

# 2011

## Opportunities and Obstacles to Retain, Grow, and Attract Green Manufacturers in Los Angeles



Sarah Barton

Urban and Environmental Policy

20 April 2011

## Table of Contents

<b>Executive Summary .....</b>	<b>iv</b>
<b>Introduction.....</b>	<b>v</b>
<b>I. History and Importance of Manufacturing in America .....</b>	<b>1</b>
National Decline in Manufacturing .....	1
Decline in Manufacturing in Los Angeles.....	1
Moving away from Manufacturing and Towards a Service-based Economy .....	2
Manufacturing Jobs Provide Higher Wages .....	3
Manufacturing Sector has the Highest Multiplier Effect.....	3
Manufacturing Provides a Pathway to the Middle Class.....	4
Manufacturing is Closely Tied with R&D.....	4
Reinvesting in Manufacturing .....	4
An Opportunity in the Clean Economy .....	5
Los Angeles has a Regional Advantage .....	5
<b>II. Regional Advantage.....</b>	<b>7</b>
Reduced Operating Costs.....	7
Improved Access to High Potential Markets .....	8
Cluster Efficiencies.....	9
Regional Infrastructure .....	10
Workforce Characteristics .....	10
<b>III. Opportunities to Grow Los Angeles' Green Manufacturing Industry .....</b>	<b>12</b>
Cluster Growth- The Cleantech Corridor .....	12
Cleantech Manufacturing Center .....	13
Opportunity in Clean Transportation.....	13
Rail Car Manufacturing .....	13
Electric Buses.....	13
Other Niche Markets- Green Building Materials .....	14
Other Land Zoned for Manufacturing .....	15
The Lanzit Industrial Site.....	15
Block 25 .....	15
The Good Year Tract .....	15
To Attract or to Grow?.....	16
<b>IV. Obstacles.....</b>	<b>18</b>
Economic Conditions.....	18
Interstate Commerce Law .....	18
Land Use Policy .....	19
Infrastructure Strains.....	19

Tough Local Campaign .....	20
Regulations .....	20
US Corporate Tax .....	21
Political Debate in Washington .....	21
Inconsistent, Short Term Manufacturing Policy.....	21
<b>V. Strategies and Recommendations.....</b>	<b>23</b>
Manufacturing Extension Partnerships.....	23
Create a Network .....	23
Collaboration Between the Private and Public Sector .....	24
Make it in America .....	24
Change the Federal Public Transportation Mix .....	24
Strengthen Domestic Supply Chain.....	24
Ensuring the Triple Bottom Line .....	25
<b>Conclusion .....</b>	<b>26</b>
<b>References.....</b>	<b>29</b>

## **Executive Summary**

This research was done to evaluate Los Angeles' opportunity to become a world leader in green manufacturing. The paper first discusses the movement away from a strong manufacturing sector to a service-based economy, and the problems associated with shrinking this industry. Then, the regional advantage of Los Angeles is discussed, explaining why L.A. has what it takes to foster a thriving green manufacturing industry. Specific opportunities for growth are then identified, citing the Cleantech Corridor, opportunities in clean transportation and green building materials, other land zoned for manufacturing, and working with existing manufacturers. Although there are strong opportunities for green manufacturing in Los Angeles, there are also obstacles to this growth. Namely, economic conditions and land use policy in L.A. are not supportive of attracting new manufacturers, nor are certain aspects of infrastructure in Los Angeles. Nationally, confusing regulations, the U.S. Corporate Tax, the political debate in Washington, and the lack of long term manufacturing policy also provide obstacles to the growth of the green manufacturing in America. Although there are challenges to overcome, there are also ways to assure the success of Los Angeles' green manufacturing industry.

First, strengthening the network and flow of information for those involved in the industry is crucial. Whether it be more effectively coordinating supply and demand, helping a manufacturer expand into new markets, or connecting manufacturers with workers participating in job training programs, strengthening this network will reduce costs and increase productivity for manufacturers. Furthermore, it is beneficial for both growing existing manufacturers, and attracting new ones.

Also, Los Angeles needs to use its influence to leverage a stronger request for more federal support of green manufacturing. A long term manufacturing strategy will give investors the confidence they need to grow the industry, and greater collaboration between the private and public sector could take that capital even further. Being able to strengthen all levels of green manufacturing supply chains will assure the greatest job creation.

Last, Los Angeles and the United States as a whole need to evaluate how policy decisions affect not only businesses, but also communities and the environment. This includes investing more in education, especially in low income communities, conducting environmental impact reports, and having a greater overall commitment to blended value policy making. There is an enormous opportunity to proceed into the future with less green house gas emissions and more good-paying jobs, but we have to make sure we all move forward together.

## Introduction

Much of the current political discourse in the United States revolves around two issues: climate change and the need for good jobs. With greenhouse gas emissions increasing by 14 percent in the U.S. between 1990 and 2008, and with unemployment at 8.8 percent in March 2011, the United States must curb these trends. Luckily, there is an opportunity in Green Manufacturing.

Green Manufacturing provides the opportunity to increase employment and reduce greenhouse gases in the United States. Providing higher wages than many other industries, a large multiplier effect, and a close relationship to R&D, investing in green manufacturing can put thousands back to work. Also, producing goods in a more energy efficient way and innovating new technologies to serve the green market will reduce energy consumption in America. As the U.S. invests more in renewable energy, it only makes sense to manufacture the components here, creating good jobs while cleaning up our economy.

Green manufacturing can generally suggest two things: manufacturing in a green way, or manufacturing green products. This paper sees the validity of both approaches, and discusses where each is most appropriate. For example, efforts to attract green manufacturers to the area usually mean attracting manufacturers of green products, although they are also expected to manufacture in an energy efficient way. For example, a manufacturer locating in the Clean Tech Corridor is meant to manufacture components that serve the green economy, and be LEED certified. The discussion of existing manufacturers in Los Angeles, however, focuses more on greening their processes, but also with the potential to retool and serve the green market.

This paper focuses on growing the Green Manufacturing industry in Los Angeles, and discusses the various opportunities and obstacles of doing so. This information was gathered from a variety of reports, articles, and interviews. Interviews were conducted with a representative from seven different organizations: Los Angeles Alliance for a New Economy (LAANE), Green for All, the Apollo Alliance, Strategic Concepts in Organizing and Policy Education (SCOPE), Community Development Technologies (CDTech), Community Redevelopment Agency of Los Angeles (CRA/LA), and the Los Angeles County Economic Development Corporation (LAEDC).

Although meant to be a comprehensive discussion of opportunities to retain, grow, and attract green manufacturers in Los Angeles, this paper does have its limitations. First, the opportunities, obstacles, and recommendations reflect trends in information gathered from the literature and interviews. Although there are surely more facets than discussed, these stuck out as the most important issues to local groups in Los Angeles that are promoting green manufacturing. Also, although issues of environmental and community justice should most definitely be included in plans to grow the green manufacturing industry in Los Angeles, this paper could not delve into them at depth. I suggest future research go more into this topic, such as the environmental and community costs associated with the port, rail and freeway systems that are important to the manufacturing

industry, and on the planning and environmental justice issues related to the Clean Tech Corridor.

Last, it is important to put this paper into context. America just came out of the Great Recession, and the opportunities, obstacles, and recommendations for growth in Los Angeles' green manufacturing industry reflect this. As the U.S. recovers, some opportunities might disappear as others arise, but regardless, the advantages of investing in green manufacturing will continue long into America's future.

## I. History and Importance of Manufacturing in America

The manufacturing industry has always played an important role in America's economic history. During the thirty years after World War II, the US experienced a booming manufacturing industry, which resulted in economic growth and a strong middle class. In fact, the gross national product grew 50 percent between 1940 and 1950, and 67 percent between 1950 and 1960. Also, between 1947 and 1973, family incomes doubled.<sup>1</sup> Unfortunately, the picture of our economy today does not look the same, and the manufacturing industry in America is significantly smaller.

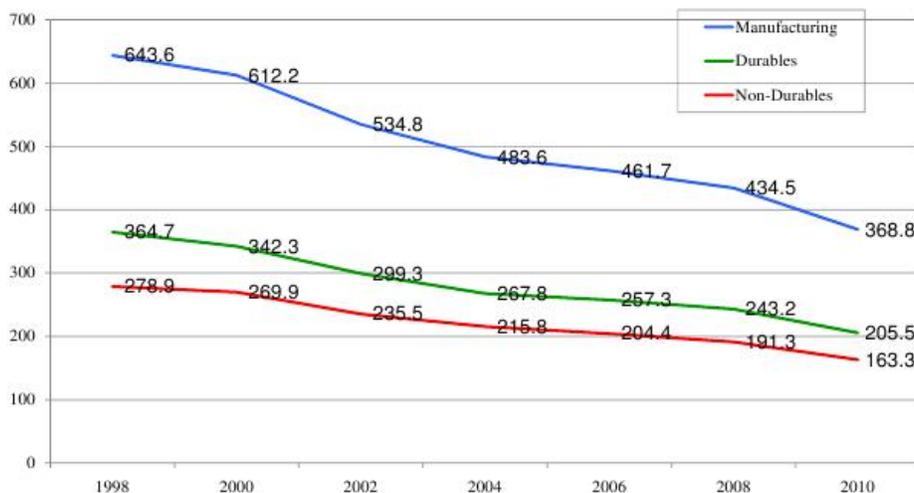
### National Decline in Manufacturing

In the past decade, the US has closed the doors to many manufacturing factories, and lost millions of good, middle class jobs. Whereas manufacturing made up 28 percent of GDP in the 1950s, now it only accounts for 11.5 percent. More specifically, between 2001 and 2010, more than 42,000 factories were closed down, and a third of all manufacturing jobs, 5.5 million, have disappeared.<sup>2</sup> From the start of the recession in December 2007, more than a million manufacturing jobs have been lost, with 200,000 in January 2009 alone.<sup>3</sup>

### Decline in Manufacturing in Los Angeles

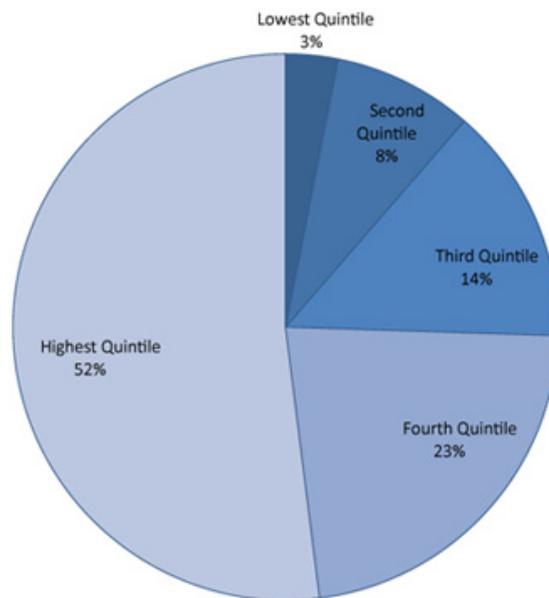
Consistent with the national trend, Los Angeles lost a great deal of manufacturing jobs impacting thousands of people who had received middle class wages. In the 1990s, moreover, post Cold War federal budget cuts resulted in the loss of 127,000 aerospace jobs between 1988 and 1996. Although other industries like the apparel industry were growing at this time, the average wage was only \$17,500 compared to \$48,900 in defense (in 1996 dollars).<sup>4</sup> This reflects the larger trend of an economic shift from employment in middle class jobs to lower paying, often service industry, jobs. In fact, in UCLA's 2007 Anderson Forecast, researchers found that from 1989 to 1999, the percentage of those earning middle class wages in LA (\$50,000 to \$75,000) declined about 40 percent- from just under 18 percent to about 10 percent.<sup>5</sup> New American Dimensions LLC graph shows this decline in manufacturing in LA County between 1998-2010.

Figure 1  
The Decline of Manufacturing  
Manufacturing Employment Los Angeles County (1998-2010), in Thousands



The erosion of manufacturing and middle class jobs is important for many reasons, and has been a leading cause for the growing income inequality in Los Angeles. As Los Angeles Alliance for a New Economy (LAANE), a leading advocacy organization dedicated to developing living wage jobs, expressed in its Poverty Report released in September 2010, the 20% of households with the highest incomes claimed more than half of all the income in the county, while the lowest-earning 20% received 3% of the pie.<sup>6</sup> What is perhaps the most striking is the data regarding the working poor. In Los Angeles, many people work full time, but do not get paid enough per hour to support themselves and their families. LAANE's report shows that more than one in four full-time workers in the county live below twice the federal poverty level.<sup>7</sup>

Figure 2  
Distribution of Aggregate Income by Quintile in L.A. County



Source: 2009 American Community Survey

This is again a reflection of the lack of middle class jobs in Los Angeles and the prevalence of low wage industries.

### **Moving away from Manufacturing and Towards a Service-based Economy**

As just mentioned, Los Angeles has been experiencing a shift away from manufacturing jobs towards a service-based economy. This is a problem for two main reasons: although the service sector is certainly capable of generating wealth, manufacturing jobs pay on average \$25,000 more per year than service sector jobs and often provide benefits such as health care and pensions.<sup>8</sup> Furthermore, the service sector cannot create the volume of jobs needed to sustain America's workforce of more than 150 million, a large economy needs manufacturing to sustain itself.<sup>9</sup> Richard Cyert, the president of Carnegie-Mellon University, gave a good explanation of why shifting away from manufacturing towards a service-based economy is problematic: "The effect of this movement over time will be to change the income distribution in the country. The shift from manufacturing to service jobs will be one in which the income distribution will become more skewed than it is

currently... Putting it another way, we will have a reduction in the number of middle-income people. The economy will tend to be polarized into two classes, the low- and high-income groups.”<sup>10</sup>

**Manufacturing Jobs Provide Higher Wages**

As LAANE’s poverty report showed, many Americans work full time but still live in poverty. For this reason, it is important for the US to invest in higher paying jobs such as those in the manufacturing industry that can move people out of poverty and into the middle class. For example, manufacturing jobs pay 21 percent more in wages and benefits than the average for the entire economy, and the often provide health, pension, and other benefits. Also, tenure for manufacturing occupations is higher than the national average for all occupations.<sup>11</sup>

Figure 3  
 Manufacturing Payroll Levels are Comparable or Better Than Other Industries  
 Total Employment, Annual Payroll and Per Capita Pay for L.A. County 2008

2008	Total Employment	Annual Payroll (000's)	Per Capita (000's)
Manufacturing	453,162	\$21,131,902	\$46.6
Construction	153,858	\$7,304,398	\$47.5
Wholesale Trade	280,991	\$14,203,755	\$50.5
Retail Trade	413,506	\$10,825,929	\$26.2
Transportation	164,246	\$7,203,301	\$43.9
Real estate	88,787	\$4,207,585	\$47.4
Education services	124,486	\$4,206,231	\$33.8
Healthcare	460,082	\$21,293,391	\$46.3
Accommodation / food services	354,147	\$6,181,399	\$17.5

Source: Source: 2008 County Business Patterns

**Manufacturing Sector has the Highest Multiplier Effect**

Besides paying better wages than many other industries, manufacturing creates the most jobs outside its own sector. . As the Manufacturing Institute notes, “every dollar in final sales of manufactured products supports \$1.40 in output from other sectors of the economy.”<sup>12</sup> The service sector, according to the National Association of Manufacturers, supports just half as much at \$0.71 in output for every dollar in final sales.<sup>13</sup> Put another way, the Economic Policy Institute estimates that every direct manufacturing job supports an additional 2.9 indirect jobs in finance, transportation, supply chains, installers, and other related businesses.<sup>14</sup> Even in 2009, a year when manufacturing was experiencing its sharpest decline to date, the sector still supported nearly 7 million nonmanufacturing jobs outside the plant.<sup>15</sup> Claudia Preparata from Green for All, a national organization working to build an inclusive green economy and lift people out of poverty, explained that because of its multiplier effect, manufacturing is a critical driver of long term sustained economic growth.<sup>16</sup>

### **Manufacturing Provides a Pathway to the Middle Class**

As the Green Building Manufacturing report created by students at UCLA's Urban Planning department states, "the work force associated with the green manufacturing industry in Los Angeles County is characterized by a high percentage of males and Latino workers. A vast majority of the workforce has a high school education or less."<sup>17</sup> But for workers without four-year college degrees, manufacturing jobs have typically provided them with access to the middle class. As manufacturing jobs disappear, the only option for many workers is low-paid service sector jobs, which again result in growing inequality and a dramatically shrinking middle class.<sup>18</sup> As the 2010 Green For All report Bridging the Equity Gap recognizes, manufacturing jobs "can create pathways into the middle class by providing prevailing-wage employment with health benefits and workforce development practices that improve career-track opportunities as jobs transform. And they can improve the overall health of low-income communities by decreasing pollution levels and creating healthier neighborhoods, among other environmental benefits." It's important that America has a strong manufacturing industry so that those with barriers to entry can become part of the middle class, and so that social inequities associated with higher pollution levels in low-income communities can be reduced.

### **Manufacturing is Closely Tied with R&D**

Manufacturing is the primary driver of the research and development that generates new ideas, inventions, and intellectual property that fuels long-term economic growth. In fact, more than two-thirds of the money spent on R&D in the US is spent in manufacturing.<sup>19</sup> Because you cannot separate innovation from manufacturing, where manufacturing goes, innovation inevitably follows. As manufacturers continue to leave the US and locate overseas, so will the R&D and America will lack the infrastructure to design new products and bring them to market. Brian Lombardozzi from the Apollo Alliance, another organization working to catalyze a clean energy revolution that will put millions of Americans to work, voiced his concern about the departure of R&D jobs to India and the resulting "brain drain" here in the US.<sup>20</sup> Currently, out of the ten companies that spend the most on R&D in the US, eight also have R&D facilities in China or India.<sup>21</sup> According to the Department of Energy, the United States spent \$15.4 billion (in 2008 dollars) between 1978 and 2007 on renewable energy R&D, but it was Japan, not the United States, that commercialized the solar panels that came from this R&D. As another example, although the LCD television was originally the product of American R&D, the entire industry had been ceded to Asia in the 1990s.<sup>22</sup> If the US continues to lose manufacturers to locations abroad, it will also lose its R&D and ability to innovate and manufacture new technologies.

### **Reinvesting in Manufacturing**

By this point, it is clear that manufacturing is an essential part of the American economy, and that steps need to be taken to rebuild this sector. But as Andrew Liveris, the CEO of Dow Chemical Company states, "I'm not interested in restoring the manufacturing sector of old. I'm arguing that we should build a different kind of sector, an advanced manufacturing sector, one that offers high paying jobs in high-tech, state-of-the-art industries. Industries of the future. Industries that are changing the world."<sup>23</sup> America

needs to invest in highly advanced, highly specialized, high value-added manufacturing. As Claudia Preparata explained, we cannot compete against the low cost production in China, we need to manufacture high value products.

### **An Opportunity in the Clean Economy**

Despite the fact that manufacturing has been declining for the past twenty years, it still represents a considerable share of the US economy. The sector's gross output in 2005 was \$4.5 trillion, and it still supports nearly 13 million jobs, or almost 10 percent of total non-farm employment.<sup>24</sup> Furthermore, the green economy has been growing three times faster than the rest of the economy.

The Apollo Alliance calculated some green economy-related statistics about its expected market size and job growth, including:

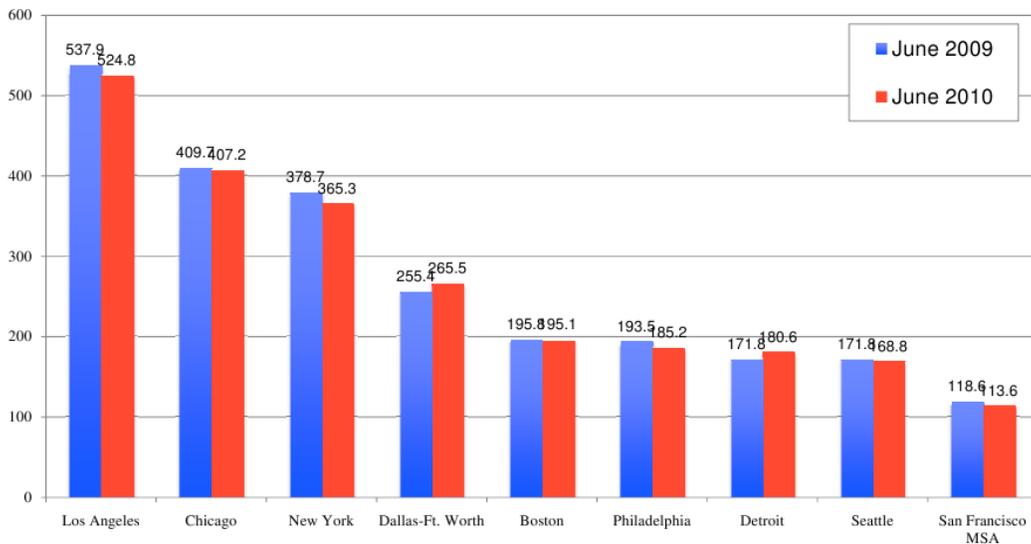
- The domestic market for solar panels, wind turbines, fuel cells, combined heat and power (CHP) systems, and biomass engines is projected to reach \$226 billion annually by 2016.
- Demand for solar and wind power will continue to expand over the next 20 years, and between 70 and 80 percent of the new jobs created in those industries will be in the manufacturing sector.
- In general, every \$1 million of investment in renewable energy systems creates approximately five full-time component piece manufacturing jobs.
- Every \$1 million invested in energy efficiency programs creates three to four building-material manufacturing jobs and five energy efficient appliance manufacturing jobs.
- Based on these figures, the Apollo Alliance calculates that \$50 billion of federal and private investment in industrial retooling and retraining programs would create 250,000 direct manufacturing jobs in the U.S., support an additional 725,000 indirect jobs, and generate as much as \$120 billion in revenue due to increased demand for products and services.

Clearly, there is an opportunity to rebuild America's manufacturing industry in the clean economy, and to see growth in good paying jobs.

### **Los Angeles has a Regional Advantage**

With such an opportunity to grow manufacturing in the clean economy, green manufacturing has the potential to reduce employment and raise incomes in cities that can develop the sector. Los Angeles in particular has a competitive advantage and is an ideal location for the development of a green manufacturing cluster. First, as the strongest manufacturing center in the nation, Los Angeles already has the infrastructure to support manufacturing.

Figure 4  
 Los Angeles Continues To Be The Largest Manufacturing Center in the Country  
 Manufacturing Employment (000's) By Metropolitan Region- 2009, 2010



Source: California Employment Development Department

Furthermore, Los Angeles has been identified as a leader in manufacturing potentially green products, with fifty-nine green manufacturing firms already identified throughout Los Angeles County.<sup>25</sup> Finally, 23% of all venture capital money in California is for cleantech, meaning that the industry is growing, particularly in California.<sup>26</sup> Green manufacturing provides the opportunity to strengthen the economy and bring back good middle class jobs, and Los Angeles can capitalize on this opportunity through its regional advantage.

## II. Regional Advantage

There are certain factors that make a city more fit for supporting industrial systems, usually referred to as a regional advantage. In a book comparing the success of Silicon Valley to the problems experienced on Route 128, AnnaLee Saxenian analyses what it takes to maintain a dynamic, competitive industrial system. She argues for a network-based industrial system where, “organized around horizontal networks of firms, producers deepen their own capabilities by specializing, while engaging in close, but not exclusive, regional relations with other specialists. Network systems flourish in regional agglomerations where repeated interaction builds shared identities and mutual trust while at the same time intensifying competitive rivalries.” Furthermore, she discusses the necessity of external services in a city, such as capital, research, managerial and technical education, training, assistance to entrepreneurs, and market information. These also include venture capital, specialized suppliers and services, infrastructure, and spillovers of knowledge associated with proximity to universities and informal information flows. With a large manufacturing base already existing in Los Angeles, the city has many of the components necessary to support the growth of green manufacturing.

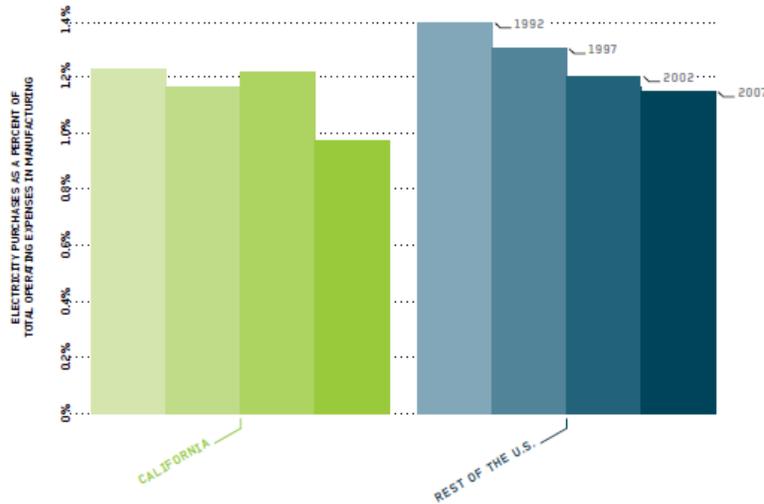
The National Renewable Energy Laboratory released a report in February of 2010, titled “State Clean Energy Policies Analysis (SCEPA): State Policy and the Pursuit of Renewable Energy Manufacturing.” It lays out the variables that manufacturers consider when determining where to locate a new facility and gives insight into the fundamental business considerations. The following includes the five main considerations and how Los Angeles excels in each of the areas.

### **Reduced Operating Costs**

Companies often open new facilities in locations with the lowest operating costs, including low transportation costs. They also look for incentives in the form of tax subsidies or direct grants.

- California has low electricity bills, ranking fourth in the nation for the lowest electricity bill as a fraction of GDP. When energy bills are lower, manufacturers have more money to invest in capital upgrades that boost productivity, or to create new jobs. For example, compared to Texas and Florida in 2008, energy bill savings meant that Californian’s had \$29 billion more to spend on other uses.<sup>27</sup>
- California manufacturers spend a smaller percentage of total operating costs on electricity, and California’s electricity productivity in manufacturing is outpacing the rest of the nation. In 2007, California’s electricity purchases as a share of operating expenses were 15 percent below that of the rest of the country and fell 21 percent from 1992 to 2007. Furthermore, in 2007 the rest of the nation spent roughly 1.1 percent of expenses on electricity costs in manufacturing industries, whereas California spent approximately one percent. This means that California’s manufacturers saved nearly \$740 million. Lastly, since 2002, California’s electricity productivity in manufacturing grew by 13 percent, while dropping by ten percent in the rest of the nation.<sup>28</sup>

Figure 5  
Electricity Purchases as a Percentage of Total Operating Expenses in Manufacturing  
California and the Rest of the U.S.



Source: 2010 California Green Innovation Index. Next 10.

- Los Angeles provides a variety of incentives for manufacturing and businesses in the green economy. For example, Industrial Development Bonds provide low cost, low interest financing for capital expenditures if the company provides public benefits, such as creating jobs.<sup>29</sup> Also, the Industrial Incentive Program approved by the Community Redevelopment Agency of the City of Los Angeles (CRA/LA) includes a loan to buy equipment for manufacturing, an energy audit grant to reduce energy use, and a grant to pay for consulting services that help manufacturers with logistics planning<sup>30</sup>. Furthermore, the California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA) is authorized to issue sales and use tax exclusions for green manufacturers under SB 71.<sup>31</sup> Finally, there are a number of financial incentives for locating in distressed areas of the city, special Department of Water and Power (DWP) power rates, and a plethora of other incentives to attract green manufacturers to LA.

### Improved Access to High Potential Markets

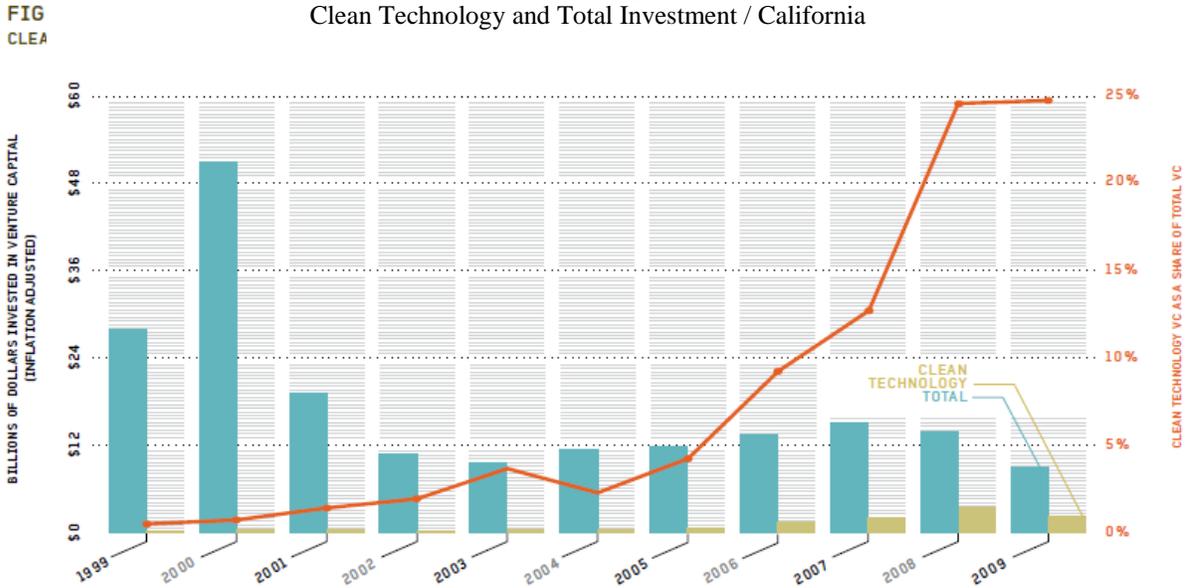
Companies can enhance their competitive position by locating manufacturing facilities in regions with markets forecasted to have high growth.

- The Green Economy is growing in California, and faster than other industries. For example, between 1995 and 2009, jobs in California's Core Green Economy expanded from 111,000 to 174,000, growing 56 percent. From January 2008-09, green jobs expanded by three percent, compared to a one percent increase in overall jobs.<sup>32</sup>
- Green Manufacturing is growing, even though there is a decline in total manufacturing. In fact, manufacturing employment in California's Core Green Economy expanded by 19 percent between 1995 and 2008 while total manufacturing employment in the state dropped nine percent. Also, as the state's traditional

manufacturing base, the Los Angeles region holds more manufacturing jobs than any other region with 32 percent of total manufacturing jobs in 2008.<sup>33</sup>

- Venture Capital investment in cleantech is growing. In 2009, investment in cleantech accounted for 25 percent of total VC, compared with only 13 percent in 2007. And in the first two quarters of 2010, investment in cleantech jumped two and a half times over the first half of 2009. This suggests that investors are feeling confident about growing opportunities in these diverse technology fields.<sup>34</sup>

Figure 6  
Venture Capital



Source: 2010 California Green Innovation Index. Next 10.

### Cluster Efficiencies

Clustering similar firms of a given industry increases efficiency, so many companies look to locate in an industry-specific hub.

- Los Angeles has designated 2,500 acres of land for a Cleantech Corridor, and 20 acres specifically zones for a Cleantech Manufacturing Center. The Clean Tech Corridor will support the entire value chain of the green economy, including research and development, technology design and prototyping, small business incubation, and full-scale manufacturing and assembly of environmentally friendly technologies.<sup>35</sup>
- The Los Angeles Area is one of the state's hot spots for Clean Transportation. Increasing 33 percent, employment has grown steadily since 1995 and jumped nine percent between January 2008 and 2009. In particular, the region has a high concentration of employment in Motor Vehicles & Equipment which witnessed a leap of 11 percent in jobs in the recent single-year period.<sup>36</sup> The passage of Measure R and the 30/10 Initiative provide further demand to invest in local clean transportation manufacturing.

## **Regional Infrastructure**

Strong infrastructure is important to companies, especially if they serve broader regional markets.

- Los Angeles has an unsurpassed network of goods movement and trade infrastructure to support a CleanTech Industry. First, the Ports of LA and Long Beach are the largest in the nation and handle 44 percent of all US imports. Also, Los Angeles International Airport is number one in international flights, with 1,000 cargo flights per day. The Alameda Corridor is the busiest intermodal rail yard in the nation, handling over 1.5 million containers in 2006.
- Los Angeles is upgrading its infrastructure. Measure R provides up to \$40 billion in new funding for transportation, especially in public transit.

## **Workforce Characteristics**

Firms seek a region with an educated and skilled workforce.

- Los Angeles has a large and growing pool of high-tech, skilled workers (226,000) engaged in technology jobs, which is the fourth largest source of jobs in the country . It also has the largest manufacturing employment base in the country with 470,000 jobs.
- Los Angeles has 198 colleges and universities offering programs related to cleantech development. For example, the Los Angeles Trade-Technical College is collaborating with large energy employers and trade unions to create the highest level of training for a new generation of green employees. Also, the California Energy Commission's Alternative and Renewable Fuel program provides \$4 million to CA Community Colleges Chancellor's office to support clean technology curriculum.
- Los Angeles continues to invest in its workforce with Measure J and Measure Q. Measure J is a \$3.5 billion bond for Los Angeles Community College District projects, which provide for crucial improvements and bolster job training. Measure Q is a \$7 billion construction and modernization program for the Los Angeles Unified School District.

Although these five factors were chosen as the main considerations for a company choosing to locate at a new site, the report also discussed the specific attributes that firms look for in a potential site. For example, quality of life variables are important, and firms look for quality public education, culture, and recreational opportunities. Again, Los Angeles has a lot to offer including its weather and proximity to the beach, mountains, desert, and wine country. It also offers its large entertainment industry and events at LA Live, the Staples Center, Dodger Stadium, the Disney Concert Hall, and many more venues.

Lastly, Los Angeles has many policies and renewable energy targets that creates an enormous demand for green goods. From the state level, AB 32 California Global Warming Solutions Act set into law that California has to reduce its greenhouse emissions to the 1990 level by 2020. Locally, the DWP reached its target for 20 percent renewable energy by 2010, and is working towards 35 percent by 2020. Also, the Green LA Action plan sets out an array of clean energy goals, such as becoming coal-free by 2020, reducing pollution at the Ports, reducing energy and water consumption, and

retrofitting city-owned buildings to LEED standards. These goals give manufacturing companies confidence that their goods will be needed in the local market, and will help attract green manufactures to Los Angeles.

### **III. Opportunities to Grow Los Angeles' Green Manufacturing Industry**

It is clear by now that manufacturing jobs are important to a city for many reasons, and that Los Angeles has a regional advantage to hosting a Green Manufacturing hub. The next step is to examine the specific opportunities LA has for growing its green manufacturing industry and soliciting new firms to the area.

#### **Cluster Growth- The Cleantech Corridor**

As the SCEPA report stressed, when deciding where to locate, firms look for clusters of an industry-specific hub. Firstly, clusters increase efficiency because of the easier access to the different components that companies need. Jeffrey Kalb experienced this during the time his company was located at Route 128, which did not have cluster efficiency. He recalled, "At Digital, we had our own capabilities for everything, not just little things, but boards, chips, monitors, disk drives, everything. It's very difficult for a small company to survive in that environment, where you can't get the components easily. It's not any one individual thing. It's the amount of energy it takes to get everything." Clearly, easy access to a cluster of infrastructure that supports an industry hub makes it much more time and cost efficient to do business. But clusters provide more than access to necessary infrastructure, they also create important social networks. In analyzing why Silicon Valley has been a successful industrial system, Saxenian explains that "Silicon Valley has a regional network-based industrial system that promotes collective learning...Companies compete intensely while at the same time learning from one another about changing markets and technologies through informal communication and collaborative practices; and loosely linked team structures encourage horizontal communication among firm divisions and with outside suppliers and customers."<sup>37</sup> Clearly clusters can make a region extremely competitive, dynamic, and able to adapt continuously to fast-changing markets and technologies- and Los Angeles has such a cluster.

The Cleantech Corridor is a four-mile long district downtown that includes a CleanTech Manufacturing Center, a Clean Innovations Research Center, and creates the Cornfields Arroyo Seco neighborhood – a LEED community. As Mayor Antonio Villaraigosa's states on his website, "The Clean Tech Corridor will support the entire value chain of the green economy, including research and development, technology design and prototyping, small business incubation, and full-scale manufacturing and assembly of environmentally friendly technologies. These physical plants will create direct employment for researchers, designers and workers, while also triggering growth in indirect green jobs like legal services, accounting and environmental consulting." The Cleantech Corridor is exactly the type of cluster that has been proven to create thriving, sustainable industrial systems and is a huge opportunity for the growth of a green manufacturing industry in Los Angeles. It is important to remember, however, that Saxenian writes from the perspective of what is good for business. It is important to note that developing an area this large could have other consequences, such as negative environmental and social justice effects on neighboring communities.

### **Cleantech Manufacturing Center**

The Cleantech Manufacturing Center (CTMC) is a 20 acre plot of land zoned M3 for heavy manufacturing. Once a brownfield, CRA LA recently sold the land for \$15.4 million to the Genton Property Group for development. Although there are no immediate plans to build on the property, Jonathan Genton hopes to eventually create a \$90 million, 500,000 square foot manufacturing facility, potentially for a firm that makes sustainable alternatives of gypsum or to a rail car manufacturer.<sup>38</sup> The living wage, project labor agreements, and targeted hiring all transferred with the land, so the development will bring good, middle class jobs to Los Angeles.

### **Opportunity in Clean Transportation**

Los Angeles has the land and resources dedicated to a cleantech cluster and manufacturing center, but the question still remains over which subsector of the clean economy will be best for this opportunity. The research of many groups in LA suggests that the biggest potential lies in the clean transportation sector. The first reason for this is that LA already has a strong green transportation industry. In fact, from 1995 to 2008, it grew 152 percent in employment in the LA region.<sup>39</sup> Furthermore, Los Angeles has big plans to finance new transportation projects through Measure R and the 30/10 initiative. Measure R is expected to generate \$40 billion in local sales tax revenues over the next 30 years, with 35% of that money going towards rail expansion projects.<sup>40</sup> If the 30/10 initiative, or “America Fast Forward,” is approved, the projects will be completed in 10 years instead of 30. This clearly generates a huge demand for clean transportation products, and creates an enormous opportunity to manufacture those components in Los Angeles.

#### **Rail Car Manufacturing**

On October 28<sup>th</sup> 2010, the MTA Board approved the issuance of RFP P3010 for the procurement of Light Rail Vehicles (LRVs). Specifically, the RFP is for 78 light rail cars to service Expo Line 1 and 2, and the Gold line Foothill Extension by 2015. The 78 cars are worth \$335 million, and there is potential for up to 235 rail cars to be built for the rest of the rail expansion projects. Although usually these cars would be purchased from a multinational company and built overseas, the MTA and LAANE are working hard to get a rail car manufacturer to locate in Los Angeles and build the cars here. This could create between 200-300 jobs in LA and be a crucial step in developing a clean transportation manufacturing cluster in Los Angeles. There is a debate, however, over the RFP’s local job provision, and if it violates the Interstate Commerce Laws. This will be discussed later as an obstacle in Section 4, as it could undermine a company from locating its manufacturing plant here.<sup>41</sup>

#### **Electric Buses**

Although the MTA and LAANE are currently in the process of trying to solicit a rail car manufacturer to Los Angeles, there could also be an opportunity in electric bus manufacturing. A recent article stated that Los Angeles is leading the nation on green transit, with the MTA being the only major transit agency whose entire bus fleet is equipped with alternative fuel technologies. Although the buses in LA are cleaner, alarmingly not a single MTA bus is manufactured in LA. But this could soon change. The

board is currently looking at a proposal for 30 electric buses as a pilot program, and if they turn out to be cheaper to operate over their life cycle, Los Angeles could bring the nation's first major electric bus plant to the LA area. Also, the Federal Transit Administration's "Buy America" requirement means that 60 percent of the value of each bus must be created in the U.S.<sup>42</sup> This means that a domestic electric bus manufacturer would leverage even more jobs in America.

### **Other Niche Markets- Green Building Materials**

Although clean transportation has been getting a lot of attention from groups trying to attract manufacturers to Los Angeles, there is another potential niche market in Los Angeles- green building materials. Local non-profits such as LAANE, Scope, the LA division of the Apollo Alliance, and CD Tech are all currently running retrofit campaigns. For example, on Earth Day in 2008, Los Angeles signed into law the Green Building Ordinance, a series of incentives and requirements for large private sector developments to meet LEED standards and use environmentally friendly building materials. Furthermore, on April 8<sup>th</sup> 2009, City Council adopted an ordinance to retrofit over 1,000 city buildings.<sup>43</sup>

These ordinances are important for three main reasons: they cut the city's greenhouse emissions, they target low-income communities, and they create a demand for green building materials. Studies show that buildings account for more than 40 percent of global warming pollution. The Green Building Ordinance alone is expected to reduce the City's carbon emissions by more than 80,000 tons by 2012, which is the equivalent of taking 15,000 cars off the road.<sup>44</sup> Furthermore, the Los Angeles Apollo Alliance's Green Jobs Initiative aims to train and place low income communities in these green retrofit and manufacturing career paths. Similarly, SCOPE, an organization that builds grassroots power to eliminate the structural barriers to social and economic opportunities for poor and disenfranchised communities, launched its Green Retrofit Workforce Initiative and its Green Career Ladder Training Program to train and place low income residents in apprentice programs and green jobs. Finally, the retrofit projects create a market for products made by green manufacturers. Megan Scott from SCOPE explained that if the city could buy locally, then taxpayer money going into retrofits could be reinvested in the community by stimulating job growth in green building materials manufacturing. With such an enormous demand from LA for the components that go into retrofits, it would be more cost efficient to manufacture them here than ship them from elsewhere.<sup>1</sup>

Although other organizations are focused on retrofitting city and large private sector developments, CD Tech, whose mission is to build livable and economically viable communities in the low-income areas of Greater Los Angeles, has a slightly different approach. In an interview with Yvette Nunez, she explained that CD Tech was formed after the Rodney King riots, recognizing that the riots stemmed from unemployment and poverty. In search of what jobs support low-income communities, CD Tech decided to focus on manufacturing and how to keep the industry competitive. Their campaign concentrates not on city buildings or new developments, but on helping existing

---

<sup>1</sup> For example, it is cheaper to make insulation somewhere than to ship it

manufacturers green their buildings and processes. Nunez explained that by leaning and greening the manufacturing facilities, they use less energy and generate less waste, saving money. CD Tech also looks at the “green chemistry,” or the products used in the factory in its production and cleaning process. Finally, CD Tech hopes to also help manufacturers identify opportunities to retool and produce goods for the green market, and training workers to do the retrofits. It is important to recognize that green retrofits not only create demand for green building materials, but that they also help existing manufacturers reduce costs and stay competitive.

### **Other Land Zoned for Manufacturing**

Although the Cleantech Manufacturing Center is located in the Cleantech Corridor cluster, there is other land in Los Angeles zoned for manufacturing that could be used in soliciting green manufacturers to the area.

The Lanzit Industrial Site is a 9.06 acre site owned by the City of Los Angeles, located in the Watts region of South Los Angeles. It is currently zoned M1 for light industrial, which includes light manufacturing. Because it is city owned, the land could also potentially be rezoned to favor heavier manufacturing. Developing the land is expected to create 773 temporary construction jobs, and at least 340 permanent full-time, living wage jobs, 51 percent of which must be made available to low and moderate-income persons. The land comes with federal financing assistance, including \$6,000,000 in a Section 108 loan, and \$1,25,000 from a Community Development Block Grant (ARRA). It is also located within a State Enterprise Zone, a Federal Empowerment Zone, and a Recycling Market Development Zone that provide incentives to tenants, such as hiring tax credits.<sup>45</sup>

Block 25 at the LA Harbor is another site designated for job-rich manufacturing or industrial uses. At 3.1 acres and zoned M2 for light industrial, the developer Wayans Pacifica, LLC is interested in green manufacturing. Many incentives are available, including Recycling Zone, New Markets Tax Credit, and the DWP incentive program. Also, the site is adjacent to the Alameda Corridor, the Port of Los Angeles, and to Southern Pacific railroad, with easy access to the 710 and the 110 freeways.<sup>46</sup>

The Good Year Tract is a 208 acre Brownfield sight with 330 parcels. There are many different projects proposed for the various parcels, such as the 59<sup>th</sup> Street Project. This project involves the remediation and rehabilitation of a 42,000 square foot industrial building for reuse as a state of the art manufacturing facility. The new tenant will provide about 16 construction jobs, and 74 permanent jobs, half of which are required to pay at or above the Living Wage.<sup>47</sup>

Important to all three of these sites is the CRA/LA’s Industrial Incentive Program. Meant to create jobs and support green manufacturing, the IIP was approved in August 2010 and is applicable to all 31 of its project areas. The program provides loans up to \$250,000 for equipment or machinery, grants up to \$50,000 for energy reduction audits, and up to \$50,000 for consultant help with planning, permitting, and operations.<sup>48</sup> Although there are advantages to locating a facility in the Cleantech Manufacturing Center, there are

clearly many sites that could host green manufacturers and come with a variety of incentives to support development.

### **To Attract or to Grow?**

Up till this point, the opportunities discussed to grow Los Angeles' green manufacturing industry have mostly focused on soliciting new manufacturers. But as Elizabeth Redman asks in her article, " 'To attract or grow?' That may not have been Hamlet's question, but it is the question of the dozens of states trying to build clean tech clusters across America today. As economic development organizations try to turn their regions into the economic engines of the green economy, they must figure out the right mix of programs and policies to grow, attract, and retain clean tech companies."<sup>49</sup> Although Los Angeles provides many opportunities to attract new manufacturers, the current market conditions have resulted in less growth than hoped. As a report from the Urban Land Institute points out, in the next couple of years there might be more near-term market potential from working with existing tenants to identify opportunities to retain them or accommodate expansions than from new development.<sup>50</sup> This can be shown by the trouble the CRA has had finding a manufacturer for the CTMC. In 2009, the plan to have Italian rail car maker AnsaldoBreda build a factory fell through, as did the deal with electric car company Coda Automotive in 2010. Although the CRA recently sold the site to Genton Property Group, it was forced by the need to repay a \$15.4 million loan, and there are no immediate plans to build on the property. The developer, however, still ultimately envisions creating a \$90 million, 500,000 square foot manufacturing facility for products and technologies that contribute to environmental sustainability.<sup>51</sup> Because of the recession, it is important that Los Angeles also promotes the sustainability of existing manufacturing as it proactively attracts new and manufacturers in order to create a high quality green manufacturing industry.

Greg Freeman from the Los Angeles Economic Development Corporation (LAEDC) provided interesting insights into why he thinks focusing on the existing manufacturers in Los Angeles is the most strategic. First of all, he stressed that if the U.S. is going to reduced its 2050 emissions to 80 percent below the 1990 levels, everyone is going to have to work towards that goal- green manufacturers cannot be the only ones producing with greater energy efficiency, all manufacturers will have to green to some extent. Also, Freeman emphasized the massive competition between cities to be the Silicon Valley of green manufacturing. Many places are being incredibly aggressive with their incentive programs, offering feed in tariffs, subsidies, free land, and other financial packages. Also, an important question to ask is, does a manufacturer have to be present in the market to serve it? Often times the answer to this question is no, and just because a manufacturer is serving the green economy does not mean that this will be any different. As Freeman expressed, standard cars are not made in Los Angeles, so why would you make electric cars here? With so much competition, getting green manufacturers to locate in LA is a difficult task.

Freeman also pointed out other reasons why it could be hard getting a business to move to Los Angeles: California is a high cost place to do business, Los Angeles has awful traffic, and land and housing prices are high. Manufacturers already located here,

however, have found ways to make Los Angeles work for them. Furthermore, they are not considering the incentives to move to other locations like Ontario or the research triangle in North Carolina.<sup>52</sup> As a manufacturing hub of the United States, LA can grow its green manufacturing industry by working with the manufacturers already based there. Providing assistance to the existing manufacturers and helping them retool into the clean economy could also create more good, green jobs.

## IV. Obstacles

Although there are many opportunities for green manufacturing in Los Angeles, it is important to gain an understanding of what could also be preventing manufacturers from moving to LA.

### **Economic Conditions**

As just expressed, in this economy many manufactures are not in a position to grow and expand to another location. Even though the green economy is growing faster than the rest of the economy, many businesses are struggling to make ends meet. When I asked Nunez why CD Tech is not working towards soliciting new manufacturers to the area, she said that the existing industry still needs a lot of support, and that a main concern of many manufacturers right now is to simply stay open and to not lose employees. By providing means for which Los Angeles manufacturer's can sustain themselves, evolve, and grow, CD Tech helps these businesses with the necessary assistance to stay competitive.

### **Interstate Commerce Law**

Although there is an exciting opportunity for a rail car manufacturer to locate in Los Angeles and create up to 300 middle-class jobs, the MTA's RFP has been controversial. In the Constitution, under Article 1, Section 8, Clause 3, are the Interstate Commerce Laws. These laws essentially state that local geographic preference cannot be given when using federal money. More specifically, the problem is not when the federal government gives money to a state government, but when a state gives money to a private business-preference should not be given to a company based in Los Angeles verses a company based elsewhere in the US.

This clause is in conflict with the MTA's desire to include local hiring criteria in RFP P3010. The local hiring clause would mean that the company has to create jobs in LA, or in other words have a manufacturing facility in LA, which violates the law that federal money cannot be given to a company based on geographic preference.

Currently, the MTA is waiting for a response from the Federal Transportation Authority (FTA) on the legality of its local hiring criteria. The MTA recently created two parallel paths within the existing RFP so that applicants could simultaneously submit a proposal that closely follows FTA regulations, and one that incentivizes local hiring. The idea behind this is that if the FTA approves creation of local jobs on a point system and not as a requirement, then the RFP will go to a company that would create local jobs in LA County, but if the FTA rejects the job creation incentive, the process of finding a manufacturer will not be delayed by having to submit a new RFP and start the process anew. Unfortunately, if the MTA does not hear back from the FTA by May 31<sup>st</sup>, it will throw out the local hiring clause completely, but LAANE and the Los Angeles Country Federation of Labor are trying to reach out to MTA board members to change this date.

The reason the FTA has this law in the first place is that they argue that local hiring is uncompetitive, and that they want the bidding process to "be fair and open." Also, it was

created so that states cannot burden commerce, and to keep the states out of the free market. Generally, RFPs are granted to a company with the lowest bid, meaning the most options for the least amount of money. What the MTA is proposing is to change the scoring so that companies also get points for creating jobs in LA.

A local hiring clause, however, also has many benefits. Producing goods locally reduces transportation costs and green house gases. Also, it makes sense that local projects like rail expansion should benefit the local workers and community members. In fact, when Measure R was passed to fund new transportation projects, it was done so with an implicit understanding that the tax money would come back to the community in the form of local jobs. Although Interstate Commerce Laws could block this from happening, there are many reasons why local hiring makes sense.

**Land Use Policy**

Another obstacle to growing Los Angeles’ green manufacturing industry is the lack of land zones for industrial use. Currently, only eight percent of the city is zoned industrial, with 25 percent of that land used for non-industrial purposes, particularly housing. Furthermore, the vacancy rate of industrially zoned property is the lowest in the nation, remaining consistently below two percent. The lack of land and the low vacancy rates mean that some manufacturing businesses are seeking new locations in areas like Orange County and Ventura. This is problematic for a variety of reasons. For example, Industrial zoned areas of Los Angeles offer employment opportunities for residents of all skill and education levels, create and support jobs in multiple other business sectors, and generate taxes that sustain the quality of life elsewhere in the City by funding streets and sidewalks, police and fire services, libraries, trash collection, and more. Furthermore, The industrial sector in Los Angeles employs fully one-quarter of the City’s total workforce and creates an estimated \$219,000,000 annually in City tax revenue.<sup>53</sup>

**Infrastructure Strains**

Traffic in Los Angeles is notoriously bad, but according to a 2003 report from the Department of Public Works, some other aspects of LA’s infrastructure are not great either. Here is the report card that that the DPW came up with after an assessment of different infrastructure components within the city<sup>54</sup>:

<b>Infrastructure</b>	<b>Grade</b>
Bridges	B <sup>+</sup>
Stormwater System	C <sup>+</sup>
Streets & Highways	D <sup>+</sup>
Street Lighting	C
Water Collection	B <sup>+</sup>
Wastewater Treatment	B <sup>+</sup>
Water	C
<b>Overall Grade = C<sup>+</sup></b>	

The streets and highways are graded on two criteria: condition of pavement and traffic congestion. The average pavement grade was a C<sup>-</sup> and the congestion grade was a D<sup>+</sup>. Although deteriorating infrastructure could provide a disincentive for manufacturers to locate in LA, if LA is successful in attracting a booming cleantech cluster, it would put even more strain on infrastructure. As Saxenian explains, “the intense localization of economic activity in a network-based system places unusual demands on a region’s physical infrastructure. Transportation congestion, housing price inflation, land scarcity, and environmental degradation are all direct outgrowths of the geographic interdependencies of a highly localized industrial system.” Not addressing these infrastructure strains could create a serious obstacle to growing green manufacturing in Los Angeles.

### **Tough Local Campaign**

Many local community development groups in Los Angeles have an impressive track record of accomplishments and wins for their constituency, but adopting a campaign around green manufacturing is tough to do. As Megan Scott explained, many of SCOPE’s members were once employed in the manufacturing industry and would like to see city leaders bring green manufacturing to LA, but it was not the right campaign for the organization. Policy is not a good hook for a local, membership based organization, and SCOPE decided to look more towards particular projects like its Municipal Retrofit Program. Furthermore, the retrofits are in the public sector, which is easier to target and are often union jobs with higher wages, whereas manufacturing is private, decentralized and project-by-project. If working to solicit manufacturers to Los Angeles is not a campaign many local groups want to organize, there could be a lack of pressure to create good green jobs.

### **Regulations**

Both in Los Angeles and nationally, manufacturers have to navigate through confusing regulations and red tape. Generally speaking, green manufacturing is split up into manufacturing sub sectors, making it challenging to pinpoint one overall economic structure and how the government regulates that structure. But as Liveras states, “Regulations matter.” The United States has a admirable commitment to the health and safety of its workers, and clear, consistent, and wise regulations protect not only the well-being of the population, but also the US’s ability to function and grow. But as Liveras points out, “Regulations are beneficial only when they’re clear, consistent, and wise. And in large part, the U.S. regulatory regime is so complex and inconsistent that regulations hinder American manufacturers—without helping anyone in particular.” He continues to explain that many of the regulations are written state by state, not in Washington, resulting in a patchwork of regulations that make business operate differently in California versus Michigan.<sup>55</sup> Companies do not ask for deregulation, only smart regulation. As the US faces more competition from abroad, it is important that complex and confusing regulations do not continue to disadvantage America from attracting green manufacturers.

### **US Corporate Tax**

Similarly, in the opinion of many CEOs at green manufacturing firms, the U.S. needs to reconsider its corporate tax policy. In 1988, the U.S. corporate tax was about 12 percent below the average rate among G-7 nations, “and with that came new business and growth, just as anticipated. American manufacturers built new plants and created new jobs.”<sup>56</sup> In 1991, the U.S. also passed an R&D tax credit, which was the best in the world.

<sup>57</sup> It did not take long, however, for other countries to recognize that low tax rates attract corporate investment, and the U.S. become much less competitive. Today, the United States has the second highest corporate tax in the world, following only Japan. Although some argue that cutting corporate taxes will reduce much needed tax revenue, the business world argues that the opposite is actually true. The lower tax rate attracts both foreign and domestic investment, so what the government might initially lose in revenue is made up for by the new businesses attracted to the country.<sup>58</sup> Again, this is largely the opinion of business executives; some could argue that a greater problem is the large amount of corporate tax loopholes in America.

### **Political Debate in Washington**

Although the U.S. may need to lower its corporate tax in order to attract new investments, the current political debate in Washington makes this unlikely. Because of the recession, most politicians are concerned mostly with deficit reduction. The current federal budget battle and narrowly averted shut down show that making any changes to the federal budget will not come easily, and that there are major disagreements over what should be funded. This debate not only affects policy like the corporate tax, but also funding for the green manufacturing industry. In its Green Manufacturing Action Plan, the Apollo Alliance suggests direct federal funding for clean energy manufacturers to retool, retrain, produce, and commercialize. It also suggests at least doubling the amount of federal funding going to the Manufacturing Extension Partnership, and increasing funding for the Green Jobs Act.<sup>59</sup> The Clean Transportation Manufacturing Action Plan also calls for more federal investment in transportation by investing \$30 billion in public transit and \$10 billion in intercity rail annually.<sup>60</sup> These investments are necessary for the U.S. to become competitive in attracting green manufacturers, but there are clearly many challenges in implementing these changes. In the recent budget debate, Republicans showed their opposition to green industry stimulus programs, and sought to cut \$438 million from the loan guarantee program for renewable-energy projects.<sup>61</sup> Efforts like this show that winning financial support for America’s green manufacturers is not going to be easy.

### **Inconsistent, Short Term Manufacturing Policy**

The federal government does not have a long term manufacturing strategy for America, but instead inconsistent, short-term policy. This sends unclear demand signals to companies about whether they can expand or remain local. Federal support gives investors confidence and reduces huge risks that could prevent manufacturers from locating in the U.S. Liveras expresses that his biggest concerns of being the CEO of Dow Chemical is risks and how to minimize them. When the government says, “‘I will give you 20 years of discounted inputs fixed, and the discount is 90 percent off market.’ Or, ‘I

will give you a tax break and a low-interest loan, and half the capital up front for building the site.' Or, 'We'll give you a fixed price on your inputs, a contract price to control for volatility.' They just eliminated a very big risk for me compared to an alternative investment. They are removing my uncertainty." Whereas other countries are putting together attractive incentive packages and reducing risks for manufacturers, the U.S. has inconsistent funding, resulting in inconsistent demand, and a lack of growth in this country.

## V. Strategies and Recommendations

Besides the suggestions made while discussing the obstacles in Chapter 4, there are other strategies that need to be adopted to green existing manufacturers in Los Angeles and to attract new green manufacturers to the region.

### **Manufacturing Extension Partnerships**

The Manufacturing Extension Partnership (MEP) was created under the Commerce Department to help manufacturers reduce costs and increase productivity. It provides a variety of services, such as assisting them with process improvement, energy efficiency, waste minimization, development and commercialization of new sustainable technologies, and identifying opportunities to expand into new markets. Although there are currently 59 MEP centers around the U.S., which support thousands of manufacturers, the MEP should be expanded. For example, it currently only assists two to three percent of the country's 330,000 small manufacturing plants. Currently, MEP activity is estimated to create or retain over 50,000 manufacturing jobs a year, so doubling federal funding could create or retain more than 100,000 jobs.<sup>62</sup>

Many organizations have stressed the need for strengthening this system. For example, a representative from Green for All stressed the importance of providing support for manufacturing on a continuum, and the need to provide manufacturers with technical assistance and tools to grow their business. By looking at business plans and auditing, the MEP can help manufacturers save energy and money. Also, providing export assistance would help companies better identify their market and customers.<sup>63</sup> As CD Tech stresses, establishing a market intermediary could effectively coordinate supply and demand, connect manufacturers with important information for becoming more competitive, and could increase communication between colleges and trade techs who provide a trained workforce.<sup>64</sup> Currently, manufacturers in Los Angeles are working in their own silos and do not have strong access to programs that increase their competitiveness. This needs to change if Los Angeles is to see a thriving green manufacturing industry.

### **Create a Network**

Promoting interaction between similar firms can lead to new ideas, collaborations, and companies. Lessons from Silicon Valley suggest that industrial systems built on regional networks were more flexible and technologically dynamic than those in which experimentation and learning are confined to individual firms. Dense social networks and collective learning means that companies will compete intensely while still learning from one another about changing markets and technologies. Providing public forums for exchange and debate mean that businesses will build shared identities and mutual trust, while at the same time intensifying competitive rivalries.<sup>65</sup> The Cleantech Corridor provides an intellectual space where this can happen, but it is important that certain organizations take the lead. Cleantech Los Angeles is one such forum for exchange, and CD Tech established the Los Angeles Manufacturing Networks Initiative in 1997, but a more centralized network needs to be created to facilitate this collaboration and exchange of ideas between companies.

### **Collaboration Between the Private and Public Sector**

As the story of Evergreen Solar shows, China is a huge competitor to the U.S.' green manufacturing efforts. Although China can incentivize companies to relocate within its borders through government subsidies, the U.S. has an enormous opportunity to secure manufacturers through greater collaboration between the private and public sector. With U.S. cleantech venture capital investment reaching \$5.1 billion in 2010, a collaboration between business and government could leverage much more investment in green manufacturing. Take, as a model, Sustainable Development Technology Canada (SDTC). SDTC is a not-for-profit foundation created by an allocation of \$1.05 billion from the Government of Canada. The purpose of its funds is to finance and support "the development and demonstration of clean technologies which provide solutions to issues of climate change, clean air, water quality and soil, and which deliver economic, environmental and health benefits to Canadians."<sup>66</sup> If the U.S. could create a similar green bank, investment from venture capitalists could go much further.

### **Make it in America**

The U.S. leads the world in venture capital investment, but the key is not sending those jobs somewhere else. Too many times, technologies that are researched and developed in the U.S. get built somewhere else. For example, "Though the LCD television was originally the product of American research and development (R&D), the entire industry had been ceded to Asia in the 1990s." Furthermore, according to the Department of Energy, the U.S. spent \$15.4 billion on renewable energy R&D between 1978 and 2007, but it was Japan that commercialized the solar panels that came from U.S. research. America needs to stop missing out on opportunities to develop these technologies at home and create thousands of well paying jobs. Brian Lombardozzi from the Apollo Alliance suggested that since R&D is usually government funded to start with, there should be a condition that the technologies have to be brought to market in the U.S. Increasing the amount of domestic suppliers will create jobs in the green economy and support domestic green manufacturing.

### **Change the Federal Public Transportation Mix**

Under the current Transportation Reauthorization Legislation, 80 percent of federal funding goes towards highways, while only 20 percent goes towards investments in public transportation. Furthermore, it has to be refinanced every five years, leading to inconsistent funding and inconsistent demand for clean transportation components. If the bill is reauthorized, however, there is an opportunity to change the funding mix and allocate \$40 billion to transportation projects. This would be an incredible job generator, creating approximately 3.7 million direct and indirect jobs, with 600,000 alone in the manufacturing sector. This commitment to public investment will furthermore send a signal that will spur private investment in rail and component part manufacturing.<sup>67</sup> Clearly it is time to update the funding mix and allocate more resources to areas that reduce unemployment and create strong manufacturing jobs.

### **Strengthen Domestic Supply Chain**

Even though LAANE is currently working to solicit a rail car manufacturer to Los Angeles, Tier 2 suppliers should not be forgotten. In fact only 30 percent of the value of a

rail car comes from Tier 1, which builds the shell, but not the engine, break system, lighting, flooring, seating, etc. As the country expands public transportation, demand for Tier 2 components could be tremendous, leading to even greater job creation. In fact, according to recent research by Northeastern University, improvements in America's domestic supply chains for buses and rail cars could increase total job creation from the purchase of these vehicles by up to 30 percent.<sup>68</sup> If the federal government grasps this opportunity in clean transportation, the country can move towards its green house gas reduction goals and put thousands of Americans back to work.

### **Expand the Educated Workforce**

The quality of the workforce is a major consideration for a firm looking to operate in a new location, but as Siemens chairman Peter Solmssen explained, "the U.S. isn't as great as some might suspect."<sup>69</sup> He expressed concern over the education system, where in 2009 the dropout rate for the Los Angeles Unified School District was 34.9 percent.<sup>70</sup> Besides for improving K-12 schools, it is also important for Los Angeles to maintain and expand its educated workforce so that businesses have enough workers with the right skill sets to meet their needs. Also, job training programs are important for developing, expanding, and upgrading the skills of the existing workforce, and can be good tools for bringing career opportunities to low-income workers. The Apollo Alliance suggests accomplishing some of these goals through increasing funding to the Green Jobs Act, which supports labor market data gathering, curriculum development, and job training in the renewable energy and energy efficiency industries.<sup>71</sup> To stay competitive in the global Economy and attract green manufacturers, Los Angeles will need expand its educated workforce.

### **Ensuring the Triple Bottom Line**

Although investing in the green economy is generally aligned with the triple bottom line, it is important to ensure that manufacturing policies seek the best outcomes for private enterprises, communities, and the environment. In particular, local governments should integrate sustainability and the greening of the industry into traditional economic development plans. Also, low-income communities should have access to job training and career path employment opportunities, and clean energy initiatives should contain labor standards and local content requirements. Overall, "blended value policy making" will ensure that the country can move forward together and that no one will be left behind.

## Conclusion

The manufacturing industry is clearly important to the United State's economy, and provides middle class jobs even for those with a high school education or less. Furthermore, both producing green products and producing in a green way assures that green manufacturing can move the U.S. economy in a more sustainable direction. It is no wonder that cities across the world are competing to grow major green manufacturing clusters.

Although the competition is high, Los Angeles luckily has what it takes to be a major player on the scene. Already home to the largest manufacturing sector in the U.S., Los Angeles has enormous potential both in its existing manufacturers and in attracting new green manufacturers. With land designated for a cleantech corridor and local green markets to serve, Los Angeles has the potential to be a global leader in the green manufacturing industry.

This is not to say that there are no obstacles for Los Angeles, but with the right strategy, L.A. should be able to excel. For example, although confusing regulations and a relatively high U.S. corporate tax might seem unfavorable to business owners, a Manufacturing Extension Partnership and a network of similar firms could more than cancel that out. Also, even though economic conditions are not the most favorable for expanding businesses, if Los Angeles can use its resources to advocate for more federal support, investors will be given the confidence they need and the domestic supply chain will strengthen. These are not easy feats, but the benefits make it an opportunity worth pursuing.

As the U.S. makes its policy of the future, recent financial and natural disasters demand that they are both economically and environmentally sustainable. Green manufacturing seems like an obvious choice, providing a way to reduced emissions and build up the middle class. This paper calls for Los Angeles to grasp the opportunity to lead our country in the right direction.

---

<sup>1</sup> Liveris, Andrew. *Make It in America: the Case for Re-inventing the Economy*. Hoboken, NJ: Wiley, 2011.

<sup>2</sup> Liveris

<sup>3</sup> *Make It in America: The Apollo Green Manufacturing Action Plan*. Rep. The Apollo Alliance, Mar. 2009.

<sup>4</sup> Peltz, James F. "Aerospace Job Losses Putting L.A.'s Middle Class at Risk, Survey Warns - Los Angeles Times." *The Los Angeles Times*. 08 Mar. 1996. Web. <[http://articles.latimes.com/1996-03-08/business/fi-44537\\_1\\_aerospace-job](http://articles.latimes.com/1996-03-08/business/fi-44537_1_aerospace-job)>.

<sup>5</sup> "Richer and Poorer: Income Inequality in Los Angeles." (9 Apr. 2007). United Way LA.

<sup>6</sup> *2009 LAANE Poverty Report*. Rep. Los Angeles Alliance for a New Economy, 28 Sept. 2010. Web. <<http://laane.org/la-county-analysis>>.

<sup>7</sup> *2009 LAANE Poverty Report*

<sup>8</sup> *Make It in America: The Apollo Green Manufacturing Action Plan*

<sup>9</sup> Liveris

<sup>10</sup> Levy, Frank. *Dollars and Dreams: the Changing American Income Distribution*. New York: Norton, 1988

<sup>11</sup> *Green Building Manufacturing in Los Angeles County*. Rep. Strategic Concepts in Organizing and Policy Education, 1 Dec. 2006.

<sup>12</sup> Liveris

<sup>13</sup> Liveris

<sup>14</sup> Bivens, Josh. Updated Employment Multipliers for the U.S. Economy. EPI, 2003.

- 
- <sup>15</sup> Liveris
- <sup>16</sup> Preparata, Claudia. "Interview with Green for All." Telephone interview. 2 Mar. 2011.
- <sup>17</sup> *Green Building Manufacturing in Los Angeles County*
- <sup>18</sup> *Make It in America: The Apollo Green Manufacturing Action Plan*
- <sup>19</sup> Liveris
- <sup>20</sup> Lombardozzi, Brian. "Interview with Apollo Alliance." Telephone interview. 2 Mar. 2011.
- <sup>21</sup> Liveris
- <sup>22</sup> Liveris
- <sup>23</sup> Liveris
- <sup>24</sup> Economic Policy Institute (EPI), 2008; BLS and Bureau of the Census, 2009.
- <sup>25</sup> *Green Building Manufacturing in Los Angeles County*
- <sup>26</sup> Preparata
- <sup>27</sup> *2010 California Green Innovation Index*. Rep. Next 10, 2010. Web.  
<[http://next10.org/next10/pdf/GII/Next10\\_GII\\_2010.pdf](http://next10.org/next10/pdf/GII/Next10_GII_2010.pdf)>.
- <sup>28</sup> *2010 California Green Innovation Index*
- <sup>29</sup> *Green Building Manufacturing in Los Angeles County*
- <sup>30</sup> CRA/LA. *CRA/LA Creates Industrial Incentive Program to Create Jobs and "Green" Manufacturing Citywide*. 10 Aug. 2010.
- <sup>31</sup> "CAEATFA SB 71." *California State Treasurer's Office*. Web.  
<<http://www.treasurer.ca.gov/caeatfa/sb71/index.asp>>.
- <sup>32</sup> Many Shades of Green, Next 10
- <sup>33</sup> *2010 California Green Innovation Index*
- <sup>34</sup> *2010 California Green Innovation Index*
- <sup>35</sup> "Clean Tech." *The Mayor of the City of Los Angeles*. Web.  
<<http://mayor.lacity.org/Issues/CleanTech/index.htm>>.
- <sup>36</sup> *Many Shades of Green*. Rep. Next 10, 2010. Web.  
<[http://next10.org/next10/publications/pdf/2011\\_Many\\_Shades\\_of\\_Green\\_FINAL.pdf](http://next10.org/next10/publications/pdf/2011_Many_Shades_of_Green_FINAL.pdf)>.
- <sup>37</sup> Saxenian, AnnaLee. *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge, MA: Harvard UP, 1994.
- <sup>38</sup> Vaillancourt, Ryan. "CRA Approves Cleantech Site Sale." *Los Angeles Downtown News*. 22 Mar. 2011.
- <sup>39</sup> *CleanTech Corridor: An Advisory Service Panel*. Rep. Urban Land Institute, 16 May 2010. Web.  
<<http://www.uli.org/~media/Documents/CommunityBuilding/AdvisoryService/Panels/CleantechPPT.ashx>>.
- <sup>40</sup> "Measure R." *Los Angeles Metro*. Web. <<http://www.metro.net/projects/measurer/>>.
- <sup>41</sup> Nguyen, Linda. "Interview with LAANE." Personal interview. 16 Feb. 2011.
- <sup>42</sup> Beutner, Austin. "Austin Beutner: With Electric Vehicles for Mass Transit, LA Can Step into the Forefront." *LA Daily News*. 19 Mar. 2010. Web.  
<[http://www.dailynews.com/opinions/ci\\_17646909](http://www.dailynews.com/opinions/ci_17646909)>.
- <sup>43</sup> *Los Angeles*. Apollo Alliance. Web. <<http://apolloalliance.org/state-local/los-angeles/>>.
- <sup>44</sup> *Green Building*. The City of Los Angeles. Web.  
<<http://www.ci.la.ca.us/MAYOR/villaraigosaplan/EnergyandEnvironment/GreenBuilding/index.htm>>.
- <sup>45</sup> *The Lanzit Industrial Site Request for Proposal*. City of Los Angeles Community Development Department, Oct. 2009.
- <sup>46</sup> "Development of Block 25." *Wilmington Industrial Park*. Web.  
<<http://www.wilmingtonindustrialpark.org/development/block25.html>>.
- <sup>47</sup> *CRA/LA Activity Report*. Rep. CRA/LA, 08 Nov. 2010.
- <sup>48</sup> *CRA/LA Creates Industrial Incentive Program to Create Jobs and "Green" Manufacturing Citywide*
- <sup>49</sup> Redman, Elizabeth. "Beyond Tax Incentives: New Strategies for Clean Tech Job Growth." *CleanTechies Blog*. 1 Mar. 2011. Web. <<http://blog.cleantechies.com/2011/03/01/beyond-tax-incentives-new-strategies-for-clean-tech-job-growth/>>.
- <sup>50</sup> *CleanTech Corridor: An Advisory Service Panel*
- <sup>51</sup> Vaillancourt, Ryan. "CRA Approves Cleantech Site Sale." *Los Angeles Downtown News*. 22 Mar. 2011.
- <sup>52</sup> Freeman, Greg. "Interview with LAEDC." Telephone interview. 11 Apr. 2011.

- 
- <sup>53</sup> Los Angeles' Industrial Land: Sustaining a Dynamic City Economy. Rep. Department of City Planning and the CRA, Dec. 2007.
- <sup>54</sup> Troyan, Vitaly B. *Infrastructure Report Card for the City of Los Angeles*. Rep. Bureau of Engineering, Department of Public Works, Jan. 2003.
- <sup>55</sup> Liveris
- <sup>56</sup> Liveris
- <sup>57</sup> *Green Building Manufacturing in Los Angeles County*
- <sup>58</sup> Liveris
- <sup>59</sup> *Make It in America: The Apollo Green Manufacturing Action Plan*
- <sup>60</sup> *Make It in America: The Apollo Clean Transportation Manufacturing Action Plan*. Rep. The Apollo Alliance, 1 Nov. 2010. Web.
- <sup>61</sup> Wingfield, Brian. "Clean-Energy Loan Guarantees Escape Cuts in Proposed U.S. Budget." *Bloomberg*. 12 Apr. 2011. Web. <<http://www.bloomberg.com/news/2011-04-12/clean-energy-loan-guarantees-escape-cuts-in-proposed-u-s-budget.html>>.
- <sup>62</sup> *Make It in America: The Apollo Clean Transportation Manufacturing Action Plan*
- <sup>63</sup> Preparata
- <sup>64</sup> *Pathways to Green Manufacturing*. Rep. CD Tech, 23 Sept. 2010.
- <sup>65</sup> Saxenian, AnnaLee. *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge, MA: Harvard UP, 1994.
- <sup>66</sup> "SD Tech Fund." *Sustainable Development Technology Canada*. Web. <<http://www.sdtc.ca/index.php?page=sdtc-profile>>.
- <sup>67</sup> *Make It in America: The Apollo Clean Transportation Manufacturing Action Plan*
- <sup>68</sup> *Make It in America: The Apollo Clean Transportation Manufacturing Action Plan*
- <sup>69</sup> Redman, Elizabeth. "Beyond Tax Incentives: New Strategies for Clean Tech Job Growth." *CleanTechies Blog*. 1 Mar. 2011. Web. <<http://blog.cleantechies.com/2011/03/01/beyond-tax-incentives-new-strategies-for-clean-tech-job-growth/>>.
- <sup>70</sup> Landsberg, Mitchell. "High School Dropout Rate Climbs to 34.9%." *Los Angeles Times*. 13 Mar. 2009. Web. <<http://latimesblogs.latimes.com/lanow/2009/05/high-school-dropout-rate-climbs-to-349.html>>.
- <sup>71</sup> *Make It in America: The Apollo Green Manufacturing Action Plan*

## References

- 2009 *LAANE Poverty Report*. Rep. Los Angeles Alliance for a New Economy, 28 Sept. 2010. Web. <<http://laane.org/la-county-analysis>>.
- 2010 *California Green Innovation Index*. Rep. Next 10, 2010. Web. <[http://next10.org/next10/pdf/GII/Next10\\_GII\\_2010.pdf](http://next10.org/next10/pdf/GII/Next10_GII_2010.pdf)>.
- Beutner, Austin. "Austin Beutner: With Electric Vehicles for Mass Transit, LA Can Step into the Forefront." *LA Daily News*. 19 Mar. 2010. Web. <[http://www.dailynews.com/opinions/ci\\_17646909](http://www.dailynews.com/opinions/ci_17646909)>.
- Bivens, Josh. Updated Employment Multipliers for the U.S. Economy. EPI, 2003.
- "CAEATFA SB 71." *California State Treasurer's Office*. Web. <<http://www.treasurer.ca.gov/caeatfa/sb71/index.asp>>.
- "Clean Tech." *The Mayor of the City of Los Angeles*. Web. <<http://mayor.lacity.org/Issues/CleanTech/index.htm>>.
- CleanTech Corridor: An Advisory Service Panel*. Rep. Urban Land Institute, 16 May 2010. Web. <<http://www.uli.org/~media/Documents/CommunityBuilding/AdvisoryService/Panels/CleantechPPT.ashx>>.
- CRA/LA Activity Report*. Rep. CRA/LA, 08 Nov. 2010. Web.
- CRA/LA. *CRA/LA Creates Industrial Incentive Program to Create Jobs and "Green" Manufacturing Citywide*. 10 Aug. 2010. Web.
- "Development of Block 25." *Wilmington Industrial Park*. Web. <<http://www.wilmingtonindustrialpark.org/development/block25.html>>.
- Economic Policy Institute (EPI), 2008; BLS and Bureau of the Census, 2009.
- Freeman, Greg. "Interview with LAEDC." Telephone interview. 11 Apr. 2011.
- Green Building Manufacturing in Los Angeles County*. Rep. Strategic Concepts in Organizing and Policy Education, 1 Dec. 2006. Web.
- Green Building*. The City of Los Angeles. Web. <<http://www.ci.la.ca.us/MAYOR/villaraigosaplan/EnergyandEnvironment/GreenBuilding/index.htm>>.
- Landsberg, Mitchell. "High School Dropout Rate Climbs to 34.9%." *Los Angeles Times*. 13 Mar. 2009. Web. <<http://latimesblogs.latimes.com/lanow/2009/05/high-school-dropout-rate-climbs-to-349.html>>.

- The Lanzit Industrial Site Request for Proposal*. City of Los Angeles Community Development Department, Oct. 2009. Web.
- Levy, Frank. *Dollars and Dreams: the Changing American Income Distribution*. New York: Norton, 1988. Print.
- Liveris, Andrew. *Make It in America: the Case for Re-inventing the Economy*. Hoboken, NJ: Wiley, 2011. Print.
- Lombardozi, Brian. "Interview with Apollo Alliance." Telephone interview. 2 Mar. 2011.
- Los Angeles*. Apollo Alliance. Web. <<http://apolloalliance.org/state-local/los-angeles/>>.
- Los Angeles' Industrial Land: Sustaining a Dynamic City Economy*. Rep. Department of City Planning and the CRA, Dec. 2007.
- Make It in America: The Apollo Green Manufacturing Action Plan*. Rep. The Apollo Alliance, Mar. 2009. Web.
- Make It in America: The Apollo Clean Transportation Manufacturing Action Plan*. Rep. The Apollo Alliance, 1 Nov. 2010. Web.
- Many Shades of Green*. Rep. Next 10, 2010. Web. <[http://next10.org/next10/publications/pdf/2011\\_Many\\_Shades\\_of\\_Green\\_FINAL.pdf](http://next10.org/next10/publications/pdf/2011_Many_Shades_of_Green_FINAL.pdf)>.
- "Measure R." *Los Angeles Metro*. Web. <<http://www.metro.net/projects/measurer/>>.
- Nguyen, Linda. "Interview with LAANE." Personal interview. 16 Feb. 2011.
- Nunez, Yvette. "Interview with CDTech." Personal interview. 4 Mar. 2010.
- Pathways to Green Manufacturing*. Rep. CD Tech, 23 Sept. 2010.
- Peltz, James F. "Aerospace Job Losses Putting L.A.'s Middle Class at Risk, Survey Warns - Los Angeles Times." *The Los Angeles Times*. 08 Mar. 1996. Web. <[http://articles.latimes.com/1996-03-08/business/fi-44537\\_1\\_aerospace-job](http://articles.latimes.com/1996-03-08/business/fi-44537_1_aerospace-job)>.
- Preparata, Claudia. "Interview with Green for All." Telephone interview. 2 Mar. 2011.
- Redman, Elizabeth. "Beyond Tax Incentives: New Strategies for Clean Tech Job Growth." *CleanTechies Blog*. 1 Mar. 2011. Web. <<http://blog.cleantechies.com/2011/03/01/beyond-tax-incentives-new-strategies-for-clean-tech-job-growth/>>.
- "Richer and Poorer: Income Inequality in Los Angeles." (9 Apr. 2007). United Way LA. Web.

Saxenian, AnnaLee. *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge, MA: Harvard UP, 1994. Print.

Scott, Megan. "Interview with SCOPE." Personal interview. 4 Mar. 2011.

"SD Tech Fund." *Sustainable Development Technology Canada*. Web.  
<<http://www.sdtc.ca/index.php?page=sdtc-profile>>.

Troyan, Vitaly B. *Infrastructure Report Card for the City of Los Angeles*. Rep. Bureau of Engineering, Department of Public Works, Jan. 2003.

Vaillancourt, Ryan. "CRA Approves Cleantech Site Sale." *Los Angeles Downtown News*. 22 Mar. 2011. Web.

Wingfield, Brian. "Clean-Energy Loan Guarantees Escape Cuts in Proposed U.S. Budget." *Bloomberg*. 12 Apr. 2011. Web.  
<<http://www.bloomberg.com/news/2011-04-12/clean-energy-loan-guarantees-escape-cuts-in-proposed-u-s-budget.html>>.

Wolff, Goetz. "Interview with Goetz Wolff." Personal interview. 18 Mar. 2011.