APPENDIX 5

EAST BAY:

Green Economic Potential

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July 2009

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INTRODUCTION

Although widely known as the birthplace of the University of California, the Free Speech Movement, and the Black Panthers, economically the East Bay, defined here as Alameda and Contra Costa counties, has often been overshadowed by San Francisco and Silicon Valley. While tied to the fortunes of the greater Bay Area, the East Bay has developed its own distinct and diversified economy. The region's legacy of progressive politics and environmental consumerism provides a foundation for the development of green industry, while local research institutions provide new technologies for commercialization. Although lacking its own network of investors, proximity to centers of venture investment in Silicon Valley and San Francisco provides an opportunity for local startups if they are able to make the necessary connections. Recently the region has also experienced an increase in investment in biotechnology and renewable energy research.

Despite Oakland's reputation during the 1920s as the "Detroit of the West", the East Bay has always been more a hub of transport and logistics than a true industrial powerhouse.[1] With the decline and decentralization of production industries throughout the latter half of the twentieth century, cities like Oakland and Richmond have made headlines more for high crime rates than as sites of opportunity. Yet while the inner city has declined, the region as a whole has maintained high rates of growth and job creation. Oakland is still a transportation hub, with large amounts of goods flowing through the Port, but mechanization has led to ever-decreasing numbers of jobs, while the community suffers from environmental degradation.

The East Bay weathered the dot com crash in the early part of this century, better than most areas, attracting tech industry workers from San Francisco and the South Bay, and contributing to a local boom in construction and housing finance. Lately, however, the East Bay has been hard hit by the economic crisis, suffering high rates of foreclosures and a massive slowdown of construction. Recent infusions of capital into renewable energy research and green jobs training, coupled with the rise of innovative policies and attempts at regional coordination, may help support the rise of the East Bay green economy. However, despite the region's innovative capacity, the scale of its green business and job growth will depend on its ability to act as a magnet for capital rather than letting purse-holders in other areas lure companies away.

[1] Johnson, Marilynn S., The Second Gold Rush: Oakland and the East Bay in World War II. Berkeley: University of California Press, 1993. http://ark.cdlib.org/ark:/13030/ft6x0nb4kn/, 19

Figure 1: East Bay Map (Contra Costa and Alameda Counties)

Source: American Factfinder

GEOGRAPHY AND RESOURCES

Located on the eastern shore of the San Francisco Bay, the East Bay is divided by a spine of hills stretching from north to south. The area is bordered by extensive shoreline to the west, the San Joaquin and Sacramento River delta to the North, and the prime farmland of the Central Valley to the east. Urbanized areas in southern Alameda County merge into the northern reaches of Silicon Valley, making the county border an almost arbitrary dividing line between the two regions.

CLIMATE AND WATER

The climate of the San Francisco Bay Area follows the Mediterranean pattern of cool moist winters and warm dry summers, although the diverse topography lends itself to numerous microclimates. Cities facing the Bay are subject to fog and moderate temperatures, while those on the eastern side of the hills, without the mitigating influence of the Pacific, are prone to more sun and higher summer temperatures. This temperature differential often draws sea breezes up over the hills. One of the oldest and largest wind farms in the state, at Altamont Pass in eastern Alameda County, benefits from this thermal effect.

Much of California has experienced severe drought over the past few years, with the East Bay Municipal Utilities District instituting mandatory water rationing last year. Water management officials do not expect the drought to be alleviated anytime soon, as many reservoirs are currently at only 50 percent of capacity while snow-pack in the state is at only 81 percent of normal, far too low to replenish the

depleted reservoirs.[2] With steady growth in population, the region's water resources will likely continue to be strained in the foreseeable future. This could be an opportunity for companies specializing in water efficiency or desalinization technologies, but it will likely increase costs for industries that require large amounts of water in their processes.

LAND

The East Bay covers about 20 percent of the land area of the greater Bay Area. About 31 percent of this land was urbanized in 2006, while another 23 percent is protected from development.[3] The shoreline of the East Bay originally developed as an industrial zone, while the areas east of the hills were largely agricultural for the first half of the twentieth century. After World War II, suburban expansion of residential and industrial development led to the dispersed settlement pattern that is apparent today. Disinvestment in rail and streetcar systems and massive investment in freeway building in the post-war era also contributed to sprawling suburban development and decline of the urban core. More recently, increased housing pressure on urban areas has led some cities to convert industrial land to residential use, raising controversy about the continued loss of jobs in goods-producing industries. However, the impacts of the recent housing and economic crises have slowed overall development in the region.

[2] California Department of Water Resources, http://cdec.water.ca.gov/

[3] Brown, Stephanie, *East Bay Indicators*. East Bay Economic Development Alliance, 2006.

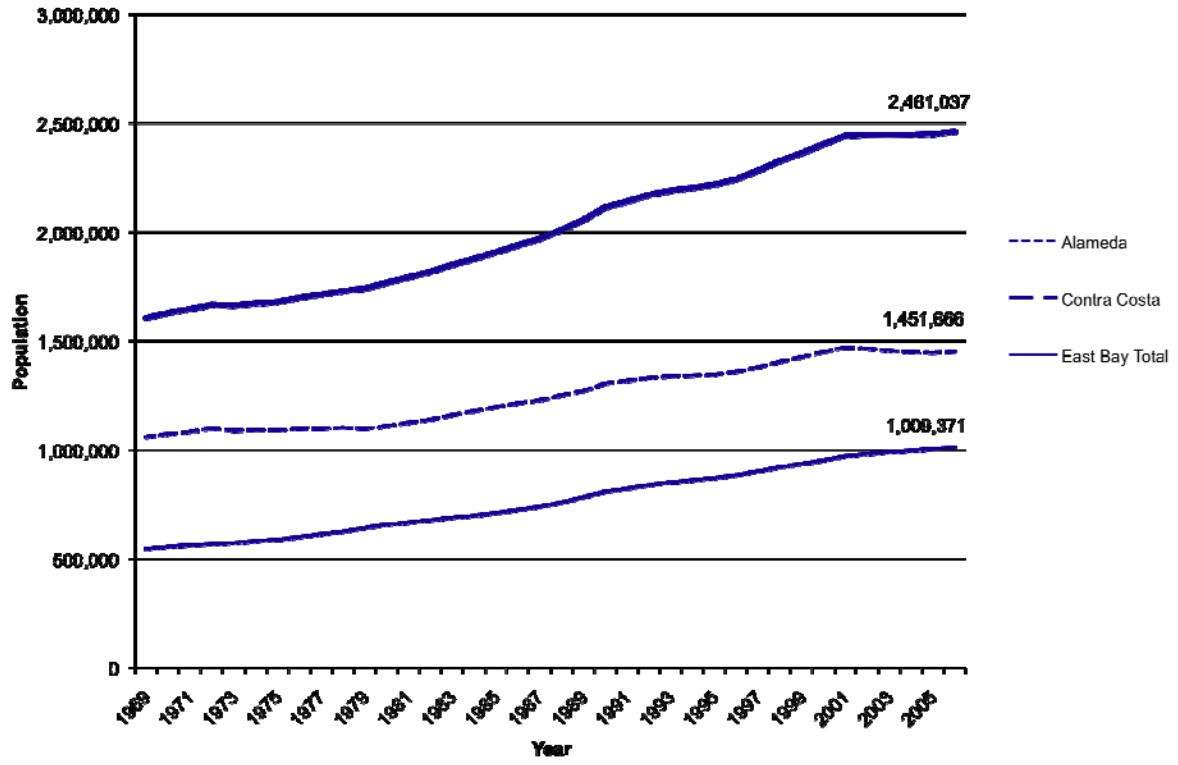
DEMOGRAPHICS

The East Bay is comprised of two counties, Contra Costa to the north and Alameda to the south. Often touted as one of the most ethnically diverse regions in California, the region has also been one of the fastest growing, experiencing constant population increases throughout the past century.[4] Much of this growth has come from waves of in-migration, due to reasons as diverse as natural disasters and wartime industrial employment. Over the past several decades, however, steady growth in employment opportunities has drawn workers from around the nation and the world, contributing to the mix of ethnicities in the area. Growth has not affected all cities in the East Bay equally, however. High rates of unemployment, poverty, and racial segregation in the flatlands of Oakland and Richmond contrast sharply with affluent white enclaves in the hills of Piedmont or suburbs like Walnut Creek.

POPULATION

Within the region's two counties are over thirty cities and a number of unincorporated communities housing approximately 2.5 million residents (See Figure 2).

Figure 2: East Bay Population Growth



Source: 2005 American Community Survey

[4] East Bay Economic Development Alliance, *East Bay Indicators, 2008.* East Bay EDA, United Way of the Bay Area, November, 2008, 6

Historically the heart of the region, the city of Oakland is still the largest population center with 401,489 residents in 2007. [5] The next largest city in the area is Fremont with 201,334 residents, followed by Hayward (140,943), Richmond (101,454), and Berkeley (101,377). However, these five cities, taken together, make up just over one third of the population of the region, with the remainder dispersed throughout the region's numerous jurisdictions. The efforts of regional organizations such as the East Bay Economic Development Alliance help to ease this jurisdictional fragmentation; however, the area continues to suffer problems of inefficiency and inequity from decentralization and large disparities in wealth.

RACE AND ETHNICITY

As a region, the East Bay is considered extremely diverse, particularly when compared with California as a whole (Table 1). The region has a greater proportion of Black, Asian and Hispanic populations than the State. Many have cited the region's collective ethnic diversity as a strong asset and source of social and economic strength and potential. On its own, Alameda County is considered the second most ethnically diverse county in the state, behind Los Angeles County, with a higher representation of Black (13%) and Asian (24%) residents and a lower representation of White (37%) and Latino (21%) residents than in the state as a whole. [6, 7] Contra Costa's population, on the other hand, is over 50 percent white, but houses a concentrated African-American community in the city of Richmond. Large numbers of African Americans migrated to the region during World War II, while the Latino population grew substantially in the latter half of the 20th century.

Table 1: Population by Race and Ethnicity, 2005-2007 (*)

	Alameda County		Contra Costa County		East Bay		California	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Total	**1,421,308**	**100%**	**1,006,486**	**100%**	**2,427,794**	**100%**	**36,264,467**	**100%**
White	533,065	37.5%	532,280	52.9%	1,065,345	43.9%	15,593,822	43.0%
Black	182,796	12.9%	92,085	9.1%	274,881	11.3%	2,205,637	6.1%
Asian	344,060	24.2%	131,646	13.1%	475,706	19.6%	4,369,567	12.0%
Other	105,075	7.4%	65,655	6.5%	170,730	7.0%	1,140,906	3.1%
Hispanic	297,212	20.9%	213,227	21.2%	510,439	21.0%	12,954,535	35.7%

(*) 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

On the whole, the East Bay's population had an upward shift in their educational attainment between 1990 and 2000. Aside from a slight increase in people with less than a 9th grade education level, the most gains were made at the higher education levels (Bachelor and Graduate degree professionals). Table 2 clearly shows that the educational attainment of the 25+ population shifted upwards in the previous decade. Additionally, the East Bay's population is more highly educated than that of the state.

[5] U.S. Census Bureau, 2007 Population Estimates, Census 2000, 1990 Census
[6] East Bay Economic Development Alliance, 7.
[7] Lopez, Alejandra, *Racial/Ethnic Diversity and Residential Segregation in the San Francisco Bay Area*. Center for Comparative Studies in Race and Ethnicity, Stanford University. September 2001.

In 2000, 42.1% of the region's residents had an associate's degree level education or higher, compared with 33.7% of California residents (See Table 2 below).

Table 2: East Bay Educational Attainment, 1990-2000

	1990	2000	%Change	2000 (CA)
Less than 9th grade	6.4%	6.9%	7.8%	11.5%
9th-12th grade, no diploma	10.2%	8.9%	-12.7%	11.7%
High school graduate (includes equivalency)	22.70%	19.4%	-14.5%	20.1%
Some college, no degree	22.8%	22.7%	-0.4%	22.9%
Associate degree	8.0%	7.1%	-11.3%	7.1%
Bachelor's degree	19.1%	21.9%	14.7%	17.1%
Graduate or professional degree	10.8%	13.1%	21.3%	9.5%

Source: US Census 1990, 2000

ECONOMIC HISTORY

EARLY HISTORY AND COLONIAL SETTLEMENT

Originally a marshy area, the East Bay's early inhabitants were the Ohlone Indians. This loose collection of over 50 tribes lived a semi-sedentary village life-style, subsisting on hunted game, fish, and wild foods until the arrival of Spanish missionaries and soldiers in 1769. Spanish colonization disrupted Ohlone communities, leading to a precipitous drop in the native population over the next few decades. The Spanish crown granted much of the land in the East Bay to Luís María Peralta, a career soldier and rancher. He retained ownership of the area when it became Mexican territory, granting it to his four sons upon his death. The Peralta sons petitioned to maintain ownership of the land when the United States took over the region following the Mexican-American War. They soon began selling off parcels for development, but growth did not hit the region until the arrival of the railroad later in the century.

Since its settlement in the 1800s, economic growth in the East Bay has been driven by waves of in-migration and investment in infrastructure development. Early development of transportation infrastructure fueled industrial development and residential expansion, which in turn drew factory workers. Large influxes of residents followed the 1906 earthquake. Migrants coming to support the shipbuilding industry in World War I provided the East Bay with a strong industrial workforce and a growing labor movement. The rise of wartime industries in World War II, brought a temporary growth in employment and another massive round of in-migration, but also heralded an era of increased mechanization and deskilling of production processes which led to widespread off-shoring of manufacturing jobs.

TRANSPORTATION INFRASTRUCTURE

Largely rural during the first half of the 19th century, the East Bay began developing rapidly as a transportation hub after 1869 when it became the westernmost terminus of the first Transcontinental Railroad. The establishment of this terminus and one of Central Pacific's largest rail yards spurred local employment and industrial development in Oakland. The Key streetcar system also developed in the late 19th century, opening up land for real estate speculation and linking Oakland, the area's largest city, with nearby suburbs, including the recently re-located University of California in Berkeley. Richmond became the terminus of the Santa Fe rail line in 1905, leading large east coast companies like Standard Oil and the Pullman Company to locate branches there. By the 1920s, the rail corridor along the East Bay shoreline from Oakland to Richmond was host to a large range of industrial facilities, engaging in metal fabrication, food processing, internal combustion engine and automobile manufacturing, and shipbuilding.[8] The East Bay's importance as a transportation and distribution hub has continued to today.

The region's economy and population grew rapidly during this period, with the investment of eastern capital and establishment of dozens of branch plants along these rail corridors. It was due to this industrial growth, particularly the presence of automobile manufacturers Ford and General Motors, that Oakland boosters labeled their city the "Detroit of the West." Despite their claims, however Oakland never rivaled Eastern and Mid-western industrial centers, and the economy was always based more on

[8] *Photo collection: New or greatly enlarged industrial establishments of Oakland and East Bay cities. Oakland Chamber of Commerce. ca. 1917*. Oakland Public Library, Oakland History Room. http://content.cdlib.org/ark:/13030/kt7199q9d0/

transportation and distribution rather than on production.[9] The region continued to develop its transportation advantage by establishing and expanding major ports in both Oakland and Richmond during the early 20th century.

IMMIGRATION

After the earthquake of 1906, refugees from the ruins of San Francisco flooded into East Bay cities, which had suffered substantially less damage. This sudden doubling of the population set off a massive construction boom, transforming cities like Berkeley from sleepy bedroom communities into vibrant commercial centers, virtually overnight. Many families, as well as some manufacturers, like Moore Shipbuilding, decided to remain in the East Bay permanently, contributing to the establishment of a strong wartime shipbuilding industry during World War I. The First World War brought another wave of migration and growth in industry. The region suffered during the Depression, however the population continued to grow with the arrival of families fleeing the dustbowl and seeking opportunity in California. While robust, industrial growth during this period continued along the lines of what some term "colonial" development. Most facilities in the region were branches of national companies while the power of capital remained in eastern centers.

WORLD WAR II MILITARY INVESTMENT AND POST-WAR SUBURBANIZATION

During the war, President Roosevelt issued an edict banning discriminatory hiring practices by government contractors.[10] Since wartime industry relied almost exclusively on military contracts, this opened up jobs that had previously been reserved for white men, to women and African-Americans. The East Bay experienced a massive surge in population, with tens of thousands of immigrants arriving from the rural south. Large shipbuilding operations, like the Kaiser shipyards in Richmond, imported workers in droves, with Kaiser alone employing as many as 90,634 during the peak production period.[11] Kaiser also developed a prefabricated components process, which decreased the skill-intensiveness of building large vessels. Instead, the company was able to hire large numbers of low-skilled workers for assembly and only a few skilled riveters and welders. This also sped up the production process. When the wartime ship-building boom ended, large numbers of low-skilled workers were set adrift, contributing to a surge in unemployment among African-Americans. Government and service sector employment increased in the area, particularly in health care and retail trades, but while this growing service sector provided expanded employment opportunities for white women, discrimination against African-American workers led to increasing levels of unemployment.

The decline in industrial employment coupled with large-scale suburbanization left former manufacturing centers like Richmond and Oakland facing rising poverty rates and a faltering tax base.[12] Recognizing the decline of the downtown area, business-owners banded together to form the Metropolitan Oakland Area Program (MOAP). The MOAP aimed to reinvigorate Oakland's downtown by promoting its further industrialization. Opening up cheap agricultural land for development led to the suburbanization of industrial and residential investment, but did little to revitalize the urban core. While upwardly mobile white families moved out to these "industrial gardens," highly racialized real estate and

[9] Johnson, 20.
[10] Johnson, 20.
[11] Johnson, 33.
[12] Self, Robert O. American Babylon: Race and the Struggle for Postwar Oakland. (Princeton, New Jersey: Princeton University Press, 2003), 26.

lending markets and discriminatory hiring contributed to increasing residential and income segregation, with African-Americans concentrated in the flatlands of Oakland, Berkeley, and Richmond. [13]

1960 TO PRESENT

While the East Bay begin its rise as a center for progressive thought and action in the 1960s and 70s, the following decades saw the regional economy weaken, leading to deepening economic inequality.[14] As the region's population grew and land became more and more limited in the East Bay, housing prices continued to rise, pushing homeownership farther from the reaches of lower- and middle-income families. Meanwhile, in the late 1970s and early 80s, along with the rest of the nation, the East Bay began to see the closing of a number of its larger, industrial businesses. Tens of manufacturing and production plants, including Colgate, Heinz and Manasse-Block, closed in the East Bay by the early 80s, and with these closures went well-paying union jobs. [15, 16] The national recession of the 1980s certainly didn't skip over the East Bay, as the region and its residents felt the economic crunch. Hard times continued for the region, although it slowly pulled itself out of recession. In the early 1990s, after not yet having rebounded from the loss of so many manufacturing jobs in the 80s, the U.S. Navy announced the closure of its remaining East Bay bases. This closure would result in the loss of an estimated 44,000 jobs in the region but would create a new opportunity for real estate development due to the new land supply.[17] As the region tried to recover from the loss of so many blue-collar jobs, it also tried to attract and keep the growing number of research and tech positions. By the late 1990s and early 2000s, the East Bay was working to enjoy the spillover from the technology revolution that was centered in Silicon Valley.[18] Since then, the region has worked hard to redefine its economy.

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[13] Self, 34.

[14] Wollenberg, Charles. Berkeley, A City in History. 2002, http://www.berkeleypubliclibrary.org/system/historytext.html

[15] Raeside, John and Stephen Buel, *30 Years of East Bay History.* East Bay Express: October 15, 2008. http://www.eastbayexpress.com/gyrobase/30_years_of_east_bay_history/Content?oid=846012&page=1

[16] Wollenberg.

[17] Raeside.

[18] Raeside.

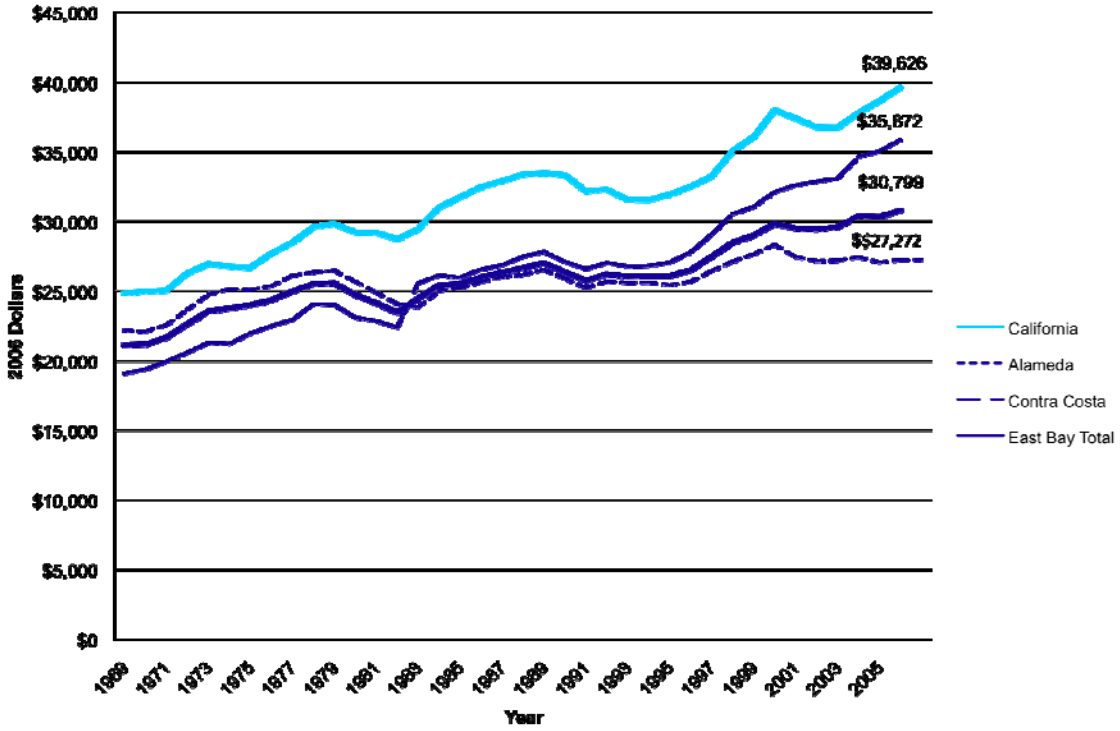
CURRENT ECONOMIC STRUCTURE

ECONOMIC INDICATORS

INCOME

Despite being more highly educated than California as a whole, the East Bay has long had a much lower per capita income than the state in 2006 ($30,799 compared to $39,626 in 2006) (Figure 3). As might be expected by their relative educational attainment levels, Alameda County with $27,272 per capita has a lower per capita income level than Contra Costa County ($35,872).

Figure 3: Per Capita Income in the East Bay and California, 1969-2006 (in 2006 Dollars)



Source: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce

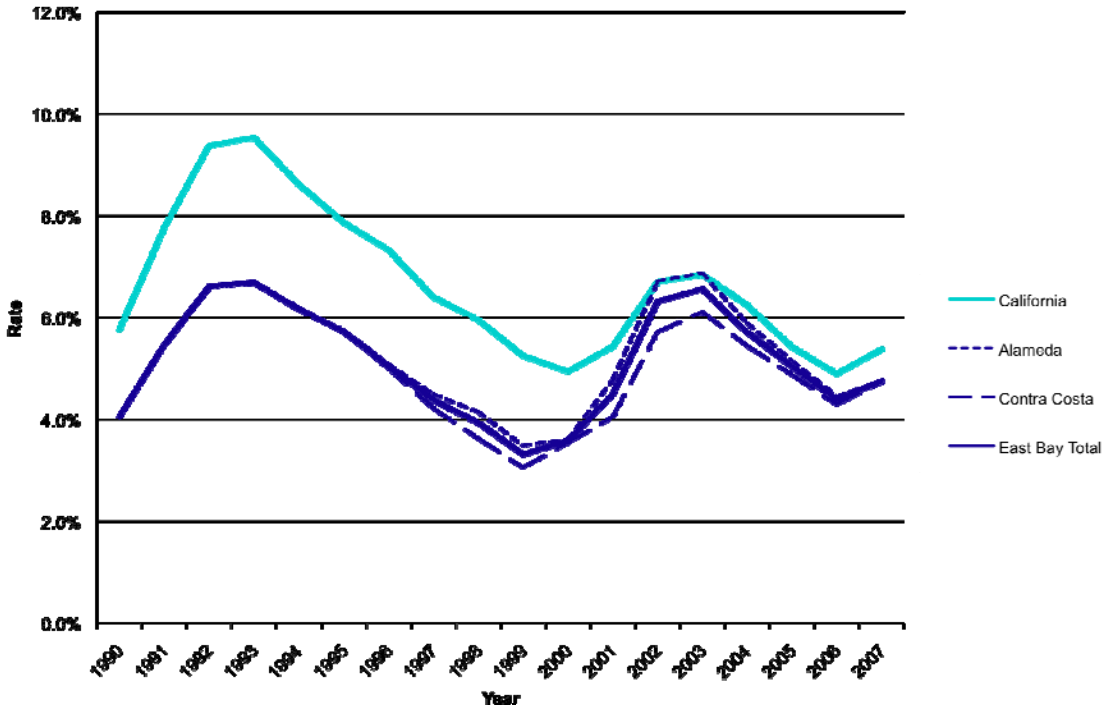
POVERTY AND UNEMPLOYMENT

Poverty and unemployment rates are both important indicators of the economic strength and weakness of a region's population and economy. While unemployment levels can highlight a region's lack of suitable employment opportunities, the poverty rate can begin to give clues as to whether the jobs available allow the workforce to live at or above a basic standard.

Historically, the East Bay has enjoyed much lower unemployment rates than California as a whole, with Contra Costa unemployment rates being even lower than Alameda county rates. By 2007, however, the county and state rates have begun to converge. As of 2007, the California unemployment rate was just around 5.4%, with Contra Costa and Alameda rates hovering around 4.7% and 4.8%, respectively. Both

the East Bay and California, however, have been heavily affected by the recent economic recession. As of May 2009, California's unemployment rate had risen to 11.2%, the highest in recent history, while the East Bay was experiencing an unprecedented 10.4% (10.7% in Alameda County and 10.0% in Contra Costa County).[19]

Figure 4: East Bay Unemployment Rate



Source: Bureau of Labor Statistics

While both the East Bay and the state have seen a rise in poverty rates between 1989 and 1999, the State experienced an almost 2% decline between 1999 and 2007. The East Bay as a whole, however, continues to have lower rates than the state (11.0% compared to 12.4% in 2007). Regardless, as Table 3 shows, one out of every ten people in the East Bay was living below the poverty line as of the 2007 ACS.

Table 3: Poverty Rates, 1989, 1999, 2007

CCI Region	1989 Poverty Rate	1999 Poverty Rate	2007 Poverty Rate
California	12.5%	14.2%	12.4%
Alameda	10.6%	11.0%	11.0%
Contra Costa	7.3%	7.6%	8.9%
East Bay Region	9.3%	9.7%	10.1%

Source: US Census, 1990, 2000, 2007

[19] Gammon, Robert. *Jobless Rates and Housing Woes.* East Bay Express. June 24, 2009. http://www.eastbayexpress.com/news/jobless_rates_and_housing_woes/Content?oid=1026866

SHIFT-SHARE ANALYSIS

Before addressing specific details of the green economy in the East Bay, 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 East Bay 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). For this report, we chose to compare the performance of the regional economy with that of California. The shift-share analysis featured in Table 4 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 of every sector that can be considered specific to the region's competitive advantage.

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).

Table 4 below presents a shift-share analysis for 2-digit NAICS industry sectors for the East Bay. Employment growth and decline in the different industries will give us a broad picture of the East Bay's economy and will point at economic sectors that could provide competitive advantages in the emerging green economy.

Table 4: East Bay Economic Structure: Location Quotients and Shift-Share Analysis, 1990-2008

	East Bay Employment			East Bay Location Quotient			California Employment			Shift-Share 1990-2000				Shift-Share 2000-2008			
Industry Title (2-digit NAICS)	1990	2000	2008	1990	2000	2008	1990	2000	2008	Economic Growth Factor	Proportional Shift	Differential Shift/ Competitive Component	Job Growth	Economic Growth Factor	Proportional Shift	Differential Shift/ Competitive Component	Job Growth
11 Agriculture, forestry, fishing and hunting	2,041	2,930	N/A	0.111	0.131	N/A	280,936	319,020	306,727	11.6%	1.9%	30.0%	43.5%	5.7%	-9.6%	N/A	N/A
21 Mining, quarrying, and oil and gas extraction	3,537	2,418	N/A	1.448	1.568	N/A	37,455	22,025	25,678	11.6%	-52.8%	9.6%	-31.6%	5.7%	10.9%	N/A	N/A
22 Utilities	N/A	N/A	N/A	N/A	N/A	N/A	66,502	56,791	58,584	11.6%	-26.2%	N/A	N/A	5.7%	-2.6%	N/A	N/A
23 Construction	50,013	60,561	66,006	1.108	1.268	1.227	692,291	682,072	799,846	11.6%	-13.1%	22.6%	21.1%	5.7%	11.6%	-8.3%	9.0%
31-33 Manufacturing	108,117	115,434	94,403	0.805	0.900	0.986	2,059,262	1,830,809	1,423,273	11.6%	-22.7%	17.9%	6.8%	5.7%	-28.0%	4.0%	-18.2%
42 Wholesale trade	41,628	52,061	48,203	1.032	1.167	1.010	618,668	636,648	709,499	11.6%	-8.7%	22.2%	25.1%	5.7%	5.7%	-18.9%	-7.4%
44-45 Retail trade	116,459	111,096	111,356	1.194	1.038	1.003	1,495,330	1,527,619	1,650,261	11.6%	-9.5%	-6.8%	-4.6%	5.7%	2.3%	-7.8%	0.2%
48-49 Transportation and warehousing	N/A	N/A	N/A	N/A	N/A	N/A	330,565	438,163	429,401	11.6%	20.9%	N/A	N/A	5.7%	-7.7%	N/A	N/A
51 Information	32,958	38,290	28,165	1.226	1.052	0.904	412,306	519,849	463,001	11.6%	14.5%	-9.9%	16.2%	5.7%	-16.7%	-15.5%	-26.4%
52 Finance and insurance	42,277	33,906	42,103	1.050	0.910	1.071	617,510	532,039	584,404	11.6%	-25.5%	-6.0%	-19.8%	5.7%	4.1%	14.3%	24.2%
53 Real estate and rental and leasing	16,911	17,436	16,240	0.997	0.958	0.878	259,926	259,876	274,938	11.6%	-11.6%	3.1%	3.1%	5.7%	0.1%	-12.7%	-6.9%
54 Professional and technical services	44,535	64,465	84,098	0.930	1.002	1.159	733,850	918,781	1,079,218	11.6%	13.6%	19.6%	44.8%	5.7%	11.7%	13.0%	30.5%
55 Management of companies and enterprises	4,237	34,412	23,553	1.390	1.490	1.690	46,728	329,758	207,230	11.6%	594.1%	106.5%	712.2%	5.7%	-42.9%	5.6%	-31.6%
56 Administrative and waste services	45,150	68,334	55,757	1.088	1.026	0.874	636,334	950,818	949,066	11.6%	37.8%	1.9%	51.3%	5.7%	-5.9%	-18.2%	-18.4%
61 Educational services	10,775	12,982	18,387	0.977	0.917	1.001	169,118	202,073	273,063	11.6%	7.9%	1.0%	20.5%	5.7%	29.4%	6.5%	41.6%
62 Health care and social assistance	71,834	93,055	106,286	1.201	1.155	1.133	916,984	1,150,609	1,394,541	11.6%	13.8%	4.1%	29.5%	5.7%	15.5%	-7.0%	14.2%
71 Arts, entertainment, and recreation	10,994	11,941	13,897	0.832	0.788	0.850	202,532	216,414	243,156	11.6%	-4.8%	1.8%	8.6%	5.7%	6.6%	4.0%	16.4%
72 Accommodation and food services	53,127	60,718	73,225	0.864	0.798	0.842	942,753	1,086,367	1,293,794	11.6%	3.6%	-0.9%	14.3%	5.7%	13.4%	1.5%	20.6%
81 Other services, except public administration	29,718	38,202	47,261	1.009	0.984	0.972	451,706	554,226	723,092	11.6%	11.1%	5.8%	28.5%	5.7%	24.8%	-6.8%	23.7%
99 Unclassified	N/A	N/A	3,796	N/A	N/A	0.810	N/A	N/A	69,714	11.63%	N/A	N/A	N/A	5.72%	N/A	N/A	N/A
Total, all industries	**716,246**	**858,590**	**871,520**	**1.000**	**1.000**	**1.000**	**10,980,978**	**12,257,882**	**12,958,485**	**11.6%**				**5.7%**			

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

In 2008, the largest providers of employment in the East Bay were Retail Trade (111,356 jobs), Health Care and Social Assistance (106,286), Manufacturing (94,403), Professional and Technical Services (84,098), and Accommodation and Food Services (73,225). Among the sectors that created more jobs in the region, three stand out: Professional and Technical Services (with 39,563 more jobs in 2008 than in 1990), Health Care and Social Assistance (+34,453 jobs), and Accommodation and Food Services (+20,098). The sectors that lost more jobs in that same period include: Manufacturing (with 13,714 jobs less in 2008 than in 1990), Retail Trade (-5,103 jobs), and Information (-4,793). Both Retail Trade and Information also show a negative Differential Shift figure.

In relative terms, Educational Services and Professional and Technical Services were the sectors that experienced a higher job growth rate between 2000 and 2008, with a 41.6% and a 30.5% respectively. The sectors that showed higher concentration in the East Bay compared to California (LQ 2008 > 1) are: Management of Companies (1.69), Professional and Technical Services (1.16), Health Care and Social Assistance (1.13), Wholesale Trade (1.01), and Educational Services (1.01). Regarding competitive performance, the sectors that showed the highest Differential Shift in the region compared to California averages were Finance and Insurance (14.3%) and Professional and Technical Services (13.0%).

Based on payroll employment data from the California Employment Development Department, the East Bay's largest industry clusters as of 2007 were Government, Professional and Business Services and Educational and Health Services. Not only are these industries currently the largest in the region, but they are also expected to be the fastest growing in the next years. The California Employment Development Department projects that between 2004 and 2014, 60% of all new jobs created in the East Bay will be in Professional and Business Services, Education and Health Services and Leisure and Hospitality.[20]

Table 5 below narrows the shift-share analysis to 3-digit NAICS level to emphasize more specific sub-sectors over broader industries. It shows significant sub-sectors (those with 10,000 employees or more in 2008) that stand out as being more concentrated in the East Bay than in California (LQ>1). Among them, those that provide more jobs in absolute terms are: Professional and Technical Services, Food and Beverage Stores, Management of companies, Credit Intermediation, Merchant Wholesalers of Durable Goods, and Educational Services. Among these sub-sectors with high LQ, those in which the East Bay shows a better competitive performance (highest DS) are: Membership Associations and Organizations, Insurance Carriers, Professional and Technical Services, and Management of Companies. Those with negative DS in the region include Telecommunications and Merchant Wholesalers.

[20] East Bay Economic Development Alliance, 2008, 23

Table 5: Economic Sub-sectors (3-digit NAICS) with Higher LQs in the East Bay, 1990- 2008 [21]

	East Bay Total Employment			East Bay Location Quotient			Shift-Share 2000-2008			
Industry Title	1990	2000	2008	1990	2000	2008	Econ. Growth Factor	Prop. Shift	DS	Job Growth
551 Management of companies and enterprises	4,237	34,412	23,553	1.39	1.49	1.69	5.7%	-42.9%	5.6%	-31.6%
517 Telecommunications	21,570	19,060	12,631	2.52	1.90	1.56	5.7%	-21.9%	-17.6%	-33.7%
813 Membership associations and organizations	7,340	8,717	11,749	0.95	0.94	1.18	5.7%	6.3%	22.7%	34.8%
541 Professional and Technical Services	44,535	64,465	84,098	0.93	1.00	1.16	5.7%	11.7%	13.0%	30.5%
524 Insurance carriers and related activities	12,678	13,015	16,456	0.91	0.92	1.15	5.7%	-0.8%	21.5%	26.4%
445 Food and beverage stores	25,099	22,446	25,775	1.31	1.07	1.15	5.7%	5.4%	3.7%	14.8%
424 Merchant wholesalers, nondurable goods	12,720	17,719	18,948	1.03	1.15	1.11	5.7%	9.1%	-7.9%	6.9%
811 Repair and maintenance	9,698	11,275	10,989	1.08	1.04	1.07	5.7%	-7.4%	-0.9%	-2.5%
522 Credit intermediation and related activities	26,724	16,997	19,325	1.22	1.02	1.06	5.7%	7.7%	0.3%	13.7%
423 Merchant wholesalers, durable goods	22,398	28,914	23,876	1.01	1.15	1.01	5.7%	-8.3%	-14.9%	-17.4%
611 Educational services	10,775	12,982	18,387	0.98	0.92	1.00	5.7%	29.4%	6.5%	41.6%

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

Although not included in the table above due to the small number of total employees (7,744 in 2008), Petroleum and Coal Products Manufacturing is the sub-sector with the highest LQ in the East Bay (7.28 in 2008, up from 5.30 in 1990). It has also showed a positive job growth recently with an increase of 13.8% in the period between 2000 and 2008, reflecting the continued strength of the refineries in Contra Costa County. Other small sub-sector in terms of employment that has showed a positive performance in the last years is Waste and Remediation Services. While the number of jobs this sector provided is small (4,937 jobs in 2008), its LQ in 2008 was 1.80 and it enjoyed a job growth rate of 33.1% between 2000 and 2008. This may be due in part to positive trends in the recycling industry.

Additionally, while there is limited NAICS employment data available for the Transportation and Warehousing sector, it is often also identified as one of the most competitive industries in the region, when compared with California.[22] This has much to do with the extensive trade and transportation network in the East Bay and throughout the Bay Area. This network includes the Oakland Seaport, the fourth largest container port in the United States, the Oakland International Airport, and extensive highway and rail transportation infrastructure. [23, 24] The network has positioned the East Bay as an important hub for much of northern California and the nation, and as such, the East Bay continues to enjoy the economic benefits associated with this position. However, because of the recent economic downturn, the rise of land costs, and the conversion of industrial land to residential land, this industry has also started to see a decline in its regional prominence and its employment capacity.[25]

[21] Sub-Sectors with 10,000 employees or more in 2008 only
[22] East Bay Economic Development Alliance, 2008, 23
[23] Port of Oakland, http://www.portofoakland.com/portnyou/
[24] East Bay Economic Development Alliance, 2008, 26
[25] East Bay Economic Development Alliance, 2008, 26

THE GREEN ECONOMY IN NUMBERS

GREEN EMPLOYMENT AND ESTABLISHMENTS

Along with many other regions, the East Bay has long kept an eye on its emerging "green economy." For the purposes of this report the term "green economy" encompasses any economic activity that reduces energy consumption or improves environmental quality. This section provides figures on green employment and establishments in the East Bay for 1990, 2000, and 2008. For each year, employment levels, average annual growth rates (AAGR), and location quotients (LQ) are presented for six different green sectors: energy research and services, environmental services, green building, green transportation, green manufacturing, and recycling/remediation.

By 2008, there were 1,102 green businesses located in the East Bay's two counties.[26] In that year, green companies (including the three national labs) employed almost 31,000 people in the region.[27] This represents almost 20% of all green employment in California. Between 1990 and 2008, the East Bay's green employment grew at an average annual rate of 1.7%, while the number of green employments grew at 3.9% (see Table 6 below).

Table 6: Green Economy Summary for the East Bay, 1990, 2000, 2008

	Green Employment								Green Establishments							
	1990	LQ	2000	LQ	2008	LQ	Region AAGR 90-08	State AAGR 90-08	1990	LQ	2000	LQ	2008	LQ	Avg. Est. Size, 2008	Region AAGR 90-08	State AAGR 90-08
Energy Research and Services	12,437	12.1	13,810	10.1	15,377	10.6	1.3%	1.7%	46	1.4	70	1.3	87	1.2	176.7	3.8%	4.7%
Environmental Services	1,476	1.2	2,933	1.4	3,412	1.3	5.1%	3.9%	182	1.1	413	1.1	473	1.1	7.2	5.8%	5.9%
Green Building	1,009	1.6	1,220	1.9	3,674	3.7	7.9%	2.3%	73	0.9	55	0.8	89	0.9	41.3	1.2%	1.4%
Green Manufacturing	783	0.6	828	0.5	647	0.5	-1.1%	0.0%	40	0.6	50	0.7	59	0.7	11.0	2.3%	2.0%
Green Transportation	3,033	1.5	6,034	2.2	3,666	1.5	1.1%	0.8%	57	1.0	84	0.9	111	0.8	33.0	4.0%	5.8%
Recycling / Remediation	4,574	2.5	4,963	2.0	4,100	1.8	-0.6%	1.1%	181	1.0	233	0.9	283	1.0	14.5	2.7%	3.3%
Total Green	23,312		29,788		30,876		1.7%	1.6%	579		905		1,102		28.0	3.9%	4.2%

Source: NETS; UC Berkeley Center for Community Innovation.

Green employment in the East Bay is largely influenced by the presence of three premier national energy research laboratories in the region: the Lawrence Berkeley National Laboratory (LBNL), the Lawrence Livermore National Laboratory (LLNL), and the Sandia National Lab. Together they provided over 14,000 jobs in 2008, almost half of all green jobs in the region. This explains the high location

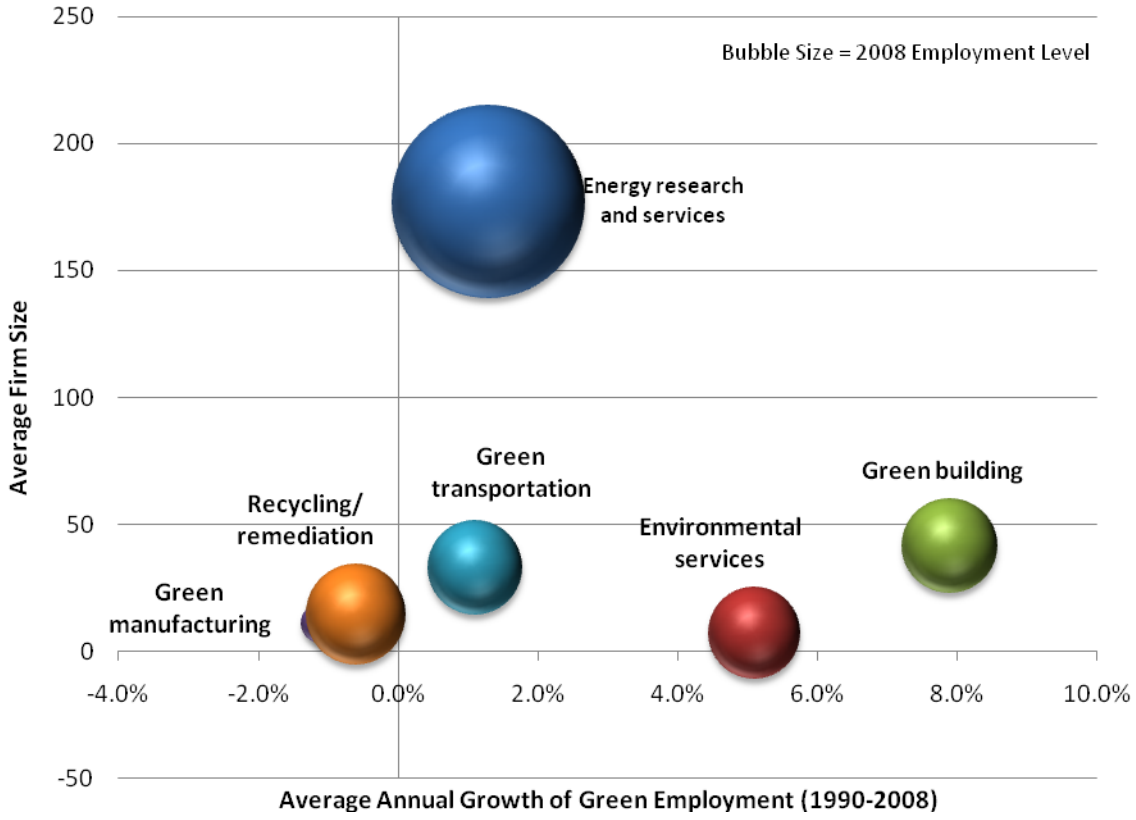
[26] Data compiled from multiple databases including the National Establishment Time Series (Dun & Bradstreet) database; the Build it Green directory; green certified business directories from Alameda County, Contra Costa County, Berkeley, and Richmond; the Oakland Partnership Greentech Cluster directory; the San Francisco Planning and Urban Research green business database; and the *East Bay Green Economy Industry Cluster Study* (Craft Consulting Group, 2008)

[27] National Establishment Time Series (Dun & Bradstreet) data

quotient (10.6) of Energy Research and Services employment and the specialization of the region in energy and energy-related activities. Other green sectors that provided a large number of jobs in the East Bay in 2008 include Green Building (3,674 jobs), Green Transportation (3,666 jobs), and Recycling/Remediation (4,100 jobs). Environmental Services have seen almost uninterrupted employment growth since 1990 with an average annual growth rate of 5.1%. The Green Building sector promises to be a powerful green economic sector in the years to come, experiencing a growth rate in employment between 1990 and 2008 that is more than triple the figure for California as a whole. Growing awareness of green building design and construction, supported by a number of national, state and local policies mandating various levels of green building, continues to encourage this growing sector.

As the green economy grows throughout California, the East Bay is gradually losing its special niche; Table 6 shows how location quotients for both establishments and employments have remained stable or declined in almost all sectors over time. However, relative to the state, the East Bay maintains high concentrations of establishments in Energy Research and Services and Environmental Services, suggesting that the economy is characterized by many small firms (with the exception of the two laboratories mentioned before). Employment in Green Manufacturing has decreased in the East Bay, especially in the period from 2000 to 2008. However, the number of green manufacturing establishments has increased slightly. That would explain the small average firm size of Green Manufacturing firms in the East Bay compared to other regions in California.

Figure 5: East Bay Green Economic Growth and Firm Size by Sector, 1990-2008



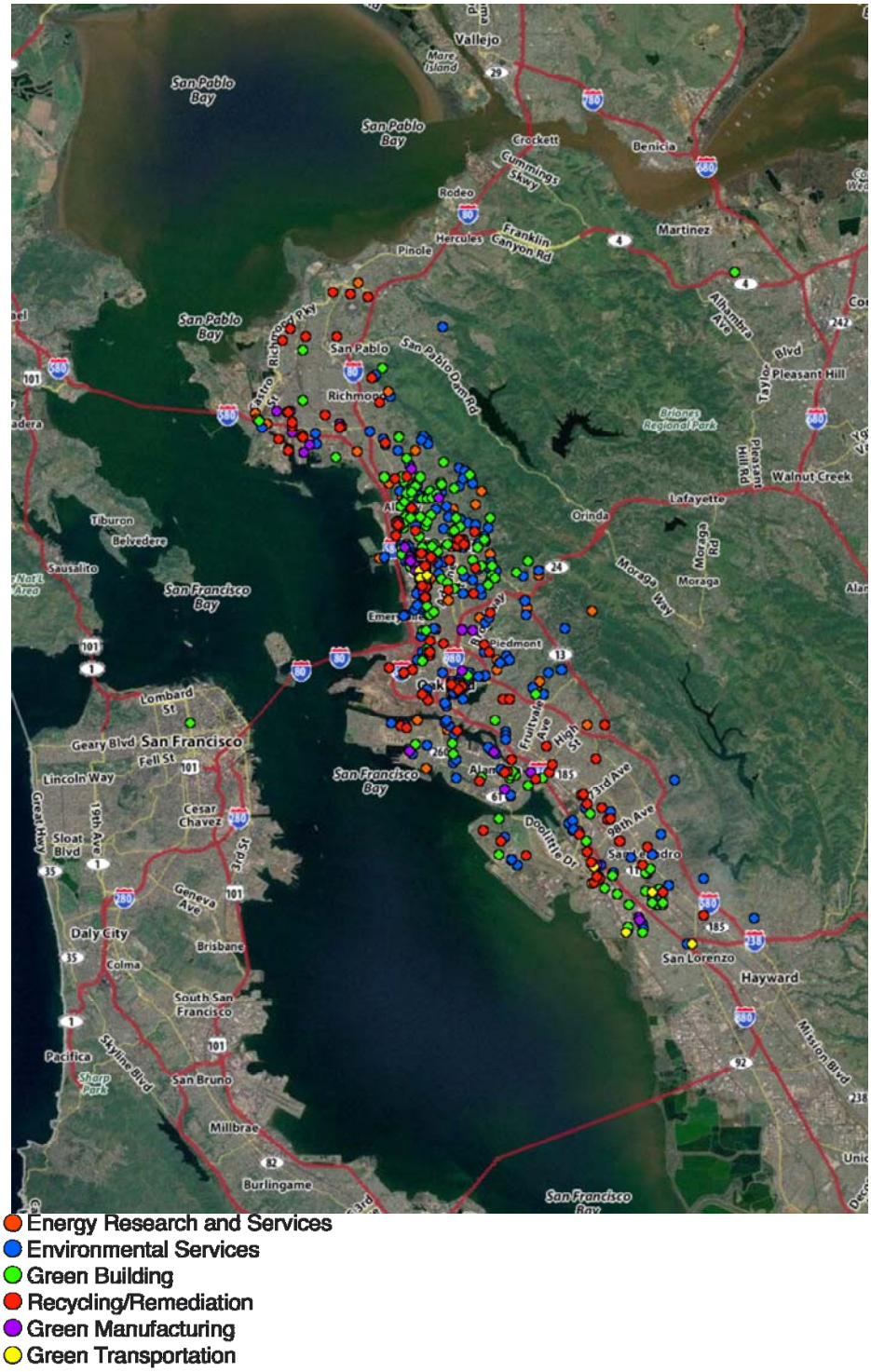
Source: National Establishment Time Series (Dun & Bradstreet) data; UC Berkeley Center for Community Innovation.

Some city officials have been eager to point out, that while we already have a larger percentage of the workforce employed in green industries, we also have a great amount of green workforce potential. As one official commented, many of the workers from the semiconductor industry have the skills needed in cleantech industries. The region can use the existence of such valuable, transferable skills to further attract green businesses:

> "A lot of people think manufacturing has left the Bay Area. Maybe it's left in some chunks, but for high value products it's still doing really well and we're still really productive. Whether it's the automobiles at NUMMI [now closing in 2010] or Amgen making their cancer treatments here. A business wouldn't come here to make a widget, but we have a really great workforce for the high-end, high-value component manufacturing. For example Western digital manufactures the most valuable part of their hard drive and it supports the rest of their plants—it's one special component that's made here and it's the highest value."

Focusing in on the older cities along the East Bay shoreline, Figure 6 shows that the highest concentration of firms is in the Berkeley area. This illustrates the influence of UC-Berkeley on the universe of firms in the area. As one business association representative said, "Other than being Chevron, or wanting to locate near the University, I don't know why an energy company would chose to be here." The university also influences the type of green businesses that stay in the area. As the same official remarked, "Who can afford to stay here? Tends to be highly remunerative people who are linked to the University. They want to stay, and will pay a premium to stay. Are we ever going to be home to large manufacturing facilities? I doubt it, it's expensive."

Figure 6: Green Businesses in the East Bay



Source: Compiled by the Center for Community Innovation from the following databases: National Establishment Time Series, Build it Green, Alameda County Green Certified Businesses, Contra Costa County Green Certified Businesses, Oakland Partnership Green Tech Cluster, Berkeley Green Certified Businesses, and Richmond Green Certified Businesses.

GREEN INNOVATION AND INVESTMENT INDICATORS

While the presence of green establishments is one indicator of a strong green economy, patents and venture capital funding sources are another way to measure the green economy's presence. Table 7 summarizes the East Bay's green innovation and investment rankings mentioned in previous sections of this report. To date, businesses in the East Bay hold 211 cleantech patents. Additionally, the region has received $440 million in cleantech VC from 2000 until 2008, and it specializes in green gazelles more than any other region. According to the composite innovation ranking elaborated for this report, the region ranks third in green innovation in California after Los Angeles and Silicon Valley.

Table 7: East Bay Green Innovation and Investment Indicators, 2000-2008

Patent Activity, 2000-08[1]			Venture Capital Investments 2000-08 ($millions)[2]			SBIR/STTR Grants, 2000-08[3]			Green Startups, 2000-07[4]			Green Gazelles 2008 [4]			Composite Innovation Ranking	
Clean-tech	% of State Overall	% of State Clean-tech	Clean-tech ($)	% 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	Overall	Clean-Tech
211	8	20	440.5	10.1	16.4	1.5	6.8	3.2	605	6.6	8.4	415	6.9	11.4	6	3

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

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

There are a number of drivers of the green economy at both the national and the regional scale. At the global and national levels, the notion of the green economy is pushed in large part by an increase in demand for energy coupled with rising energy costs, and growing environmental awareness.[28] However, while demand for a larger and more efficient green economy is being necessitated by global realities, most of the real drivers for green economic development are being implemented at state and local levels. With California at the forefront of environmental policy in the United States, regional regulations have been able to capitalize on the state standards to encourage green economic development at the local level. The East Bay city and county governments have certainly worked to create local sustainability policies, and are taking advantage of a strong and open local market, and even venture capital opportunities as a way to promote green economy industries.[29]

As a region, the East Bay has a number of wonderful resources and incentives, which help to attract green economy businesses. Investing in the green economy promises to be an equal investment in a region's economic growth and job creation, and as such, other regions throughout the State and the Nation are also working to become the premier green business economy. To rise to the top, however, the East Bay will have to address many of the remaining financial, institutional and political challenges that threaten to make the region less competitive.

The East Bay hosts a large number of green businesses, world-class universities and research institutions, public-private partnerships, non-profit organizations, investment firms, and other entities that are beginning to coordinate their efforts to promote green economic development in the regions. To date, these have not organized into an effective regional economic development network as seen in other regions (such as Silicon Valley's Joint Venture: Silicon Valley). Businesses in the region, according to one interviewee, respond to a wide range of drivers when going "green":

> "So, it could be cutting costs, I mean, Wal-Mart is a lot about cutting costs, dramatically reducing the packaging and the shipping costs, and the re-shelving of products, labor costs. There are a lot of business benefits they get from it. Obviously, reputational kinds of things. In some cases, it's being the ability to attract and retain people like you, people coming into the job market who want to work for good companies. In some cases it's improved quality and reduced risk. You know, it's all different. Sometimes they are being beat up by environmentalists and their license to operate is being threatened. In some cases is regulation or fear of regulation, anticipating regulation… it's like carbon emission, carbon taxes or carbon trade."

The presence of a progressive business mindset and green demand in the East Bay was another factor mentioned frequently as a driver for green businesses. One interviewee stated that "the biggest impact is not even from AB32, but from community pressure" and another remarked: "A lot of companies are changing their business practices to make them more sustainable, and want to engage with the City on

[28] Craft Consulting Group, *East Bay Green Economy Industry Cluster Study*. June 25, 2008. links.sfgate.com/ZGOU, 23

[29] Chapple, Karen, Malo Hutson, Kate Gordon, *The Green Economy as an Economic Development Tool: The Role of Federal Policy.*

how to do it. Involvement is really about how much the owners and managers care about being green. Companies recognize they need to be doing something green these days, if only for marketing reasons."

Importantly, expediting permitting processes for companies can play an important part in their decision to locate in the region, perhaps even more so than funding according to some interviewees:

> "And we had worked really hard on their initial plans to make sure we were meeting all their deadlines. They need building permits, they need their tanks inspected, they need permits from the air resources board. So we just really worked on providing top-notch service to them. Ultimately in the end, even though we were one of the lowest ranked cities, they picked us to build their next manufacturing plant. So they're building the 600,000 sq ft plant here... We didn't give them any money, not a dollar, there was no money exchanged. They just knew that we could speed their process through. I really don't end up dealing with the technology. I just deal with people from the business who are mandated to get it up and running. And we just see how fast we can go. It's not the very glamorous part, making sure that the sewer connection is adequate, but it seems to really make a difference."

Another interviewee echoed those sentiments:

> "The other thing you can do is something that doesn't require dollars, so one of the most successful examples is the San Francisco building permit example. What they did was, they said okay, we recognize one of the biggest pains to the building industry is time: waiting for permits. So what we're gonna do is the higher rated you are on the LEEDS system, the higher your position on the waiting list. And so what happened was everyone strated going…first silver, then gold, then platinum, because they were gonna get to the front of the line. And they didn't have to spend a cent doing that; all they had to do was get rid of government bureaucracy."

Challenges, however, are plentiful. One economic development official pointed to zoning requirements as a potential problem: "We have zoning requirements, so that if there's a storefront that used to have a tax-preparer and now somebody is going to go and open up a dentist shop, well that's a whole new use and it has to go through a bunch of committees, where I might just think, it's just a new tenant and it's in a light use arena—they're not manufacturing cars—but there are …competing desires in the city to balance everything out in the city… So I think those kinds of things just end up slowing everything down and encouraging people to look elsewhere where they don't have to think about it."

Another development professional explained that "it's not that easy to locate these firms because of their huge power needs and huge water consumption. […] It will be harder to locate these firms in the future as water supplies are diminished, so I keep worrying about water districts. The county has—I think seven different water providers. Any big industry typically has water needs, so we're getting a little bit nervous. [..] I'm worried about the availability of resources."

The increased costs associated with environmental regulation, e.g. air quality regulations at the Port of Oakland, are yet another challenge: "You could do a whole other study on the impact of these stricter environmental regulations in California, and it's not just our Port, its LA and Long Beach, as well. We've essentially made it much more expensive to bring cargo. Because there are these ports in Mexico and Canada, and because the Panama Canal is being widened, the theory is that we'll be circumvented. So, is that a good thing in terms of air quality? Yes. Is it a bad thing in terms of employment in these sectors and the competitiveness of Oakland in terms of that sector? Yes. But people could also argue that other

Ports of the world will have to follow our lead, but in that time lag… right now our Port is only really 50% utilized. So you've got consequences of that."

The following section seeks to highlight some of the key actors and efforts toward furthering innovation and green economic growth in the East Bay, as well as nascent attempts to coordinate green economic development regionally.

EXISTING GREEN BUSINESSES

Six of the top 200 environmental service firms in the United States are headquartered in the East Bay, and it is also home to multiple environmental consulting and engineering firms, a concentration of 3.5 times the national average.[30]

Several industry leaders are located in the East Bay, including the solar companies Bright Source and Solaria Corporation, as well as Bay Biodiesel, headquartered in Martinez, Solyndra (a photovoltaic manufacture) in Fremont, PowerLight in Richmond, and Amyris Biotechnologies in Emeryville. One interviewee suggested that the region is particularly strong when it comes to bioenergy technologies:

> "one of the reasons that the BP institute ended up here is that we have 825 biotech companies here in the Bay. […] There's a trained workforce of 50,000 that's working in the biotech industry and we have expertise, managerial experience, and the capital. That's what will make it easy to spin companies out of here, that's all in place you know the network relationships and knowledge. So, yes, I would expect that Berkeley will become, let's call it the industrial biotechnology, could become what Stanford was to the IT industry. I think we would be a failure if that was not the case."

Green building is another fast-growing sector of the East Bay's green economy. Newark's CalStar Cement, is a leader in green building material manufacturing, and, having received $3.4 million in venture capital funding, plans to manufacture high-quality cement that requires far less energy – and hence results in a smaller amount greenhouse gas emissions – than the conventional material.[31] According to one interviewee, "green-friendly policies in the East Bay has led to various federal research grants invested in the area, have attracted green-businesses along with sparking schools and labs conducting more research in green-tech."

ACADEMIC AND RESEARCH INSTITUTIONS

Proximity to research institutions is an important factor driving regional innovation since locating near universities or government laboratories can 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 corporations.[32] This is definitely true of the emerging green industries that have few companies with enough capital to conduct the research and development necessary to bring new products to market.

[30] Craft Consulting Group, 33.
[31] Craft Consulting Group, 33.
[32] Audretsch, D., *Agglomeration and the location of innovative activity.* Oxford Review of Economic Policy. 14. 1998,18-29.

As already mentioned, the East Bay is home to several premier academic and research institutions, including the University of California, Berkeley (UC Berkeley) and the Lawrence Berkeley National Laboratory (LBNL). One interviewee noted that the region, "through its research labs and schools, allows those with ideas to produce them and ultimately become a reality." Green-related research is taking place in departments at UC Berkeley, including the sciences, engineering, and interdisciplinary programs like the Energy and Resources Group (ERG). LBNL "has been at the forefront of green-tech" research and an important source of technological innovation.

UC Berkeley is also home to the Energy Biosciences Institute (EBI). Funded by a $500 million BP grant, it is a partnership among BP, UC Berkeley, LBNL, and the University of Illinois that aims to deliver breakthroughs in energy bioscience. [33] LBNL also leads the Joint BioEnergy Institute (JBEI), which is funded by the Department of Energy (DOE) and has as its mission to "advance the development of the next generation of biofuels."[34] One interviewee pointed out that the two biofuels institutes in the East Bay together with LBNL constitute "a concentration of talent that Stanford doesn't have and UCSF has nothing."

Finally, UC Berkeley's Haas School of Business is an important source of entrepreneurial talent for the green economy in the East Bay. One interviewee singled this out as an important asset for the East Bay:

> "The number one thing goes back to what were saying before, which is proximity to knowledge resources. And that includes everything from the inventors of technology to the consultants who help you get it done to the work force that you can recruit to do this. It's very hard when you're in a situation where you have to recruit your workforce from somewhere else…Look at the challenges they're facing in Colorado. They're trying to build this big cleantech supercluster, and they're having challenges. The reason they're having challenges is that they have the universities but...they have people inventing things but they don't have an entrepreneurship. Here we have people who understand how to be entrepreneurs…they may not have done it in cleantech, but they know what it takes, they understand how to structure the trajectory of a company, how to do milestones, the whole nine yards."

The availability of entrepreneurial talent is particularly important because of the gap between innovation generated at the lab and the capacity to bring an innovative product to market. One interviewee remarked: "We go out and try to encourage scientists to recognize that they have inventions, because many of them are researchers who don't necessarily think along those lines. They understand discovery of new knowledge and they understand writing of academic papers, but they don't always consider whether they have developed a new technology that can then be used." Proximity to a pool of business-minded people interested in green products is therefore an important asset.

UC Berkeley's Office of Technology Licensing (OTL) is among the most important East Bay organizations facilitating the technology transfer process. In FY08, the OTL established IP rights agreements with 27 companies of which 14 were start-ups. Importantly, of the 14 early stage licensees, at least 9 were green tech companies, including Adura Tech (lighting energy efficiency), Aptility / MicroClimates (residential energy control and demand response), Cooler (carbon usage calculators), HFTA (biofuel production), International Energy (biofuel production), Solexel (photovoltaics), Stressmarq Biosciences (bioreagents),

[33] Over 10 years.
[34] Joint BioEnergy Institute, http://www.jbei.org/.

Taoit/Goodguide (product sustainability ratings), and XL Tech / Ecoprene (isoprene biofuel production).[35] Several other organizations are involved in trying to bridge the lab to market gap, including LBNL's Technology Transfer Department and the Berkeley Energy and Resources Collaborative (BERC), a student group mentioned by several interviewees as an important networking opportunity in the East Bay.

While the universities and research institutions produce intellectual and entrepreneurial capital, the retention of this valuable asset is dependent upon other factors. For example, one interviewee expressed concern that "a chicken and egg problem" can occur, noting that "[t]he company will emerge, and look around, and find out that our industrial facilities are old and inadequate and they'll go somewhere else, because they don't want to wait the 2-3 years it would take to build something for them. Or the opposite could happen, we could build something speculatively and those companies never emerge in the way we think they will." Multiple organizations have emerged at both the governmental and non-governmental level to try to assist new green business both with the technology transfer process and finding the facilities and workforce necessary for expanding their operations.

PUBLIC-PRIVATE PARTNERSHIPS

The East Bay benefits from the presence in the region of a number of organizations that aim to facilitate green economic development. In late 2007, the mayors of Oakland, Berkeley, Richmond, and Emeryville along with the U.C. Berkeley chancellor and the head of the Lawrence Berkeley National Laboratory (LBNL) announced an ambitious plan to foster and promote the green economy in the region. The so-called East Bay Green Corridor Partnership (EBGCP) has since expanded to include four more East Bay cities – Alameda, San Leandro, Albany, and El Cerrito, as well as three other educational institutions: the Peralta and Contra Costa community college districts, and Cal State East Bay. Each of these cities brings different economic strengths and policy approaches to the partnership, but they seek to develop through policy coordination and marketing a new collective identity for the region as the "Silicon Valley of Green."

The partnership resulted from a conversation between UC-Berkeley Chancellor Robert Birgeneau and the local mayors about how to link campus resources to the cities more effectively. One major impetus was the $500 million investment by British Petroleum in biofuels research by a consortium including UC-Berkeley, LBL, and the University of Illinois. The partnership aims to capitalize on the East Bay's regional strengths and assets, as well as foster and retain start-up companies spawned by innovative research coming from U.C. Berkeley and LBNL. This would be done by creating a positive business climate and putting in place incentives for green businesses, as well as coordination among technology-transfer, economic development, and workforce development departments in the region.

One of the organizations involved in the Partnership does its own work in business attraction that complements the EBGCP's work. Among the main goals of the *East Bay Economic Development Alliance (EDA)*, a public-private partnership, is to "capture green investment [and] growing green businesses." One interviewee explained that the EDA has been participating in trade shows in order to market the East Bay as a great place to invest in green.

The *Oakland Partnership* is another public-private initiative that strives to strengthen the regional economy and has developed its own GreenTech Cluster initiative, although this initiative has run into challenges. An interviewee remarked on the need to focus the excitement around the green tech

[35] UC Berkeley Office of Technology Licensing, *OTL FY08 Annual Report*, http://otl.berkeley.edu/page.php?nav=66.

economy and actually voice the concerns of green businesses. However, there were difficulties in finding "practical business people who had a company who wanted to shape this thing" and who had the time to take the lead on initiatives. Instead, the GreenTech Cluster initiative had "a lot people who were from non-profits, who were academics, who theoretically had a sense of where this thing could go." Despite the challenges, the Oakland Partnership has also pursued other ideas. Together with the East Bay Green Corridor, it launched the East Bay *Green Academy* whose goal is to bring together workforce training programs in Alameda and Contra Costa Counties, as well as local education institutes, and ensure that their curricula are aligned with the workforce needs of local green employers.

GREEN POLICIES AND OTHER LOCAL GOVERNMENT INITIATIVES

The Bay Area has always been known for its progressive politics and policies. The liberal, relatively well-educated population has certainly been an important factor in the region's political decisions and abilities. While some issues have been more of a struggle than others, there is certainly a culture of environmental awareness in the Bay Area, which helps facilitate green policies and regulations. As a policy maker noted, "the people who live and work here already seem to be interested in this "green" issue. They tend to be early adopters; tend to be more civic–minded than people who live in the suburbs. … (I)t's a similar story to the tech boom. Regions with an open-minded culture tend to innovate more quickly." A recurring theme during the interviews was the idea of local governments' ability to drive sizeable demand for green products through their regulatory and procurement practices. All 14 Alameda County cities, for example, have committed to the Cool Counties Initiative, which calls on regional leaders to reduce local greenhouse gas emissions 80 percent by 2050. Berkeley, Oakland and others have also both adopted Climate Action Plans, which recommend specific actions to achieve emission reductions in various sectors, including transportation and land use, building energy use, and waste reduction and recycling.

Specific local policies are in place to encourage green economic development. An interviewee noted that the "City [of Oakland] has been at the forefront of a number of things, mostly on the regulatory front: they are completely overhauling their building code, requiring green building practices, doing a good job reaching out to contractors, to make it not too burdensome on them in the near-term." Oakland's *Green Light on Green Building* program strives to streamline green building permitting by supporting new green construction with information programs and incentives, and also encouraging existing building owners to "go green" by offering technical assistance and tax breaks. Other activities in Oakland include the Green Building Resource Center which provides assistance to residents, the Environmentally Preferable Purchasing Policy, and long-term, strategic plans for climate action, zero waste, and local food systems (spurred in part by its activist nonprofit sector).

Other East Bay governments have also implemented green building ordinances including the City of Berkeley, which requires builders to consult the Berkeley Green Building Coordinator, the City of Albany, which has put in place Green Building Standards of Compliance; and the City of Richmond, which requires that all city-funded projects achieve minimum green building standards. Berkeley has an active Office of Energy and Sustainable Development that has enacted a point-of-sale ordinance that requires homeowners to do energy efficient retrofits before selling (the *Residential Energy Conservation Ordinance*). The city's *BerkeleyFIRST* Sustainable Energy Financing Initiative program, started in 2007 also aims to stimulate the local economy through purchasing incentives. The program helps homeowners overcome the major hurdle to installing solar panels by having the city pay all upfront fees and allowing homeowners to amortize the costs over 20 years. The program encourages residents to

consider alternative energy sources while boosting the local solar panel industry.[36] Berkeley also houses the Rising Sun Energy Center, which offers a summer program that trains high school students to conduct home energy use evaluations. Such local policies are important in driving demand for green products and services.

A second role for local government is in waste management, which our data show is among the most competitive– although not most innovative – green industries in the East Bay. An interviewee remarked that the Oakland *Public Works Agency* was "one of the first public agencies to have a zero waste goal… this has led to a nice relationship with our recycling community. And Oakland has a large recycling community because of the Port. Scrap goes onto barges and gets made into things they sell back to us. My basic understanding is that there is an example of the virtuous cycle between some of these regulatory initiatives and the recycling industry." The East Bay is also home to three *Recycling Market Development Zones* (RMDZ) including Oakland/Berkeley, Alameda County-Southern, and Contra Costa. The RMDZ is a state program that "combines recycling with economic development to fuel new businesses, expand existing ones, create jobs, and divert waste from landfills" and "provides attractive loans, technical assistance, and free product marketing to businesses that use materials from the waste stream to manufacture their products and are located in a zone."[37] Some business leaders have showed frustration that the RMDZ is not more fully utilized, and cities could be more aggressive in marketing this advantage.

Finally, while the state has encouraged the renewable energy sector via its Renewables Portfolio Standard, the role for local governments is unclear. Berkeley, Emeryville and Oakland have been exploring Community Choice Aggregation (CCA) as a way of providing their residents with more power from renewable sources than is currently required by the statewide standards. The City of Alameda is unique in the Bay Area in having a municipal power company that provides over 80 percent of the city's power from renewable sources.[38] Yet, one economic development official expressed doubts that a city's policies can promote clean energy development: "I don't know that a city's policies can promote a market so much. […] Most of the cities in the region have decreased their building permits for solar installation, as a way of promoting solar installations of both commercial and residential, and we have done that. So we are trying…there are other ways that we try to promote clean technologies, but there's not a direct linkage between those and business development policies." The lack of budgetary allowances for programs supporting clean technologies is a major problem: "I get at least 2 phone calls a day from brokers 'Hi, I'm representing a cleantech company. We want to know what you can do for us. San Jose has said…Santa Clara has said…' So Santa Clara can give really cheap utilities and San Jose can do a whole bunch of miraculous things. But we have no budget. Zero. So I have no money for incubators, no money for loan funds."

Another interviewee, however, pointed to the ability of local governments to "use their procurement budgets to stimulate cleantech companies to come into their town. Say you wanted to launch a fleet of plug-in hybrid buses,--or hybrid buses--you're going to be prepared to do a substantial procurement, but you wanted to condition that on the company setting up a presence in your city, both to maintain the buses and to train people, and create a workforce development component to it as well. Cities and counties spend a lot of money." Another interviewee echoed those sentiments, noting:

[36] City of Berkeley, *BerkeleyFIRST*. http://www.berkeleyfirst.renewfund.com/
[37] California Integrated Waste Management Board, http://www.ciwmb.ca.gov/RMDZ/.
[38] Alameda Municipal Power, http://www.alamedamp.com/aboutus/.

"I'd say those three are probably the [policies] that come to mind most immediately: the incubating of companies, the pulling in by demand on the procurement side, and using city pension money to take an active position. And then, just generally policies, like a city-wide mandate to retrofit all the city buildings, or all the public housing, redo all the windows, redo all the duct insulation, as it's sort of a procurement strategy, but it's driven by a policy that says "we're going to have x% of our municipal fleet be clean fuel, or x% of our electricity generated from renewables, or we're going to retrofit some percentage of our downtown office space, or our municipal buildings" and then the companies that respond to those bids, there's a hook that says if you win we're going to help you set up shop here. We don't want you necessarily coming in from the outside, doing the job and then leaving. We want you to leave a presence in terms of training, at least, and hopefully training and a corporate footprint that lasts for a while."

GREEN JOBS TRAINING

Although few green businesses are growing right now, many believe a shortage of qualified workers will become an issue in coming years. For example, as the solar industry is experiencing rapid growth, jobs are being created in design, manufacturing, sales, logistics, installation, operations, maintenance, etc, but solar employers are experiencing increasing difficulty in finding qualified solar workers.[39] Building a skilled employment base is a major prerequisite for future green economic growth, and the East Bay has taken some positive steps toward meeting the challenge. Importantly, this is also a challenge in keeping those jobs local. As one interviewee put it, "We don't just want wind energy to be coming down from British Columbia, we want solar energy to be able to go up, it's some sort of an exchange."

For example, the *Ella Baker Center*, together with the East Bay branch of the *Apollo Alliance*, designed and launched the *Oakland Green Jobs Corps*, a workforce development program that provides low-income Oakland residents with job training and facilitates their placement in green economy jobs. The collaboration, which also includes Laney College, the Cypress Mandela Construction Training Program, and Growth Sector, Inc., graduated its first class in June 2009. Students are provided with basic training first before focusing on skills specifically needed for green-collar employment, e.g. solar installation, green construction, energy efficiency, etc.

Solar Richmond is one example of a city-sponsored job training program that links low-income residents to economic sectors that are creating quality green-collar jobs. Solar Richmond is a non-profit organization in the city of Richmond, California that provides low-cost and free solar installation to low-income homeowners and trains low-income Richmond residents in the solar technology skills required to do the work. Solar Richmond partners with Richmond BUILD, the city-sponsored job training program. Students undergo a 10-week pre-apprenticeship course in construction skills training and solar installation. In addition, a job placement component is included.

The East Bay's local community colleges also offer green vocational training. In addition to the Green Jobs Corp, Oakland's Laney College, for example, offers an Environmental Control Technology Program, a technical program that awards associate degrees in Residential and Light Commercial HVAC as well as Commercial HVAC systems. Other traditional courses such as energy systems, landscape design, engineering and architecture are also being adapted to include skills required for green employment.

[39] Solar Tech, *Creating a Solar Center of Excellence White Paper*, June 2007, www.solartech.org.

CHALLENGES AND OPPORTUNITIES

Despite all of the region's wonderful resources and organizations aimed at promoting the green economy, there remain some important challenges to having a truly successful and nationally recognized green economy. Common concerns – to all East Bay businesses, not just green firms – include the cost of doing business and living in the region, the lack of low-cost industrial land, and the high crime rates in some industrial areas.

There are, however, additional steps that many feel that the East Bay governments can take to address the challenges of attracting top green tech companies and green economy industries. As a number of people, from government officials to policy makers to business owners, have pointed out, if the East Bay wants to develop its green economy, the region and its cities need to clarify what exactly the "green economy" is. The confusion over what cities are trying to attract and foster seems relatively widespread. As one business owner noted, "*Green* is not a sector, it's an overlay to everything. When you talk about *green innovation* or the *green economy*, what are you talking about? Are you talking about cleaning products, computers, clothing, cars, food, and manufacturing or are you talking about cleantech and research etc.?" If the region is committed to becoming a national center for the green economy or for green innovation or even just trying to develop workforce development programs, this role needs to be made clear. Additionally, it needs to be acknowledged that strategies to attract and promote these various green economies will change depending on how the region defines its role.

While most cities in the East Bay region have been proactive about promoting policies that support the green economy, supporters and critics are convinced they could do more with market-based strategies. On the policy front, some feel that cities could be more aggressive about designing policies that not only require "green" work in the region, but also encourage companies that do the green work to locate locally.

East Bay governments could also make a greater effort to support local green businesses by implementing stronger Environmentally Preferable Purchasing policies. Such efforts not only help support the local economy and the environment, but can also serve as drivers of regional innovation.[40] One investor also noted, that governments can help to create economic *pain points,* which not only incentivize people to purchase environmentally friendly goods, but also encourage venture capitalists to invest in green innovation. In this way, regulations and economic conditions can act as a driver for innovation. "The thing that really makes it something where you have venture investors, where you have real money flowing into it rather than impassioned people is typically something like pain points that have to do with alternatives. For example, when energy is expensive, people are more willing to invest in alternatives." The investor noted that the region can no longer rely on purely emotional or environmental incentives to push green innovation and the green economy. Government policies will be essential in creating a good regulatory and economic climate for this type of economy.

Another way in which municipalities can get involved is through supporting the incubation of green tech companies. As one expert noted,"It helps that however broke they are, the public sector actually has money to spend right now, relative to other people. They're not sitting on their wallets entirely. And the stimulus money is going to come sooner or later."

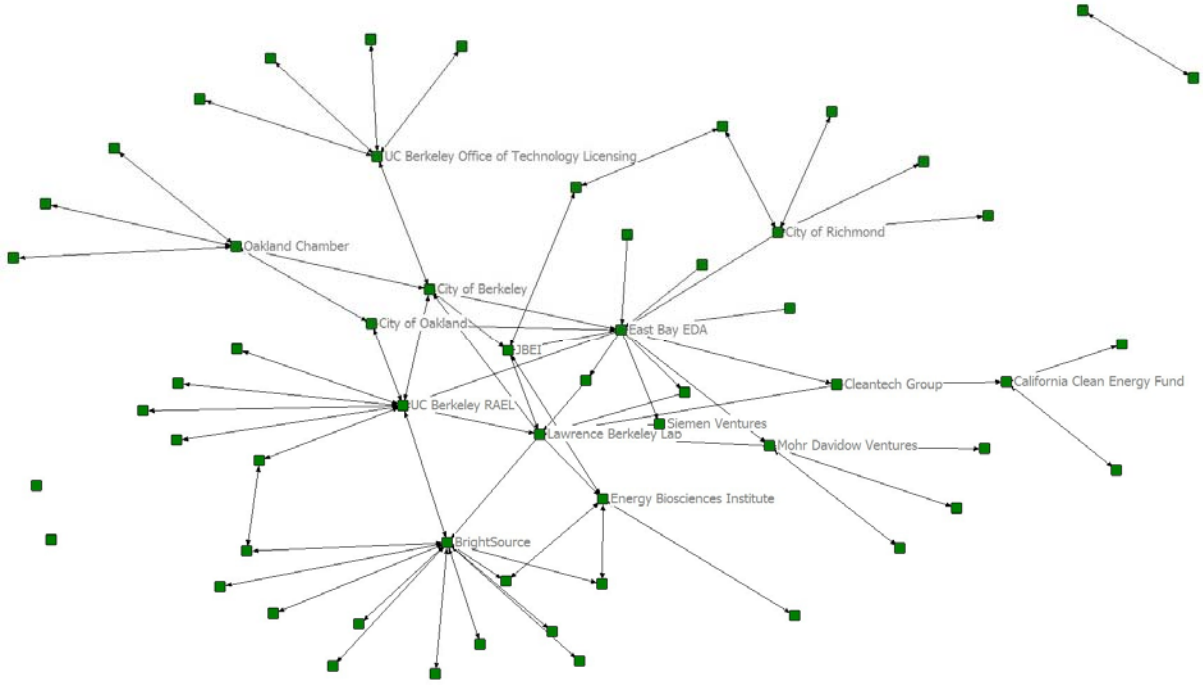
In addition to city and regional policies, there are other community and business resources that should be strengthened in order to promote the green economy. According to one green economy specialist,

[40] Chapple, *Defining the Green Economy: A Primer for Green Economic Development*.

one of the most un-tapped resources that the Bay Area has to offer is the local community and vocational colleges. While there are already a few programs in place, it has been suggested that more could be created, particularly in collaboration with governments. He suggested that because of the number of these colleges and the number of students that come out of them, they could provide a very beneficial resource to both businesses and cities looking to train new employees.

Another community building activity that should be encouraged is that of social networking. While there are a few informal groups that have been cited, for example the Sustainable and Renewable Energy happy hours, green experts have noted that a more formal organization of different green industries would be welcome. Through interviews with key, local, green economy figures, a network map was put together to show the extent of professional relationships between business, research and city officials. As Figure 7 shows, while the public sector is linked within itself, and the private sector and research groups are linked within themselves, there is very little connection between the two groups. These connections should be strengthened to take advantage of the great and varied resources that make the East Bay a unique place for the green economy.

Figure 7: Social Network Map of the Green Economy in the East Bay



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

Meanwhile, not all green industries are the same, and groups that aim to organize different sectors together should be careful about how much overlap there really is after you take away the "green" aspect. Most agree that dialogue and networks are much more fluid and easier to have when they are more sector or geography oriented. Finally, the Bay Area and the various communities should work to be more aggressive about attracting angel networks and investors. This gap in financing and supporting new innovation and development can often be seen as an insurmountable obstacle to entrepreneurs.

CONCLUSION

The East Bay is clearly making an ambitious attempt to become "the Silicon Valley of the green economy". Through organizations like the East Bay Green Corridor Partnership, and other public and private initiatives, the region is hoping to stake its claim at the forefront of green innovation and development. In many ways, the region is well positioned to become a competitive region in attracting the green economy. Between its progressive local governments, top research institutions, and a growing critical mass of green businesses, the region seems to have the parts necessary to further develop the green economy. In the past, the East Bay has lagged its sister regions, Silicon Valley and San Francisco, in economic development, lacking the cross-sectoral networks of the former and the unified progressive government of the latter. It remains to be seen whether this time the local players can rise to the challenge of leading the country in green innovation.

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