

APPENDIX 7

LOS ANGELES COUNTY: Green Economic Potential

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INTRODUCTION

“For Los Angeles, as Carey McWilliams wrote more than fifty years ago, is not merely a testing ground but also a ‘forcing ground, a place where ideas, practice, and customs must prove their worth or be discarded.’ It is a ‘land of magical improvisation,’ a place that ‘creates its own past.’ Los Angeles, in fact, has continually reinvented itself and tested out new ideas”¹

Los Angeles County is a region full of potential. Possessing both powerful assets and immense challenges, Los Angeles constantly struggles to construct a new identity through the reconciliation of its historical legacies, infamously negative reputations, ever-changing socio-economic milieu, and sincere desires for sustainability. As the momentum around the green economy continues to build, the region will be presented with opportunities to test out new ideas, forge new systems of thinking and doing, and embrace a new culture.

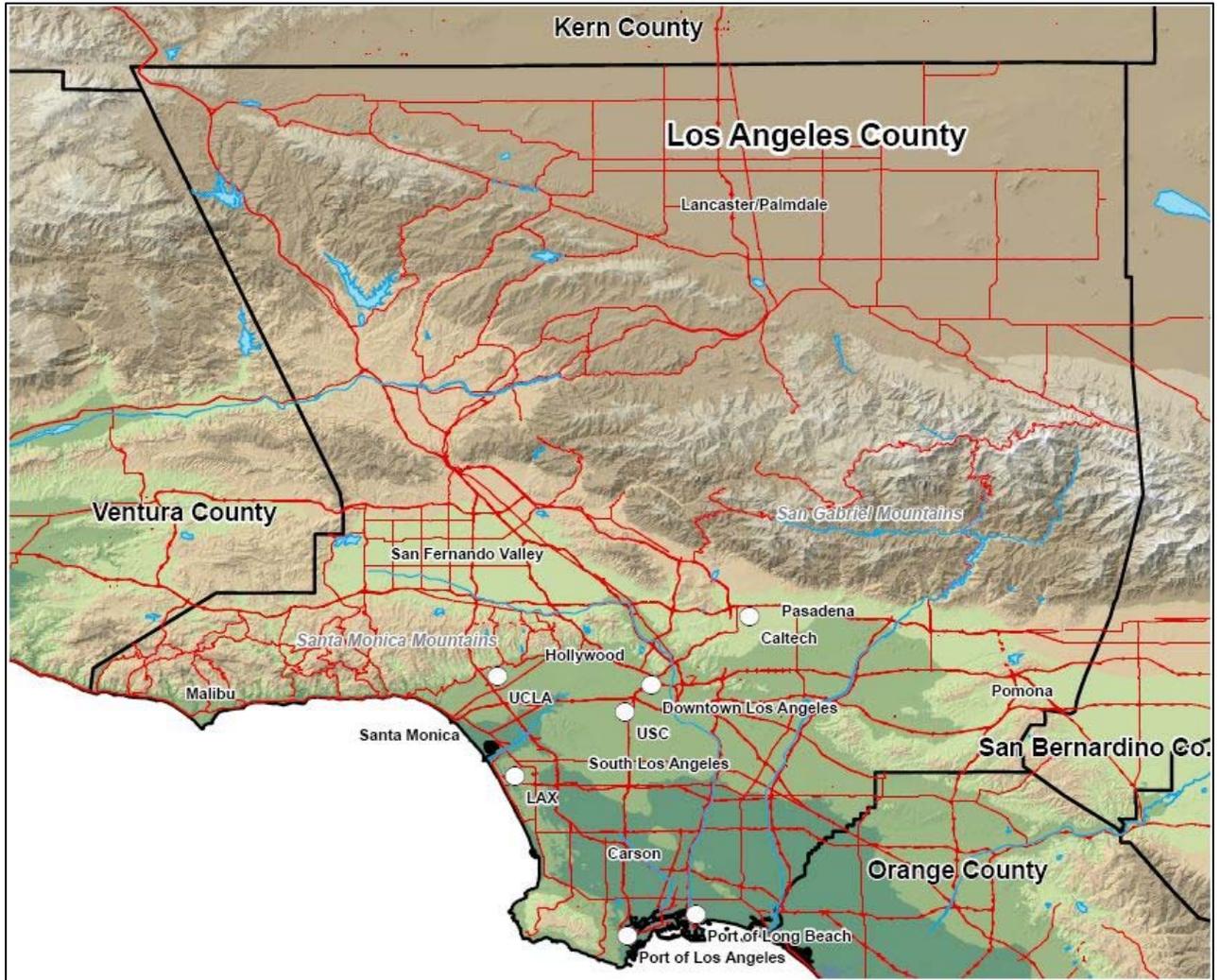
Though it has yet to reach its full innovative potential, the green economy in the region is alive and well: there are close to 3,000 green businesses in the county alone. With over 35,000 green jobs, it is the highest green-employment region within California. Both geographically and demographically, its diversity can support a wide range of economic and workforce development. Its historically strong ties to manufacturing, aerospace engineering, and international trade create multiple entry points into the specialized niches within the green economic structure. Moreover, the region’s specific climate endows it with advantages toward building its green economic competitiveness.

Most importantly, Los Angeles County has both the awareness and desire to incorporate “green” into current economic structures as well as to invent completely new ways of promoting simultaneous environmental and economic success. The political will exists in certain areas of the region, with supportive government policies pushing for the development of a green economy. Universities and other research institutes explore the seemingly limitless scientific possibilities through the production of innovative clean technologies. And despite its reputation as a sprawling, gas-guzzling, horizontally-built metropolis, the region is consciously striving for a greener, cleaner image. Its myriad challenges, however, position Los Angeles County as a region that is still a work-in-progress. Networks need to be strengthened, investment culture developed, and economic gain needs to be balanced with environmental and equitable standards.

This report hopes to highlight the historic and current patterns of growth, as well as the strengths and weaknesses, existing in the region, and their implications for the region’s green economic development and innovation potential. Through quantitative data and qualitative information, we seek to present a three-dimensional picture of L.A. County that includes its complexities, diversity, and dynamism. Though by no means a comprehensive discussion of what is the largest county in the United States, this report captures a snapshot of a region in the midst of reinventing itself yet again.

¹ Gottlieb, Vallianatos, Freer, & Drier, 2005:1.

Figure 1: Map of Los Angeles County



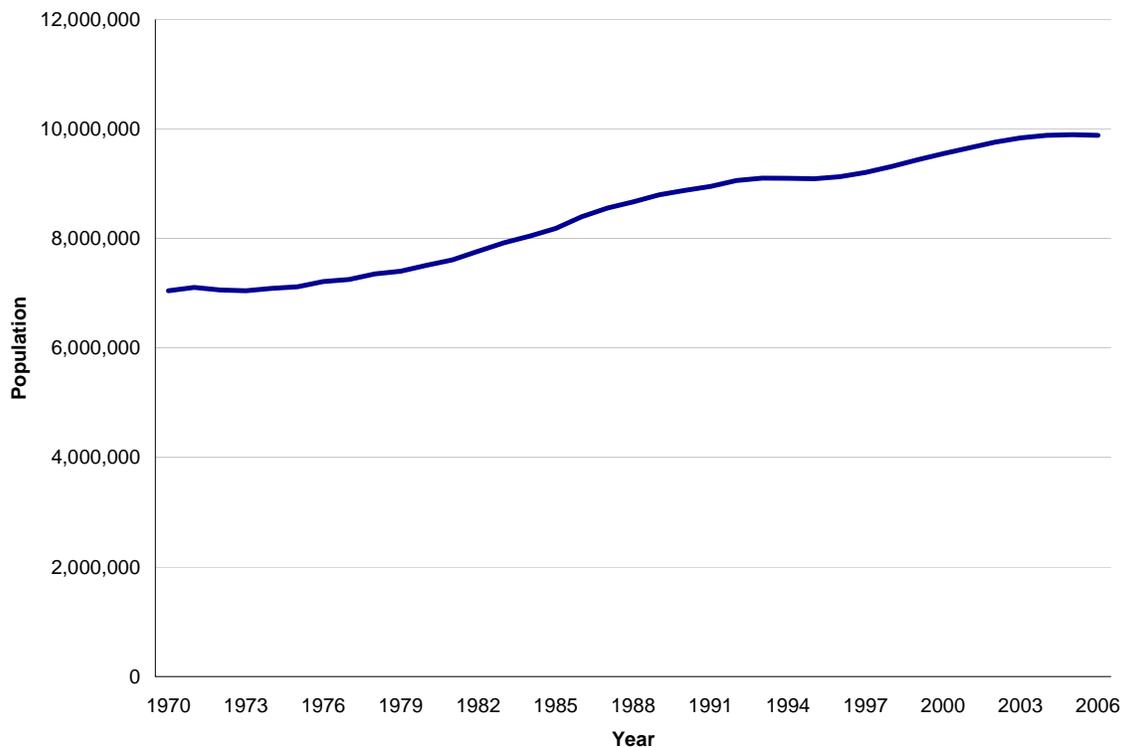
Source: ESRI ArcGIS Map

DEMOGRAPHICS

POPULATION

Los Angeles County is by far the most populous county in the United States. According to the U.S. Census Bureau, the county's population numbered just under ten million at 9,880,908 as of 2006, meaning that about 27 percent of the California's 36,249,872 people live in the county.

Figure 2: Los Angeles County Population Growth, 1970-2006



Source: Bureau of Economic Accounts, Table CA1-3 Population

RACE AND ETHNICITY

Los Angeles County's large population also provides it with a high amount of racial and ethnic diversity. According to the US Census' 2005-07 American Community Survey, 29 percent of the population in Los Angeles is White, 9 percent is African-American, 13 percent is Asian, and about 47 percent is Hispanic/Latino. Table 1 shows the raw population numbers along with the percentages. Of the total population, 49.5 percent is male and 50.5 percent is female with a total median age of 34.1 years. The same survey also states that of the 9,883,649 residents in the county, 3,537,054 -- or 35 percent of the total population -- were born in a foreign country (note that these are *official* numbers that may not

count the large illegal-immigrant population in the county). Of those who were foreign-born, about 42.7 percent were naturalized with the other 57.3 percent still legal residents.²

Table 1: Race/Ethnicity in Los Angeles County, 2005-2007 (*)

	Los Angeles County		California	
	Number	Percentage	Number	Percentage
White	2,875,173	29.1%	15,593,822	43.0%
Black	861,686	8.7%	2,205,637	6.1%
Asian	1,262,995	12.8%	4,369,567	12.0%
Other	224,917	2.3%	1,140,906	3.1%
Hispanic	4,658,878	47.1%	12,954,535	35.7%
Total	9,883,649	100.0%	36,264,467	100%

(*) Represents the average characteristics over the 3-year period of time (2005-2007)
Other: American Indian and Alaska Native, NHOPI, some other race, 2 or more races

Source: US Census Bureau 2005-2007 American Community Survey

EDUCATIONAL ATTAINMENT

Looking a little more closely into the data, one can see that the county population's educational attainment is weighted toward the low-skilled. As of 2000, 30 percent of the residents who were 25 years or older did not have a high school diploma. About 27 percent of the population had attained some college or an associate degree, 15.5 percent had a bachelor's degree, and only a 7.8 percent had a graduate or professional degree. In other words, a large proportion of the county's population remains fairly low-skilled, and only a small percentage are achieving higher educational attainment. This can become a serious factor as we continue to look at how the county can successfully integrate itself within the growing Green Economy. Table 2 shows current education levels along with those from 2000 and 1990.

Table 2: Los Angeles County Educational Attainment (Adults 25 Years and Over), 1990-2000

	1990	2000	%Change
Less than 9th grade	16.2%	15.6%	-3.7%
9th-12th grade, no diploma	13.8%	14.4%	4.3%
High school graduate (includes equivalency)	18.8%	20.7%	10.1%
Some college, no degree	20.0%	19.7%	-1.5%
Associate degree	6.2%	7.4%	19.4%
Bachelor's degree	16.1%	15.5%	-3.7%
Graduate or professional degree	8.8%	7.8%	-11.4%

Source: US Census Bureau 1990-2000

² US Census Bureau, 2005-2007 American Community Survey

ECONOMIC HISTORY

HISTORICALLY MAJOR INDUSTRIES

Throughout LA County's extensive history, a wide array of industries and sectors has supported its ever-growing economy. The following provides a brief survey of the County's major industries in the last 75 years.

DEFENSE AND AEROSPACE

The defense and aerospace industries have historically been a major catalyst for the growth and prosperity of the county's (and region's) economy. Started in the 1920s and 1930s when the aircraft industry first took root in Southern California, the defense industry experienced explosive growth during World War II. Key to this growth was the continued expansion of the aircraft industry, along with the development of missile and military electronics production that led to huge aerospace/electronics complex that was established in the area. The major catalysts for this growth, however, were the lavish Department of Defense (DoD) expenditures along with the "internally generated stock of agglomeration economies."³

Some of the first aircraft firms to settle in the area were the Douglas Aircraft Company and the Lockheed Aircraft Company, both founded locally in the 1920s; Northrop Aircraft was founded a couple of decades later -- in 1941-- at Hawthorne. Companies that relocated to LA County from other parts of the country included North American Aviation (later Rockwell North American), which transferred its operations to Inglewood from the northeastern United States, and Vultee Aircraft Inc, which moved to Downey in the 1930s. What these companies had in common when they transferred was that they all chose the same general area of the county: fringe and coastal areas with abundant cheap and undeveloped land that was near airstrips. Although the industry kept growing during the inter-war years, it did not become a major industrial powerhouse until World War II and afterward. For example, in 1940, about 34,800 workers were employed in aircraft assembly in Los Angeles County; by 1943, 190,700 were employed in the same industry, a 448% increase in three years.⁴ Although employment did fall from that World War II peak in the following years, employment in aircraft did not decrease below 40,000 in the county.

Aside from aircraft manufacturing, another major defense sector that grew during this same time was missile and defense electronics production. The biggest factor in the birth of this sector within Los Angeles County was the establishment of the Jet Propulsion Laboratory in 1929. The institution was integral in training personnel and potential workers while simultaneously developing rocket technology. The skilled labor that was trained at this facility led to the development of rocket firms like Arojet General in Azusa along with the Marquardt Company in Van Nuys.⁵ These growing firms, along with the quickly-expanding aircraft companies embraced the growing need of rocket development and were key in the growth of this defense sector in the region.

Related to rocket development was the defense-related electronics sector. Although historically weak, especially compared to the aforementioned sectors, the electronics industry began to develop during the WWII period with the establishment of Collins Radio, Gilfillan, and Hoffman Radio.⁶ The

³ Scott, 1994:55.

⁴ Scott, Allen J. 1994:61.

⁵ Scott, Allen J. 1994:61-62.

⁶ Scott, Allen J. 1994:63.

development of electric technologies like ground control approach and reconnaissance technology for aircrafts further sparked growth within this sector. The electronics sector remained one of the strongest industries in the region after its initial period of growth during the 1950s. From the middle of the 1960s to the late 1980s, the number of electronic production establishments continued to grow faster than employment. During the 1970s, the electronics industry outperformed all other manufacturing sectors. Today, the advanced electronics industry is among the County's most important high-technology activities. The main high-tech electronic sectors today are telecommunications, advanced computers and electromedical equipment sectors.⁷

Today, the Defense-Aerospace industry does not play the major role that it held at the peak of its dominance during the WWII and post-war period. According to the LAEDC, only 37,800 workers were employed in aerospace-related occupations in 2008, a 0.5 percent decrease from 2007.⁸ Causes for concern for the industry mostly revolve around its aging workforce as the LAEDC fears that there will be a lack of skilled replacements.

INTERNATIONAL TRADE

Los Angeles is one of the world's leading trade centers. It surpassed New York as the United States' leading customs district in 1994. In 2001, the Los Angeles Customs District (LACD) handled 270 billion in trade, both imports and exports. This was about 54 percent of total West Coast merchandise trade, about one seventh of total U.S. global trade, and roughly one twentieth of total world commerce.⁹ Much of the trade activity is in waterborne commerce. In 2001, the Los Angeles and Long Beach ports accounted for 28 percent of the United States' waterborne commerce, two and a half times more than in the New York area. On the other hand, LACD ports handled only 12 percent of the nation's airborne commerce compared with 24 percent for New York.¹⁰ Furthermore, port-of-entry data underestimates Los Angeles' NAFTA trade with Mexico and Canada because most goods from those countries are transported by truck or train and therefore recorded in border-area customs districts.¹¹ Los Angeles International Airport (LAX) is the world's third busiest passenger and fourth busiest air-cargo facility¹² Finally, LA's two transcontinental rail systems, which connect the San Pedro Bay ports to the rest of the North American market, handle almost 70 percent of total West Coast trade shipped by rail.¹³

MANUFACTURING

Los Angeles County is the nation's premier manufacturing center. Thanks in large part to the extensive defense spending by the federal government, manufacturing became a major engine of economic growth for the region. Although most of the manufacturing involved defense-related industries, today the focus has somewhat shifted towards the production of consumer goods. According to the LAEDC, there were 462,300 manufacturing jobs in 2006 for the county alone, far ahead of Chicago's 390,200.¹⁴ The number of manufacturing jobs in the county would rank it as the 11th largest manufacturing "state" in the nation, right after Wisconsin with its 505,000 jobs. The largest manufacturing sub-sector in the county is in computer and electronics manufacturing with about 60,000 jobs in 2006; it was followed by

⁷ Suarez-Villa & Walrod, 1997.

⁸ Los Angeles Economic Development Corporation, 2009.

⁹ Erie, 2004:10.

¹⁰ Erie, 2004:11.

¹¹ *ibid*

¹² Erie, 2004:14.

¹³ Erie, 2004:13.

¹⁴ Los Angeles Economic Development Corporation, 2007.

apparel with 59,200 jobs, transportation equipment with 51,200 jobs, fabricated metal production with 51,200 jobs, and food products with 42,700 jobs in 2006.¹⁵

Though the region remains robust, an alarming trend has been occurring as manufacturing jobs have been on a steady decline throughout the county (as in the rest of the country). The LAEDC's data show that Los Angeles County lost 43 percent of its manufacturing base between 1990 and 2006. The biggest losses have been in transportation equipment and computer and electronics production. Apparel and metal fabrication have also experienced some losses. The losses in computer and electronics production have been in direct correlation with the reduction of federal defense spending entering the region, as this manufacturing subsector is usually a direct input towards the defense-aerospace industry.

That is where the similarities end between consumer manufacturing and aerospace, as the former tends to be concentrated along what the LAEDC refers to as the "North Gateway," or the southeast area from Downtown Los Angeles. This area had about 105,047 manufacturing jobs in 2006, about 22 percent of the county's entire manufacturing sector.¹⁶ The county's *Southbay* area, along with the San Fernando and San Gabriel Valley's had the rest of the manufacturing firms. Even as spread out as the various manufacturing clusters are throughout the county, the major issue in manufacturing job losses to foreign countries is cost; within cost, aside from wages/benefits, land prices are a major threat to the sector's strength in Los Angeles County. Large blocks of developable land are increasingly scarce throughout the county, with much land being lost to either housing or retail development. This leaves potential manufacturing firms with very few options in locating within the county. This phenomenon has led to the rise in industrial land rates, where many have moved above \$0.50 per square-foot per month.¹⁷ Entering the county is hard enough for industrial firms, but remaining in the region has become that much more difficult. The aforementioned scarcity of industrial land has severely threatened many industrial firms' ability to stay in the county as they constantly face the threat of being priced out.

MEDIA AND ENTERTAINMENT

One branch of the economy that has become synonymous with Los Angeles has been the entertainment industry, particularly the motion picture (film) industry agglomeration in Hollywood. Though motion picture production, distribution, and exhibition are central components of Los Angeles County's entertainment industry, other crucial sectors include radio/television broadcasting and sound recording industries. Taken together, the industry boasted over 16,000 establishments in Los Angeles County in 2006 with an estimated 241,100 employees in 2005 and \$38.7 billion generated in annual revenues in 2001.^{18,19,20} In terms of employment, it is the third largest industry operating in the region, after international trade and tourism.²¹

Drawing \$9.63 billion in domestic box office and \$26.7 billion in worldwide box office in 2007, the motion-picture industry is an undeniably powerful economic presence, much of which is located in Los

¹⁵ *ibid*

¹⁶ *ibid*

¹⁷ *ibid*

¹⁸ Los Angeles County Economic Development Corporation, 2008.

¹⁹ Los Angeles County Economic Development Corporation, 2006.

²⁰ Los Angeles County Economic Development Corporation, 2004.

²¹ Los Angeles County Economic Development Corporation, 2006.

Angeles.²² According to the US Department of Commerce and Census Bureau, 74.5% of the industry's \$10 billion in receipts for motion-picture production alone, and 63.8% of the total industry employment (close to 32,000) in motion-picture production came from Los Angeles based companies.²³ The region has always been an extricable part of the industry's history. Films were being made in the Los Angeles region as early as 1903, where the unique nature of film production combined well with the climate and landscape of Southern California.²⁴ The clement weather, along with the "city's proximity to a great many difference kinds of landscapes" provided filming locations for virtually any needed setting, whether they are barren deserts for Westerns or "Mediterranean" influenced architecture.²⁵ Throughout the 1910s and 20s, the major studios were settling down in Hollywood, Burbank, Culver City, and other nearby regions, setting the stage for the intense industry boom during the 1930s and 40s, particularly in post-World War II years. The next thirty years involved a crisis period for the film industry that resulted in a massive restructuring from the vertically integrated studio system to the now-existing dense network of flexible, specialized smaller firms that compete with and complement one another.²⁶ Los Angeles County's motion-picture industry is now composed of the eight major studios, their subsidiaries, and the smaller independent firms, all of which handle film production, distribution, and exhibition within a shifting, project-oriented structure; these companies are supported by the flexibly specialized external complex.²⁷ With the advent of the blockbuster in the 1980s, the increase in DVD sales/rentals, and the support of federal government agencies for exporting films to international markets, Hollywood's film industry continues to experience physical expansion and corporate growth.²⁸ Furthermore, the agglomeration of dense networks and firms signifies the strong presence of skilled workers, specialized technologies, and trade unions, which make it further attractive for companies in the related sectors of television and radio.

Radio and television broadcasting, as well as sound recording, make up the rest of the entertainment industry in the Los Angeles region. Though not as large a presence as the film industry, the television, radio, and music recording sectors in 2002 were comprised of over 300 establishments, generated \$13 billion in receipts, and employed more than 22,000 workers.²⁹ Because of the glamour, influence, and talent/skill of the film industry, radio broadcasting stations began to coalesce in Los Angeles in the 1920s, with networks' west-coast headquarters moving to Hollywood from San Francisco in the 1930s, including CBS, NBC, and ABC.³⁰ With the development of television in the next decade, these ensconced studios shifted to television production and broadcasting relatively smoothly, aided by the motion-picture industry's highly developed infrastructure and skilled technicians.³¹ The television/radio industry's presence in Hollywood and Los Angeles County was further cemented by the creation of the Academy of Television Arts & Sciences and its partnership with UCLA's Department of Theater Arts.³²

Despite its role as one of the strongest components to the Los Angeles region's economy, the entertainment/media industry faces several challenges that could undermine its economic positioning.

²² Motion Picture Association of America, 2007.

²³ Scott, 2004.

²⁴ Nelson, 1983: 182.

²⁵ *ibid*, p.182.

²⁶ Storper & Christopherson, 1987.

²⁷ Scott, 2004.

²⁸ LA County Economic Development Corporation, 2005.

²⁹ *ibid*

³⁰ Nelson, 1983.

³¹ *ibid*

³² Academy of Television Arts & Sciences, 2008,

New developments on the Internet and file-sharing software could abet piracy and reduce theatre attendance, while recent “runaway” production activities in cheaper locations have the potential to drastically alter film production processes. Furthermore, outflow of labor and capital to locations such as Toronto and Vancouver may heighten competition from film industries outside of California.³³ How Los Angeles’ entertainment/media industry will respond to these challenges remains to be seen; however, there are opportunities for companies/firms to creatively restructure and innovate both their products and networks.

TRANSPORTATION AND LAND USE

Occupying most of the Los Angeles Basin, along with deserts, mountains, and beaches, Los Angeles County offers a diverse natural geography. The county is about 4,061 square-miles and contains various rivers, most prominently the Los Angeles and San Gabriel Rivers. Its two most significant mountain ranges are the towering San Gabriel Mountains to the north and the Santa Monica Mountains, which primarily separate the basin from the San Fernando Valley. This eclectic mixture of geographical assets has helped make Los Angeles County a major economic powerhouse. Its balmy, temperate climate attracts people from all over the world and has been a catalyst in drawing LA’s celebrated motion-picture industry to the region. The basin’s steady flatlands have made it easy for industry to locate in the area while inducing the development of sprawling real-estate. The relatively consistent land elevation has also made possible the construction of the region’s extensive freeway network, whose role in advancing the county’s economic prosperity has been integral. Today, most of the county is developed primarily with single-family housing structures along with designated industrial areas and various commercial strips across the county. Most of the area is built out, with Antelope Valley, a region north of the San Gabriel Mountains, the only open space left in the entire county. Historical land use policies in the county have resulted in sprawl-like growth patterns that include low-density commercial and industrial development, consuming much of the available land in the county.³⁴ Furthermore, flexible land use and zoning practices have resulted in a large number of industrial parcels being used for commercial and residential purposes, making it difficult for the county to accommodate new industries and the research needs of emerging businesses by limiting the adequacy and availability of industrial and office park land.³⁵

Los Angeles County’s transportation network is heavily burdened. The primacy of international trade to LA’s economy makes it vital that the county’s infrastructure be able to support volumes of commerce sufficient for the region to maintain its economic dominance. Los Angeles is one of the world’s leading trade centers. In 1994, it exceeded New York to become the United States’ leading customs district.³⁶ In 2008, the Los Angeles Customs District (LACD) handled about \$356 billion in trade, both imports and exports, or more than 10 percent of total U.S. global trade.³⁷ Data specifically focused on port-of-entry underestimates Los Angeles’ NAFTA trade with Mexico and Canada because most goods from those countries are transported by truck or train and therefore recorded in border-area customs districts. Waterborne commerce makes up much of the region’s extensive trade activity. In 2008, the Port of Los Angeles and Port of Long Beach were first and ninth respectively in the ranking of the top U.S. ports by value of two-way trade. Together, the two constitute the world’s fifth busiest container port and are a

³³ Scott, 2004.

³⁴ Los Angeles County Department of Regional Planning, “Draft General Plan: Planning Tomorrow’s Great Places,” 2008.

³⁵ *ibid*

³⁶ Erie, Steven, *Globalizing LA: Trade, Infrastructure, and Regional Development*, Stanford University Press, 2004.

³⁷ LAEDC, “International Trade Trends and Impacts: The Southern California Region,” May 2009.

primary economic engine in the County – as well as one of its biggest polluters. It is estimated that 40,000 trucks use the three major freeways out of the ports (I-710, I-605, SR 91) on an average weekday.³⁸ Efforts are already underway to green the transportation sector in Los Angeles. One example is the two ports' Clean Air Action Plan, a comprehensive strategy to cut air pollution and other port-related emissions.

The Los Angeles International Airport (LAX) is the world's third busiest passenger and fourth busiest air-cargo facility. Approximately 75 percent of the region's air cargo traffic goes through LAX, ranking second in the U.S. in value of freight shipments.³⁹ Other large airports in the area include Long Beach Municipal Airport and Bob Hope Airport in Burbank. There are fifteen public-use and joint-use airports located in the county. In 2006, air travel in the region was about 88 million annual passengers.⁴⁰ LAX is currently serving about 70 percent of all air passengers, well over the 40 million annual air travelers it was designed for. Due to air quality and noise concerns, however, airport expansion and planning efforts are facing significant challenges.⁴¹

Finally, LA's two transcontinental rail systems, which connect the San Pedro Bay ports to the rest of the North American market, handle almost 70 percent of total West Coast trade shipped by rail.⁴² The County has an extensive rail network, including freight and passenger lines. In an effort to ensure efficient goods movement and minimize at-grade crossings, the County has built the Alameda Corridor, a 20-mile cargo corridor with a 10-mile below-grade section between the two ports and the central Los Angeles freight transfer station.⁴³ An extension of the Alameda Corridor east through the San Gabriel Valley to the transcontinental rail network has been in construction since 1999.⁴⁴

Los Angeles County has an extensive highway network, with multiple interstate and state highways crisscrossing the region. Infrastructure capacity constraints resulting in traffic congestion is a main economic challenge faced by Los Angeles' international-trade complex. Close to 10 million people currently reside in the county, and that number is projected to rise to 12.2 million by 2030.⁴⁵ Los Angeles does have a mass transit network, including the subway, light rail, and bus services. The LA Metropolitan Transportation Authority (Metro) bus system operates more than 2,000 buses on 185 routes, and several other municipal operators provide bus services throughout the county. In addition, Metro has 17.4 miles of subway and 55.7 miles of light-rail, which connect various parts of the region. Two additional operators – Metrolink and Amtrak – also provide services in the county, with Amtrak connecting the region to the interstate passenger rail network. However, in 2006 only 7 percent of workers aged 16 and older in Los Angeles County commuted to work on public transportation while 72 percent commuted driving alone.⁴⁶ Single-occupant vehicle use is associated with the highest level land consumption among transportation modes and generates the highest environmental impacts.⁴⁷ Congestion reduces the region's competitiveness by making it costly to conduct business in the area. In

³⁸ Los Angeles County Department of Regional Planning, 2008.

³⁹ *ibid*

⁴⁰ *ibid*

⁴¹ *ibid*

⁴² Erie, 11-14.

⁴³ Los Angeles County Department of Regional Planning, 2008.

⁴⁴ *ibid*

⁴⁵ *ibid*

⁴⁶ U.S. Census Bureau, American Community Survey 2006, Table S0802

⁴⁷ Los Angeles County Department of Regional Planning, 2008.

2003, total costs incurred due to congestion were estimated at almost \$12 billion, significantly higher than any U.S. region.⁴⁸

Balancing LA's economic reality and trade ambitions with the severe health and environmental concerns such as air pollution and climate change is a challenge that the county faces into the future. Greening this major sector is of crucial importance to the Los Angeles region. What's more, there is significant potential to make transportation in Los Angeles more environmentally friendly, whether through improved public transportation options, public outreach, or greening of the vehicle fleet (e.g. alternative fuels, hybrid vehicles, electric vehicles, etc.).

LAND AND SPRAWL: LA COUNTY CHALLENGES

As mentioned earlier, LA's historical land-use policies have resulted in the spread-out nature of the whole county. This has led to the development of a large metropolitan area that encompasses several thousand square-miles. Although this provides businesses with a large consumer base, it still creates problems for face-to-face interaction among various entities. According to a representative of LA Mayor's Office of Energy and Environment, "[Los Angeles'] weakness is its size. It's inherent size. Size is both a weakness and a benefit. Because it's hard for people to focus in any one geographic way." It is tough for people to begin to grasp the concept of where LA begins and where it ends, this provides the region with a major roadblock in attracting any new business to the area. Something that was commonly addressed by the interviewees was that distance really makes LA County a tough place to conduct business. Because it is so spread out, it is tough to create a tight-knit and dynamic cluster where entrepreneurs speak with researchers, for example. LA business promotion organizations like Entretch are trying to address that very issue. Yet, LA County's spread out nature makes it difficult to conduct business.

Related to the county's land-use predicament is the, up until recently, sky rocketing real-estate prices. Another challenge that was identified by several of the people interviewed for this report was the county's high property prices, which made it difficult for not just existing businesses to survive, but also tough to *attract* any new companies, especially *green* businesses. The problem first starts with the fact that most of LA County is built-up. Mostly made up of residential land-uses, with commercial corridors and ever-decreasing industrial zones, up and coming *green* businesses find it tougher to find adequate space. As mentioned by one of the founders of a non-profit organization in LA that promotes high-tech start-ups:

"the real-estate dynamic is a crucial factor to either making it possible for energy companies to stay here or not...In reality, everything is built up, especially near the universities clusters (UCLA, Caltech, USC), there is just not much of that space available. As I mentioned earlier, it is just not office space, it's a combination, they quickly grow out of their beginning space, you need multiple configurations in which they can move into."

The most desirable land for start-ups is usually near universities. The problem, however, is that the land near schools is already built-out, making any available spaces either too expensive or forcing firms to undesirable areas far from where they want to be. Yet, this is not only something that proves bad for the firms seeking to locate into LA County, but it is also something that negatively affects investors. According to the Chair of a region-based angel group, "being located in LA County sucks!" Rents are too high; the costs are too high for companies. It really doesn't help." On the same subject, a partner from a venture capital firm located in LA County, revealed that:

⁴⁸ *Ibid*

“The negatives are that the cost of living in Southern California is extremely high, so it’s difficult to get people to relocate here. We try to hire people from Detroit, and it’s very difficult, because they’ve got a four-bedroom three bathroom house in Detroit, and that same house that’s \$250K in Detroit is \$2M here—I mean, you can’t move.”

High real-estate prices are not something that simply affects the single firm, but it also makes it harder for investors like angel groups or venture capitalists to go on their day-to-day business. If new, up and coming firms are not locating to the area, then the market for investors such as these is essentially gone. As the partner from Rustic Canyon also pointed out, high real-estate prices also affect the potential workers of any new firm that locates to a highly priced region. Even with having a firm successfully find adequate space, it still needs employees to work, and in LA County, the reality is that employees may have it difficult to find an affordable dwelling. All of these factors propose major difficulties for LA County’s entrepreneurial culture. If firms are not locating here and investors do not have a market for their services, then there is no reason for them to be here. Thus, they will pretty much go to areas that are more conducive in attracting firms and new start-ups. In addition, if faculty from universities or researchers-turned entrepreneurs cannot find both real-estate *and* funding, then they will not stay in the area. This is a very real problem that LA County faces. Land prices are extremely high and its investment culture is not the strongest. Although efforts have been made in the latter, more needs to be done with the former.

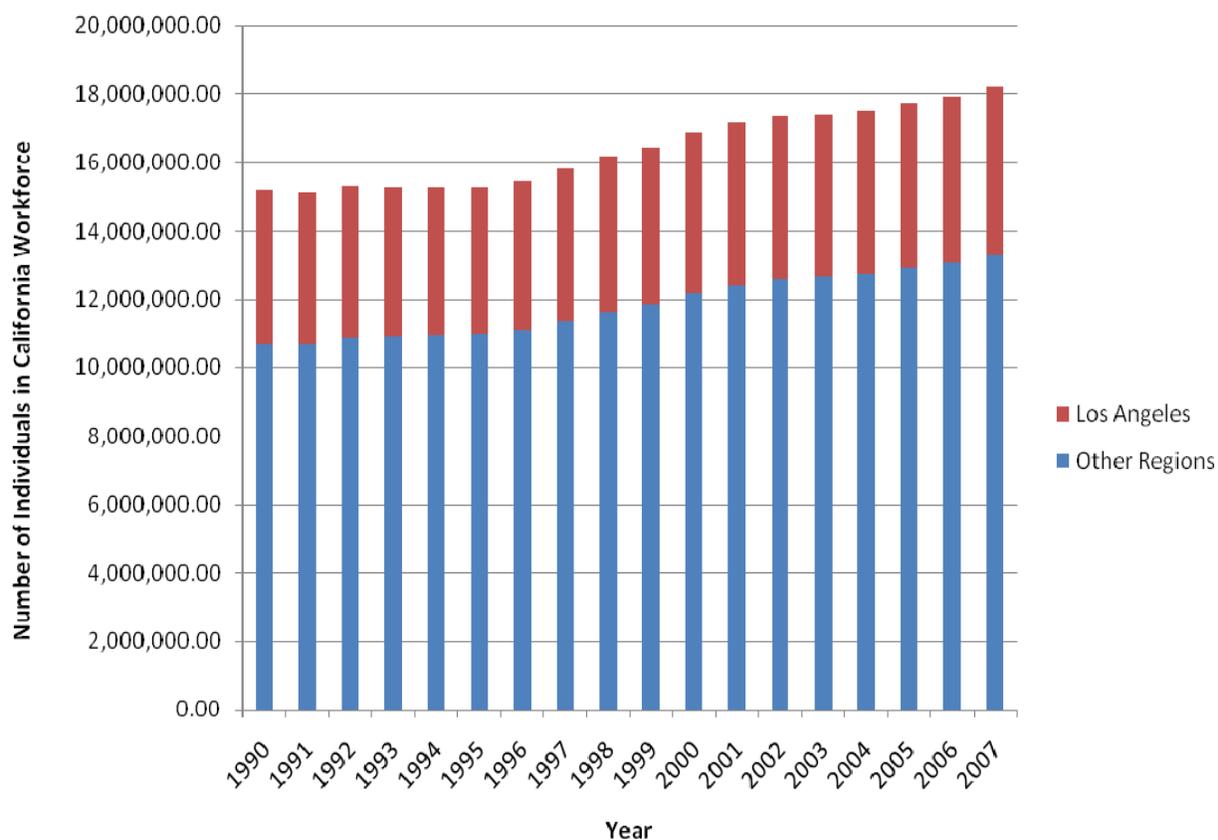
CURRENT ECONOMIC STRUCTURE

ECONOMIC INDICATORS

LABOR FORCE

According to the 2007 American Community Survey, about 7.5 million, or 76 percent, of the total 9.88 million Los Angeles County residents were 16 years or older, in other words, of legal working age. Of those, about 64.1 percent were in the labor force, with 59.7 percent actually employed. In 2007, CA had a labor force of about 18 million workers, with four million being from LA County alone. This means that for that year, LA County's workforce made up about 22% of the state's workforce. Figure 7 below shows the percentage of CA's workforce that LA County has made up from 1990-2007.

Figure 3: LA County and CA's Workforce

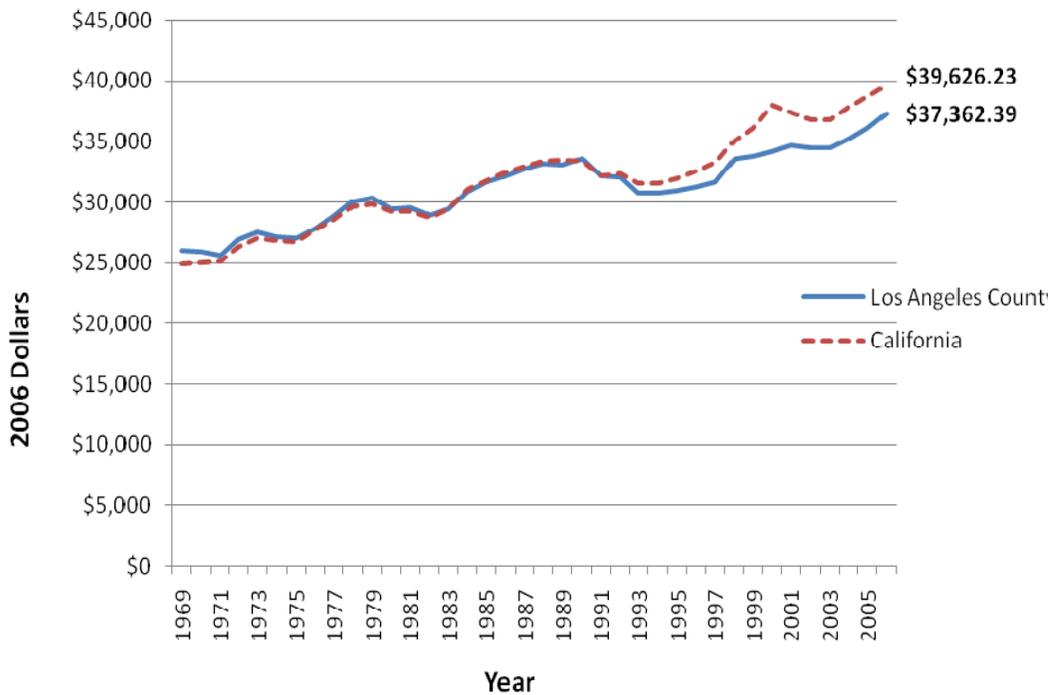


Source: Dun & Bradstreet/NETS Database

INCOME

As of 2006, L.A. County's per-capita income was at about \$37,362; this was well below CA's which was at \$39,626. As Figure 3 shows, both LA County's and CA's per-capita income had been on an upward trend. Of course, given the current economic climate, one needs to expect that these numbers are on a downward trend and possibly lower than those shown here.

Figure 4: Los Angeles County and CA Per-Capita Real Income, 1969-2006 (in 2006 \$)



Source: Bureau of Labor Statistics (Personal Real Income) and Bureau of Economic Accounts (CA1-3 Population)

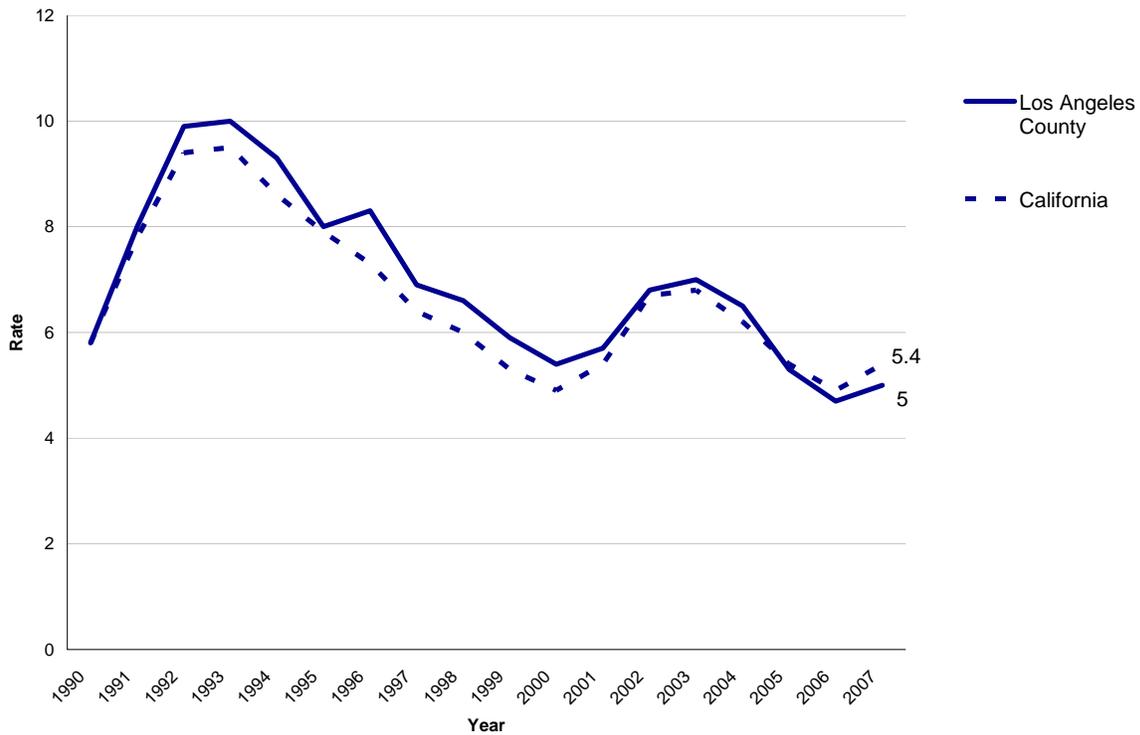
POVERTY AND UNEMPLOYMENT

According to the Bureau of Labor statistics, about five percent of the county's working-age population was actually unemployed.⁴⁹ As Figure 5 shows, LA County's unemployment rate has been lower than that of California in recent years, despite being traditionally higher.

From 1989 to 1999, county poverty increased from 15 to 17 percent. When looking at these rates, one must make note of the County's large population; since in 1999, it numbered over 9 million, this means that about 1.6 million people were below the poverty rate.

⁴⁹ US Census Bureau, 2005-2007 American Community Survey

Figure 5: Los Angeles County and California Unemployment Rate



Source: Bureau of Labor Statistics

OVERALL NATURE OF INDUSTRIES

As diverse as Los Angeles County's industries are, the nature of these specific sectors are just as varied and different. Los Angeles County has never been a region that wholly depended on several large, vertically integrated factories, an economic structure so commonly seen in older industrial cities like Detroit or Pittsburgh. The region has had a healthy mixture of large factory complexes and small/medium-sized establishments employing fewer than 500 workers.⁵⁰

Heavily dependent on defense-spending, the region experienced some difficulty in transitioning its economy to one that did not need as much federal capital. With the defense-related sector experiencing precipitous job losses, it has been the area's small, craft-producing businesses that have given the local economy a major lift. According to Scott and Rigby, at the time their research was conducted (1996), the five major craft/small-manufacturing industries in the region were: textiles, apparel, furniture and fixtures, printing and publishing, and jewelry. At the time, the industries employed about 27% of the region's whole manufacturing labor force and the total value output of the industries in 1992 was at \$15 billion.⁵¹ Their research found that these small craft industries had very common traits. First of all, many firms are labor-intensive and quite small, making them unable to reap the full benefits of internal scale economies. The firms also did not combine all production stages under one roof, most relied on subcontracting with other nearby firms for input materials and other goods; subsequently, this lead to clustering and agglomeration of similar firms that depended on similar

⁵⁰ Scott, 1994:42.

⁵¹ Scott & Rigby, 1996.

subcontractors.

Such an organizational structure allows the firms to take advantage of more specialized subcontractors, enhanced information flows and technology transfers, leading to the development of local manufacturing cultures that produce positive external scale economies, which in turn reduce costs and spark innovation. The proximity of similar businesses allows them to share a common labor pool and allows the labor markets to be highly flexible.⁵² Unfortunately for these businesses, not everything is all well and good. Scott and Rigby further state that many of these small craft industries are under intense price competition with firms from Latin America and Asia, forcing a downward pressure on wages and work environment. Furthermore, unable to compete with high-quality producers, many of these businesses have begun to focus on competing in the low-end market.

Furthermore, according to the LAEDC, of the 16,006 manufacturing establishments in 2005, about 37.2 percent had between 1-4 workers, with firms employing between 1-49 workers accounting for 88.1 percent of the total manufacturing establishments in the county. Only 85 of the 16,006 total manufacturing firms in 2005 had 500 workers or more.⁵³ From this data, we can see that most business in the county, both past and present, has been pretty much carried by vertically disintegrated, agglomerated firms and establishments.

SHIFT-SHARE ANALYSIS

Before addressing specific details of the green economy in Los Angeles County, it is important to establish a general understanding of the regional economy more broadly. In order to do so, this section resorts to two instruments widely used in regional economic analysis: location quotients and shift-share analysis.

- *Location Quotient* (LQ). This report calculated location quotients for all economic sectors in order to determine whether or not the regional economy (Los Angeles County) has a relatively greater ($LQ > 1$) or lesser ($LQ < 1$) concentration of that sector than California averages. Although LQ are useful for showing the sectors in which the region specializes, they do not explain the sources of change over time. They do not describe either how the performance of the regional economy differs from that of the state. Shift-share analysis indicators address some of these issues better.
- *Shift-share Analysis* is a technique used in regional economics to measure the performance of a region compared to a larger geographic entity (state or nation, for instance). This section compares the performance of the regional economy with that of California. The shift-share analysis featured in Table 5 below decomposes changes in employment levels in three categories in order to identify whether the sources of employment growth or decline in the region are specific to the state's overall employment growth trend (Economic Growth Factor), the sector performance (Proportional Shift), or the region's competitiveness (Differential Shift). Because sector effects and California growth rate are subtracted, the Differential Shift (DS) gives us a measure of the share of employment growth that is specific to the region's competitive advantage. The higher the DS, the more competitive is the region in that specific sector.

⁵² *ibid*

⁵³ Los Angeles Economic Development Corporation, 2007.

Location quotients (LQs) and Differential Shifts (DS) are therefore indicators of the specialization and competitiveness, respectively, of the region in specific economic sectors (2-digit NAICS industries) or sub-sectors (3-digit NAICS industries).

In 2008, the largest providers of employment in Los Angeles were Manufacturing (439,353 jobs), Retail Trade (423,238), Health Care and Social Assistance (391,925), and Accommodation and Food Services (324,062). Among the sectors that created more jobs in the region, three stand out: Health Care and Social Assistance (with 97,068 more jobs in 2008 than in 1990), Other Services, except Public Administration (+88,805), and Accommodation and Food Services (+64,021 jobs). The sectors that lost more jobs in that period of time include: Manufacturing (402,104 jobs less in 2008 than in 1990), Finance and Insurance (-60,320), and Retail Trade (-28,729).

Table 4 below provides a specific breakdown of the various industries in Los Angeles County at the 2-digit NAICS industry sectors. Industry growth and decline in employment levels will give us a broad picture of Los Angeles economy and will provide hints about economic sectors and industries that could offer competitive advantages in the emerging green economy.

The sectors that were relatively concentrated in Los Angeles County compared to California averages in 2008 ($LQ_{2008} > 1$) are: Information (1.59), Educational Services (1.27), Other Services, except Public Administration (1.24), Transportation and Warehousing (1.20), and Wholesale Trade (1.15), Manufacturing (1.11), and Real Estate (1.06), Arts, Entertainment, and recreation (1.03), and Health Care and Social Assistance (1.01). Among them, Information shows the best competitive performance in the region with a DS of 10.1%. Other relevant competitive sectors in the region ($DS > 1\%$) include: Other Services, except Public Administration (9.4%) and Arts, Entertainment and Recreation (3.7%). While Utilities and Mining, Quarrying, Oil and Gas Extraction also show a positive DS, their contribution to total employment is not very relevant.

In order to narrow the analysis, Location Quotients (LQs) were calculated at the 3-digit NAICS level. Not surprisingly, the three sub-sectors with the largest LQs were: (1) Motion-Picture and Sound-Recording, (2) Textile Mills, (3) Apparel Manufacturing. Textile Mills however is not very significant in employment terms as it only employed 9,081 people in 2008. In looking at industries with high levels of concentration in the region, we see that Motion-Picture and Sound Recording is growing throughout the state, but much faster in Los Angeles County, with a Differential Shift of 9.3 percent. Out of these three highly concentrated industries in Los Angeles County, only Motion-Picture and Sound-Recording Industries has experienced a positive job growth in recent years, with 17,190 more jobs in 2008 than in 2000. Table 5 illustrates the actual LQs and shift-share analysis for the top 10 Sub-Sectors by LQs (sub-sectors with 10,000 employees or more in 2008 only).

Table 4: Los Angeles County Economic Structure: Location Quotients and Shift-Share Analysis, 1990-2008

Industry Title (2-digit NAICS)	Los Angeles Employment			Los Angeles Location Quotient			California Employment			Shift-Share 1990-2000				Shift-Share 2000-2008			
	1990	2000	2008	1990	2000	2008	1990	2000	2008	Economic Growth Factor	Prop. Shift	Differential Shift/Competitive Component	Job Growth	Economic Growth Factor	Prop. Shift	Differential Shift/Competitive Component	Job Growth
11 Agriculture, forestry, fishing and hunting	13,288	7,346	6,663	0.14	0.08	0.08	280,936	319,020	306,727	11.6%	1.9%	-58.3%	-44.7%	5.7%	-9.6%	-5.4%	-9.3%
21 Mining, quarrying, and oil and gas extraction	8,148	3,434	4,276	0.64	0.55	0.60	37,455	22,025	25,678	11.6%	-52.8%	-16.7%	-57.9%	5.7%	10.9%	7.9%	24.5%
22 Utilities	17,292	12,772	13,691	0.76	0.79	0.84	66,502	56,791	58,584	11.6%	-26.2%	-11.5%	-26.1%	5.7%	-2.6%	4.0%	7.2%
23 Construction	171,466	128,338	148,953	0.73	0.66	0.67	692,291	682,072	799,846	11.6%	-13.1%	-23.7%	-25.2%	5.7%	11.6%	-1.2%	16.1%
31-33 Manufacturing	841,457	620,476	439,353	1.20	1.18	1.11	2,059,262	1,830,809	1,423,273	11.6%	-22.7%	-15.2%	-26.3%	5.7%	-28.0%	-6.9%	-29.2%
42 Wholesale trade	250,858	222,362	226,576	1.19	1.22	1.15	618,668	636,648	709,499	11.6%	-8.7%	-14.3%	-11.4%	5.7%	5.7%	-9.5%	1.9%
44-45 Retail trade	451,967	388,652	423,238	0.89	0.89	0.93	1,495,330	1,527,619	1,650,261	11.6%	-9.5%	-16.2%	-14.0%	5.7%	2.3%	0.9%	8.9%
48-49 Transportation and warehousing	129,811	158,302	142,817	1.15	1.26	1.20	330,565	438,163	429,401	11.6%	20.9%	-10.6%	21.9%	5.7%	-7.7%	-7.8%	-9.8%
51 Information	185,066	205,973	204,306	1.32	1.38	1.59	412,306	519,849	463,001	11.6%	14.5%	-14.8%	11.3%	5.7%	-16.7%	10.1%	-0.8%
52 Finance and insurance	220,803	146,583	160,483	1.05	0.96	0.99	617,510	532,039	584,404	11.6%	-25.5%	-19.8%	-33.6%	5.7%	4.1%	-0.4%	9.5%
53 Real estate and rental and leasing	86,524	74,376	80,493	0.98	1.00	1.06	259,926	259,876	274,938	11.6%	-11.6%	-14.0%	-14.0%	5.7%	0.1%	2.4%	8.2%
54 Professional and technical services	263,289	257,637	272,077	1.05	0.98	0.91	733,850	918,781	1,079,218	11.6%	13.6%	-27.3%	-2.1%	5.7%	11.7%	-11.9%	5.6%
55 Management of companies	14,284	96,001	57,538	0.90	1.02	1.00	46,728	329,758	207,230	11.6%	594.1%	-33.6%	572.1%	5.7%	-42.9%	-2.9%	-40.1%
56 Administrative and waste services	220,581	265,620	264,241	1.02	0.98	1.00	636,334	950,818	949,066	11.6%	37.8%	-29.0%	20.4%	5.7%	-5.9%	-0.3%	-0.5%
61 Educational services	72,556	77,605	96,273	1.26	1.34	1.27	169,118	202,073	273,063	11.6%	7.9%	-12.5%	7.0%	5.7%	29.4%	-11.1%	24.1%
62 Health care and social assistance	294,858	326,567	391,925	0.95	0.99	1.01	916,984	1,150,609	1,394,541	11.6%	13.8%	-14.7%	10.8%	5.7%	15.5%	-1.2%	20.0%
71 Arts, entertainment, and recreation	69,765	60,001	69,612	1.01	0.97	1.03	202,532	216,414	243,156	11.6%	-4.8%	-20.9%	-14.0%	5.7%	6.6%	3.7%	16.0%
72 Accommodation and food services	260,041	276,770	324,062	0.81	0.89	0.90	942,753	1,086,367	1,293,794	11.6%	3.6%	-8.8%	6.4%	5.7%	13.4%	-2.0%	17.1%
81 Other services, except public administration	159,767	177,751	248,572	1.04	1.12	1.24	451,706	554,226	723,092	11.6%	11.1%	-11.4%	11.3%	5.7%	24.8%	9.4%	39.8%
99 Unclassified			17,457	N/A	N/A	0.90			69,714	11.6%	N/A	N/A	N/A	5.7%	N/A	N/A	N/A
Total, all industries	3,734,576	3,507,057	3,592,605	1	1	1	10,980,978	12,257,882	12,958,485	11.6%	0.0%	-17.7%	-6.1%	5.7%	0.0%	-3.3%	2.4%

Source: US Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2008. Calculations by UC Berkeley Center for Community Innovation

Table 5: Economic Sub-sectors (3-digit NAICS) with Higher LQs in Los Angeles County⁵⁴, 1990- 2008

Industry Title	Los Angeles Total Employment			Los Angeles Location Quotient			Shift-Share 2000-2008			
	1990	2000	2008	1990	2000	2008	Econ. Growth Factor	Prop. Shift	DS	Job Growth
512 Motion picture & sound recording industries	88,511	106,975	124,165	2.30	2.73	3.07	5.7%	1.1%	9.3%	16.1%
315 Apparel manufacturing	87,087	94,084	54,950	2.15	2.64	2.79	5.7%	-48.7%	1.4%	-41.6%
488 Support activities for transportation	25,179	38,496	41,727	1.42	1.85	1.78	5.7%	10.6%	-7.9%	8.4%
711 Performing arts and spectator sports	39,764	26,778	27,852	1.29	1.75	1.69	5.7%	5.4%	-7.1%	4.0%
814 Private households	23,998	57,487	120,389	1.08	1.45	1.55	5.7%	96.8%	6.9%	109.4%
481 Air transportation	31,806	29,149	19,512	1.29	1.52	1.48	5.7%	-34.9%	-3.9%	-33.1%
515 Broadcasting, except Internet	16,038	18,859	19,472	1.38	1.58	1.47	5.7%	9.1%	-11.6%	3.3%
336 Transportation equipment manufacturing	152,491	75,687	50,499	1.58	1.68	1.46	5.7%	-26.4%	-12.6%	-33.3%
337 Furniture and related product manufacturing	39,541	33,941	19,137	1.48	1.54	1.43	5.7%	-43.0%	-6.3%	-43.6%
323 Printing and related support activities	37,625	29,992	21,481	1.22	1.27	1.38	5.7%	-37.7%	3.6%	-28.4%

Source: US Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2008. Calculations by UC Berkeley Center for Community Innovation

⁵⁴ Sub-Sectors with 10,000 employees or more in 2008 only

THE GREEN ECONOMY IN NUMBERS

GREEN EMPLOYMENT AND ESTABLISHMENTS

This section provides figures on green employment and establishments in Los Angeles County for 1990, 2000, and 2008. For each year, employment levels, number of establishments, average annual growth (AAGR), and location quotients (LQs) are presented for six different green sectors: energy research and services, environmental services, green building, green transportation, green manufacturing, and recycling/remediation.

Table 6: Green Economy Summary for Los Angeles County, 1990, 2000, 2008

	Green Employment						Green Establishments										
	1990		2000		2008		1990		2000		2008						
	LQ		LQ		LQ		LQ		LQ		LQ						
						Region AAGR 90-08	State AAGR 90-08					Avg. Est. Size, 2008	Region AAGR 90-08	State AAGR 90-08			
Energy Research and Services	500	0.1	545	0.1	998	0.2	3.9%	1.7%	64	0.8	88	0.7	134	0.7	7.4	4.4%	4.7%
Environmental Services	5,336	0.9	5,960	0.7	6,632	0.6	1.2%	3.9%	310	0.8	664	0.8	800	0.7	8.3	5.7%	5.9%
Green Building	2,395	0.8	1,490	0.6	2,028	0.5	-0.9%	2.3%	152	0.8	122	0.8	171	0.7	11.9	0.7%	1.4%
Green Manufacturing	8,146	1.3	9,187	1.4	7,449	1.3	-0.5%	0.0%	172	1.1	173	1.0	202	0.9	36.9	1.0%	2.0%
Green Transportation	12,339	1.2	14,201	1.3	11,336	1.1	-0.5%	0.8%	116	0.9	255	1.2	506	1.4	22.4	9.1%	5.8%
Recycling / Remediation	9,638	1.1	12,536	1.3	11,432	1.2	1.0%	1.1%	561	1.3	788	1.4	1007	1.4	11.4	3.5%	3.3%
Total Green	38,354		43,919		39,875		0.2%	1.6%	1,375		2,090		2,820		14.1	4.3%	4.2%

Source: NETS; UCB Center for Community Innovation.

In 2008, there were more than 2,800 green businesses in LA.⁵⁵ In that year, they employed almost 40,000 people in Los Angeles County.⁵⁶ This represents 24% of all green employment in California. Green employment in Los Angeles between 1990 to 2008 barely grew, particularly when compared than the state as a whole, with an average annual growth of 0.2% compared to the state average of 1.6%. Compared to the other California regions studied in this report (East Bay, Silicon Valley, Upper San Joaquin Valley, Inland Empire, and San Diego), LA County was the region that experienced the lowest job growth rates in green employment during that period. However, it should be noted that LA County is also the region with highest initial levels of total green employment. While green employment rapidly increased from 1990 to 2000, the region experienced a loss of green employment from 2000 to 2008. The green sectors that lost the most jobs in those 7 years were Green Transportation, Green Manufacturing, and Recycling/Remediation. Green Building, Environmental Services and Energy Research and Services gained jobs, with particularly strong gains in the former likely due to the real estate boom.

The rates are more favorable for the county when taking the number of green establishments as a unit of analysis, which shows an average annual growth of 4.3% from 1990 to 2008, which is comparable to

⁵⁵ Data compiled from multiple databases including the National Establishment Time Series (Dun & Bradstreet) database; the Build it Green directory; and the DB, SCOPE, and Economic Roundtable databases combined

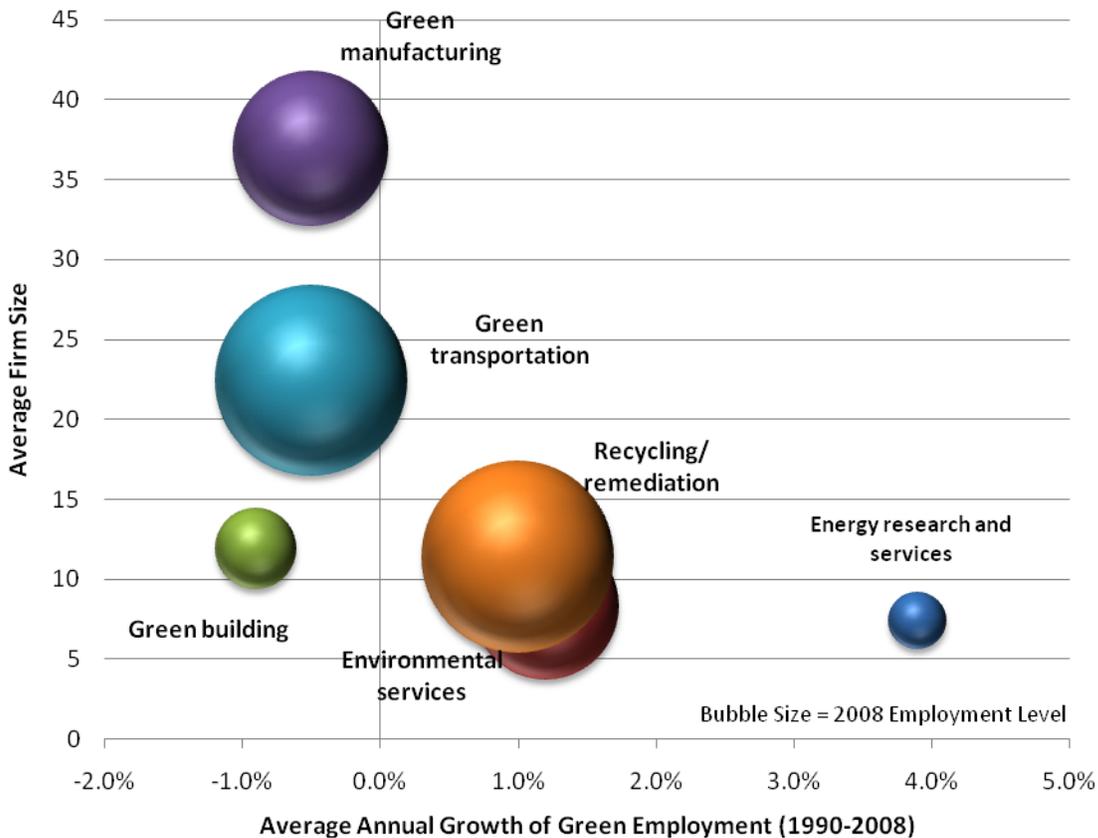
⁵⁶ National Establishment Time Series (Dun & Bradstreet) data

the state rate. Recycling/Remediation is the green sector that employed the most people in the county in 2008 with a total of 11,432 jobs, followed by Green Transportation (11,336 jobs) and Green Manufacturing (7,449 jobs). These three sectors had the highest employment location quotients, revealing LA's green economy specialization in green transportation, manufacturing, and recycling.

Energy Research and Services is the sector that grew at the highest rate in Los Angeles despite also being the green sector that employs the least people. However, the potential of the sector is remarkable: its average annual growth rate between 1990 and 2008 (3.9%) was almost 20 times that of the average green employment growth in LA (0.2%).

Figure 6 offers a glimpse into the relationship between firm size, total sector employment and the growth of each green sector from 1990 to 2008. This graph shows how Green Transportation, Green Manufacturing, and Recycling/Remediation dominate the green economy in Los Angeles. Energy Research and Services shows in this figure, again, its growth potential in the region despite the small number of people it employs.

Figure 6: Los Angeles County Green Economic Growth and Firm Size by Sector, 1990-2008



Source: NETS; UCB Center for Community Innovation.

The green sectors with the most workers per firm in the region are Green Manufacturing and Green Transportation while those with fewer workers are Energy Research and Services and Environmental Services.

GREEN INNOVATION AND INVESTMENT INDICATORS

In terms of the number of innovation, our study concluded that LA County ranks the highest in California. A total of 280 clean-tech patents between 2000 and 2008, and the largest number in the state of SBIR Grants and green startups makes LA number one in the composite innovation ranking elaborated for this report.

Despite a venture capital (VC) investment of over 400 million between 2000 and 2008, other regions in California such as Silicon Valley and the East Bay were able to raise more venture capital than LA for clean tech investments. In comparing both VC investments and the amount of patents that happen in LA County, there is a serious disconnect. Although LA County produces a large amount of new technology, as evidenced by the number of patents, it still receives a small amount of VC funding. This means that funding may not be as readily available for start-up companies within the county triggering many to leave for other areas where funding is easier to come by. Table 7 below illustrates LA County’s innovation metrics and rankings:

Table 7: LA County Green Innovation and Investment Indicators, 2000-2008

Patent Activity, 2000-08 ¹			Venture Capital Investments 2000-08 (\$millions) ²			SBIR/STTR Grants, 2000-08 ³			Green Startups, 2000-07 ⁴			Green Gazelles 2008 ⁴		
Clean-tech	% of State Overall	% of State Clean-tech	Clean-tech (\$)	% of State Overall	% of State Clean-tech	Clean-tech Grants	% of State Overall	% of State Clean-tech	Green Start-ups	% of State Overall	% of State Green	Green Gazelles	% of State Overall	% of State Green
280	11.6	26.6	403.5	9.1	15	15.5	28.4	33.2	1876	31.1	25.9	774	26.5	21.2

Sources: 1) USPTO, 2) VentureExpert; 3) US Small Business Administration, 4) NETS. CCI Calculations

THE GREEN ECONOMY ON THE GROUND: INSTITUTIONS, NETWORKS, AND INITIATIVES

It is no surprise that the LA region is one of the world's preeminent economic powers. The area boasts a world-class port complex, extensive highway and rail systems (both passenger and freight) all the while having the country's largest county. These combined factors have pushed LA County into becoming a major economic powerhouse. Yet, it also contains other assets that have the potential to push for its smooth transition into a greener economy. Integral to any region's economic competitiveness is its ability to innovate. Aspects of Los Angeles County's innovation infrastructure, networks, and political climate are supporting the development of new technologies. They serve as regional assets that could improve LA County's competitive edge for both creating and retaining innovative technologies and further the greening of its economic growth.

KEY REGIONAL PLAYERS

Los Angeles County's large size acts not only as a challenge for the region but a potential asset as well. By its sheer size, the region is home to a variety of business associations, investment entities, government agencies, academic/research institutions, and non-profit organizations that support local businesses. Within each category of social organizations are key players that are already working toward developing strategies for building a healthy economic climate in the region, particularly in attracting, growing, and retaining businesses. Several of those key players are:

- **Business Associations:** Among the most influential business associations within Los Angeles County are the LA Chamber of Commerce and the LA County Economic Development Corporation (LAEDC). The Chamber, with its 1,600+ business members, engages in numerous programs aimed at advocating the interests of the city's private sector; it publishes newsletters, hosts seminar series, runs eight subcommittees, and provides small business services.⁵⁷ Meanwhile, the LA County Economic Development Corporation provides business leadership skills training through the Southern California Leadership Council and research studies through the Center of Economic Development.
- **Investment Entities:** LA County is home to three high-tech angel networks: the Pasadena Angels, 12 Angels, and the Tech Coast Angels. Each of these angel networks has members affiliated with the same universities, research institutions, and local businesses, while some individuals serve both the Pasadena and Tech Coast Angels. Many of their Board and Chair members are also drawn from the same pool of local institutions and companies.⁵⁸
- **Government/Public Agencies:** The City of Los Angeles without a doubt exerts a strong presence within the region. Although its role in the region's green economic and innovation development will be discussed further in the following section, it is worth identifying as a key player in the incipient formation of a green LA County network. The Los Angeles Mayor's Office, San Pedro Bay Ports, and the Community Redevelopment Agency (CRA) are several of the public agencies actively working towards creating new nodes of communication within the region.

⁵⁷ Los Angeles Chamber of Commerce website, <http://www.lachamber.com/index.php?src=>.

⁵⁸ Pasadena Angels, <http://www.pasadenaangels.com/index.php>, and Tech Coast Angels, <http://www.techcoastangels.com/Public/content.aspx?ID=EA6BF3BF-964F-11D4-AD7900A0C95C1653>.

- **Organizations Supporting Business Growth:** Among the diverse group of organizational entities that support business growth, it is remarkable the work of the Business Technology Center of LA County (BTC), a project within Los Angeles County's Community Development Commission. An award-winning business incubator, the BTC provides early stage businesses with office space and supportive resources.⁵⁹ Another organization working to increase region-wide communication is Entrettech, a non-profit corporation dedicated to assisting high-tech businesses with strategic resources and connections. Affiliated with Entrettech is the Caltech/MIT Enterprise Forum, which consists of monthly meetings geared toward "[providing] advice, support, education and networking opportunities to technology-based ventures in the Southern California area."⁶⁰
- **Research and Educational Institutions:** Los Angeles County has a high concentration of universities and affiliated research institutions that provide R&D spaces and highly skilled human capital. The three largest universities, UCLA, USC, and Caltech (and JPL) have informal relationships with other key players, while the extensive California State University and community college systems also run programs aimed at increasing green innovation and training future entrepreneurs. The following section undertakes a more detailed analysis of relevant research and educational institutions in LA County.

RESEARCH AND EDUCATIONAL INSTITUTIONS

Proximity to research institutions is an important factor driving regional innovation. It is particularly important to the green sector. The green industry is relatively new and few companies have enough capital to conduct the research and development necessary to bring new products to market. However, locating near large research institutions such as universities or government laboratories will likely provide companies with easier access to research output. It has been noted that small – and frequently new – firms are capable of generating innovative output while undertaking very small amounts of investment in innovation by exploiting knowledge created by expenditures on research in universities and on R&D in large corporation.⁶¹ Firms in LA County have a big advantage because Los Angeles has the second highest concentration of premier research universities.⁶²

The University of California, Los Angeles (UCLA), the University of Southern California (USC), and the California Institute of Technology (Caltech) are the three largest research institutions in the region. They are perceived unequivocally as assets that can greatly benefit the County's green businesses through four main avenues: 1) promotion of innovative developments, 2) concentrating scientific talent and human capital, and 3) creating opportunities for technology commercialization while bringing together future engineers/scientists with future entrepreneurs. While cleantech and other environmental innovation development is taking place at the universities' various physical science and engineering departments (as well as their ancillary research institutes), specialized university offices facilitate the transfer of innovation generated by academic research to the private sector. The existence of offices

⁵⁹ Business Technology Center, BTC Incubation Acceleration Program (IAP) Description, <http://www.lacdc.org/CDCWebsite/uploadedFiles/ER/BTC/btc%20incubation%20program%20101607.doc>. Business Technology Center, 2002.

<http://www.lacdc.org/CDCWebsite/uploadedFiles/ER/BTC/LOS%20ANGELES.doc>.

⁶⁰ Caltech/MIT Enterprise Forum, Mission Statement, <http://www.entforum.caltech.edu/about.html>, Accessed March 1, 2009.

⁶¹ Audretsch, 1998.

⁶² Rothaermel & Ku, 2008.

with complementary functions (creation → commercialization → dissemination) ensures that new developments are not left in an economic vacuum but tailored to business opportunities.

PROMOTION OF INNOVATIVE DEVELOPMENTS

Each of the three universities boasts extensive and prestigious engineering and physical/life sciences departments. Professors and graduate students conduct research on cutting edge scientific developments such as nanotechnology, genomics/proteomics, and material engineering. As the Chairman of a technology-promotion non-profit in LA saw it, “a lot of the technology development is now occurring at the university/research institute level.” Some of the noteworthy research developments at the universities include:

- USC’s Viterbi School of Engineering focuses on a range of technological research, while its Energy Institute and Stevens Institute for Innovation specifically emphasizes producing technological improvements for energy and sustainability. The Energy Institute’s mission statement encompasses the generation of “both short and long-range fuel and energy solutions” through the production of “alternatives are more environmentally friendly, more amenable to distributed generation of electricity, and overall more consistent with long-term sustainability goals.”⁶³
- UCLA’s Henry Samueli’s School of Engineering and Applied Science is home to a diverse group of research centers, most notably working in the field of nanotechnology. Recent innovations by faculty have included production of a new plastic polymer to increase sunlight absorption for solar cells and the genetic modification of *E.coli* bacteria that could produce higher density biofuel production.⁶⁴ Additionally, UCLA (along with UC-Santa Barbara) hosts the California Nanosystems Institute (CNSI) which conducts research in what could be termed green technologies. According to a representative of the CNSI, the institute has “two concentrations in [green] areas: the Environmental Wing has research on nanotoxicology [and] the Energy Group [on] water and power issues.”
- Caltech not only claims a close relationship with the renowned Jet Propulsion Laboratory (JPL), but also hosts several on-campus research centers focused particularly on development and promotion of energy-related technologies. The Power, Environmental and Energy Research Center and Center for Sustainable Energy Research all work towards producing green and clean technologies.^{65,66}

CONCENTRATION OF SCIENTIFIC TALENT AND HUMAN CAPITAL

The science and engineering departments and research centers at the three universities produce not only innovative technologies but a talented pool of highly trained engineers, scientists, and other researchers. This human capital is seen as a key asset to the growth of green businesses in the region

⁶³ University of Southern California, Energy Institute Research Initiatives. http://www.usc.edu/research/initiatives/future_fuels/. Accessed March 2, 2009.

⁶⁴ Asumi, Hanai, & Liao, 2008.

⁶⁵ California Institute of Technology; Power, Environmental & Energy Research Center (PEER Center), <http://www.peer.caltech.edu/>. Accessed March 2, 2009.

⁶⁶ California Institute of Technology, Center for Sustainable Energy Research, <http://www.ccsr.caltech.edu/>. Accessed March 2, 2009.

together with universities and research institutes. According to a representative of the office of technology transfer of a LA university, universities are crucial for innovation because they “want that talent, the development of research that could be incubated and then commercialized in LA.” One of the founders of a high-technology promotion non-profit viewed the students/researchers from the universities as “scientific horsepower” that would drive technological innovation, while the executive director of a technology business incubator wondered how the region could effectively “utilize the brain technology of all these people.”

Furthermore, access to the strong presence of scientific talent produced by the universities was one of the primary reasons one Los Angeles photovoltaic manufacturer decided to locate to the area. As the company’s vice president stated: “As you know, we’re literally down the street from USC with its tremendous business school and student asset, not far from UCLA, which has a photovoltaic program, and a number of other universities in the area that we can draw from when we needed the added technology focus.” While the universities may be fertile grounds for producing human capital, the retention of this valuable asset is dependent upon other factors, which will be discussed further below.

TECHNOLOGY TRANSFER AND COMMERCIALIZATION

In addition to the departments and centers that conduct the research, UCLA, USC, and Caltech all have offices that help in the transitive process from development/creation to dissemination/commercialization. USC’s School of Business is home to the Center for Technology Commercialization. A notable program it recently began involves several competitions for entrepreneurial teams that select the best venture plan or business technology commercialization plan. Throughout the competition, teams are mentored by angel network representatives and could potentially apply for an actual commercial license for a technology.⁶⁷

Another example of this science/business blend is Caltech’s Office of Technology Transfer (OTT), which has ensured that in the last ten years Caltech researchers have received about forty to fifty patent licenses per year; furthermore the OTT fosters start-up companies at a rate of about eight per year.⁶⁸ The office acts as both a facilitator for the patent license process and a supportive forum where technologies can be reviewed and assessed on their commercial potential. In addition, the OTT has a specific startup friendly licensing agreement that allows a university faculty or student to start a company without paying large amounts of initial capital. In a recent ten-year study on Caltech’s startup success rate, the OTT found that out of eighty startups, approximately 75% of them were still in existence—a success rate that they are proud to consider better than a VC firm.⁶⁹

Similarly, UCLA’s Office of Intellectual Property & Industry Sponsored Research’s (OIP-ISP) mission is to make possible academia’s collaboration with industry for scientific breakthroughs. Furthermore, the Entrepreneurship and Business Development Committee at UCLA works to familiarize scientists and engineers with the business aspect of research, and to bring academic inventors and business people closer through educational seminars and social events.⁷⁰ Because the University of California system has a policy of granting licensees access to a University invention in exchange for the licensee’s commitment to further develop/commercialize the invention and to pay agreed-upon fees, UCLA’s opportunities for

⁶⁷ University of Southern California, Center for Technology Commercialization, <http://www.marshall.usc.edu/ctc/>. Accessed March 3, 2009.

⁶⁸ Caltech Office of Technology Transfer, <http://www.ott.caltech.edu/>. Accessed February 23, 2009.

⁶⁹ *ibid*

⁷⁰ University of California, Los Angeles, <http://www.aim.ucla.edu/profile/main.asp>. Accessed February 23, 2009.

commercializing technologies is growing. In the fiscal year ending on June 30, 2008, UCLA entered into 204 utility-license agreements.⁷¹ Those agreements are in a variety of technological areas, from digital media to pharmaceutical applications. Cleantech inventions are among those agreements. For example, Solarmer, a company based in El Monte, was founded in 2006 specifically to commercialize the plastic solar cell technology developed by the California NanoSystems Institute. Meanwhile, the genetically-modified E.coli based high-density biofuel production technology was licensed by Gevo, Inc., a company located in nearby Pasadena. Most recently, the CNSI, in partnership with the OIP-ISP (as well as collaboration with the Anderson School of Management and the School of Law), announced the creation of an on-campus incubator that would “[create] an improved culture of entrepreneurship.”⁷²

THE REGIONAL ECONOMY: LIFESTYLE, INFRASTRUCTURE, AND GEOGRAPHIC CHARACTERISTICS

LIFESTYLE

Los Angeles County is known for movie-stars, the American Dream, endless beaches, warm temperatures and eternal sunshine. It is tough for any region to compete with the laid-back and charming lifestyle that LA creates. Easily overlooked, this is something that was identified by many interviewees as a key driver of the region’s continued economic competitiveness. To quote a representative of a LA local development agency, “lifestyle...for some people makes a big difference. Even though for some there are perceived disadvantages to being in LA... if the executives want to live here, that makes a huge difference.”

Although it is important to get that insight from those working in the public sector or in schools, it is even more important to find out if actual firms really do feel this way about the region’s lifestyle being a major asset and a reason as to why they are located in LA County. Lifestyle is therefore a great intangible regional asset and a major driver for having firms locate to LA County.

INFRASTRUCTURE

In addition to its climate and lifestyle, the county also possesses various man-made assets that cannot be matched by any other region in the country. A representative of a LA local development agency puts it this way: “I don’t know all the possibilities...we talked about talent, workforce, lifestyle, research centers, we just did transportation, we have the largest port in the US, the LAX is huge, the Alameda corridor, if someone’s down at the port they can get their stuff right out to the middle of the country. So those are some of the main assets.” In addition, a representative of the LA Chamber of Commerce also pointed out that:

“You know, it’s hard to do business in Southern California, yes, LA is an expensive place to set up shop; but we have the two largest ports in the United States, we have the largest municipal-owned utility in the United States, we have one of the largest transportation authorities in Metro, we have a massive consumer base, we have a progressive consumer base as well.”

Furthermore, a representative of the LA Mayor’s Office of Energy and Environment further revealed that:

“The assets are: we own our own utility—the largest municipal utility in the country—, we own the largest port in the country, and then we own four airports and the convention center. No other city can say they own these kinds of assets that have such a [wide impact]...it touches every business. No business can get

⁷¹ University of California, 2008.

⁷² Singh, A., 2009.

away without having electricity, no business get away with not using airports for business, and the products that come in through the Port. Those assets we have 100% control over; they're not like PG&E, they're not like the ports in different [areas], so we can develop policies that can help with both the attraction, retention, and growth, of that."

The region is literally blessed with a number of man-made assets spread throughout the county. The proximity to the Port and Airport complexes allows local businesses to get products in and out of the region fairly quickly. The Alameda Corridor further expedites that process as firms can also get their products from the Ports onto the county's interior with little to no delay. In addition, the interconnected highway network provides major accessibility to any area in the county; no matter where a firm may be located, they are usually not more than 15 minutes away from a major freeway. All of these factors make conducting business in LA County very attractive and propose to continue to play a major role in attracting green firms.

Yet, it is not only the reality that the county has two major ports, countless airports, an extensive rail network and transportation network but also very key is the fact that the local governance has legitimate power over such entities. As the Deputy Mayor mentioned, having control over the Port or the Airport allows the City to impose tougher restrictions with very little trouble. This means that the region's major complexes can become greener at a faster rate with fewer roadblocks. Not every city in the country has that type of influence over such major infrastructural entities as does Los Angeles. All of these factors promise pave the way for LA County's smooth transition into the green economy.

REGIONAL GEOGRAPHIC AND SOCIAL CHALLENGES

Despite its many natural wonders and economic advantages, LA County still faces major challenges. A steady and reliable water supply, the region's lifeblood throughout the last few decades, is in serious jeopardy of being reduced. In addition, the area's choking congestion and sprawled nature, along with its high-priced real-estate have the potential of severely putting LA County at a major competitive disadvantage to newer, developing areas. Furthermore, Los Angeles County is in a seismically active area and must be able to withstand a major earthquake. Such an event can severely threaten the region's economic health by taking lives and destroying infrastructure and buildings. In order to reduce extensive damages from such a catastrophe, the region must prepare for earthquakes by retrofitting buildings and infrastructure while developing emergency strategies for its large workforce.

In addition to the problems discussed above, Los Angeles faces ample social problems such as crime, inadequate health-care provision, income inequality, gang violence, racial tension, poorly-performing schools, etc. These problems not only impair the locals' lives but also threaten the economic well-being of the county. Providing adequate health-care and other social services to improve workers' livelihood will greatly benefit businesses by providing them with a happy, productive and healthy workforce, in addition to reducing costs for employers. Reducing crime is integral in creating a business-friendly environment while improving schools and reducing ethnic tensions can make the county an attractive destination for green as well as non-green companies.

NETWORKS THAT POTENTIALLY SUPPORT GREEN INNOVATION

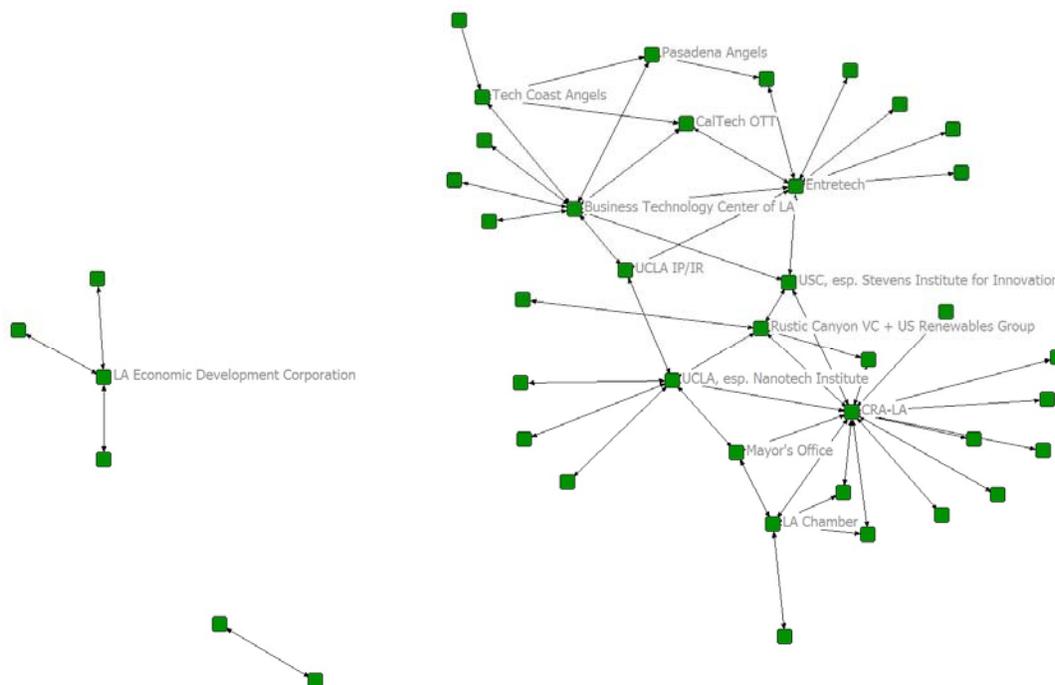
While no highly developed region-wide network solely focused on the green economy or green innovation currently exists, the region still hosts a considerable number of business associations, universities, non-profit organizations, investment firms, and other social entities that are beginning to recognize the need for increased communication. Communication is critical for the growth of a region's innovation, as "innovation has come to be based increasingly on the interactions and knowledge flows

between economic entities such as firms, [sic] research organizations [sic], and public agencies.”⁷³ The following sections seek to highlight several of the key efforts toward green/innovation network formation in the Los Angeles County region, efforts that have the potential to become assets for further innovation and green economic growth.

SOCIAL NETWORK MAP

Through qualitative research methods, the relationships between some of these key players were mapped out onto a regional social network map (Figure 7). Although the complete list of contacts could not be included in the map due to its sheer number of individuals, the network map allows us to see that the communication nodes reflect the polycentric clustering of the region’s overall economic structure. Due to its size and sprawl, Los Angeles County’s network consists of smaller clusters that form in various sub-regions.

Figure 7: Social Network Map of the Green Economy in LA County



Source: UC Berkeley Center for Community Innovation based on responses of interviewees in this project

PARTNERSHIPS, PROJECT COLLABORATIONS, AND INFORMAL RELATIONSHIPS

With so many diverse associations and organizations present in the region, it is unsurprising that several loose partnerships and informal collaborations already exist within LA County. Although by no means an extensive region-wide network, these smaller relationships between non-profits, universities, and agencies are indicative of the potential for larger network hubs to grow and connect in the future.

- **First Look LA:** Currently in its third year, this conference is a collaborative effort by UCLA, USC, and Caltech to showcase the most promising innovative technologies developed at the institutions to the venture capitalist community. Although it is an invitation-only event, the First

⁷³ Asheim & Gertler, 2005:293.

Look LA conference facilitates the commercialization process of LA-based innovations and furthermore brings together the three largest universities in the region. Regarding the collaborative nature of the conference, a representative of the office of technology transfer of a LA university asserted that, “[with] strength in numbers...everyone benefits. None of our individual institutions are big enough to carry the [cleantech] flag so it benefits everybody to have a vibrant entrepreneurial community in the LA region...It’s important to work together to make sure that happens.”

- **Technology Testing Relationships:** The high concentration of universities provides both public agencies and private companies alike with opportunities to become research partners. For instance, the Port of Los Angeles partners with UC Riverside College of Engineering’s Center for Environmental Research and Technology (CE-CERT) to conduct mobile source emissions tests. Though UC Riverside is not within the County, its relationship with the Port exemplifies a joint agency/university effort that occurs in a greater metropolitan region. Another research partnership is taking place between a photovoltaic manufacturing company, and Loyola Marymount University. The nature of the partnership was one of basic research and testing; the company now plans to formalize an internship program with USC and UCLA. The company’s Vice President opined that “bringing together green companies, the local universities, and suppliers of materials in the region...would go a long way in facilitating interaction” that would lead to “development of new ideas and technology.”
- **Green Conferences:** A number of “green”-related events take place in the region, through the work of various organizations whose mission is to promote green growth in the economy and through lifestyle changes. The Verde Xchange, a web-based newsletter on California’s environmental policy developments, hosts an annual Green Marketmakers Conference that offers participants an inside track on the evolving opportunities, policies, and regulations arising from implementation of new climate change laws. Another LA-organization, Entretch, co-hosts the annual GreenTech conference in which investors and interested companies can come to see innovative technologies from both the public and private sector. Although these green conferences do draw attendees from outside the region, they are opportunities for regional leaders to promote communication between groups interested in the growth of the green economy and technology.

PASADENA’S MINI-CLUSTER

The closest resemblance to a well-developed regional network can be found in a mini-clustering of high-technology organizations and agencies within the City of Pasadena. Several of the region’s key players form part of that mini-cluster, seen in the denser constellation of blue dots in the top right side of the social network map (Figure 7). Individuals from Caltech/JPL, Entretch, the Business Technology Center, both Pasadena and Tech Coast Angels, the Caltech/MIT Enterprise Forum—as well as others—communicate with one another on a frequent basis, are members of the same Boards, and collaborate on certain events (such as Entretch’s Green Tech conferences). The cluster itself cannot strictly be labeled as a green network, since the involved organizations focus upon high-technology business growth/retention and development of innovation and entrepreneurs. However, cleantech, as a subset of high-technology, will become more and more of an area of interest for this mini-clustering of non-profits, research institutions, commercialization offices, and incubators. The already established conduits of communication and trust built from social interaction mark this Pasadena high-tech cluster as a future asset to the region.

CLEAN TECH LA ALLIANCE

The most formalized network effort in Los Angeles is arguably the CleanTech Los Angeles Alliance. A two-year relationship between the City of Los Angeles, the CRA/LA, the Los Angeles Business Council, UCLA, USC, and Caltech/JPL became formalized by the Mayor's signing of a Memorandum of Understanding on April 15, 2009.⁷⁴ The new partnership, which also includes the LA Chamber of Commerce, will work towards having Los Angeles become the "cleantech industry leader."⁷⁵ A website (<http://www.cleantechlosangeles.org>) currently lists updates on cleantech and other related news and events, while also offering information, resources, and reports on topics such as energy, climate change, clean transportation, and green workforce development. Further developments are on the way, promising the formal partnership to become a non-profit that works to increase LA's cleantech opportunities.

It is apparent from the website that the Clean Tech LA Alliance carries multiple agendas, one of which is the establishing of Los Angeles' reputation as one that is "green". A section titled "Rethink LA" asks the site visitor to "explore topics where you had pinned Los Angeles-- and realize that this diverse city can surprise you."⁷⁶ Long associated with the decidedly un-green images of manufacturing centers, suburban sprawl, and traffic congestion, proponents of a green LA recognize the need to renew the city's image if it is to be seriously considered as the center for green/clean economic activity. According to a representative of the Los Angeles Mayor's Office of Energy and Environment, when people are asked to think of a green city, they "automatically go to cities like San Francisco, Seattle, Portland" but not Los Angeles because it has "a historic reputation...whether it's real or not, people just don't want to believe [it is a green city]." Thus, green development for Los Angeles County includes the greening of intangible elements as well as the tangible ones, one that could be an effective way to change LA's image.

According to a representative of a LA local development agency, the group of public and private institutions/organizations met in order to secure funding through the Institute for Climate Solutions - a research institute created by the California Public Utilities Commission - and although initial plans did not work out as planned, "out of that [effort]...developed this ongoing relationship which has led to the creation of the [CleanTech LA] website" and the Clean Tech LA partnership. Although still in an incipient state, the CleanTech Los Angeles Alliance captures the one noticeable form of green/innovation network development in Los Angeles County. Rather than "green" being injected into an already existing strong regional network, green growth and innovation seem to be the pulling point around which networks are beginning to form, solidify, and strengthen. Whether this particular method of green economy/innovation network formation is more or less effective remains to be seen; however, the CleanTech LA Alliance is evidence of discrete groups in the region coming together to increase communication and could possibly become an asset to further green development and innovation.

While these tenuous partnerships and collaborations would not be seen as traditional regional assets for green economic development and innovation, they are nonetheless potential sites for nodes within a larger, more widespread network. For the Chairman of a LA business promotion company, the future green network of LA County is "not going to be a large hub, [but] more of small clusters that will have a uniting theme or central group to connect them."

⁷⁴ CleanTech LA website, http://www.cleantechlosangeles.org/news_events/show_news.php?id=43, Accessed April 16, 2009.

⁷⁵ *ibid*

⁷⁶ *ibid*

REGIONAL NETWORK CHALLENGES FOR GREEN INNOVATION DEVELOPMENT: CHALLENGES

Although in the earlier discussion on networks several collaborations and partnerships were identified as potentially becoming regional assets, there are still significant challenges to the formation of strong networks in Los Angeles County. Even though organizations, research institutions, government/public agencies, and private sector associations are concertedly trying to establish a stronger green economic presence in the region, there are inherent problems, noticeable gaps, and disconnects embedded into LA County's social network infrastructure. These challenges include: the size and widespread nature of the region, weak communication links between certain sectors, and a complete separation between green information networks and technology innovation networks.

LA COUNTY'S GEOGRAPHIC CHALLENGES

At over 4,000 square miles, Los Angeles County covers a massive land area.⁷⁷ Add to its size the infamous developed sprawl, the congested freeways, and the lack of a highly developed public transit system, and travel within the region becomes difficult in more ways than one. This geographically inherent aspect of LA County is perhaps the most frequently noted obstacle to developing a strong social network supporting green economic development and innovation. In their discussion of regional innovation systems, Asheim and Gertler argued that "tacit knowledge"—a key component in the generating of innovations—"does not 'travel' easily because its transmission is best shared through face-to-face interaction between partners who already share some basic commonalities."⁷⁸ If face-to-face interactions are crucial to the building of trust between partners, then it becomes problematic when a region's size alone significantly inhibits the traveling of ideas/knowledge that could spark innovation. It is without question that individuals in Los Angeles County face physical challenges due to the size and spatial makeup of the region.

Size and sprawl were consistently identified as network obstacles by various key players in LA County. The founding economist of a LA economic development organization drew a grim picture of the state of green networks in the region when he declared that he did not "know of any established green networks... LA is so spread out and diverse that it's hard to consider a clustering of networks being developed." The Executive Director of a LA business technology organization shared a somewhat more optimistic outlook on the collaborative nature in the region, but also acknowledged that "the geography isn't that far apart, say 20 miles, but with traffic it's two hours. That's just a fact of life." Compounding the challenge posed by LA County's imposing geography were the limited political and economic patterns that were overlaid onto the land itself. As the Director of a web-based green newsletter stated, "[LA County] is a huge geographical area with lots of jurisdictions.(...)We can't get everybody in the room, there are many jurisdictions in the county, hundreds of districts" that form an unwieldy geopolitical patchwork quilt. Not only the spatial layout of political parties but the economic layout partly resulting from the region's geography produced challenges toward network development. "What is challenging," according to the Chairman of a LA business promotion company, "is that [Los Angeles County doesn't] have a high density and cluster. That makes it difficult to getting innovation not only established but also retaining it in the area."

While LA County's large size endows it with certain advantages, in terms of communication and network development around green economic development, it is an unequivocal challenge. According to Saxenian, the geography of the Silicon Valley region contributed to its success as a regional innovation

⁷⁷ US Census Bureau, Los Angeles County Quick Facts, <http://quickfacts.census.gov/qfd/states/06/06037.html>, Accessed April 20, 2009.

⁷⁸ Asheim & Gertler, 2005: 293.

system because it “ensured a density of development that minimized physical distances between companies and facilitated intensive informal communications.”⁷⁹ Therefore, a geographic comparison between Silicon Valley and Los Angeles County is also a network comparison between the two regions. This dual comparison was summed up by the Chairman of a technology business network in Southern California when he stated that “people from Silicon Valley come [to LA County] and wonder where that [network] infrastructure is. By having [partners] come close means that you can have coffee with them, you can breakfast with them, you can ask them what’s going on with your company. It’s a lot easier to build rapport, a relationship with the investor. If you have to jump on the plane and get to most of the investors, it’s really difficult to build that relationship.”

GAPS IN THE COMMUNICATION NETWORK

Partnerships and informal relationships between research institutions, private firms, government agencies, and non-profit organizations do exist in the region. However, two areas within the communication network remain particularly weak: relationships among firms and relationships among governments. There are no green business associations that operate at a regional scale; without even a basic social formation, it is difficult to know the degree to which green firms and businesses speak to one another, share ideas, or plan collaborations. In searching for cleantech businesses, a representative of a LA local development agency observed that “it’d be valuable for cleantech businesses to be more aware of each other as a community and promote themselves as a community.” Meanwhile, an executive at an LA-based photovoltaic manufacturing company noted that while “other industries really lobby and get federal funding for their activities”, the solar industry “as a whole doesn’t have the political or policy clout that other industries might.”

Furthermore, there does not appear to be a strong relationship between Los Angeles County’s local governments. This also may be partly due to the region’s large size; currently LA County encompasses 88 cities, each with their own city councils, and communication among so many discrete political entities is a challenge. The chief economist of a LA economic development organization ascribes this lack of communication to “small cities in the county just [looking] at themselves and [not] at what’s happening throughout the county that can impact them.(...) It’s hard to encourage them to look outside of their own city. It’s hard to get these small cities to think globally.” A representative of Los Angeles Mayor’s Office echoed those concerns:

“We [Los Angeles] have control over what we do within the city boundaries, as the Mayor’s Office, but there’s a regional...component that’s missing. We have a very weak regional jurisdiction model in LA. I think the Bay Area is a little stronger. ABAG has more teeth than... our Southern California Area of Governments [SCAG].”

NETWORK DISCONNECTION

Within Los Angeles County, there seem to be two separate networks operating: those that are promoting “green” by holding conferences, disseminating information, and providing resources, and then those that match funding opportunities with high-technology developments. The main distinction between the two “networks” is their relationship to green economy/innovation. While the first grouping of network efforts specifically came together in order to champion the greening of the economy, the second group dealt with high-technology and had been working with cleantech/green tech before it became such a heightened area of focus. As a result of these different timings with green-related issues, both networks have areas of overlapping interest (green/clean technology, sources of

⁷⁹ Saxenian, 1994: 30.

funding, etc.) yet they do not communicate extensively with one another. This disconnect is best summed up by a cleantech venture capitalist:

“I think there’s something called GreenLA, but I don’t know what they do. I think they have some get-togethers... But again, the pockets of capital that invest in companies and the networking and GreenLA, they’re really two different groups. Generally, if you’re an entrepreneur or promoter or developer, you know where the sources of capital are, there’s probably ten or fifteen. And you wouldn’t necessarily go to a GreenLA event to find the sources of capital.”

Composed of VC firms, innovative researchers, and others in investment, the high-technology social cluster operates in similar fashion to the way it used to, before “green economy” or “cleantech” became popular topics of discourse. As a result, innovative *green* technologies are treated exactly the same as any other innovative technologies; the process of securing investment capital and commercializing the technology remains the same. Regarding this process, a representative of the office of technology transfer of a LA university stated that:

“We entertain whatever is of interest to the general market.(...)Energy has always been very popular...so with all the new projects that are coming out...you have more people looking at green technologies, clean technologies. And so it’s nothing different that we’re doing here because...[cleantech] has always been an important part of our portfolio.”

Unlike these high-technology networks, those that were formed specifically with green innovation or economic development in mind—such as the CleanTech Los Angeles Alliance—must create new strategies for the increased awareness and promotion of “green”. As a result, these groups recognize the need to build networks and try to do so through information and resource sharing, increased links of communication, and events that bring together a diverse range of interested groups/organizations. The development of the CTMC with the CRA/LA provides an example of the efforts to gain information through extensive public and private sector outreach, as one of its representatives points out:

“We [the CRA-LA] collected a lot of information...through the request for information, some through conferences and just meeting with people and getting the word out, some through our consultant, and then we also started developing... the network—that was really key for us, the VC people, the business associations that are also in cleantech, and just really getting the word out [about the CTMC].”

While each network’s operational processes and strategies for growth are based on different circumstances and relationship to “green” topics, there does not appear to be strong communication between the two. The chairman of a region-based angel group stated that “our network is developed as our work happens. It’s not as if we have constant contact with people in a certain company—we talk to them once they’re needed...we’re not trying to develop a set of networks.” However, an increased dialogue between the green-promoting groups and high-tech investment groups could perhaps lay groundwork for future partnerships. A region as widespread as Los Angeles County will no doubt host several clusters within its network; communication through idea and information sharing among those clusters would strengthen the overall regional network and facilitate further the green economy and innovation.

GREEN POLICIES AS A REGIONAL ASSET

Policies can act as regional assets when they support green economic growth, increase the number of quality jobs, and provide opportunities for innovation. Most notably, the City of Los Angeles’

governmental policies to reduce its carbon footprint and adopt environmentally-sustainable practices have potential to incentivize companies' shift to developing green/clean products and practices. Meanwhile, these efforts also create a favorable economic climate for attracting, retaining, and supporting green companies in various sectors. Although Los Angeles is not the only local government in the region pushing green policies, this section will focus on mainly on LA due to the city's size and influence. Before discussing how specific policies can become regional assets, it is helpful to list and briefly describe a few of the more relevant ones.

- **Green LA: Climate Change Plan for Los Angeles:** Arguably one of the most influential impetuses for actual and potential green economic development through innovation is AB32 and the efforts to curb global climate change. The State's Global Warming Solutions Act of 2006, calls for reducing greenhouse gas (GHG) emissions to that of 1990 levels by the year 2020.⁸⁰ In response to AB32 and as a push to exceed its requirements, the City of Los Angeles is working towards adoption of the Mayor's Green LA Plan, which sets goals of reducing Los Angeles' CO₂ emissions to 20% below 1990 levels by 2010 and 35% below 1990 levels by 2030.⁸¹ Ambitious and comprehensively conceived, the Green LA plan involves over fifty policy measures that address ways to reduce GHG emissions within specific areas such as water reduction, open space allocation, greening the airports, and developing a green economic strategy.
- **San Pedro Bay Ports Clean Air Action Plan (CAAP):** In November 2006, both the Port of Los Angeles (POLA) and the Port of Long Beach (POLB) adopted the Clean Air Action Program (CAAP), a five-year program aimed at reducing criteria pollutant air emissions from port activity through innovative methods. Partnering with the United States Environmental Protection Agency (Region 9), South Coast Air Quality Management District (SCAQMD), and the California Air Resources Board (CARB), the Clean Air Action Program seeks to reduce harmful emissions including greenhouse gases, nitrous oxide (NO_x), sulfuric oxide (SO_x), and particulate matter, including diesel (PM, DPM). Source specific performance standards are applied to each category of emission sources, from ocean-going vessels to cargo handling equipment, all the while promoting effective implementation strategies, new technology investment/development, and a monitoring and tracking program.⁸²
- **Green Building Ordinance:** As with alternative energy, green building is another area rife with potential development when considering efforts to reduce GHG emissions and cut energy usage. LA's Green Building Program was approved by City Council and signed into ordinance by the Mayor in early 2008.⁸³ Set at reducing the city's CO₂ emissions by 80,000 tons by 2012, the program's legislative iteration, the Private Sector Green Building Ordinance, is considered one of the toughest green building standards imposed by any city.⁸⁴ A combination of development requirements and incentives, the Green Building Ordinance includes the following: the Standard of Sustainability, a mandatory requirement for all new development projects greater than 50 units (50,000 square feet) to be in compliance with the LEED Certified level; the Standard of Sustainable Excellence, a voluntary incentive program that expedites the development process if

⁸⁰ Assembly Bill No.32, California Environmental Protection Agency, Air Resources Board, August 2006, copy found at <http://www.arb.ca.gov/cc/docs/ab32text.pdf>.

⁸¹ Mayor's Office of the City of Los Angeles, 2007.

⁸² Ports of Long Beach and Los Angeles, 2006.

⁸³ Office of the Mayor, Green Building Ordinance #179820, April 22, 2008,

⁸⁴ Roosevelt, 2008.

buildings promise to meet LEED Silver standards; and the creation of a Sustainability Team that will oversee projects and act as liaison between private companies and city agencies.⁸⁵

- **Clean Tech Manufacturing Center:** A joint effort put forward by the Mayor's office and the CRA/LA on September 2008, the Initiative for the Clean Tech Manufacturing Center (CTMC) seeks out innovative green tech companies/manufacturers to locate within the 20-acre CTMC thus creating a hub of entrepreneurial innovation, creative technology development, and environmentally-friendly business practices.⁸⁶ A recently remediated *brownfield* site, the CTMC is proposed to be an anchor for the larger four-mile Clean Tech Corridor that will run along the Los Angeles River and function as the location for a green technology/innovative and sustainable manufacturing cluster. The CRA/LA recently released the Request for Interest (RFI), which identifies which companies are sought for location to the CMTC site, while future solicitations through a Request for Proposals (RFP) is said to occur once more extensive contact with companies have been made.⁸⁷

There are several ways in which the City of Los Angeles' green policies could potentially become assets that foster its green economy and innovative capacity. Policies can create or reinvigorate new markets, attract businesses by offering incentives, and spur the innovation process.

GOVERNMENT POLICIES CREATE NEW MARKETS

Los Angeles' sheer size translates into the government's considerable purchasing power, which, when combined with effective green policies, could create new markets for environmentally-friendly products and services. A representative of the LA Mayor's Office regarded the city's green policies in this way:

We're a big city, and if any big city does things in scale, it changes the way a market functions. That applies very well to encouraging the green economy because it's all about scale.(...) [With city product purchasing], you can make people produce it. Remember that they're going to respond to only what the market is going to support, so *if you actually become a market*, they can respond. And [the City of LA] is doing that.

The city's role as a market creator through purchasing can be seen in the developments that have occurred at the Port of Los Angeles through the implementation of the CAAP. As part of the plan's goal to reduce air pollutant emissions from facility vehicles such as trucks and tractors, the Port created its Gateway Cities Fleet Modernization Program, spending over \$17 million to replace 530 older, diesel

⁸⁵ "Building a Green Los Angeles: Framework for the City's Green Building Program", overview from the Office of the Mayor of Los Angeles, April 22, 2008, http://mayor.lacity.org/stellent/groups/electedofficials/@myr_ch_contributor/documents/contributor_web_content/lacity_004866.pdf.

⁸⁶ Community Redevelopment Agency of the City of Los Angeles News Release, "Mayor Villaraigosa and CRA/LA Announce Groundbreaking Initiative to Create Clean Technology Manufacturing Center in Downtown Los Angeles", September 23, 2008, <http://www.crala.net/internet-site/Media/upload/PressReleaseRFICleanTech09232008-2.pdf>

⁸⁷ Community Redevelopment Agency of the City of Los Angeles, "Cleantech Now in Downtown LA: The People, The Places, The Possibilities", Request for Interest, 2008, http://www.crala.net/internet-site/Projects/Central_Industrial/upload/CRALA_CLEANTECH_webpost.pdf.

trucks with cleaner-fueled ones.⁸⁸ ⁸⁹ The city's considerable purchase of the cleaner-fueled trucks provided an opportunity for growth for the truck company.

Similarly, the Green LA Plan, though in its earliest stages of implementation, outlines possibilities for markets to be created through government purchasing. One of the largest components to the Green LA plan is the focus on creating alternative/renewable energy sources in order to reduce GHG emissions. In November of 2008, the city's Department of Water and Power (LADWP) released its Solar Energy Plan, which sets the goal of securing 1,280 megawatts (MW) of solar power by 2020 through a three-part program.⁹⁰ Included in the Solar Energy Plan is a feed-in tariff that sets up a contract between private solar sellers and the LADWP whereby the Department would purchase solar energy produced by private facilities. The purchasing of solar-generated power by the DWP could create an enormous potential market. A representative of the LA Chamber of Commerce succinctly stated that "if you want to develop a solar manufacturing facility, any solar purchase by the City of LA or that's somehow funded by the City of LA would get preference over others—and that's a huge, huge incentive to be in the City of Los Angeles." When asked what would further promote green companies in the region, a local venture capitalist simply replied, "I'd like to see the DWP buy some green power."

GOVERNMENT POLICIES ATTRACT AND RETAIN BUSINESSES THROUGH INCENTIVES

Aside from turning the purchasing power of the city into a market for green/clean economic development, policies can also provide businesses with incentives that make the region—or even the switch to "green"—more attractive. Even regulatory policies may include benefits that could incentivize businesses and companies to become greener. According to the director of web-based green newsletter, "these policies set a framework that is both a carrot and a stick to make investments in paradigm shifts in economic sectors in California."

One such policy that could provide this framework of growth through incentives is the recently adopted Private Sector Green Building Ordinance. Although the ordinance serves a regulatory role in dealing with the private sector, it also indicates potential growth in green construction/building sectors through incentivizing green building construction. The ordinance was endorsed by members of the developing sector, including the Los Angeles Business Council and Trammel Crow Company, who saw the plan as beneficial to the city, the environment, and businesses.⁹¹ Furthermore, the benefits could also include not only the construction companies but their local suppliers as well; according to a report by the Economic Roundtable, the residential construction sectors obtained most of their supply inputs from within the Los Angeles County.⁹² Thus, if the Private Sector Green Building Ordinance is successful in promoting green building construction within the city, the entire local cluster of green construction is expected to undergo growth and development.

⁸⁸ Corporate Social Responsibility News Wire, "San Pedro Bay Ports Allocate \$6.3 Million to Continue Gateway Cities Fleet Modernization Program", March 15, 2007; [HTTP://WWW.CSRWIRE.COM/NEWS/7842.HTML](http://www.csrwire.com/News/7842.html).

⁸⁹ Corporate Social Responsibility News Wire, "Harbor Commissioners Approve \$4.7 million Expansion of Truck Modernization Program", June 2, 2005; <http://www.csrwire.com/News/4019.html>.

⁹⁰ Solar LA: The Los Angeles Solar Energy Plan, report by the Los Angeles Department of Water and Power, November 24, 2008; 26p., http://mayor.lacity.org/stellent/groups/electedofficials/@myr_ch_contributor/documents/contributor_web_content/lacity_004982.pdf

⁹¹ Roosevelt, 2008.

⁹² Burns & Flaming, 2006: 23-24.

Further, the development of the Clean Tech Manufacturing Center in Downtown LA offers another example of potential green economic growth through incentive offerings. Green/clean technology companies and manufacturers that locate in the Clean Tech Manufacturing Center will receive an extensive panoply of federal, state, and local incentives, including tax exemptions/reductions, discounted electricity rates, access to grants, and workforce training programs.^{93,94} The host of incentives should encourage a large number of companies to move into the CTMC or even begin to increase research and development efforts in order to produce green/clean technologies or manufacturing processes. Since beginning outreach last fall, more than 100 green manufacturing businesses expressed interest in the CTMC.⁹⁵

GOVERNMENT POLICIES SPUR INNOVATION

Policies have the potential to not only create new markets and attract businesses through incentives, but also to take part in the innovation process. State policies such as AB32 can become, according to the Director of the Caltech/MIT Enterprise Forum and founder of Entrettech, “a driver of innovation in California... The clean air policies at every level are mandated for either car emissions or cities to achieve, and that is a very important framework that will drive innovation.”⁹⁶

On a more local level, a policy that could produce technological innovations is the Technology Advancement Program (TAP) under the San Pedro Bay Ports’ CAAP. The TAP specifically seeks to promote investment into research, development, evaluation, and incorporation of innovative, clean technologies that would further the goals of the Action Plan. The program is seen as a “catalyst for identifying, evaluating, and demonstrating/piloting new and emerging emissions reduction technologies/strategies applicable to the port industry”; it thus provides opportunities for green technology businesses to showcase their products/services as well as encourages other businesses to consider intensifying their research and development of innovative, clean technologies.⁹⁷ According to the 2007 Annual Report, the Technology Advancement Program has evaluated and implemented eight new technology projects, two of which are in completed stages.⁹⁸ The Vycon REGEN system manufactured by Vycon, Inc., which is fitted onto a rubber tire operating crane, resulted in a 25% reduction of particulate matter, an estimated 30% reduction in NOx, and estimated 30% reduction in CO₂ emissions from reduced energy usage.⁹⁹ Another completed project involved yard tractors retrofitted with liquefied natural gas (LNG) engines, a technology manufactured by Kalmar Industries and the Cummins Engine Company that also demonstrated reductions on PM and NOx emissions.¹⁰⁰ Even more recently, the Port unveiled a new fleet of heavy-duty all-electric trucks manufactured by Balqon Co., a small business that partnered with the Port through the TAP in order to develop and test

⁹³ Clean Tech Manufacturing Center Brochure, 2008, http://www.crala.net/internet-site/Projects/Central_Industrial/upload/CTMC_brochure_11609_V2.pdf.

⁹⁴ CRA/LA News Release, September 23, 2008.

⁹⁵ Reston, M.; “Angling for a Piece of LA’s Future Clean-Tech Center”; *Los Angeles Times*; April 27, 2009.

<http://www.latimes.com/news/local/la-me-clean-tech28-2009apr28,0,3196324.story>.

⁹⁶ Interview with Caltech/MIT Enterprise Forum director, conducted by Carlos Velasquez, on 4/6/2009.

⁹⁷ San Pedro Bay Ports, Technology Advancement Program: Final Guidelines, March 30, 2007; 25p.,

<http://www.cleanairactionplan.org/civica/filebank/blobdload.asp?BlobID=2211>.

⁹⁸ San Pedro Bay Ports Clean Air Action Plan: Technology Advancement Program, 2007 Annual Report, March 2008, 39p., <http://www.cleanairactionplan.org/civica/filebank/blobdload.asp?BlobID=2301>.

⁹⁹ *ibid*

¹⁰⁰ *ibid*

the trucks.¹⁰¹ The Port has already purchased 50 trucks to be used onsite, while plans are being made to extend the market for these clean vehicles.

There is debate as to how much government policies can catalyze innovation. A representative of California NanoSystems Institute asserted that “policy can help [researchers] to think differently, but there isn’t a direct correlation in policies driving research.” Meanwhile, the Chairman of a technology business network in Southern California saw policies as “a way for government to tell people ‘these are the things we think are important’” but was doubtful as to whether “government policies [dictate] what technology is. They’re really looking for solutions.” While this debate may be more indicative of the multiple conceptualizations of the term “innovation”, it is apparent that new ways of conducting business are the result of certain government policies, such as the Technology Advancement Program.

GREEN POLICIES: CHALLENGES

Although there are plenty of policies being drafted in the area that are pushing for more stringent environmental regulations and ultimately contributing to the overall greening of the region, they still are not always good for the local economy. As mentioned earlier in this report, LA County is the country’s preeminent manufacturing center. With over 400,000 manufacturing jobs, environmental restrictions will disproportionately affect areas like LA County. Policies like AB32, the Global Warming Solutions Act of 2006, have the potential to severely cripple a large part of the county’s economy. A representative of the LA Chamber of Commerce pointed out:

“AB32 is probably the biggest challenge. I mean, manufacturing in LA is just so difficult, there are so many employer restrictions, there are so many environmental restrictions, and a lot of it for good reason, but it makes it hard to compete with places like Texas or even South America or China, which don’t have any of these restrictions. Plus land here is very expensive and we are very congested; and so all of that is sort of the dark side of the opportunities here.”

Policies like AB32 have the potential of placing LA County at a major economic competitive disadvantage when compared to other regions in the state and the country. As mentioned in the previous section, the county already experiences some of the most expensive real-estate prices in the country while boasting a fairly weak investment infrastructure. Adding stringent environmental regulations that make it even more expensive to conduct business in the county puts local businesses in an even tougher position if they seek to produce any profit.

When asked about the potential impacts of AB32 on the LA region, a representative of a LA economic development organization mentioned that politicians “have approached everything rationally and see what the potential consequences are. It [AB32] could be an opportunity, but you have to make sure that you’re not driving industry away and hurting people.”

In order to avoid such situations, several interviewees proposed that policies should be less regulatory and provide more incentives. The chairman of a business attraction organization based in LA makes the point that policies should “not penalize old companies that have already been there and grew under old requirements. It’s important to make that transition easier through tax incentives. You can’t fault companies that started when green was the main objective. Providing incentives to companies to become greener is the right route to go, especially in these down times.” Thus, the goal seems to be policies that provide incentives for businesses to become greener as opposed to making them do so. In

¹⁰¹ White, 2009.

providing incentives, governments can make the transition into becoming greener that much easier and as such reduce the potential risks involved in making such a switch. According to a representative of the LA Chamber of Commerce, some examples include: “providing tax incentives, reducing property taxes, sometimes it’s important to provide housing assistance if you’re trying to get people to move here.”

INNOVATION

Having the “scientific horsepower,” supporting policies and networks is phenomenal for a region’s innovative and economical competitive advantage. Yet, a region also needs to have these institutions actually produce some results; this is where LA County really shines.

ORIGINS

LA County has three major research universities and eight engineering schools. Our research reveals that a great part of LA technological innovation happens at the university level although not exclusively there. As pointed out by the Chairman of a regional-based angel group, “innovation comes from everywhere.” A representative from the CA NanoSystems Institute at UCLA pointed out that the creation of new technologies and ideas is not a linear process. As described by a representative of the office of technology transfer of a LA university, it can happen through two faculty or researchers exchanging thoughts and ideas, which can then turn into the development of a technology and ultimately seek funding to commercialize it and make some profit. Yet, it can also occur by a researcher simply continuing on in his/her own projects, receiving government grants or collaborating with a private firm, and ultimately marketing that new technology. The point is, innovation can happen at any place at any time and has a completely different process every time.

This diversity also implies that all innovation does not always happen at the university/research institute level. Other *legs* of innovation that were identified throughout our field work and this report were the role that policies play along with what is done at the private firm level. When talking about policies and innovation, a representative of the LA Chamber of Commerce puts it this way:

“The same sort of policies that can handicap businesses can also be a benefit requiring businesses to innovate, so for example, the Clean Air Action Program at the Port of LA has forced terminals to look at fuel emissions and vacuum facilities so now they can’t emit. And so now you’ve got sources of alternative power; they’ve got something called the Sock on a Stack, which is essentially a bonnet you put over a ship’s smoke stack which captures all of the emissions while the ship’s on dock. And there are local companies that are developing those technologies.”

As this example illustrates, policy’s role in sparking innovation looms extremely large. This is another major asset that LA County possesses as it is arguably one of the most proactive regions in drafting *green* legislation. As mentioned in the *Policy* section of this report, there is a lot that is happening throughout the county to make it more environmentally friendly. Although not all policies will help spark innovation, they do have huge potential.

Although historically the creation of new technologies occurred in private firms’ R&D departments, lately this has become less and less common. As mentioned by a representative of a business promotion organization in LA, “big companies are getting out of research; a lot of technology development is now occurring at the university/research institute level.” Yet, innovation still occurs within the walls of some private firms. An LA-based solar panel manufacturer does have an in-house technology development process, where:

“[every worker] will come up with an idea...and the engineering team will review that idea and present it to a cross-functional team that we’ve developed – representatives from manufacturing and marketing and sales, logistics, engineering and so forth – and review it as a team. If we deem it appropriate, we will then authorize the development of a plan and a budget that we present to senior management who will sign off on it and we proceed to develop a program.”

In this case, the company simply does not look at purchasing technologies from universities or funding research, but it continues to implement the traditional model of in-house technology-development. Since technologies created at private firms are already owned by a profit-seeking entity, there really is no need to commercialize/disseminate the new technology. However, what happens to those technologies created at the university/research institute level? How do those get disseminated and commercialized?

COMMERCIALIZATION

All of the county’s three major research universities count on the presence of their Offices of Technology Transfer/Commercialization to sell those newly-created technologies to any entity willing to purchase them. Yet the process by which that happens differs greatly. According to a representative of the office of technology transfer of a LA university, their department does not “do technology push, we prefer technology pull.” This means that while some technology transfer departments (like UCLA’s) will market the technology on their websites, they already have connections made with potential technology-buyers and need not devote resources to marketing. Yet, some faculty will not need to utilize the tech-transfer offices, since some already have connections made with industry and can easily sell their technologies to them, with little to no assistance from such departments. As one can see, the schools throughout LA County employ different methods of commercializing their technologies –some are more proactive while others already have connections and do not need to employ such a strategy.

Although each school has a distinct method of commercializing its technologies, there have been efforts to collaborate amongst all three. As touched upon in the *Networks* section of this report, the preeminent showcase of all schools’ technologies is *FirstLook LA*. According to the Director of JPL Technology Transfer, the goal of this event is to bring together all of the region’s best and most innovative technologies (along with being the ones with the most profit-potential) from all three schools. When asked as to why collaborate, the Director mentioned that she believes that not one school can “carry the flag” for the whole region, it will take a concerted effort by all three schools working in unison to promote the innovative potential of the region.¹⁰²

In addition to *FirstLook LA*, other efforts to promote the innovative potential of the region, particularly in green technologies, include the *Greentech 2007/2008* conferences. The conference seeks to showcase some of the best technologies that were created in the region and have the potential of reducing environmental harm. Although such a conference is not led by any school, it still features some of the best technologies that were created by the schools, meaning that it does involve some collaboration among such parties. Not to be forgotten, private firms are also working on collaborating with other entities in order to push for the creation of innovative technologies. According to the Vice President of an LA-based photovoltaics manufacturing company, the company is looking at developing “some cooperative initiatives and certainly [does] have an interest in working with universities, in writing proposals to get some DOE funding in developing new products and new technologies.” Although not as strongly developed as in other regions, there is some collaboration among the major technology-

¹⁰² *ibid*

creating entities in the region to push for more innovation and improve their communication. It will be interesting to see into what such efforts materialize into.

INVESTMENT

Key to the innovation and technology-creation process is the role of investment. As important as it is to have entities that are creating new technologies and collaborating amongst each other to commercialize and strengthen partnerships, having capital available to fund such technologies (and start-up companies) is just as key to the region's economic viability. Unfortunately for LA County, this is where it falls off. Nevertheless, there has been a rise in the funding for technologies that are considered *green*. According to representative of the office of technology transfer of a LA university, "inquiries for these types of technologies [cleantech] have increased. Absolutely, and funding—we have sponsored research where companies can come and fund professors to do work in certain fields and yes, I've definitely seen a few of those come our way." There has been a rise in the inquiries for green technologies by potential investors. In addition, the chairman of regional-based angel group mentioned that he has seen a rise in the number of companies and individuals presenting what would be considered green technologies to them. Thus, although it still remains small when compared to other regions, changes are occurring in the funding for innovative technologies in the region.

Innovation and the creation of new technologies is something that is a major asset to LA County. As summarized on this section, it boasts three major research universities along with having eight engineering schools. Although it is here where most innovation is happening, there are instances within the county where it is driven by private firms and the policies created by the local governance. Such entities have also noticed the importance of collaboration and have been pushing to develop stronger relationships with other key players in the whole innovation process. Thus, LA County is in prime position to remain (and grow) as a major producer of new technologies; something that bodes well for the county's competitive advantage.

REGIONAL INVESTMENT AND FINANCIAL CLIMATE: CHALLENGES

Los Angeles County does not have a strong investment presence, a challenge perhaps partly stemming from other regional problems such as size, widespread spatial distribution of groups, and a weak network system. While the presence of strong universities and research institutions all but guarantees innovative development within the region, the financial and investment climate does not seem commensurate with its level of talent and human capital.

Innovation, when indicated by the number of patents produced in a region, is a strong presence in LA County. However, the region is not a strong contender in securing venture capital investments for the cleantech innovation that goes on. If a region's innovation were to be measured by its cleantech VC investments alone, it could be assumed that Los Angeles County is not a very innovative region. Although the region ranked second in the number of cleantech patents produced, it is ranked fourth in the total dollar amount of cleantech VC investments made from 2000 to 2008. Both the East Bay and San Francisco regions secured more VC investment dollars than Los Angeles County, even though they produced much fewer cleantech patents. Furthermore, although Silicon Valley and LA County each had similar numbers of patents, the former region was able to secure twice as much VC investment funding than the latter. These two figures, though by no means an accurate and complete picture of the state of innovation within Los Angeles County, clearly show a disparity between the innovative activities and investment opportunities of the region. They indicate the absence of a cohesive and effective region-based investment climate within the region.

The lack of a strong investment/financial climate in LA County was also observed and remarked upon by individuals working within areas related to the green economy and high-tech innovation. As the chairman of a technology business network in Southern California stated, “LA doesn’t have a strong venture network within the region. There are not a lot of venture funds... It really comes down to what kind of climate, what kind of culture you establish in each region. Without having really good culture, active participating investors, it’s harder for companies to get funded.” While there are several venture capital firms in the region, they are not always investing in local research projects. For instance, a representative of a LA local development agency states having worked with several VC firms in the area that were “local, they’re based in LA, although they invest all over and we’re trying to encourage them to invest here.” Furthermore, many of the VC firms that worked closely with LA universities were located in the Bay Area. The Director of an office of technology transfer of a LA university commented on that:

“Some firms have set up shop down here [LA County], but I think [most firms] feel they don’t need to because [Silicon Valley] is so close. They can just come down for the day. In fact, a lot of our planned events are from 10am to 2pm, which [investors] plenty of time to fly down and get here, then fly back up in time for dinner.”

An already weak investment system in the region is more acutely felt for startups that are growing and in need of a second round of funding. Without a strong VC and finance culture, securing that next-step, larger funding becomes difficult. This problematic process was described by an investor working with a locally-based VC firm:

“Let’s assume you’re investing in a new process to make solar panels, to make ethanol or biodiesel, to make electricity or fuel, all right? You can invest 5, 10, 15 million dollars to develop a new technology, but in order to build a plant, that costs hundreds of millions of dollars. A fuel plant—hundreds of millions of dollars. Venture capital firms just don’t have that kind of money.”

The problem of securing the second—and beyond that—round of funding was echoed by the Chairman of a regional-based angel group: “Green is the area where VC’s are mostly interested in right now [yet] the real problem you face is that you know most companies will need a second round of funding.”

On top of the weak investment/financial presence in LA County, securing funding may be difficult for investors because of problems that are inherently, not region-specific, based in investment itself. Currently, in regards to cleantech, the Chairman of a technology business network in Southern California states, “there is interest in the sector, but you’re starting to see venture capital fatigue. There are so many companies and they have to have something to differentiate them, something so unique so as to attract venture capital’s interest.” Even though there is a rise in green/cleantech investment, one venture capital investor saw it as “A bubble. I think there’s a lot of people who had capital, and they were trying to invest it with the success rate that they did in software...and I don’t think that really works. So a lot of money has been put into cleantech...and I don’t think they’re going to be able to get their money out.(...) Often the venture firms, they have no idea what the demand is for the new technology.” The comparatively low cleantech venture capital investment captured in the figure above is perhaps a result of these various developments in the nature investment itself. Although Los Angeles County does have a weak investment culture, the complications arising from venture capital fatigue, problems with multiple rounds of funding, and an unforeseeable future market perhaps all explain the disparity between innovation activity and funding opportunity in the region.

CONCLUSIONS

Los Angeles County features a strong and diverse economic foundation. Aided through its natural assets, infrastructural improvements and an eclectic mixture of people, the county's economy continues to grow. Although there are imminent threats to its historically strong industries, the advent of the already-growing Green Economy provides the county with a major opportunity to continue its economic dominance. Through its growing business and green networks, a slew of investments through the region's generous angel-networks and the strong innovative capacity of its world-class institutions, the region is equipped with the tools to fully embark on this transition. Yet real threats do exist, and the local governance must do everything possible to mitigate its impacts.

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