and development market related to the greening of the economy is difficult to pin down. Certainly, there will be demand for research in numerous fields ranging from materials science to energy efficiency to biochemistry. How much research and development will be conducted in Los Angeles County will depend on how successful local institutions are at competing for funding, and it will depend on how many firms choose to conduct their R&D, in whole or in part, in the county.

#### ► What is the employment opportunity?

The employment opportunity is unknown. It will depend on how much research is conducted in Los Angeles County.

#### ► Does L.A. County have a comparative advantage?

Los Angeles has a definite comparative advantage in Research and Development. The region is home to multiple world-class universities that support leading research in a variety of disciplines. One indicator of the area's strength in research is the billions of dollars in federal grant funding attracted by local institutions. As sources of green-related research funding become available, these same institutions will be well-positioned to compete. Firms in technology, health and biomedical, manufacturing, transportation, and professional services—all core sectors of the L.A. County economy—may also be engaged in their own green-related research and development.

L.A. County has several indicators of strength in research and development, including access to venture capital, federal funding received and the number of patent applications filed. Venture capital in the Los Angeles and Orange County area totaled over \$1.6 billion in 2010. Funding from the National Institutes of Health, a division of the U.S. Department of Health and Human Services, in L.A. County (determined by congressional district) totaled over \$869 million in 2010 to all research institutions and private organizations. The three largest research institutions in

Los Angeles County, University of Southern California, University of California, Los Angeles, and California Institute of Technology, alone received over two billion dollars in research funding in 2010, roughly \$433 million in ARRA (American Recovery and Reinvestment Act) funding for 2009 and 2010, and together filed 680 new patent applications in 2009.

#### ► What are the key challenges?

The competition to attract green-related research and development funding is fierce. Many cities, regions, and countries around the world are looking to the greening of the economy to be a major source of employment generation and are investing accordingly. Los Angeles-based researchers and their respective institutions will need to work to establish the area as a leading center for green-related research and development.

#### ► Conclusion

The size of the opportunity is difficult to quantify beyond observing that it will be large and growing. The competition to attract research and development dollars and its related employment will be significant, but Los Angeles County's existing strength in research and development should translate well into green research.

### Applying Green Practices

The technology industry cluster encompasses high-tech product manufacturers, technology researchers, and technology services firms.

#### ► Facilities

Technology firms can pursue many of the common building-related green strategies, such as LEED certification and energy-efficient retrofitting. For example, Lockheed Martin operates a total of eight LEED-certified buildings.<sup>7</sup> At a single facility in Florida, lighting upgrades save over \$300,000 and 2,500 metric tons of CO<sub>2</sub> emissions annually. Another facility in Arkansas saves over \$200,000 and 2,300 metric tons of CO<sub>2</sub> emissions due to automated lighting and HVAC control software. Lockheed Martin reduced water consumption by 11 percent in 2008 by implementing simple water conservation best practices such as installing low-flow plumbing fixtures, repairing leaks, reducing landscape watering, and recycling water used in processes. Facilities that have implemented a comprehensive approach to greening can seek certification.





## Alternative Energy

Some technology firms are turning to alternative energy sources in order to save money and diversify their power supply. Lockheed Martin has made several such investments successfully.<sup>8</sup> A facility in Owego, New York operates a biomass boiler that reduces emissions by 9,000 tons of CO<sub>2</sub> annually. A solar plant at their Sunnyvale, California facility generates 1.3 million kWh per year. In 2009, Lockheed Martin purchased over 98 million kWh of green power, enough to power almost 10,000 homes for a year, or the equivalent of removing almost 13,000 cars from the road for a year.

## Computer Efficiency

One commonality in this otherwise diverse industry cluster is the intensive use of electronic equipment. In addition to consuming electricity for their own operations, computers generate heat which must be cooled right away, thus consuming more electricity. Energy efficiency of computers can be improved in several ways. Energy Star equipment uses less energy and generates less heat. Servers can be moved to dedicated data centers that are better equipped for efficient cooling. Computers can also be replaced entirely. For example, Lockheed Martin saved \$1.2 million by eliminating 1,700 servers and replacing them with a server virtualization program.<sup>9</sup> Manufacturers of computing equipment are deploying low power chipsets to alleviate thermal issues as computing power needs accelerate.

## Waste Disposal & Hazardous Materials

Some high-tech manufacturing processes generate harmful materials, and many electronic parts contain trace amounts of toxic substances. By properly disposing of these materials, and ensuring that customers who buy such products do the same, firms can eliminate hazardous materials from their environmental footprint. For example, Lockheed Martin has recycling contracts ensuring 95 percent of its computer equipment is recycled.<sup>10</sup> According to Northrop Grumman, in 2007, employees at company sites recycled more than 500 tons of wood, 2,500 tons of paper and cardboard, 31,500 tons of metals, 345 tons of computers, and related equipment, 135,788 gallons of fuel/oil, and 85 tons of other materials such as batteries, tires, fluorescent light tubes, mercury thermometers, cables, and more.<sup>11</sup> Boeing, too, has set impressive recycling goals, aiming to improve rates by 25 percent for solid waste recycling, energy efficiency, and greenhouse gas emissions intensity by 2012.<sup>12</sup>

## Research and Development

Research related to the technology industry cluster is a way to create more opportunities for greening throughout all industries in Los Angeles County. A prime example is the research that the Massachusetts Institute of Technology (MIT) has been conducting related to nanotubes and more efficient photovoltaic solar power generation. MIT research has found that a genetically-engineered M13 virus, typically found in bacteria, can be used at the microscopic level to increase the efficiency of solar cells. It is highly feasible that this discovery will result in a viable product, since it only requires a small modification in the manufacturing of these solar cells and existing production facilities can be used, so these more effective solar cells can be quickly brought to market.

## Data Centers

Data centers house computer systems and store large amounts of data; they also require a lot of energy to operate. Data centers must always be online for two reasons: the technical components that they contain require a controlled climate, a constant temperature, and a constant level of humidity; and if the users are to remain satisfied with the service they provide (telecommunications, social networking, etc.), they must have continuous access to that service and stored data. In addition to the large amounts of energy required to operate the data center, it requires an equally large backup power system that can switch on in the event of a power failure.

Data centers use a variety of strategies to minimize their power needs. Facebook created their Pineville, Oregon data center from the ground up with efficiency in mind, custom-designing their servers, power supplies, server racks, and battery backup systems. This new data center consumes 38 percent less electricity and costs 24 percent less than their other facilities. Facebook's efficiency measures included the following: a 480-volt electrical distribution system to reduce energy loss, enabling 93 percent of the energy from the grid to feed the server (higher than the EPA industry average); the removal of anything in the servers that reduced efficiency, such as centralized chillers and traditional inline UPS systems; Ethernet-powered LED lighting and passive cooling infrastructure; the reuse of hot aisle air during winter to heat offices and the outside air flowing into the data center; and elimination of the need for a central, uninterruptible power supply.

The new techniques and technology that Facebook employed during the construction of this new data center was facilitated by their Open Compute Project, a partnership with other tech companies to develop ways to make data centers greener by using less materials and making them more energy efficient.



## Applying Green Practices (continued)

### ► Partnerships

The formation of partnerships in the technology cluster can result in industry wide green strategies that address the specific energy needs required by high-tech operations. A prime example of one such successful partnership is the Open Compute Project previously mentioned.

In order to help spread sustainability throughout the industry, Facebook offered to share the more efficient technology they incorporated into the design of their new data center through their Open Compute Project, a collaborative effort within the computing industry to share technologies, both newly developed and evolved, that are more sustainable and energy and cost efficient. Facebook partnered with a number of computer hardware and software companies, including Alfa Tech, AMD, Delta, Intel, Power-One, Quanta, and Synnex, to address server technology, data center technology, and energy efficiency. Open Compute servers were designed with fewer parts, use less plastic, are easier to service, are less expensive to build, and their thermal and electrical systems require less energy to run. Technical specifications and computer-aided design (CAD) drawings (DXF and SolidWorks parts and assemblies) are provided for free to anyone who is interested.

In their next generation of design, Facebook is partnering with other companies including Dell, HP, Rackspace, Skype, Zynga and others, to achieve their vision of ever more efficient technology. Technical specifications and CAD drawings will again be provided free of charge.

### ► Programming

The computing industry is power intensive, but more efficient computing can be achieved through the development of new programs requiring less use of central processing units (CPUs).

New programming languages have been developed that have achieved this goal.

Google software engineers created the “Go” language, an alternative to C++, which makes the compiling process more efficient. Compiling is the process of translating source code into binary code that can then be processed by the CPU. Typical C++ can take from minutes to hours to compile to executable code. Go reduces that time down to seconds by addressing redundancies present in the C++ compiling process. It is currently being used on some projects internally at Google.

Facebook engineers have developed the programming language of HipHop, a source code translator which transforms PHP source code into C++ and then compiles it using g++. Within a six month period, Facebook reduced CPU usage by nearly 50 percent, meaning they can do an equal amount of work using only half the number of servers. With this demonstrated success, Facebook has now assisted other tech companies (including Drupal, MediaWiki, phpBB and WordPress) to adopt this new programming language to run their web applications faster and more efficiently.

Recognizing the importance of software development to the future of the technology industry, Microsoft’s FUSE Labs have created the Kodu software. This free programming language for the Xbox 360 and Windows personal computer (PC) was designed to generate an interest in coding among younger generations by using a 3-D video-game format to introduce programming concepts. Using these concepts, animated characters can be scripted to perform a variety of actions. It is an easily accessible format which does not require the direction of a computer science teacher or professional to use. New intellectual capital to the technology cluster is stimulated through such interest in computer programming from younger audiences.

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# Tourism and Hospitality

## Cluster Overview

Tourism and hospitality is a major job creator in Los Angeles County. Some 24 million overnight guests arrived in Los Angeles County in 2009, spending over \$11.8 billion in the local economy. Once you add to that the day trip visitors from nearby communities and the millions who arrive at Los Angeles gateways to visit attractions in neighboring Orange County, you realize the real importance of tourism to the local economy.

Drawn by great weather, scenic coastlines, Hollywood's motion picture industry, and local theme parks, including Universal City (which is the top tourist attraction in Los Angeles County), visitors to Southern California soon find there is much more to see and do here.

Museums, including the Getty, the Getty Villa, Norton Simon, Museum of Contemporary Art, and the Los Angeles County Museum of Art, feature masterpieces, antiquities, and contemporary art. At Exposition Park in downtown Los Angeles, the Natural History Museum features one of the most extensive collections of natural and cultural history, while the California Science Center nearby offers hands-on learning to more than 1.4 million visitors each year.

Prospects for tourism in Los Angeles County will continue to grow as investment into the expansion of cultural events and attractions continue to build.

### Industry Roster

- Amusement Parks and Arcades
- Convention and Tradeshow Organizers
- Gambling Industries
- Museums, Historical Sites and Like Institutions
- Passenger Air Transportation
- Passenger Car Rental
- Passenger Deep Sea Transportation
- Printing and Related Support Activities
- Scenic and Sightseeing Tours
- Travel Arrangements and Reservations

2010-2020

### Employment Prospects



The employment outlook in the tourism and hospitality cluster is very good. The cluster is expected to add 12,100 jobs by 2020, an increase of 15 percent over current employment. Improvement in consumer spending will help to boost activities in this cluster, and the proposed development of accommodations and tourist facilities in Los Angeles County will draw additional convention business to the region. Greening is not expected to have a significant impact on employment in this industry.

Source: LAEDC



## ESTABLISHMENTS

2009  
**2,922**  
0.7% of county total

1999  
**3,723**  
1.2% of county total



## EMPLOYMENT

2009  
**78,493 Jobs**  
2.0% of county total

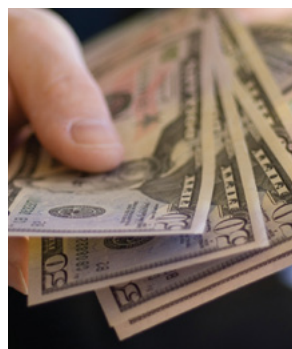
1999  
**85,481 Jobs**  
2.1% of county total



## ANNUAL PAYROLL

2009  
**\$2,805 Million**  
1.4% of county total

1999 (in 2009 dollars)  
**\$3,226 Million**  
1.6% of county total

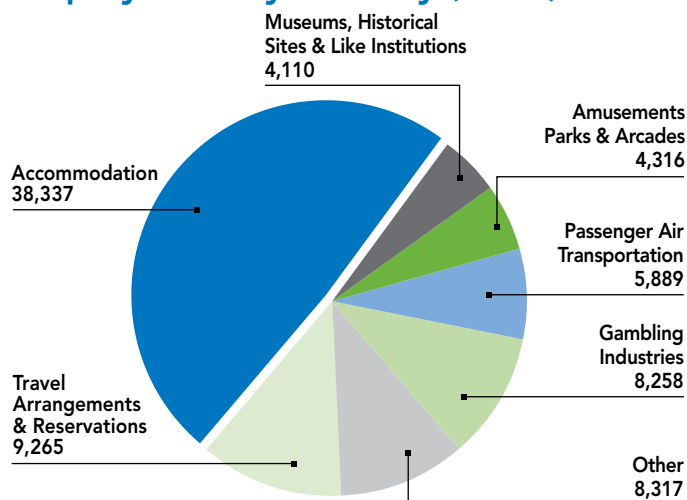


## OUTPUT

2009  
**\$12.5 Billion**  
1.4% of county total

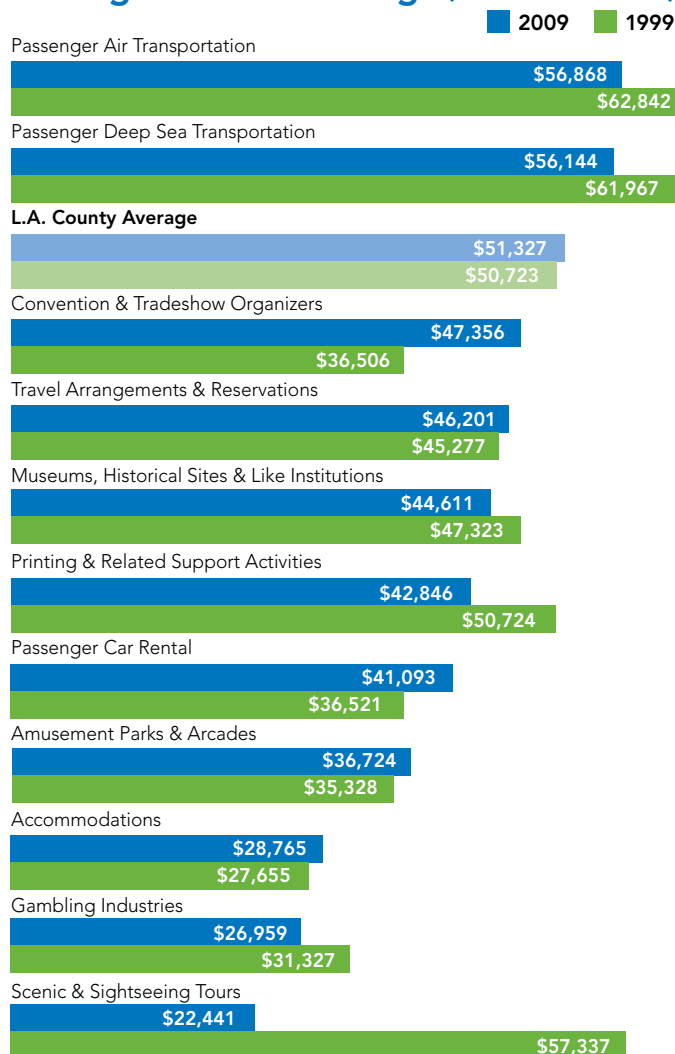
Source: LAEDC

## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)



Source: CA EDD

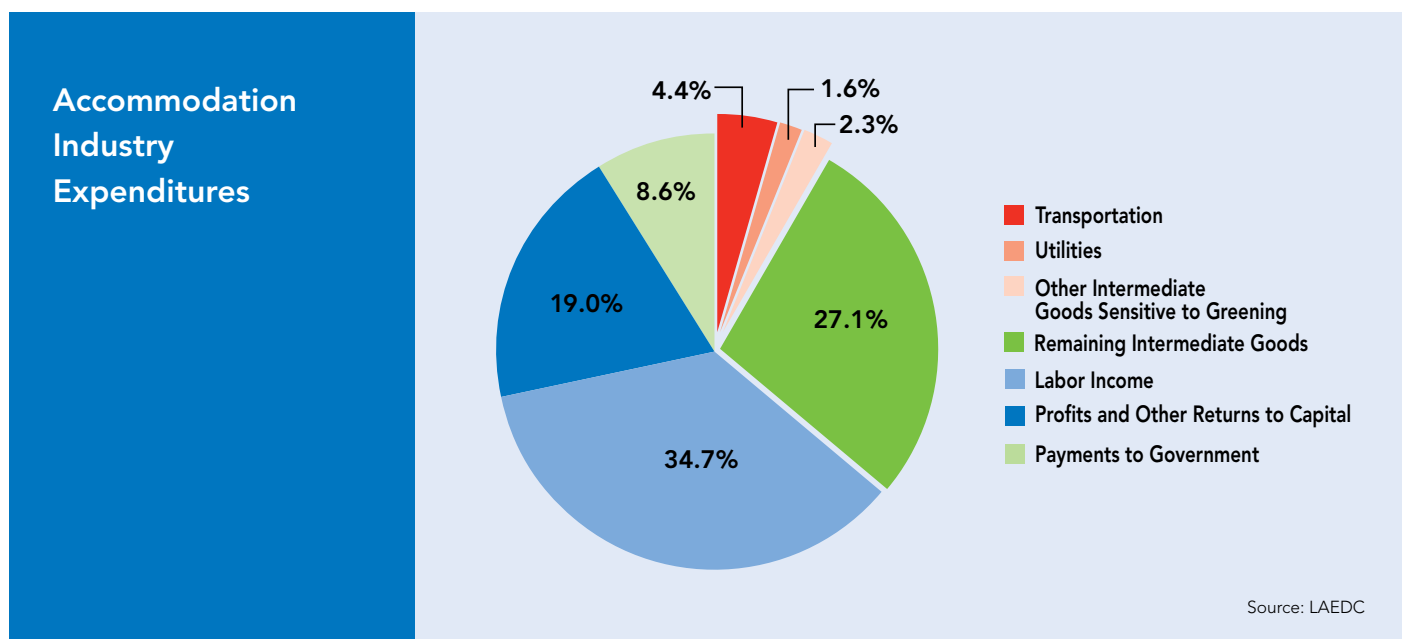




## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the accommodation industry,<sup>†</sup> with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the accommodation industry in Los Angeles County spent on average \$6,942 per employee on utilities and transportation, while generating \$114,404 in output per employee.
- Utility spending accounts for 4.4 percent of all expenditures by accommodation firms, the second highest share among the 29 industry groups we examined.
- Hotels and other accommodation establishments consume a significant amount of electricity and water in the course of providing guests with a comfortable experience.
- The accommodation industry may be vulnerable to an increase in utility prices, but there are many cost-saving energy efficiency and water efficiency strategies available.

*Firms in the tourism and hospitality industry cluster will adopt green practices primarily for the cost savings but also to present an environmentally friendly image to their customers.*

<sup>†</sup>This industry group includes NAICS code 721. This definition does not include all businesses that fall within our tourism and hospitality cluster.





## Things to Consider

By definition, the firms in the tourism and hospitality cluster cater to visitors in a particular area and thus are location dependent. The accommodations, amusement parks and arcades, gambling centers, passenger car rentals, museums, historical sites and similar institutions, scenic and sightseeing tours, and similar industries do not have the option of relocating to avoid the costs of greening. Travel arrangements and reservation services have greater flexibility, particularly since most of this business has migrated online. The transportation side of the cluster, including tour operators and air passenger transportation, may

have to invest in cleaner vehicles to meet regulatory demands. Firms dependent on business travelers, particularly airlines, may find that digital replacement lessens demand from some of their best customers as telepresence becomes a more common substitute for travel to business meetings.

Overall, firms in this cluster will help create demand for green products and services in the L.A. region, but they have limited potential to participate as vendors in the green market.

## Examples of Regulations Driving the Greening of the Tourism and Hospitality Cluster

- ▶ The South Coast Air Quality Management District Rule 2202 requires employers who employ 250 or more people on a full or part-time basis for a consecutive six month period to implement an emission reduction program. Rule 2202 specifically aims to reduce mobile source emissions generated from employee commutes.<sup>1</sup>
- ▶ The Proposed Rule 2301 from the South Coast Air Quality Management District (AQMD) sets forth restrictions to lessen the growth in emissions (e.g., new vehicle trips, construction activity, etc.) from new residential, commercial, industrial, and institutional development and redevelopment projects.<sup>2</sup>
- ▶ Los Angeles County's Green Building Program (effective in 2009) guides new development in the unincorporated areas of Los Angeles County through three ordinances: Low Impact Development, Green Building, and Drought-Tolerant Landscaping. The Low Impact Development Ordinance provides an approach to managing rainfall and stormwater runoff. The Green Building Ordinance requires the use of construction materials and techniques that would improve the energy efficiency of a building and create fewer pollutants. Lastly, the Drought-Tolerant Landscaping Ordinance requires that landscaping use specific plants that have low water needs.<sup>3, 4</sup>
- ▶ The California Green Building Standards Code (CALGreen), which became effective January 1, 2011, requires that new buildings do the following: reduce water consumption, divert construction waste from landfills, increase building efficiencies, and utilize low-pollutant emitting materials.<sup>5</sup>
- ▶ Prompted in part by a 2008 Executive Order declaring a statewide drought, conservation efforts and innovative solutions to increase water supply/decrease water demand were pursued. Some of these efforts included the use of tiered water rate structures and drought-tolerant landscaping.<sup>6</sup>
- ▶ The Mandatory Commercial Recycling Measure, as part of the AB 32 scoping plan, aims to reduce five million metric tons of carbon dioxide equivalents. To achieve this, the measure sets a path to recycle an additional two to three million tons of commercial waste annually.<sup>7</sup>



## Applying Green Practices

### ► Accommodation

For hotels, casinos, and other accommodation businesses, utilities represent a significant expense. Consumption of utilities also represents the majority of their environmental impact. As a result, the most cost-effective green best practices are also the most environmentally-friendly. In general, incremental improvements on a per-room basis will add up significantly.

### ► Lighting

A large hotel “may use 30 percent of its total electricity on lighting.”<sup>8</sup> Hotels can install efficient light bulbs, overhead lighting, and LED fixtures both in rooms and in common areas. The Holiday Inn chain has replaced neon and fluorescent lighting, with LEDs, achieving an estimated 52 percent reduction in electricity use; the company estimates this will save \$1.4 million in energy costs as well as \$3 million in maintenance costs since LEDs last longer.<sup>9</sup> At a single Fairmont Hotel location in Winnipeg, lighting upgrades reduced power consumption by 882,000 kWh, enough to power 327 homes, and save \$44,000 per year in utility costs.<sup>10</sup> The hotel properly disposed of the 1,314 replaced light bulbs, diverting them from landfills. Eliminating incandescent lighting has the added benefit of reducing heat generation, which reduces the need for air conditioning. Most efficient lighting options have a longer lifespan than traditional lighting, so lights will need to be replaced less often as well.

### ► HVAC

Air conditioning consumes a significant amount of electricity, especially in Southern California.

Accommodation establishments can cut this cost by raising the average indoor temperature, but they cannot risk making guests uncomfortably hot. Air conditioning costs can also be reduced by applying air conditioning selectively. For example, hotels can turn off climate control in vacant rooms and disable the AC when windows or sliding doors are opened. Kimpton Hotels use infrared sensors to deactivate HVAC systems when rooms are unoccupied.<sup>11</sup> Natural ventilation can also be substituted for air conditioning when appropriate.

### ► Water

Hotels have been employing water-saving measures for many years with excellent results. To reduce laundry needs, hotels can ask guests to use the same towels and sheets for two consecutive days. This can cut water use significantly and reduce corresponding power consumption from laundry

machines as well. The Fairmont Royal York in Toronto, Canada installed a commercial water softener, reducing laundry water use to one wash and one rinse per cycle, saving 476,000 liters of water per day, or enough to supply 500 homes.<sup>12</sup> Low-flow bathroom fixtures can make a significant impact when installed throughout an entire facility. For example, the Holiday Inn in Flinders, Australia reduced water usage by 50 percent after investing \$19,500 in low-flow fixtures; the hotel recouped this expense after only 18 months due to lower water bills.<sup>13</sup> Outside the building, sites with significant landscaping can cut water use by irrigating less often and only at night. For example, Starwood’s Element hotel in Lexington, Massachusetts, which tests green strategies for the broader hotel company, has reduced potable water consumption by 51 percent through water-efficient landscaping.<sup>14</sup>

### ► Certification

Pursuing green certification, such as LEED, serves two purposes. Most importantly, it provides a framework for greening that is measurable and goal-oriented. Such programs provide useful information during the greening process. Second, an earned certification informs guests of the establishment’s successful green efforts. This can help attract and retain guests. Many hotels recognize these advantages: Marriott Hotels is currently operating a LEED hotel prototype; all Element hotels are pursuing LEED certification; Hyatt operates one LEED certified hotel; and “the W hotel” in West Hollywood is pursuing LEED certification.

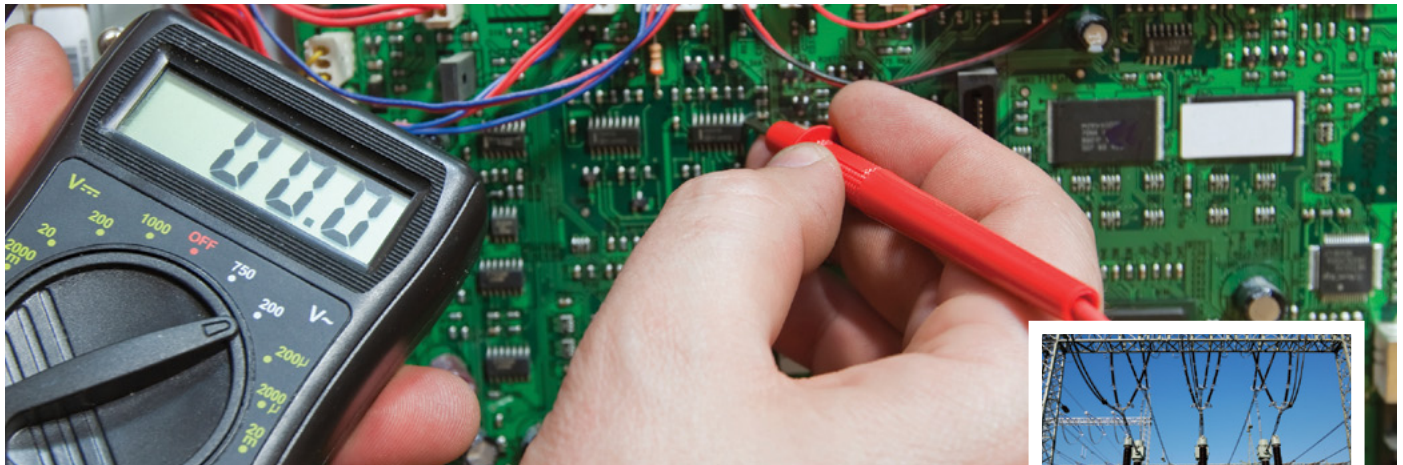
### ► Travel

Businesses engaged in travel, tours, and chartered vehicles can benefit from transportation-related greening practices, such as the use of alternative fuel vehicles. Airlines have started using the continuous descent approach where aircraft come in to land at a constant speed and rate of descent, which uses less fuel and generates less noise.



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## Utilities

### Cluster Overview

The utilities industry cluster includes power generation and transmission; natural gas distribution; water treatment; and distribution and the collection, treatment and disposal of sewage. The utilities cluster, composed of both public and private operations, employs over 46,500 in Los Angeles County.

Los Angeles County is home to the largest municipally owned public utility in the nation. The Los Angeles Department of Water and Power (LADWP) provided the City of Los Angeles with roughly 193 billion gallons of water in the 2009-2010 fiscal year and 24.8 million megawatt-hours of electricity. Areas not being served by the LADWP are supplied with water by the Metropolitan Water District and electricity through Southern California Edison, both of which are headquartered in Los Angeles County.

Natural gas service in the county is provided by the Southern California Gas Company. Headquartered in downtown Los Angeles and a subsidiary of Sempra Energy, it is the largest natural gas distributing utility in the U.S.

Sewage removal is provided by the Sanitation Districts of Los Angeles County, which own, operate, and maintain approximately 1,400 miles of sewers, 10 water reclamation plants, and an ocean discharge facility for treatment. Together, they operate the largest engineered wastewater recycling program in the world.

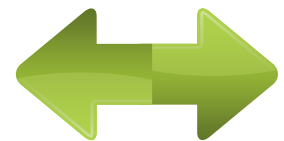
The utility industry has faced significant challenges, such as the need for water conservation, energy efficiency, and pollution reduction, which have resulted in industry changes in structure, regulation, and technology.

### Industry Roster

- **Electric Power Generation, Transmission and Distribution (Local Government)**
- **Electric Power Generation, Transmission and Distribution (Private)**
- **Natural Gas Distribution (Private)**
- **Natural Gas Distribution (Public)**
- **Water, Sewage and Other Systems (Private)**
- **Water, Sewage and Other Systems (Public)**

2010-2020

### Employment Prospects



The employment outlook for utilities is mixed. The industry is expected to add 2,600 jobs by 2020, an increase of 6.5 percent over current employment. As a population-serving industry, its output should expand as the population grows. However, energy efficiencies and green awareness in all sectors of the economy, including the household sector, will reduce demand overall. Nevertheless, changes in the sources and delivery methods of power may create opportunities.

Source: LAEDC



## ESTABLISHMENTS

2009  
**277**  
0.1% of county total

1999  
**307**  
0.1% of county total



## EMPLOYMENT

2009  
**30,781 Jobs**  
0.8% of county total

1999  
**27,415 Jobs**  
0.7% of county total



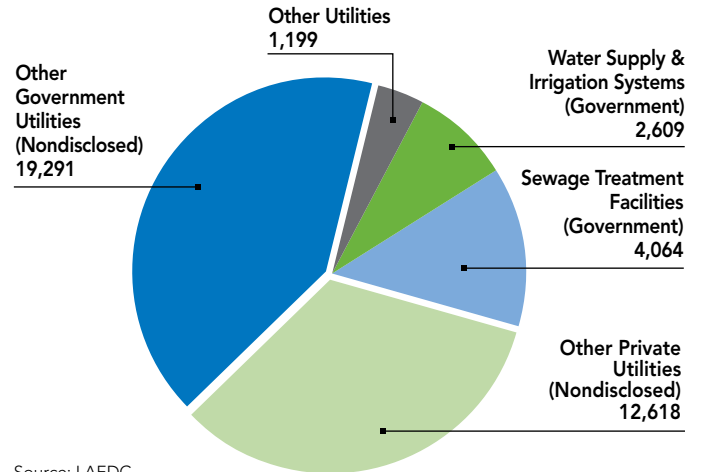
## ANNUAL PAYROLL

2009  
**\$2,904 Million**  
1.4% of county total

1999 (in 2009 dollars)  
**\$2,261 Million**  
1.1% of county total

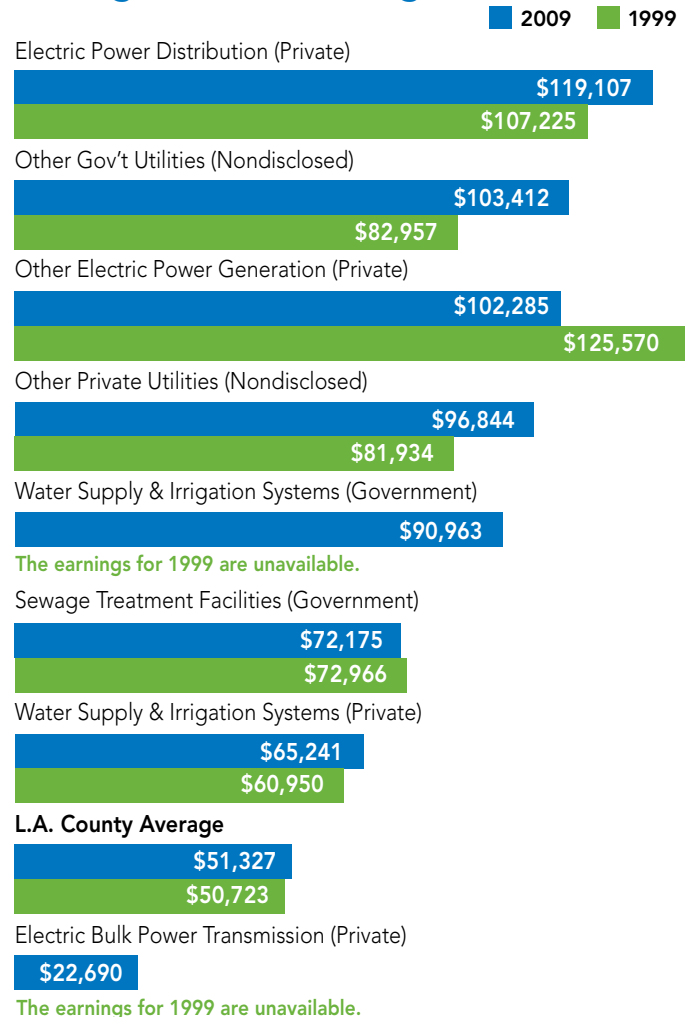
Source: LAEDC

## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)



Source: CA EDD

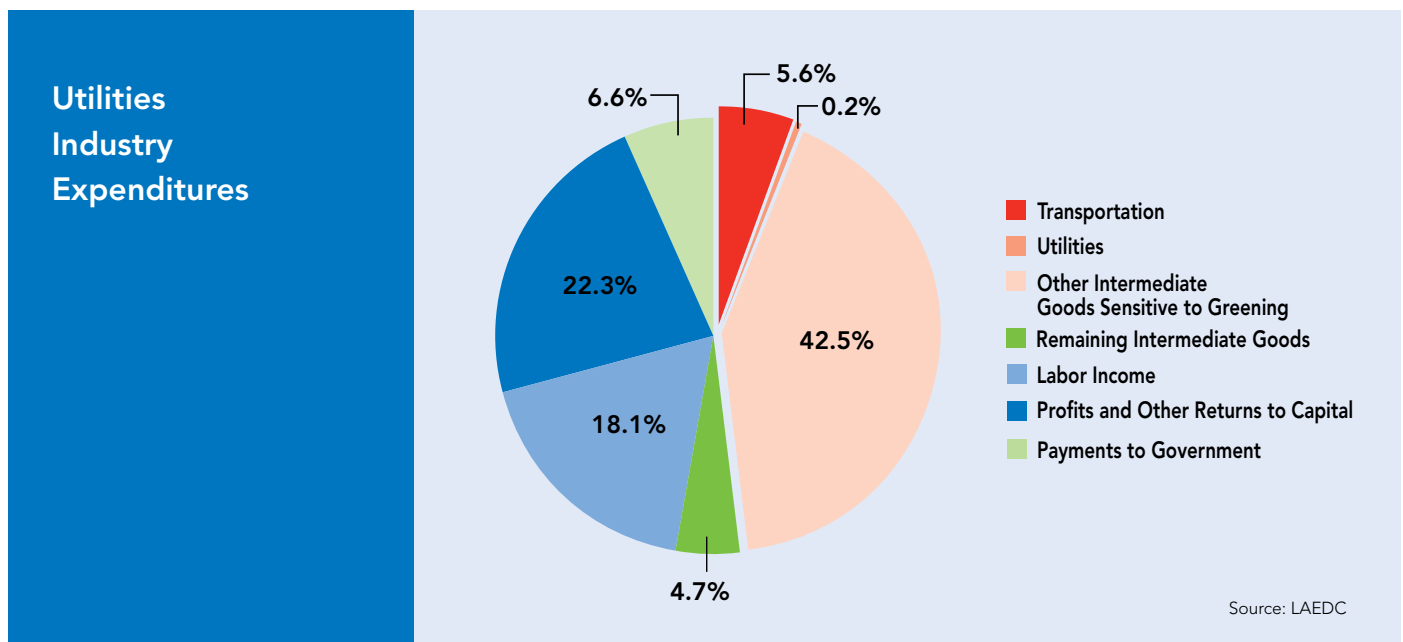




## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the utilities industry,<sup>†</sup> with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the utilities industry in Los Angeles County spent on average \$53,410 per employee on utilities and transportation, while generating \$923,556 in output per employee.
- Electricity providers are very sensitive to the prices of coal, natural gas, and other fossil fuels used to produce electricity. Though electric utilities are generally able to pass expenses along to consumers, they are also under regulatory pressure to diversify into greener power options.

*The adoption of green practices in the utilities cluster will be driven primarily by regulatory compliance, notably with the Renewable Portfolio Standard. Environmental programs, including renewable power, energy efficiency programs (for their customers), and the upgrading or replacement of power plants along the coast that use once-through (water) cooling will increase the cost of power. The resulting cost increases, along with higher transportation costs, are one of the primary reasons that greening will mean higher costs throughout the economy.*

<sup>†</sup>This industry group includes NAICS code 22.



## Things to Consider

Among the major industry clusters in Los Angeles County, the utilities cluster is the most directly affected by green regulations. For this heavily regulated, geographically-tied, population-serving cluster, serving the market from afar is not an option. The cost of generating electric power will increase due to compliance with several green-related regulatory requirements, foremost among them the mandate for both public and investor-owned utilities to source 33 percent of their power from renewable energy. Power from renewable sources is more expensive than power from coal-fired plants, and, in many cases, requires significant investment in new transmission lines to connect renewable power facilities to the grid.

The public and private natural gas distribution industries would appear to be potential beneficiaries from the mandate to move away from coal use. A combined-cycle gas turbine power plant running on natural gas is the cleanest source of power from fossil fuels. Base load power from such plants can be supplemented (and replaced) by cleaner power from variable

(intermittent) renewable sources such as solar and wind power when it is available. Natural gas is also widely used in residential applications (appliances, heating, and hot water) as well as in major commercial and industrial applications, notably for large boilers. Yet, the South Coast Air Quality Management District has indicated that to reach long-term air quality targets, it will be necessary to replace applications that use natural gas with electricity-powered equivalents as part of the gradual phasing out of fossil fuel combustion within the region.<sup>‡</sup>

Water, sewage, and other systems will also be affected by the increase in power costs due to the shift to renewable energy sources. Water agencies in Los Angeles County import a lot of water, and pumping water uphill is energy intensive.

Collectively, the utilities are one of the largest contributors to the large and growing demand for green goods and services in Los Angeles County.

## Examples of Regulations Driving the Greening of the Utilities Cluster

- ▶ On April 12, 2011, Governor Jerry Brown signed into law SBX1 2 (Simitian) (2011), which requires that 33 percent of the state's electricity (provided by both public and investor-owned utilities) must come from renewable sources by December 31, 2020.<sup>1</sup> This Renewables Portfolio Standard (RPS) is a significant part of the AB 32 scoping plan.
- ▶ For almost three years, the State of California was confirmed to be in a statewide drought as issued through an Executive Order by Governor Arnold Schwarzenegger in June 2008. This prompted statewide conservation efforts and innovative solutions as a way to increase water supply/decrease water demand. Some of these efforts included the use of tiered water rate structures and drought-tolerant landscaping.<sup>2</sup>
- ▶ Set in place through AB 811 (Levine) (2008) and AB 474 (Blumenfield) (2009), the California Clean Energy Municipal Financing Law enables property owners to finance property-attached energy efficiency and renewable energy projects. This is more commonly known as a property assessed clean energy (PACE) finance program.<sup>3</sup> Legal challenges have been mounted against the program, but there are ongoing efforts being done to restore the PACE program.<sup>4</sup>
- ▶ The utility-based method of On-Bill Financing (OBF) provides energy efficiency financing by allowing customers to upgrade their property through payments on their monthly utility bill. Southern California Edison has provided \$16 million in funds for OBF, and \$6.3 million in projects have been waitlisted due to the popularity of the program.<sup>5</sup>
- ▶ In a format compatible to the U.S. EPA's Energy StarPortfolio Manager, AB 1103 (Saldana) (2007) requires electric and gas utilities to maintain records of energy consumption of nonresidential buildings.
- ▶ In December 2010, the EPA entered into two proposed settlement agreements to issue rules on addressing greenhouse gas emissions from fossil fuel-fired power plants and refineries—which together make up 40 percent of the nation's GHG emissions.<sup>6</sup> Several states (including California) signed onto the agreement with EPA. This agreement outlines EPA's commitment to issuing regulations establishing new source performance standards and emission guidelines for existing facilities.<sup>7</sup>

<sup>‡</sup>See, for example, draft comments on EPA rules on National Ambient Air Quality Standards for Ozone: [www.aqmd.gov/hb/attachments/2010/March/100338AB.doc](http://www.aqmd.gov/hb/attachments/2010/March/100338AB.doc). The point about phasing out fossil fuels in the basin remained in the final submission and has been the subject of presentations by AQMD executive officer Barry Wallenstein.



## Specific Market Opportunity: Energy Generation

Electricity consumption alone accounted for 24 percent of the state's greenhouse gas emissions in 2008, according to the California Air Resources Board. Energy generation is thus a major target for greening.

In addition to regulatory agencies, the key actors in the energy generation market include investor-owned utilities, publicly owned utilities, energy service providers, and developers of renewable energy.

### ► How big is the market demand?

In 2009, Los Angeles County had electric power consumption of 73.1 gigawatt hours (GWh), with residential uses consuming 21.5 GWh and non-residential uses consuming 51.6 GWh hours. While the power market is large, it is relatively flat. Even though the population has grown considerably over the past three decades, gains in energy efficiency have kept overall consumption fairly steady. However, the recent push to increase energy from renewable sources, particularly as a replacement for coal-fired electricity generation, will create a large and growing market. This push can be seen more clearly through

*The recent push to increase energy from renewable sources, particularly as a replacement for coal-fired electricity generation, will create a large and growing market.*

California SBX1 2 (2011), which recently set a goal for utilities to reach 33 percent of electricity from renewable sources by 2020.

Ramping up the share of power sourced from renewable energy will require large investments in new facilities and transmission infrastructure. The Public Utilities Commission report entitled *33% Renewables Portfolio Standard*

*Implementation Analysis Preliminary Results* (2009) estimates investment of \$115 billion statewide by 2020 to meet the 33 percent target.

### ► What is the employment opportunity?

The investment in renewable power will clearly involve large sums of money, both to build the facilities and to purchase the resulting power. The employment prospects in Los Angeles County, however, are not obvious.

Investment in renewable energy will generate employment during construction and operation of the facilities (and any required transmission lines), but the employment during construction will vary considerably by project and technology. The biggest variable will be the share of construction spending dedicated to the purchase of specialized materials, such as

solar panels. The purchase of such materials will generate employment in green materials manufacturing, but it will create less construction industry employment than might be expected based solely on the project cost.

Additional employment will be generated by the ongoing operation and maintenance of the facilities. Overall, the employment involved will be modest in this capital-intensive field.

### ► Does L.A. County have a comparative advantage?

L.A. County is an attractive market for renewable energy based on its size and the amount of power required to meet various state and local renewable energy targets. Also, the climate makes the county well suited for various solar power technologies.

Renewable power can be transported over significant distances and still remain profitable. New facilities serving the L.A. County market may be located in adjacent counties (the L.A. region offers many good locations for solar arrays, geothermal plants, and wind farms), or elsewhere, including out-of-state.

### ► What are the key challenges?

There are numerous challenges to developing green power in Los Angeles County. Here we touch on regulatory, technical, cost, and policy challenges.

Regulation is a key element in renewable power. The regulatory challenges involve permits, contracts, and rules. Obtaining the required permits can be difficult since delays in reviewing projects for federal permits have held up large-scale solar facilities, and biogas and cogeneration facilities need hard-to-obtain approval from the South Coast Air Quality Management District. Utilities report difficulty getting even modest contracts for green power approved by regulators, noting that it is much harder than the equivalent process for conventional power plants. In terms of rules, there is ongoing disagreement among the investor-owned utilities, publicly owned utilities, and energy



## Specific Market Opportunity: Energy Generation (continued)

service providers over the relative fairness of rules that are applied to some but not others, and those where the application is equal but the consequences are not.

The primary technical challenge revolves around the difficulty of integrating intermittent wind and solar power into the grid and the related search for large-scale storage solutions. For the foreseeable future, combined cycle natural gas power plants will be an essential source of relatively clean base load power.

Cost is always a concern, and power generation faces multiple cost-related challenges. First, energy sourced from renewable energy is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Second, there are numerous factors besides the cost of renewable energy that are contributing to rising power costs: energy efficiency programs; resources adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in tariffs; upgrading and replacing aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once through (water) cooling. There is a possibility that the public will blame rising costs on renewable energy (alone), creating a backlash.

On the policy front, the challenge is in resolving the tension between the different motives driving the renewable energy program. Maximizing employment, reducing greenhouse gas emissions, and keeping power costs under control are not always compatible. For example, there is tension surrounding in-state versus out-of-state generation of green power. If minimizing cost is the goal, allowing out-of-state generation helps prevent the spikes in market price that would be more common if renewable power could only be sourced in-state. If maximizing local employment is a concern, in-state sourcing might be the preferred option.

### Conclusion

How L.A. County fares in the energy generation market will be determined on a project-by-project basis. There is no "silver-bullet" solution for renewable power. Meeting the more aggressive renewable power targets will require a little bit of everything, including large scale solar, distributed power (rooftop solar panels), wind, geothermal, and biogas. The amount of power sourced from within the county will ultimately depend on the underlying economics, reliability, and technical and environmental feasibility of the projects that are developed.

## Applying Green Practices

### Renewable Energy

The largest source of emissions in utility operations is related to energy generation. Currently, most electricity is still generated through the burning of coal, but with the passage of SBX1 2, utilities are required to achieve 33% of their electricity from renewable resources by 2020. Examples of renewable sources of electricity include wind, solar, geothermal, hydroelectric, and bio-waste conversion technology power generation. In 2009, Sempra Generation began construction on the largest photovoltaic solar power project in the U.S., in addition to completing its first wind energy project. The Los Angeles Department of Water and power (LADWP), the nation's largest public utility, announced that it would generate 35 percent of its power from renewable sources by 2020. AS of 2010, the LADWP met its goal of supplying 20 percent of power for the City of Los Angeles from renewable sources.

The next chapter in renewable energy involves the implementation of renewable energy tax credits that can be traded within a market to ensure compliance with RPS.

A local feed-in tariff program is another option. These programs are typically long-term contracts that guarantee access to the grid, setting a contracted price for the energy generated by rooftop solar installations on privately-owned residential and commercial structures. Such programs address the high upfront installation costs that can be an impediment to widespread use.

### Water Conservation

The demand for water will continue to grow as the population increases. In order to avoid future water shortages related to this growth amid persistent drought conditions, water conservation has become a focal point for sustainability. The LADWP has established ordinances relating to landscape irrigation, and offers cash rebates to both residential and commercial customers who utilize high-efficiency appliances and water fixtures.

The widespread use of water as a coolant in the generation process results in increases in both water use and water pollution. Two alternative methods for cooling are dry-cooling, which uses less than 10 percent of the water volume that is typically used, and the use of reclaimed water, which reduces the pollution of fresh water. Sempra's Palomar Energy Center in Escondido saved more than 927 million gallons of fresh water in 2009 using reclaimed water in their electricity generation.



## ► Facilities

Utilities can go green by pursuing LEED certification for their facilities. Another opportunity exists in installing solar panel roof installations to generate on-site electricity. Southern California Gas Company's Energy Resource Center in Downey has two solar technologies installed. The electricity it generates is used to power the air conditioning system, which can account for more than half of a building's total electricity consumption. Solar power can be consumed during peak demand hours when costs are high.

## ► Research and Development

Ongoing research into technologies to achieve conservation and renewable source goals will present major opportunities for the greening of utilities. For example, Semptra plans to invest \$14.6 billion over the next five years to bring clean natural gas, energy efficiency, renewable power, and smart grid innovations to the market.

## ► Transportation

Utilities require large fleets of vehicles since they are a population-serving industry. One opportunity for greening involves deploying more fuel-efficient vehicles in these fleets. Semptra operates over 1,100 alternative-fuel vehicles and provides employee training on maximizing fuel efficiency; these measures reduced GHG emissions by 5.9 percent (or 3,290 metric tons) from 2007 to 2009.

## ► Waste

There are many opportunities in the utility cluster to recycle the waste stream. Not only does this result in the diversion of waste away from landfills, but it presents an opportunity for the utilities to generate revenue. In 2009, Semptra's recycling of metal and meters, lead cable, paper and cardboard, electric transformers and transformer oil generated more than \$4.1 million in revenue.

## Sources

<sup>1</sup>Office of Governor Jerry Brown. "Governor Brown Ends State's Drought Status, Urges Californians to Continue to Conserve." *Office of Governor Jerry Brown*. March 30, 2011. Available from: <http://gov.ca.gov/news.php?id=16959>. Last accessed on April 18, 2011.

<sup>2</sup>Office of Governor Jerry Brown. "Governor Brown Signs Legislation to Boost Renewable Energy." *Office of Governor Jerry Brown*. April 12, 2011. Available from: <http://gov.ca.gov/news.php?id=16974>. Last accessed on April 18, 2011.

<sup>3</sup>Renewable Funding. "CaliforniaFIRST." Renewable Funding. N.D. Available from: <https://www.renewfund.com/node/220>. Last accessed on April 18, 2011.

<sup>4</sup>PACENow. "Federal Regulatory Overreach." PACENow. N.D. Available from: <http://pacenow.org/blog/>. Last accessed on April 18, 2011.

<sup>5</sup>Southern California Edison. "On-Bill Financing." *Southern California Edison*. April 15, 2011. Available from: <http://www.sce.com/business/onbill/about-on-bill.htm>. Last accessed on April 18, 2011.

<sup>6</sup>United States Environmental Protection Agency. "Addressing Greenhouse Gas Emissions." *Air Quality Planning & Standards*. January 28, 2011. Available from: <http://www.epa.gov/airquality/ghgsettlement.html>. Last accessed on May 5, 2011.

<sup>7</sup>United States Environmental Protection Agency. *Settlement Agreements to Address Greenhouse Gas Emissions from Electric Generating Units and Refineries: Fact Sheet*. N.D. Available from: <http://www.epa.gov/airquality/pdfs/settlementfactsheet.pdf>. Last accessed on May 4, 2011.





# Waste Management

## Cluster Overview

The solid waste stream, a byproduct of human existence, has grown with the population and economy. Los Angeles County is currently the most populous county in the nation, and the number of residents is expected to grow from today's population of 10.4 million to almost 13.1 million by 2050. The continued growth of this subsector of the economy seems assured.

This industry cluster is composed of establishments engaged in the collection, treatment, and disposal of waste materials, including: local hauling of waste; materials recovery facilities, such as recyclers; remediation service providers, such as contamination clean-up; and septic pumping.

Solid waste management within Los Angeles County is largely handled by the Sanitation Districts of Los Angeles County. They operate three landfill facilities within Los Angeles County: the Puente Hills Landfill (one of the largest landfills in the United States), which is located near the City of Whittier; the Calabasas Landfill, which is located near the City of Agoura Hills; and the Scholl Canyon Landfill, which is located in the City of Glendale. Activity associated with this organization is included within the government cluster, but these landfills are also used by private firms operating within this industry cluster.

Private waste management companies operating within Los Angeles County include Athens Services, Waste Management, DART, Valley Vista Services, Republic Services, Burrtec, and Universal Waste. Additionally, there are landfills within the county that are operated by private waste management companies and contracted by the County of Los Angeles and its municipalities for their waste collection and residential services. Privately-operated landfills in Los Angeles County include: Antelope Valley Landfill in Palmdale; Bradley West Landfill in

Sun Valley; Chiquita Canyon Landfill in Castaic; Lancaster Landfill in Lancaster; and Sunshine Canyon Landfill in Sylmar.

We anticipate that increased focus on the treatment and recycling of waste materials will provide new opportunities in this industry.

### Industry Roster

- Remediation and Other Waste Management Services
- Waste Collection
- Waste Treatment and Disposal

2010-2020

### Employment Prospects



The employment outlook for waste management is very good. The industry is expected to add 3,000 jobs by 2020, an increase of 32 percent over current employment. Green awareness and new processes of waste remediation, recycling, and conversion will create significant opportunities in this sector.

Source: LAEDC



## ESTABLISHMENTS

2009  
**350**  
0.1% of county total

1999  
**370**  
0.1% of county total



## EMPLOYMENT

2009  
**9,343 Jobs**  
0.2% of county total

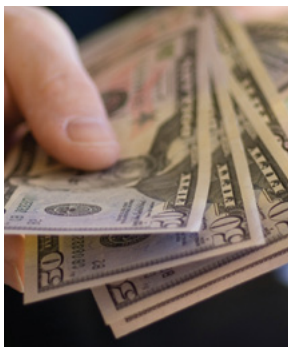
1999  
**9,067 Jobs**  
0.2% of county total



## ANNUAL PAYROLL

2009  
**\$488 Million**  
0.2% of county total

1999 (in 2009 dollars)  
**\$540 Million**  
0.3% of county total

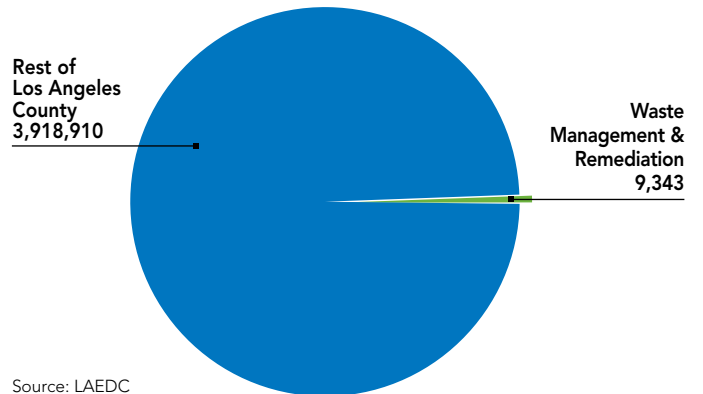


## OUTPUT

2009  
**\$2.0 Billion**  
0.2% of county total

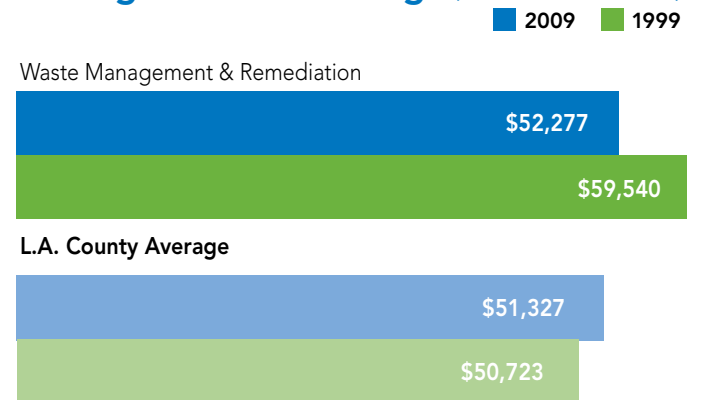
Source: LAEDC

## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)



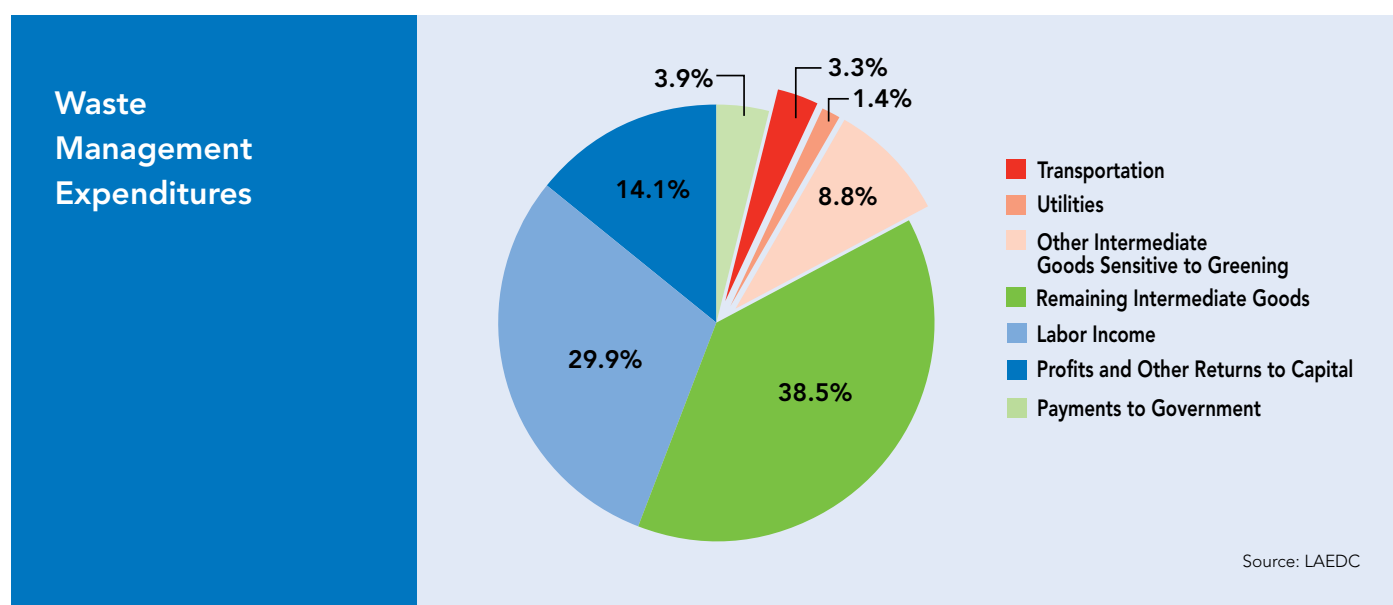
Source: CA EDD



## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the waste management industry,<sup>†</sup> with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the waste management industry spent in Los Angeles County spent on average \$53,410 per employee on utilities and transportation, while generating \$923,556 in output per employee.
- Waste management businesses spend a moderate portion of expenditures on fuel and equipment. However, most expenditures from this industry go toward service-based inputs and payments to employees, which are not price-sensitive to greening.

*Firms in the waste management industry will adopt green practices for the cost savings and to comply with government regulations. If permitting issues can be resolved for waste-to-energy facilities, greening could also offer the industry a significant opportunity.*

<sup>†</sup>This industry group includes NAICS code 562.



## Things to Consider

The industries in the waste management cluster are primarily population-serving and are strongly tied to particular geographic locations, making relocation to avoid green regulations a non-issue. Treatment and disposal operations may increasingly locate facilities outside the county, but such moves are being driven by land availability and local permitting issues. Firms in this group will help create demand for green products and services, and applying greener practices to operations within this cluster, such as the adoption of more fuel efficient vehicles, appears to be well underway.

Waste reduction, reuse, and recycling are central to the greening of the economy, and waste management is one of the major green opportunity areas identified in this report. The large number of households and businesses in Los Angeles County ensure a steady supply of solid waste, which is increasingly being viewed as raw material rather than garbage. The Soex Group, for example, regards the large volume of clothing discarded each year in Los Angeles as a possible source of material for its line of insulation materials for the automotive industry. Firms in the waste-to-energy business have a similar view of the food and plant waste generated in the region. Capitalizing on waste-to-energy opportunities to stimulate employment growth will require resolving conflicting environmental regulations, particularly in the case of power generation using captured gas from landfills.

## Examples of Regulations Driving the Greening of the Waste Management Cluster

- ▶ California Governor Arnold Schwarzenegger's Executive Order S-06-06, set aggressive targets for the production and use of bioenergy, e.g., biomass used for electricity.<sup>1</sup>
- ▶ The proposed 2011 Bioenergy Action Plan serves as a blueprint for growing the use of bioenergy in California, aiming to address siting, permitting, and regulatory barriers to increasing bioenergy and biofuels production, among other things.<sup>2</sup> The 2009 plan cited the attainment of local air permits as a major issue for biopower facilities in California, and, in Los Angeles County, permits to emit particulate matter for new solid-fuel biomass projects render new projects "financially unviable."<sup>3</sup>
- ▶ As part of the California Air Resources Board (CARB) scoping plan for AB 32, the Mandatory Commercial Recycling Measure aims to achieve a reduction in GHG emissions of five million metric tons of carbon dioxide equivalents with a plan to recycle an additional two to three million tons of commercial waste materials on an annual basis.<sup>4</sup>
- ▶ Effective June 17, 2010, CARB's Landfill Methane Control measure requires owners and operators of certain landfills to install/optimize gas collection and control systems. Local air districts are authorized to enter into memorandums of understanding with CARB to implement and enforce this provision.<sup>5</sup>
- ▶ In September 2003, California's Solid Waste Collection Vehicle Rule was passed to reduce the impacts of exhaust from diesel-fueled waste collection ("garbage") trucks. The rule required that waste collection trucks be gradually phased into cleaner trucks from 2004 to 2010.<sup>6</sup>
- ▶ While not yet final, the EPA is proposing a rule that would add hazardous pharmaceutical wastes to the federal universal waste program, thereby making it easier for waste-generators to collect and properly dispose of these items.<sup>7</sup>



## Specific Market Opportunity: Waste Management

The largest landfill in Los Angeles County, Puente Hills, is slated to close in 2013, and there are no new landfills planned within the county. Residents will have to pay more to transport their waste further inland for disposal or increase the share of waste that is diverted to recycling or energy generation. Recycling efforts have improved in cities throughout the county over the past decade, but there is still plenty of room for improvement before reaching the levels observed in Japan, Taiwan, and several European countries.

### ► How big is the market demand?

The market for improved waste management is large. By global standards, the more than 10 million L.A. County residents are comparatively affluent and generate a lot of trash. Even with recycling having become commonplace, the county buried almost seven million tons of solid waste in 2009. (A further 600,000 tons of waste was transformed through burning or converted to energy.)

In Los Angeles County, the top components of household waste are organic materials (45 percent), paper (28 percent), plastic (nine percent), and metal (five percent). For businesses, the top components are paper (34 percent), organic materials (31 percent), plastic (11 percent), and construction and demolition debris (10 percent). There is much untapped potential for green disposal options in the waste stream. Organic waste, in particular, is a major component of overall waste and represents an opportunity for emerging waste-to-energy technologies. Similarly, fabric and cloth could be almost entirely diverted from the waste stream and recycled.

### ► What is the employment opportunity?

There will be a modest employment gain to the extent that the material that was formerly buried is instead used for some other purpose. Such activities may include sorting recyclable items for export (as is typical for paper products and scrap metal) or operating waste-to-energy power plants. There would also be a one-time employment gain during the construction of any new facility.

### ► Does L.A. County have a comparative advantage?

The county generates a large, steady stream of waste that represents raw materials to firms that reprocess the waste (such as shredding old clothes to produce insulation) or convert it to energy.

### ► What are the key challenges?

The key challenges will be economic and regulatory. It may not be profitable (or desirable) to process recycled products locally. Already, the two largest exports from the Ports of Los Angeles and Long Beach are scrap metal and recycled paper. The demand for these inputs falls when the economy slows and may remain low if greater participation in recycling programs leads to a glut.

Currently it is cheaper to dispose of organic waste in a landfill than it is to process it at a waste conversion facility; however, that will change as transportation costs and fees at disposal sites in other counties rise. It is estimated that the tipping point for these fees will occur within five to seven years. Obtaining the required permits for processes that convert recycled materials into an energy may be a significant challenge in Los Angeles County (as it would be for any new point source of emissions of various regulated air pollutants). Permitting a waste conversion facility can take six years longer in California than in other states; it is currently harder to site new waste conversion facilities within Los Angeles County than it is to site a new landfill.

### ► Conclusion

There is significant potential for new recycling and waste conversion facilities and a modest employment gain in Los Angeles due to current landfills reaching capacity.





## Applying Green Practices

Proper waste management is integral to the greening process. The current system can be improved by reducing generated waste, diverting recyclable or compostable materials, disposing properly of toxic materials, and capturing emissions from landfills. It is also important to note that L.A. County's largest landfill, Puente Hills, is set to close in 2013, and no new landfills are planned within the county.

### ♻️ Recycling

One of the simplest ways to green the waste management process is to increase the percentage of waste that gets recycled. This serves the dual purpose of reducing the load on landfills and reducing consumption of raw materials. Though the U.S. has improved its recycling figures in recent decades, it still has a long way to go to catch up with its Western European and Japanese counterparts. One study estimates that 32 percent of U.S. municipal waste is recycled, whereas 70 to 80 percent of Japan's municipal waste is recycled.<sup>8</sup> Waste Management, Inc. currently processes six million tons of recyclables annually and plans to process more than 20 million tons by 2020.<sup>9</sup> Green Waste Recovery, Inc., located in Northern California, diverts about 85 percent of household waste from landfills through recycling.<sup>10</sup> The Green Waste Project in Phoenix, AZ diverts compostable waste from landfills and processes it at a facility in the middle of the city.<sup>11</sup>

### ♻️ Waste Conversion Technologies

Conversion technology is the accelerated breakdown or gasification of solid bio-waste using one or more of the following catalytic processes: thermal (a gasification process that uses heat, steam, or pressure); chemical (a process that uses acid and water to split the chemical structure); or biological (anaerobic breakdown more commonly known as composting). Gas generated by these processes can be used to generate renewable electricity and to produce clean burning fuels like ethanol and biodiesel.

There are many benefits to adopting conversion technology. Bio-wastes are a locally produced and sustainable resource. Using emerging conversion technologies could reduce the cost and pollution associated with exporting carbon-based waste from Los Angeles County; reduce the release of methane from landfills; and produce ethanol locally. These projects may be eligible to take advantage of billions of dollars in federal incentives from the USDA and the Department of Energy for advanced biofuels research and development and facilities construction. For example, CR&R Incorporated, located in Southern California, was awarded \$4.5 million by the California Energy Commission through the Alternative and Renewable Fuel

and Vehicle Technology Program for their CR&R municipal solid waste to Biomethane Project, which is to fuel their fleet of more than 100 refuse collecting vehicles.

The most prominent obstacle to the adoption of conversion technologies is permitting from the South Coast Air Quality Management District. Their permitting process does not currently take into account the net emissions of a potential conversion facility, thus making the required permits difficult to obtain.

### ♻️ Landfill Gas Capture

Capturing natural gas from landfills is one of the most elegant ways to manage waste and reduce the carbon footprint. By collecting gas instead of flaring it off or allowing it to dissipate, landfills reduce the methane, carbon dioxide and other greenhouse gases that would otherwise enter the atmosphere. Once processed, this gas can fuel waste collection vehicles, power landfill operations, or be sold to utilities. Waste Management, Inc. currently produces enough energy to power the equivalent of one million homes annually, and by 2020 it expects to double this amount.<sup>12</sup>

### ♻️ Vehicle Fleets

Waste management companies operate large fleets of collection trucks. By greening their fleets, companies in this industry can do their part to reduce vehicle emissions. For example, Waste Management, Inc. is making capital investments over 10 years to improve its fleet fuel efficiency by 15 percent.<sup>13</sup> At a landfill operated by Waste Management in Livermore, CA, The Linde Group operates a landfill natural gas facility that partially supplies the fuel for Waste Management's fleet of 300 garbage and recycling vehicles.<sup>14</sup> While natural gas is inherently less greenhouse gas-intensive than diesel, this arrangement reduces overall emissions even more because the landfill gas would otherwise be flared off.



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# Wholesale Trade and Logistics

## Cluster Overview

With almost 145,000 workers in 2009, the wholesale trade and logistics sector plays a major role in Los Angeles County. Its close ties to international trade, manufacturing, fashion, and furniture give this slice of the county's economic production added importance.

Trade and logistics has become an important industry in the past decade as international trade has grown significantly. A vital aspect of the supply chain, wholesale distributors provide an important buffer between suppliers and retailers, allowing both to operate more efficiently. Brokers and agents who act on behalf of buyers and sellers are closely allied with the distributors.

Major distribution points are found near the airport and port areas and near downtown Los Angeles where the fashion, flower, toy, and produce markets are located. An increasing number of warehouse operations are establishing cost-effective operations

in the outlying parts of the county, including the Santa Clarita, Antelope, and San Gabriel Valley areas, due to the limited availability of industrial land in Central Los Angeles.

Wholesale trade and logistics facilitate the flow of goods. With the advent of robotics and modern computer technology, warehouse operations have become a field requiring specialized skills and talent.

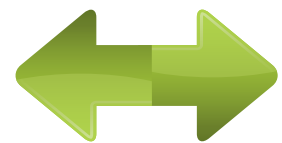
If consumer demand picks up in the recovery period, employment prospects can be expected to improve in L.A. County. However, projected growth in these industries is dependent on the strength of the global recovery, the consumer's appetite for spending, and continued investment in trade infrastructure in the Los Angeles region, since competition from other water-borne trade entry points is expected to intensify in the next decade.

## Industry Roster

- **Merchant Wholesalers**
  - Beer, Wine, and Distilled Alcoholic Beverage
  - Chemical and Allied Products
  - Coal and Other Minerals and Ores
  - Drugs and Druggists Sundries
  - Electrical and Electronic Goods
  - Grocery and Related Products
  - Hardware, Plumbing /Heating Equipment
  - Lumber and Other Construction Materials
  - Miscellaneous Durable Goods
  - Miscellaneous Nondurable Goods
  - Paper and Paper Product
  - Petroleum and Petroleum Products
  - Professional and Commercial Equipment
- **Warehousing and Storage**
- **Wholesale Trade Agents and Brokers**

2010-2020

## Employment Prospects



The employment outlook for the wholesale trade and logistics cluster is not good. The cluster is expected to add only 3,800 jobs by 2020, an increase of less than three percent over current employment. The outlook is based on poor prospects for consumer spending after the current recovery, and increased competition from other water-borne ports, including the expected opening of the Panama Canal expansion. Additionally, any growth that would occur in the industry regionally is more likely to accrue to neighboring counties.

Source: LAEDC



## ESTABLISHMENTS

2009  
**13,419**  
3.2% of county total

1999  
**13,515**  
4.4% of county total



## EMPLOYMENT

2009  
**144,749 Jobs**  
3.7% of county total

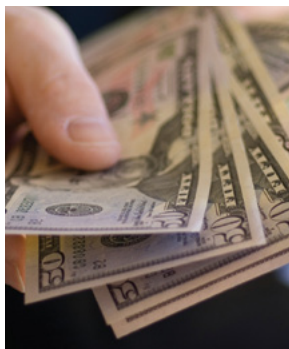
1999  
**151,498 Jobs**  
3.7% of county total



## ANNUAL PAYROLL

2009  
**\$7,850 Million**  
3.9% of county total

1999 (in 2009 dollars)  
**\$8,500 Million**  
4.1% of county total

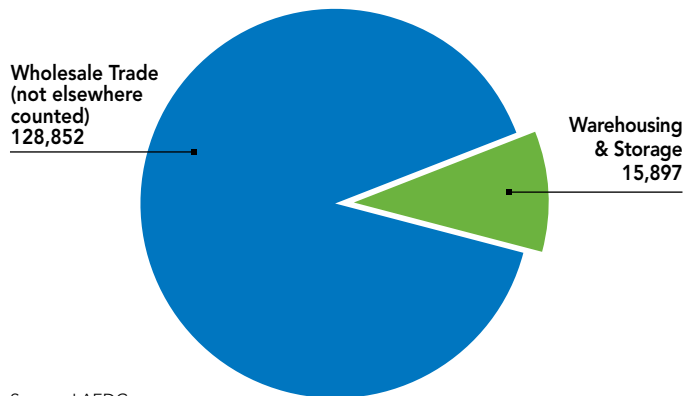


## OUTPUT

2009  
**\$31.9 Billion**  
3.6% of county total

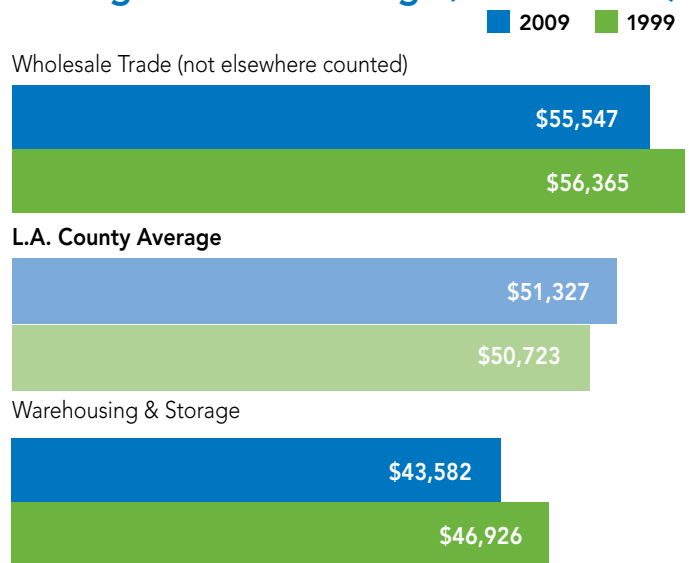
Source: LAEDC

## Employment by Industry (2009)



Source: LAEDC

## Average Annual Earnings (in 2009 dollars)



Source: CA EDD

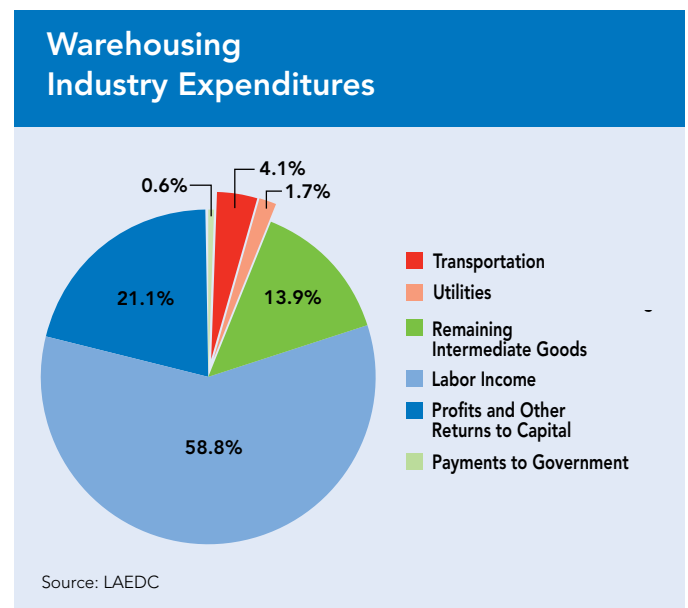
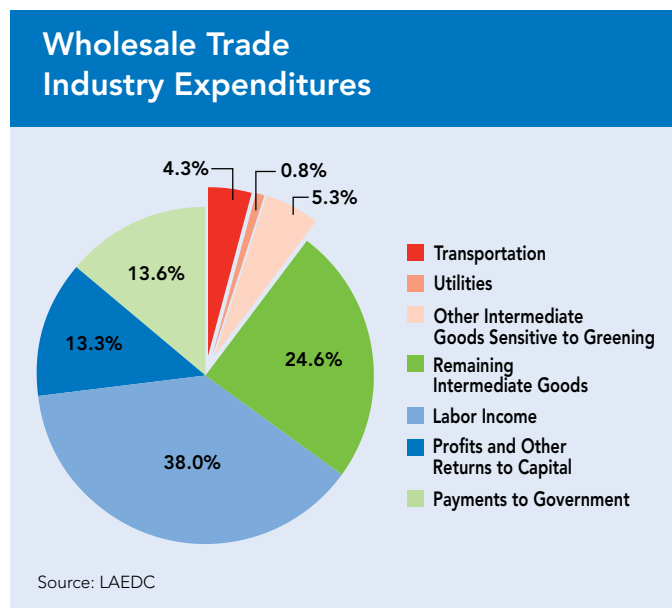
*Firms in the wholesale trade and logistics cluster will adopt green practices primarily as a defensive measure against rising costs. The large rooftops of buildings in the industry may offer one of the better opportunities for distributed power generation using solar photovoltaic panels.*



## Potential Cost Increases

Businesses purchase a variety of goods and services for ongoing operations and in production, the prices of which may change due to the greening of the economy. Looking forward, we expect utility costs to rise because power from renewable sources is more expensive than power generated using coal-fired or combined-cycle natural gas power plants. Moreover, other factors driven in whole or in part by green considerations may contribute to rising power costs, including: resource adequacy (making sure enough generating capability is online to avoid interruptions in service); feed-in-tariffs; the upgrade and replacement of aging infrastructure; and rules requiring the replacement or mitigation of power plants along the coast that use once-through (water) cooling. Additionally, we expect transportation costs to rise to reflect the cost of compliance with lower emissions standards.

The chart below shows average expenditures for the wholesale trade<sup>†</sup> and warehousing<sup>§</sup> industries with red wedges representing goods and services whose price may increase due to greening. Intermediate goods are deemed to be sensitive to greening if they have a large energy or transportation component or are subject to other greening requirements.



- In 2008, firms in the wholesale trade industry in Los Angeles County spent on average \$9,176 per employee on utilities and transportation, while generating \$180,936 in output per employee.
- The majority of wholesale trade expenditures go toward service-based inputs and payments to employees, which are not price-sensitive to greening.
- The absolute amount of this industry's utilities and transportation spending is significant (almost \$400 million on utilities and almost \$2.1 billion on transportation). By making their operations more efficient, these firms can make a significant impact on regional sustainability.
- In 2008, firms in the warehousing industry in Los Angeles County spent on average \$5,038 per employee on utilities and transportation, while generating \$87,851 in output per employee.
- The majority of warehousing expenditures go toward service-based inputs and payments to employees, which are not price-sensitive to greening.

<sup>†</sup>This industry group includes NAICS code 42.

<sup>§</sup>This industry group includes NAICS code 493.





### Things to Consider

To the extent that firms in the wholesale trade and logistics cluster are located in Los Angeles County to serve the large regional market, these businesses are location dependent and do not have the option of relocating to avoid greening their businesses. Growth in this cluster is more likely in adjacent counties with greater land availability, but such locations are subject to many of the same state regulations.

To the extent that firms in this cluster support and are tied to the flow of international goods, moving through the region to and from the rest of the United States, environmental regulations could be a contributing factor in driving businesses to leave

or at the very least expand outside of the region or state. The cost of greening the industry seems secondary to the multi-year delays caused by environmental reviews of infrastructure projects intended to increase capacity. Firms that see their future growth taking place near alternative ports may give a lower priority to investment in energy efficiency and other green practices in Los Angeles.

Overall, firms in this cluster will help create demand for green products and services, particularly cleaner vehicles, but they have limited potential to participate as vendors in the green market.

### Examples of Regulations Driving the Greening of the Wholesale Trade and Logistics Cluster

- ▶ On November 22, 2010, the Ports of Los Angeles and Long Beach approved an updated San Pedro Bay Ports Clean Air Action Plan (CAAP) to “integrate common goals for air quality in the South Coast Air Basin.”<sup>1</sup> The updated CAAP includes the addition of the San Pedro Bay Standards, which will be used to measure the plan’s progress and effectiveness going forward. These standards set forth an aggressive plan to meet several goals of the California Air Resources Board, including the reduction of health risk impacts and the reduction of emissions, both relative to 2005 levels. The CAAP, which was originally enacted in 2006, aims to reduce air pollution of ships, trains, trucks, and other heavy machinery that are used in moving goods at the Ports.<sup>2</sup>
- ▶ The California Air Resources Board (CARB) has an On-Road Heavy-Duty Diesel Vehicles (In-Use) Regulation, which requires retrofitting of heavy duty trucks to ensure each truck has 2010 model engines by 2023.<sup>3</sup>
- ▶ In January 2007, the California Department of Business, Transportation & Housing and the California Environmental protection Agency released California’s Goods Movement Action Plan, which outlines ways in which goods movement industry and infrastructure can be improved and expanded so as to generate jobs; increase mobility and relieve traffic congestion; enhance public and port safety; improve air quality and protect public health; and improve California’s quality of life.<sup>4</sup>
- ▶ SB 375 (Steinberg) (2008) is an implementation measure of AB 32, which requires the development of regional GHG emission reduction targets for passenger vehicles. Each of the State’s metropolitan planning organizations, e.g., the Southern California Association of Governments (SCAG) for Los Angeles County, are required to prepare Sustainable Community Strategies demonstrating how the region plans to meet the set GHG reduction targets through an integrated approach to land use, housing, and transportation planning.<sup>5</sup>
- ▶ Under the authority of the Clean Air Act, the U.S. Environmental Protection Agency began a phaseout of the production and import of ozone-depleting substances (or ODS). Currently, the program is in Class II of its phaseout, which consists of hydrochlorofluorocarbons (or HCFCs). The most widely used HCFCs are in refrigerants, and the more common commercial and industrial uses include retail food refrigeration and cold storage warehouses. The schedule of ODS phaseouts can be found in the Montreal Protocol.<sup>6</sup>



## Applying Green Practices

Wholesale trade and logistics businesses generate a significant amount of fossil fuels in the process of moving goods from one place to another. Many firms in this industry cluster also occupy warehouse space.

### ► Facilities

Wholesale and logistics companies can conduct important greening efforts at their warehouses. By adopting a comprehensive set of green strategies, building managers can reduce their facility's environmental impact in many ways. For example, HD Supply, a leading wholesale distributor in L.A. County, has taken such an approach.<sup>7</sup> More than 50 percent of HD Supply's establishments have implemented recycling programs for paper, plastic, aluminum, wood pallets, and cardboard. Additionally, more than half of their establishments use green cleaning products and provide employees with reusable bottles and mugs. To reduce energy consumption, one HD Supply warehouse has installed efficient fluorescent lighting, and another supplements lighting with skylights. A facility located in Virginia has elected to use electric forklifts instead of the typical propane-powered models to reduce dust and exhaust, a practice which has been adopted industry-wide.

### ► Transportation

Logistics operations can benefit from the greening of their truck fleet. Efficient fleets burn less fuel, which saves money and reduces emissions. For example, Wal-Mart increased its fuel efficiency by 38 percent in 2008 through a combination of vehicle upgrades, space-efficient truck loading, and the reorganizing of truck routes.<sup>8</sup> Wal-Mart's ASDA subsidiary reduces empty truck miles by coordinating truck trips with their suppliers so that trucks can haul loads going both directions.

In the past, expensive real estate and falling transportation costs pushed storage facilities to the outskirts of major population centers. Though cost-effective, the long truck trips associated with such a strategy are environmentally unfriendly. Where possible, locating storage facilities closer to suppliers and customers may allow wholesale trade and logistics firms to reduce their environmental impact and mitigate rising transportation costs in L.A. County.

### ► Operations

Wholesale and logistics companies can conduct important greening efforts at their warehouses. By adopting a comprehensive set of green strategies, building managers can reduce their facility's environmental impact in many ways. Operations can elect to use solar photovoltaic or electric forklifts instead of the typical propane-powered models to reduce dust

and exhaust; adopt sustainable purchasing best practices that consider both the cost and environmental aspects; implement green cleaning product policies; and provide employees with reusable bottles and mugs.

Re-evaluating operational processes with energy management in mind can also result in big savings while significantly reducing annual energy needs. For example, Fonterra Mount Maunganui Cool Stores in New Zealand determined that they could use a wider range of temperatures in their cool rooms by focusing on product temperatures, which are more stable, rather than on room temperatures. As a result, they are able to turn off their refrigeration plant during the day and use off-peak energy pricing for night-time operations. The initial investment for installation was \$12,500. Their energy consumption has been reduced from 3,310,000 kWh a year to roughly 2,050,000 kWh, resulting in a savings of nearly \$90,000 per year.

### ► Renewable Energy

Cold or refrigerated storage facilities have high energy requirements in order to achieve heat displacement. For example, the energy needed for one ton of refrigeration at -40°F can be five times greater than what is required by normal air conditioning. Due to the size of these storage facilities and their energy requirements, they are perfect candidates for rooftop solar installations. In late 2008, United States Cold Storage installed a rooftop solar array on their warehouse in Tulare, CA that offsets 14 percent of the facility's annual electricity needs. The success of that installment has led the firm to plan additional installations over the next five years, and to consider cooperative funding initiatives such as Power Purchase Agreements, in which third party investors would fund and maintain installations located on United States Cold Storage buildings. In addition to solar installations, scalable wind turbines and natural gas stationary fuel cells are also renewable options that are viable sources of energy for cold storage facilities.

### ► Partnerships for Renewable Energy

Large opportunities exist for public and private partnerships to develop in this industry cluster in relation to renewable energy generation systems. The nature of warehousing and logistics operations requires buildings which are ideal for solar roof installations. Warehousing and logistics firms, third party investors, and utility companies can partner together to fund the installation and operation of solar roof systems and split the



renewable energy credits associated with it. One such example is the partnership between Hamann Construction (El Cajon, California), Innovative Cold Storage Enterprises, Inc. (ICE; San Diego, California), San Diego Gas & Electric (SDG&E), and SunPower Corp. (San Jose, California). In 2009, construction was completed on a 134,511 square-foot cold storage building with a 1.1 megawatt solar photovoltaic system. SDG&E had awarded Hamann and ICE over \$225,000 in incentive funding through the California Solar Initiative and federal tax incentives. The solar system is estimated to reduce CO<sub>2</sub> emissions by 1.5 million pounds annually, achieve a 75 percent reduction in energy costs to ICE, and half of the energy generated by the solar photovoltaic system will be fed directly to the grid. The renewable energy credits are split between SDG&E and Innovative Oil and Gas (a Hamann company).

## ► Retrofitting

As more efficient equipment and methods are being developed for facilities within the wholesale trade and logistics industry cluster, more opportunities present themselves to reduce carbon footprints through retrofitting. Warehouse retrofitting typically falls into the following categories: building envelope upgrades; lighting, HVAC systems, and water heating upgrades; and water conservation measures.

Building envelope upgrades have the largest potential to reduce an operation's environmental impact and result in long term cost savings. Common retrofits include such measures as installing higher levels of insulation and glazing or the addition of energy efficient windows and thermal glass skylights to utilize more natural light, maintain climate control, and meet exhaust requirements. Solar roof installations are an optimal choice for warehousing and storage facilities to generate their own renewable energy since they typically have large flat roofs. However, facilities electing not to invest in solar installations can still choose to use cool roof systems which are highly reflective

and absorb less energy from the sun. Also, dock shelters, while more expensive than roll-up doors, are more energy efficient since they reduce the amount of outside air exchanged during the loading and unloading process.

Building interior retrofits are beneficial as well. Lighting retrofits usually try to achieve lower lighting power densities through more efficient design, the increased usage of natural daylight, and more efficient lighting control systems such as the installation of dimmers and motion sensors. HVAC equipment and systems should be upgraded to more efficient models with properly designed and functioning ventilation controls, fans, and duct systems. Similarly, water heating systems should be replaced with more efficient models, and all piping should be properly insulated to achieve maximum efficiency.

Finally, water conservation methods should be employed such as the installation of low flow plumbing fixtures and the use of drought-resistant landscaping. An additional water conservation method would be the use of reclaimed water for landscape hydration.

## ► Waste

Paper, shrink wrap, corrugated packaging, wood, and recyclables are all waste byproducts of warehousing operations. Wholesale trade and logistics firms can implement recycling programs which will divert waste, reduce their impact on the environment, and generate revenue. More than 50 percent of HD Supply's establishments, a leading wholesale distributor in L.A. County, have implemented recycling programs for paper, plastic, aluminum, wood pallets, and cardboard. Other methods of reducing waste associated with this industry include the use of returnable and reusable metal containers in place of boxes, the reuse of pallets, and the use of efficient packing techniques. GM was able to save \$12 million on disposal costs through a reusable container program with its suppliers.

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## Section III – Conclusion

Due in large part to the diversity and size of Los Angeles County's \$500 billion economy, we anticipate that the region will stand at the forefront of greening the global economy. Despite this leadership role, greening L.A.'s economy will not serve as a panacea for its high unemployment. While it is expected that Los Angeles will be a large market for green-related goods and services, the existence of this market does not in any way mean that the region will serve as the place where those goods and services are produced. Thus our local, regional, and state policymakers and public officials, as well as leading private sector stakeholder organizations, can all play a role to ensure that Los Angeles County serves as both an ideal consumer market and employment base for the greening of our regional economy.

Throughout this report, we have given both recommendations for specific industry clusters and overall greening recommendations that can be applied across all clusters. Until now, we have focused our efforts on what businesses can do to green their efforts. In this last section of the report, we go a step further by offering recommendations that can aid public officials and local, regional, and state policymakers in their decision-making as they pertain to three key areas: 1) attracting, growing, and retaining green businesses and green jobs; 2) advancing business assistance; and 3) creating a favorable regulatory environment.

### Recommendations for Attracting, Growing, and Retaining Green Businesses and Green Jobs

#### • Start with the principles outlined in the Los Angeles County Strategic Plan for Economic Development

- Green businesses are businesses first and foremost and will seek out and remain in areas that offer an educated workforce; available land; a business friendly environment; modern infrastructure; and a high quality of life.

#### • Act quickly to take advantage of California's—and in some cases, L.A. County's—first-mover status within the United States

- There is a one-time opportunity to nurture and attract the firms that will meet the demand for green goods and services created by state and local regulations and policies. Winners in the first round of procurement will be better positioned to meet subsequent local demand and compete for similar contracts elsewhere.



### Recommendations for Attracting and Expanding Green Businesses and Green Jobs (continued)

#### ► Adopt bold policies that signal a serious intent to attract green businesses

- Los Angeles faces two challenges: first, countering the perception that California is a high-cost, hostile place to do business; and second, differentiating itself from a host of global competitors who are touting their potential market size, a highly skilled or low-cost workforce, and subsidies and other incentives to attract green businesses.
- Los Angeles will be an also-ran in the global rush for green businesses without policies that make it a more attractive place to locate green businesses. State and local officials should evaluate policies *targeted at green and clean technology firms* such as reducing taxes for the first five years on new firms; continuing and increasing the R&D tax credit; and creating new (or repurposing old) Enterprise Zones, specifically for firms providing green goods and services. Other possibilities include expanding the manufacturers' sales tax credit beyond Enterprise Zones, exempting more green sector sales and use taxes, and reinstating the manufacturers' investment tax credit.

#### ► Position the region as a center for the green economy

- Support efforts that place the region at the forefront of the transition to the green economy, such as VERDEXCHANGE, an annual conference that promotes Los Angeles as one of the most economically vibrant and environmentally conscious regions in North America. The conference brings together leading clean and green technology, infrastructure, and sustainable practice market makers –private and public – to learn, network, and do business with global and local green economy manufacturers, entrepreneurs, elected officials, utility executives, energy and water regulators, environmental stewards, investors, and project financiers.
- Marketing outside of and within L.A. County will both be important. First, there is a critical need to generate awareness to people and firms outside the region of the strength and attractiveness of the growing demand for green products and services in L.A. Second, outreach to local residents and businesses is necessary to help raise awareness of the importance of going green and the many cost-effective ways to do so. Successful outreach will increase demand and the overall draw of the regional market.
- Aggressively seek more federal funding for clean technology and energy efficiency research at L.A. County-based institutions. Help leverage the County's research and development facilities for the commercialization of green-related research, technology and similar opportunities.

#### ► Play to the region's strengths

- The region will do well in green services such as construction and renovation, consulting and auditing, and, to a lesser extent, transportation and energy generation, since the local market will be a sufficient attraction, and, in many of these areas, the region is already strong.
- Focus attraction efforts on firms that do not necessarily need to be located in Los Angeles but which may consider it due to some combination of local factors, including market size; regional infrastructure; research and development strengths (research universities); workforce; and existing, complementary manufacturing clusters (such as aerospace).

#### ► Be cautious with green-related training programs and ensure they are carefully matched with demand

- There will be very few unambiguously green jobs owing to two challenges: first, many so-called green jobs can be filled by current workers with little or no need for additional training, as in green-related construction, renovation, and retrofitting where the recession has created an overhang of under- and unemployed skilled workers. Second, green employment opportunities may be slow to materialize due both to an uncertain federal regulatory environment and firms in green businesses opting to serve Los Angeles and other global markets from outside the region.





### Recommendations for Assisting Existing Businesses in Going Green

#### ► Expand efforts to help firms seeking to adopt green practices

- Smaller firms in particular tend to have fewer resources to dedicate to researching and implementing green practices. Education efforts will be critical to spread knowledge of cost-effective strategies. Programs that provide practical advice such as the energy and efficiency audits offered by the utilities and groups like California Manufacturing Technology Consulting<sup>†</sup> will be critical.

#### ► Provide multiple financing mechanisms for adopting green practices

- Funding will be a key hurdle since many firms and organizations will not be in a position to fund large, upfront transition costs (such as the cost of a new, more efficient boiler), even if the investments promise immediate savings and long-term cost-recovery.
- Grants, subsidies and creative programs will be essential. Legislation such as AB 811, which provides for long-term repayment of energy efficiency improvements to a building through a surcharge on the improved building's property taxes, faces difficulties as applied to residential properties, but it could provide an important mechanism for funding green improvements to commercial and industrial structures (as envisaged in the legislation).

### Recommendations for Creating a Better Regulatory Environment to Achieve a Greener and More Vibrant Economy

#### ► Aim for regulatory certainty, clarity, simplicity and flexibility

- Planning is always difficult for major investments with an operational time horizon measured in decades or a multi-year cost-recovery period. Concerns about regulatory risk may kill a particular investment or, in the case of expected rate structures or subsidies, an entire industry.
- Adopt rules with the longest possible time horizon. For regulations, this may give firms a chance to incorporate equipment upgrades and other purchases into their long-term plans. For incentives, a longer timeframe or a ramped decline over multiple years can help avoid the boom-and-bust investment pattern created in the wind power industry by incentives that are dependent on frequent renewals.
- The need for certainty can also be handled with grandfathering. Knowing that investment decisions evaluated for cost-effectiveness and compliance with current regulations will be exempt from stricter regulations down the road should encourage long-term planning. It may even incentivize swifter compliance with current regulations by firms seeking to reduce the uncertainty associated with anticipating the direction of future regulations.
- Regulatory certainty and flexibility need not be mutually exclusive: the former implies long-term stability for planning; the latter implies openness to creative environmental solutions that meet the spirit if not the technical requirements of green regulations. Flexibility is also a means of ensuring firms have reasonable options to respond to extraordinary events and unforeseen circumstances.

#### ► Implement green regulations with the twin goals of creating a healthy environment and a vibrant economy

- Strategies (including unfunded mandates) that focus on emissions reductions without ample consideration about their effects on the economy will be less successful in the long run. This is true because local greening strategies have a limited impact on the global environment. If the strategies combine a healthy environment and economy, however, they are more likely to be voluntarily emulated by other communities, regions, and nations, thereby multiplying their impact.
- Cost containment should be a primary objective. Even modest increases can seem unreasonable when added to the myriad costs that make it expensive to do business in California.
- Passing green legislation is the easy part. Agencies must ensure that, once promulgated, regulations are implemented in a way that produces environment and economic co-benefits. As part of the regulatory adoption process, agencies should assess the economic impact of a green regulation (in addition to its environmental impact), as well as, submit a description of all reasonable alternatives to the regulation and why those were not chosen.

<sup>†</sup>California Manufacturing Technology Consulting is a private non-profit corporation that operates through a cooperative agreement between the Hollings Manufacturing Extension Partnership (HMEP) of the National Institute of Standards and Technology (NIST) under the Department of Commerce.



### Recommendations for Creating a Better Regulatory Environment to Achieve a Greener and More Vibrant Economy (continued)

#### ► Explore ways to allow global emissions reductions to offset local emissions

- Many green products (such as high efficiency windows) will add to the state's greenhouse gas emissions during the production process, but will help lower the emissions associated with the activities of firms, organizations, and households that use them. Firms making such products should not be discouraged or precluded from operating in Los Angeles County and the rest of the state.

#### ► Rely on markets to the fullest extent possible

- Set reasonably achievable targets rather than mandating detailed solutions. For example, SB 375 focuses on reducing vehicle miles traveled to reduce greenhouse gas emissions, precluding other creative strategies that might achieve the same goal. Allow firms to determine the most cost-effective strategies for reaching the established goals. Doing so helps avoid problems with one-size-fits-all solutions and builds in flexibility.
- Be wary of favoring one technology or set of technologies over another. This is particularly important because billions of dollars are being invested globally in research and development in clean technology and energy efficiency which may produce startling breakthroughs. Moreover, the widespread adoption of eco-friendly policies will likely reduce production costs through efficiencies of scale. Instead of trying to predict which solution(s) will emerge, set goals that enable firms to rapidly adopt new (or newly cost-effective) solutions.
- Explore additional means to incentivize the adoption of green initiatives. For example, consider opportunities for entities to aggregate carbon credits and sell them on a voluntary carbon market.

#### ► City governments and the county should adopt policies that encourage early implementation of cost-effective green measures

- Cities that have not already done so should swiftly adopt green building codes to harness the long-term cumulative impact of regulations, as was done with rules governing indoor water usage. Green building codes do not need to be developed from scratch; cities can borrow suitable templates from their neighbors or the county. To the extent possible, add carrots such as subsidies, faster review of applications for permits, and over-the-counter approvals.

#### ► Make sure that regulations are not working at cross purposes

- Make sure that one set of environmental regulations does not prevent creative solutions to other environmental goals. For example, facilities that capture methane gas and burn it to generate electricity can significantly reduce emissions of greenhouse gases, but they are often blocked by rules governing emissions of nitrogen oxides.

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