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Los Angeles

Laurie Kaye

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Attracting "Green Industry":

An Economic Development Approach for the City of Los Angeles

Laurie Kaye

**"A comprehensive project submitted in
partial satisfaction of the requirements for the degree
Master of Arts in Urban Planning"**

Abstract:

Los Angeles is an urban center that faces a slew of environmental and economic challenges. Economic and environmental goals can be met through an environmental sustainable agenda that concentrates on attracting and developing the green economic sector. The green economic sector includes all businesses that provide environmental goods and services such as alternative sources of energy and pollution prevention technology. The foregoing research examines the green economic sector in Los Angeles. It first quantifies existing establishments in the city, and then examines other municipalities and international governments in order to present a set of recommendations to build upon and reform existing programs in the city. This burgeoning sector offers opportunities for revenue generation and job growth within the city. Political attention has been recently focused on these possibilities. Green industry can help to reverse some of Los Angeles' environmental and economic problems.

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PART ONE: INTRODUCTION

Los Angeles is known as an urban center of wealth and economic opportunities. The second largest metropolitan area in the United States, its average home is valued at far higher than the national average and it offers a variety of employment opportunities for residents. (U.S. Census Bureau, 2004)

At the same time, Los Angeles is a city plagued with a slew of environmental problems. According to Environmental Defense, Los Angeles has the worst air quality in the country (Environmental Defense, 2005). According to sustainlane, a website that ranks the sustainability of cities, Los Angeles is less sustainable when compared to other metropolitan areas (Sustain Lane, 2005). Congestion and environmental degradation remain a fact of life for residents.

Los Angeles is both a place of pollution and economic promise. Environmental preservation and economic growth are not mutually exclusive policy goals. The City of Los Angeles can simultaneously advance environmental preservation and economic expansion. This paper focuses on economic development in the City of Los Angeles in Los Angeles County with a focus on developing the green economic sector. For the purposes of this report, the environmental goods and services industry, or the green economic sector, is defined by "activities which produce goods and services to measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems" (OECD, 1996: 9). Green industry, the green economic sector and the environmental goods and services industry will be used interchangeably throughout the report, and all fall under the above definition. I will

examine how the development of green industries can bring economic prosperity and jobs into Los Angeles.

There are currently around 300 green establishments operating in Los Angeles County amounting to .08 % of all of the wage and salary establishments composing the county's economy. 40% of those establishments are located within the city of Los Angeles (Flaming and Burns, 2006). Thus green industry does not currently account for a large proportion of the city's economic base. However, especially when attached to both the burgeoning technological and services sectors, the industry may become more significant in the future.

The city of Los Angeles has the opportunity to grow and benefit from green industry developmental efforts. According to Daniel Flaming and Patrick Burns of The Economic Roundtable in their recent report entitled "Jobs in Los Angeles' Green Business Sector (2006: 9):

"Los Angeles has unrealized opportunities to become a growing provider of 'green' goods and services, and through this growth to create decent jobs that benefit all residents of the city."

According to Flaming and Burns (2006), Los Angeles has a variety of advantages for attracting green industry.

Strengths that Los Angeles can build on include: a large diverse economy with significant strengths in many green technology industries, ambitious environmental goals and the need for innovative technologies to achieve those goals, a growing consumer market for green products and services, significant public sector requirements for green

products and services and exceptional intellectual assets in local universities and research institutions (Flaming and Burns, 2006).

Los Angeles has the potential to expand the number of jobs generated from green industry. This paper is organized as follows. First, I define green industries using NAICS categories and then measure the size of the green industry in Los Angeles with employment and establishment data. Second, I examine public policies in Germany and Santa Monica that act to stimulate green industries. Third and finally, I make public policy recommendations for stimulating the expansion of green industries in Los Angeles.

Methodology/Theoretical Background and Study Limitations

Theoretical Background: Defining Sustainability

At the most basic level, the conception of green industry starts with an emphasis on what is known as sustainable development, and particularly environmentally sustainable development. The concept of sustainable development is significant because it integrates economic and environmental goals into one common and mutually beneficial set of objectives. It is the synthesis of these ideas that underlies this analysis. Sustainability has become a politically useful concept over the past two decades.

In recent years, the concept of sustainable development has garnered significant political attention. The concept of sustainable development comes from the Brundtland Commission's working group. The Brundtland report was the first comprehensive definition of what sustainable development really entails. The commission established that

sustainable development is development that meets the needs of this generation without compromising the needs of future generations (Bleischweitz & Henricke, 2004).

For my purposes, the above definition is far too broad and general, as are many definitions of sustainable development discussions. Only environmental sustainability is directly relevant to the aims of this paper. One of the most substantive usages of this term is the Environmental Sustainability Index developed by Daniel Esty and Peter K. Cornelius (2001). The index, representing a country's sustainability progress, was calculated for countries of varying sizes and income levels throughout the world. Internationally, both sustainability measure and the size of the environmental goods and services sectors vary (Esty and Cornelius, 2001).

I use the definition presented by Esty and Cornelius (2001). They divide sustainability into a variety of categories. For the purposes of this report, a municipality is sustainable to the extent that

- Its vital environmental systems are maintained at healthy levels, and that the levels are improving rather than deteriorating.
- People and social systems are not vulnerable to environmental disturbances.
- The county or city cooperates with other countries to manage common environmental problems. It also reduces negative environmental externalities suffered by areas outside its borders.
- It has in place institutions and underlying social patterns of skills, attitudes and networks that foster effective responses to environmental challenges

The connection between sustainability, economics and green industry was most clearly explained by James Higgins (1996) in his paper "Canadian Perspective on the World Environmental Industry." According to Higgins (1996:65):

Sustainable development is a concept which encourages both economic growth and a healthy environment. It recognizes the desirability of economic growth and change and acknowledges the right of individuals and organizations to pursue economic goals, including sales and profits. At the same time, however, it recognizes that today's decisions must permit future generations to enjoy a quality of life that is at least as good as that which we enjoy today. It must therefore be sustainable, correct past damage to the environment, and prevent undesirable future impacts. The concept of sustainable development is fast becoming a major policy initiative for governments; one that will be more and more vigorously promoted by incentives and disincentives.

An important aspect of sustainable development will be the development of companies which can contribute to sustainability by providing products and services which reduce environmental degradation, provide better ways of doing things while reducing impacts, and contribute to the "greening" of our society. Opportunity for the future exists for such sustainable technologies, ones which not only prevent pollution from ever

happening but also provide multiple environmental economic and social benefits.

Sustainable development is a powerful theoretical concept because it bridges the gap between economic and environmental goals. In the past, it was assumed that environmental preservation and economic development were mutually exclusive and inversely related goals. The concept of sustainable economic development turns this perception on its head and instead asserts a positive connection between the environment and the economy. Environmental preservation can be pursued along side, and even as a function of, economic development.

And in practical terms, sustainable development, as defined above, is a politically useful concept. According to Sophia Heller at the Mayor's Office of Economic Development and Housing, the City of Los Angeles recognizes the importance of sustainable development. The mayor's office has linked the production of environmental goods and services with this theoretical conception of how economic goals should be met. The very idea of green industry is a part of a greater effort to make the city of Los Angeles more sustainable. Attracting green industry is one practical application of sustainability objectives.

Methodology and Study Limitations

The following research uses both qualitative and quantitative approaches. The first task is to define and identify "green industries" or the environmental goods and services industries in Los Angeles. As indicated above, green industries were defined by the OECD (2001:9) as "activities that produce goods and services to measure, prevent, limit, minimize

or correct environmental damage to water, air and soil, as well problems related to waste, noise and ecosystems. This includes cleaner technologies, products and services that reduce environmental risk and minimize pollution and resource use." I took this definition and identified relevant NAICS categories. Then, using County Business Patterns data, I quantified these industries and their economic impacts.

Much of the following research focuses on examining programs in other municipalities both within and outside of the United States. Some cities, such as Santa Monica, have drafted citywide sustainability programs.ⁱ Germany has taken the concept a step further by developing "business parks." In places such as Freiburg, Germany entrepreneurs must agree to do business in an environmentally sensitive way, agree to limit air emissions and waste, and take various energy conservation measures. Recycling targets and health monitoring are also considered (Bleischweitz & Hennicke, 2004).

This paper examines how the successful elements of these programs can be applied to Los Angeles. These approaches are built upon by focusing on sustainability as an industry and not simply as an outcome that must be accomplished in addition, or in isolation from, other business goals.

This study will not present a sustainability plan for the city of Los Angeles. Although creating such a plan, and the establishment of benchmarks, is a central recommendation, such a program and the appropriate benchmarks will not be specified here. This too is beyond the purview of the present research.

Despite this limitation, the following research should contribute to the environmental sustainability and economic development literature. In recent years, there

has been a lot of talk about sustainability and high tech economic growth, which includes green goods and services. Much of the discourse has been conceptualized at the national or international level. Many European countries have gone to greater lengths to develop green goods and services and contributions, especially in the realm of data analysis, have been made by international organizations like the OECD (Bleischwitz & Henricke, 2004). As such, strategies tend to be broadly conceived and lack grounded, achievable results. By focusing on Los Angeles, this project can serve as an example of how sustainable development in general, and the development of green goods and services in particular, can be bolstered at the local level.

The conceptualization of the green industry is also rather novel. The green cluster directly links economic development and the environment. The idea of the green industry defines environmental services, or those that retard environmental degradation, as a viable industry that can be developed in Los Angeles. Not only will this reduce environmental degradation, but it will create jobs and revenue.

PART TWO: DEFINING AND QUANTIFYING GREEN INDUSTRIES

Defining "Green Industry" or the Environmental Goods and Services Sector

What is the environmental goods and services sector? Green industries have been a fuzzy concept at best. Los Angeles is not far behind the curve in terms of developing a definition for this potentially growing sector of industrial and commercial activity.

Environmental goods and services, after all, are not a traditional category of industry and are not widely recognized. Therefore, the first step is defining what green industries are.

This project aims to first define what environmental industries are and to then quantify their existence in Los Angeles.

Part of the difficulty of defining green industry is that it is a new and rapidly changing sector. The notion of sustainable development, and the technologies that facilitate it, date back only to the 1980s and thus do not provide much of a legacy or history of best practices. Data has not been devised and there has been little or no government emphasis on compiling and analyzing available information.

At the same time, technological change has been rapid and the categories of environmental goods and services have multiplied. Higgins (1996) divides the development of environmental goods and services into four categories. The first generation of technologies concentrated on cleaning up the effects of pollution. They are termed *remediation* technologies. They address the symptoms of damaged resources or environments. They are costly and range from low to high tech. Examples include soil remediation, toxic site clean-ups and water treatment.

These first generation technologies were followed by the second generation of *abatement* technologies. According to Higgins (1996: 65) defines abatement as "the catching of pollutants with end of the pipe technologies which prevent them from entering the environment." These relatively costly technologies capture and treat pollutants before release. They also consume capital, energy and resources. Finally they generate a reduced stream. Examples include flue gas desulphurization, sewage treatment plants and catalytic mufflers.

Pollution prevention technologies compose the third generation of environmental technologies. They are more cost effective than abatement technologies and are used at the site of industrial process design and product design or composition. Pollution prevention technologies reduce or prevent pollution by changing the product or process. They also lead to a reduced waste stream. Examples include the introduction of chlorine-free paper, cyanide-free electroplating and lead-free gasoline and industrial process design. Finally, the fourth generation includes what Higgins refers to as *sustainable* technologies. These technologies are defined by their environmental, economic, social and resource efficiency. Examples include ecological engineering, recycled products and industrial ecology (Higgins, 1996).

The OECD has become a major player in defining and monitoring green industries. It has been at the forefront of defining the theoretical connection between industry and environmental objectives. And more significant to this study, they have been at the forefront of quantifying the development of green industries.

One of the best examples of an attempt to both define and quantify green industry is from the OECD/Eurostat Informal Working Group on the Environmental Industry. The group met several times between 1994 and 1997. The aim of the group was "to share experiences and harmonize views on the environmental goods and services industry" (OCED,1996: 3). In 1996, they published an interim definition and classification of the environmental goods and services industry. The interim report proposed an OECD-wide definition and classification and identified a set of core environmental goods and services activities (OCED, 1996).

The OECD's Working group definition states that:

The environmental goods and service industry consists of activities which produce goods and services to measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. This includes cleaner technologies, products and services that reduce environmental risk and minimize pollution and resource use (OECD,1996:9).

This definition is broad and allows the incorporation of a vast variety of industry activities. The essential uniting factor, however, is the incidence of environmental preservation as a product of industrial activities. This allows for flexibility in defining green industry or the environmental goods and services industry.

At the same time, the above definition is not purely theoretical. The concept is specified through the inclusion of the second sentence: "Cleaner technologies, products and services that reduce environmental risk and minimize pollution and resource use clearly delineates the types of industrial activities and the types of companies that fall under this category" (OECD, 1996: 9). This definition will be used throughout this report as a way to identify and quantify "green" industries.

The working group further divided products into two groups. They were groups according to two main guidelines that were articulated as "the clear environmental purpose of goods and services supplied by the environmental goods and services industry. And the ease of statistical assessment of these activities and products" (OECD, 1996:9). Groups are as follows:

- The pollution management group:

This group includes goods and services that are exclusively supplied for environmental purposes. They also have a significant impact on reducing polluting emissions that are easily statistically identifiable. This group can be divided into a variety of types of production of equipment and specific materials for and the provision of services for:

- Air pollution control
- Wastewater management
- Solid waste management. Includes hazardous waste collection, waste collection, treatment and disposal and waste recovery and recycling (excludes manufacture of new materials or products from waste and scrap)
- Remediation and clean-up of soil, surface water and groundwater
- Noise and vibration abatement
- Environmental monitoring, analysis and assessment

- The Cleaner Technologies group:

This group includes goods and services that reduce or eliminate negative environmental impacts. They are often supplied for purposes other than environmental ones. This includes the production of equipment, technology, specific materials or services for:

- Cleaner/resource-efficient technologies and processes
- Cleaner/resource-efficient products

- Resource management group:

This group includes goods and services that are associated with environmental protection. However, environmental protection is not their primary purpose. Examples include energy saving and management, renewable energy plants or indoor pollution control). This includes the production of equipment, technology and specific materials, provision of services, and construction and installation for:

- Indoor air pollution control
- Water supply
- Recycled materials (manufacture of new materials or products from waste or scrap, separately identified as recycled)
- Renewable energy plant
- Heat/energy saving and management
- Sustainable agriculture and fisheries
- Sustainable forestry
- Natural risk management
- Eco-tourism
- Other (e.g. nature conservation, habitats and biodiversity)

In sum, the three groups comprise the green industries and services. OECD identified the pollution management group as the core of the environmental goods and services industries. "Cleaner technologies and products" and "resource management" are also significant areas and OECD believes that their importance will increase in the future.

Globally, the environmental industry was estimated at \$453 billion in 1996, \$484 billion in 1998 and \$518 billion in 2000. There is a wide variation in both the quantity of green industry and sustainability of different nations (OECD, 1996).

Quantifying Green Industries in Los Angeles

The environmental goods and services industry can be identified, defined and quantified in Los Angeles. Flaming and Burns offer the most comprehensive analysis of the green goods and services sector in their recent report entitled *Jobs in L.A.'s Green Technology Sector*. Flaming and Burns use a similar definition of green goods and services to the one specified at the outset of this report. They state that the characteristics expected of green goods and services are the provision of renewable or less-polluting sources of energy. Technologies that help reduce pollution created by the existing economic base, transportation infrastructure, and residential communities also fit into the green category (Flaming and Burns, 2006).

Using this definition, Flaming and Burns identified green goods and services within NAICS categories. Categories included are those that currently have some number of green industry. Green establishments were identified, according to the above definition, by researching business directories, running Internet searches, looking through newspaper articles, and examining existing lists from L.A.'s Department of Water and Power and the California Energy Commission (Flaming and Burns, 2006).

The findings for the Los Angeles-Long Beach MSA are summarized in Table 1. By using relevant NAICS categories, Flaming and Burns have identified 295 establishments in the county that span a wide variety of industrial classifications. Most industries have less

than 5 establishments, although environmental consulting services (541620) has a large number of establishments with a total of 46. Professional services had the greatest number of categories of green establishments. According to Flaming and Burns (2006), Green goods amount to .08 % of all of the wage and salary establishments composing the county's economy. As shown in the table 1, out of the categories that currently have some number of green goods and services, only around 2 percent of providers are green.

Table 1: Total Number of Green Establishments

NAICS Code & Title (Unclassified)	Total Green Establishment	Total establishments	Percent of Establishments that are Green
22 Utilities	16	114	14.0
221121 Electric Bulk Power Transmission and Control	2	4	50.0
221210 Natural Gas Distribution	1	33	3.0
221310 Water Supply and Irrigation Systems	12	72	16.7
221320 Sewage Treatment Facilities	1	5	20.0
23 Construction	71	7915	0.9
235610 Roofing Contractors	12	481	2.5
236115 New Single-Family Housing Construction (except Operative Builders)	4	2552	0.2
238162 Nonresidential Roofing Contractors	2	.	.
238211 Residential Electrical Contractors	41	1453	2.8
238212 Nonresidential electrical contractors	1	.	.
238221 Residential Plumbing, Heating, and Air- Conditioning Contractors	5	1718	0.3

238222 Nonresidential Plumbing, Heating, and Air- Conditioning Contractors	3	.	.
238321 Residential Painting and Wall Covering Contractors	1	852	0.1
238910 Site Preparation Contractors	2	153	1.3
31-32 Manufacturing (Non- Durable)	5	89	5.6
311613 Rendering and Meat Byproduct Processing	1	4	25.0
321219 Reconstituted Wood Product Manufacturing	1	1	100.0
324191 Petroleum Lubricating Oil and Grease Manufacturing	1	9	11.1
325611 Soap and Other Detergent Manufacturing	1	30	3.3
325998 All Other Miscellaneous Chemical Product and Preparation Mfg.	1	45	2.2
33 Manufacturing (Durable)	3	50	6.0
326140 Polystyrene Foam Product Manufacturing	1	29	3.5
331315 Aluminum Sheet, Plate, and Foil Manufacturing	1	4	25.0
332420 Metal Tank (Heavy Gauge) Manufacturing	1	18	5.6
42 Wholesale Trade	15	3994	0.4
423120 Motor Vehicle Supplies and New Parts Merchant Wholesalers	1	1132	0.1
423720 Plumbing and Heating Equipment and Supplies (Hydronics) Merchant Wholesalers	4	704	0.6
423730 Warm Air Heating and Air-Conditioning Equipment and Supplies	1	101	1.0

Merchant Wholesalers

423830 Industrial Machinery and Equipment Merchant Wholesalers	3	920	0.3
423840 Industrial Supplies Merchant Wholesalers	1	498	0.2
423930 Recyclable Material Merchant Wholesalers	1	302	0.3
424690 Other Chemical and Allied Products Merchant Wholesalers	1	337	0.3
425120 Wholesale Trade Agents and Brokers	3	.	.
44-45 Retail Trade		1825	0.0
441110 New Car Dealers	1	514	0.2
445299 All Other Specialty Food Stores	1	321	0.3
453998 All Other Miscellaneous Store Retailers (except Tobacco Stores)	3	548	0.6
454390 Other Direct Selling Establishments	1	442	0.2
48 Transportation and Warehousing	2	491	0.4
484220 Specialized Freight (except Used Goods) Trucking, Local	1	482	0.2
486110 Pipeline Transportation of Crude Oil	1	9	11.1
54 Professional, Scientific, and Technical Services	92	14664	0.6
541110 Offices of Lawyers	2	6889	0.0
541310 Architectural Services	2	853	0.2
541320 Landscape Architectural Services	1	152	0.7
541330 Engineering Services	13	1453	0.9

541360 Geophysical Surveying and Mapping Services	1	11	9.1
541380 Testing Laboratories	9	202	4.5
541511 Custom Computer Programming Services	2	1392	0.1
541611 Administrative Management and General Management Consulting Services	2	1461	0.1
541613 Marketing Consulting Services	1.00	705	0.1
541614 Process, Physical Distribution, and Logistics Consulting Services	1.00	139	0.7
541618 Other Management Consulting Services	1.00	282	0.4
541620 Environmental Consulting Services	46.00	193	23.8
541690 Other Scientific and Technical Consulting Services	4.00	577	07
541710 Research and Development in the Physical, Engineering, and Life Sciences	7.00	355	2.0
55 Management of Companies and Enterprises	1.00	987	0.1
551114 Corporate, Subsidiary, and Regional Managing Offices	1.00	987	0.1
56 Admin. Support and Waste Management and Remediation Services	24.00	197	12.2
562111 Solid Waste Collection	4.00	115	3.5
562211 Hazardous Waste Treatment and Disposal	9.00	15	60.0
562212 Solid Waste Landfill	1.00	19	5.3
562910 Remediation Services	9.00	41	22.0

562998 All Other Miscellaneous Waste Management Services	1	7	14.3
61 Education Services	1	40	2.5
611210 Community Colleges	1	40	2.5
81 Other Services (Except Public Administration)	1	234	0.4
811212 Computer and Office Machine Repair and Maintenance	1	234	0.4
92 Public Administration	5	.	.
924110 Administration of Air and Water Resource and Solid Waste Management Programs	5	.	.
Total	295	27738	1.1

Source: Adapted from Flaming, Daniel and Burns Patrick. (2006). *Jobs in Los Angeles' Green Technology Sector*. Los Angeles: Economic Roundtable. County Business Patterns(2002)

Numbers of green businesses can be compared with the total number of establishments in the city of Los Angeles. The percent of these establishments that are green was then calculated. The greater the percentage, the more the green this sector is represented within that particular NAICS category. Utilities, with 14% of utilities classified as green, is the largest as of 2002 data. Data was not available beyond 2002.

Many of the establishments are located in the city of Los Angeles. According to Flaming and Burns, 40% of the establishments are located within the city of Los Angeles. They state that when (2006: 9), "viewed altogether, L.A.'s green technology sector is highly diversified, with a broad range of production activities (research and development, manufacturing, sales and distribution) and services (remediation, engineering, legal research and development, and testing laboratories) located here." As shown in table 2, these establishments include a wide variety of services that are largely high tech. The

highest number of establishments is in the solar power category. Of the 92 solar power establishments, 43 are located in the city of Los Angeles. This suggests the prevalence of this alternative energy source in Los Angeles and indicates that there may be potential growth in that sector of the economy (Flaming & Burns, 2006). As of 2002, the industries with Green Technology Components that contribute the most revenue green technology sectors are (in the form of billions of dollars): single-family housing construction (7.6), measuring and control device manufacturing (7.3), engineering service and testing labs (5.4), environmental consulting service (3.7), and transmission and power-train parts manufacturers (2.9). The five industries located within the City of Los Angeles that contributed the most in revenue are Engineering Services and Testing Labs (4.0), Measuring and Control Device Manufacturing (3.4), Single-Family Housing Construction (3.3), Environmental Consulting Services (2.8), R and D in Physical, Engineering and Biological Sciences (1.5).

Table 2: Green Establishments in the City of Los Angeles vs. Los Angeles County

Type of Green Establishments	City of Los Angeles	Balance of Los Angeles County	Los Angeles County Total
Alternative Fuel Vehicles	5	16	21
Biomass / Waste-to-Energy Power	7	9	16
Construction	5	8	13
Environmental Components Manufacturer	7	11	18
Environmental Components Distributor	1	1	2
Environmental Consulting	31	44	75
Fuel Cell Manufacturer	0	3	3
Solar Power	43	49	92
Waste Disposal	13	24	37
Water Purification	2	7	9
Wind Power	1	3	4

Other	3	3	6
Total	118	178	296
Percent	40%	60%	100%

Source: Adapted from Flaming, Daniel and Burns Patrick. (2006). *Jobs in Los Angeles' Green Technology Sector*. Los Angeles: Economic Roundtable.

Green establishments are distributed around the County. Flaming and Burns found that there was some clustering of establishments. According to their findings (2006: 15) “,while construction and solar power establishments, for example, are scattered throughout the county, there are some discernible geographic concentrations of other green technology vendor categories. Waste disposal / remediation firms are concentrated in the cities of Los Angeles, Vernon, Huntington Park, Torrance and Irwindale. Environmental consulting is concentrated in downtown Los Angeles, West Los Angeles, Santa Monica, Western San Fernando Valley, Pasadena, and Torrance. Alternative fuel vehicle businesses are concentrated in Carson, Gardena and Torrance.” The agglomeration potential for green industries is unknown.

Along with the number of establishments present in the city, the green industry can also be quantified through the number of jobs generated from the industry. The growth trend continues today and green industries, when viewed in conjunction with high technology and biotech, significantly contribute to the new potential employment opportunities within the city. Table 3 summarizes the 15 top industries identified by the roundtable and show the concentration of these jobs within the city of Los Angeles County. This shows the regional impact of green industries in terms of job generation. Several categories of green goods and services have stable or growing job levels along

with wages of at least 2.500 a month. These industries include: building equipment contractors, scientific and/or technical consulting, architectural and/or engineering services, computer systems design, scientific research and development services, electrical component manufacturing, and power train equipment and manufacturing. Building and equipment contractors generated the most well paying jobs

Table 3: Top Green Industries by Employment

4-Digit NAICS Code	Industry Title	Total LA Co. Employment 2002	LA Co. Green Employment 2002
4231	Motor Vehicle Parts Wholesale	51,723	1655
5413	Arch & Engineering Services	31892	710
5416	Sci. & Tech Consulting Servs.	27698	210
5415	Computer Systems Services	26176	123
4237	Plumb & Heating Equip. Whls.	23704	83
3345	Instruments Mfg.	19669	211
2381	Structural Contractors	15863	188
3344	Electronic Component Mfg.	15290	635
2382	Building Equip. Contractors	14768	179
3363	Motor Vehicle Parts Mfg.	11856	340
3116	Animal Processing	6956	139
3241	Petroleum Products Mfg.	5533	125
3359	Other Electrical Equip. Mfg.	4858	304
3333	Machinery Manufacturing	3501	231
3336	Power Train Equip. Mfg	1119	312

Source: Adapted from Flaming, Daniel and Burns, Patrick. (2006). *Jobs in Los Angeles' Green Technology Sector*.

After considering job growth and the number of establishments, Flaming and Burns identified 17 key industries. It is politically and economically infeasible to concentrate efforts on all of the industries identified as green and exhibited in Table 1. Therefore, Flaming and Burns identified industries that they believed had the highest growth potential

and those which they believe will yield the greatest number of jobs. They then used three filtering criteria to further identify industries. First, the category must yield more than 500 jobs into the City of Los Angeles. Second, there must be stable or growing employment. In order to meet the “stable and growing employment” criterion, Flaming and Burns specify that businesses will have to have “wage and growth-trend characteristics that generally resemble the industry group that they fall within.” Third and finally, average monthly wage in 2002 must be greater than \$2,500.

The 17 industries are relatively equally distributed throughout the NAICS categories. Residential Building Contractors had the highest employment in 2002. Nearly all categories experienced growth since 1996. Water and Sewage Systems is the only category that experienced a net loss of jobs. Predictably, science and technical growth experienced the largest growth with an influx of 4,400 jobs into the city of Los Angeles.

The jobs and revenue generated from green industry positively benefit the economy. Given the economic development opportunities associated with green goods and service industries established by the above research, it seems that this sector of the economy is a viable one. It deserves attention through developmental efforts.

Table 4: 17 Top Green Industries in the City of Los Angeles

Industry	Average Employment 2002	Annual Job Change 1996-2002	Average Monthly Wage 2002
Water and Sewage Systems	2,803	(10.00)	5,343.00
Res. Building Construction	6,544	1,177.00	2,808.00
Building Equip. Contractors	11,217	1,928.00	3,400.00
Building Finish Contractors	9,865	2,912.00	2,625.00

Petroleum Prod Recycling	2,059	184.00	6,521.00
Cleaning Compound Mfg	3,627	744.00	4,584.00
HVAC Equipment Mfg	608	134.00	2,780.00
Other Electrical Equip Mfg	1,162.00	407.00	3,020.00
Misc. Durable Goods Whlse	11,927.00	1,906.00	2,642.00
Wholesale Electronics	6,809.00	3,156.00	3,476.00
Legal Services	34,924.00	3,651.00	6,322.00
Architecture & Engineering	9,565.00	748.00	4,649.00
Computer Sys Design	8,452.00	3,196.00	5,178.00
Scientific & Tech Consulting	10,419.00	4,400.00	5,005.00
Scientific R&D	3,775.00	843.00	5,397.00
Waste Collection	720.00	381.00	2,209.00
Remediation & Waste Mgmt	928.00	543.00	2,771.00

Source: Adapted from Flaming, Daniel and Burns Patrick. (2006). *Jobs in Los Angeles' Green Technology Sector*. Los Angeles: Economic Roundtable.

PART 3: SEARCHING FOR ANSWERS THROUGH A COMPARATIVE

ANALYSIS

How can the city of Los Angeles maintain existing green industries and attract new establishments into the city? A look at programs that have been implemented in other municipalities and in other nations may be helpful. It is valuable to engage in a comparative analysis in developing a conception of green industries in Los Angeles and in formulating possible strategies for bolstering the industry.

Officials of the City of Los Angeles have realized the importance of a comparative analysis in the formulation of policy. Romel Pasquel and Sophia Heller from the Mayor's Office have both indicated the importance and usefulness of such an analysis. They realize that the city can learn from other places.

However, any such analysis does face some limitations. Los Angeles is a particularly distinct political, cultural and economic space. Los Angeles is distinctively large and therefore faces unique challenges. Los Angeles County's size differentiates it as both a distinctive and significant economic unit. Los Angeles County spans 4,725 miles with a population of 9,761,037. This makes Los Angeles County equivalent to the eighth largest state in the nation, just behind Ohio (LAEDC, 2002).

Both the city of Los Angeles and the metropolitan statistical area are further defined and distinguished from other municipalities by their populations. Breaking down the population by ethnicity, Los Angeles County is 55% White, 9% Black, 13% Asian and 47% Hispanic. Los Angeles County's population is only 55 % White compared with national average of 76%. And the county is 47% Hispanic/Latino versus 14% in the United States numbers. The big difference between the United States and Los Angeles is in terms of the number of foreign born. In Los Angeles County, 36% of individuals are foreign born. Only 12% of individuals are foreign born in the United States. Furthermore, 57% of the population in Los Angeles County speaks a language other than English. This is much higher than a mere 19% of individuals that speak a language other than English in their home throughout the United States (United States Census Bureau, 2004).

The unique diversity of the population will dramatically impact the economic development of the region. Simply put, non-English speakers will likely be disadvantaged in the labor sector and language barriers preclude those individuals from employment in many of the more skilled sectors of the economy (Southern California Association of Governments, 2004).

The demographic and geographic characteristics may mean that actionable results elsewhere may fail to translate into successes in Los Angeles. However, it would be shortsighted to simply dismiss comparative analysis.

Despite the difficulties and drawbacks associated with comparative analysis, a comparative analysis is the only real way to address the problem. We cannot learn simply from Los Angeles' previous experience with sustainability efforts as these have been limited, largely unsuccessful and largely unrelated to specific goals for attracting green industries. Therefore, other countries and municipalities offer the only examples available. Los Angeles can learn from both the successes and those failures and find valuable lessons from these efforts. First, I will examine some of the innovative programs implemented in Germany in order to bolster sustainability and green industry through the development of business parks. Secondly and finally, I will summarize some of the relevant domestic efforts in the adjacent city of Santa Monica.

An International Example: Germany

As previously stated, the United States and the city of Los Angeles are behind in terms of reaching sustainability goals and developing the green industry sector. Foreign governments, particularly in Western Europe, have devised the most innovative programs. Most of the research has been done internationally and foreign governments and NGOs have provided the most detailed data for the environmental sector of the economy. It is valuable to look at sustainable development efforts and, in particular, to examine efforts to

bolster green businesses. This will consequently generate ideas for programmatic changes and additions in Los Angeles (OCED, 2001).

Germany is at the forefront of promoting sustainability measures and attracting green businesses into the country. It provides a model of success for Los Angeles through government led efforts. The German government has played a key role in pushing sustainable development (Gibbs, 2002).

Germany aggressively pushes for the use of environmentally friendly products. For example, building proposals in Lower Saxony are examined to determine the percentage of products that are environmentally friendly and that will be used to construct buildings. Considerations include reducing water consumption, emissions, waste and recycled product usage. Heat insulation, use of passive solar energy and the collection of use and rainwater are also considered (Gibbs, 2002). Green purchasing by the government helps to bolster industry demand and provides a model for private corporations to follow in their own corporate purchasing decisions.

Germany takes its efforts to a new level by creating what are known as "sustainable business parks." By targeting certain areas for development, environmental business parks help governments reach a variety of goals. According to Gibbs (2002; 121),

The environmental park is designed to:

- supply assistance and services to enterprises in environmental matters and to certify products and processes
- supply assistance to enterprises for eco-reconversion of production cycles and develop environmental research on the basis of local expertise
- supply information and international contracts concerning technological evolution, environmental regulation and market dynamics in the EU

- organize scientific and technological training in specific sectors
- supply services to the public administration.

One of the most successful business parks is located in Freiburg. Like all business parks, it is intended for businesses that are devoted to having a positive environmental effect. New investors must agree to limits on air emissions and waste and to energy conservation measures. Recycling targets and health monitoring are also considered. These businesses subsequently fuel demand for environmental goods and services. Environmental goods and services are needed in order to meet these limits. Therefore, through the creation of business parks, environmentally friendly businesses are placed within the city (Gibbs, 2001).

However, the positive effects of these businesses are even greater than this. As mentioned at the outset, this paper does not focus on environmentally friendly industry (or those businesses that take environmental effects into consideration in corporate decision making) and only directly considers the environmental goods and services industry. These industries will fuel demand for green goods and service providers who may also locate within the business park. Environmentally friendly companies must purchase technology in order to achieve low emissions and in order to monitor health concerns. Thus, they also create demand for environmental goods and services by engaging in green purchasing strategies. More and more green goods and service providers will be attracted into the city. This leads to the ultimate aim of this paper—the bolstering of the green goods and service industry (Gibbs, 2001).

The positive results from Germany's government lead efforts, including their conception and implementation of business parks, have been demonstrated over the past

two decades. The environmental industry in Germany grew throughout the 1980s and grew at rates faster than the manufacturing industry. Between 1983 and 1989, it boasted an average growth rate of 6.9 % compared with a 4.3 % growth rate in the industrial sector as a whole. The industry continued to grow and employed over 171,500 people by 1993 (Bleischwitz & Hennicke, 2004).

Today, the German environmental industry is both competitive and innovative. According to the OECD (1996), the German environmental industry is more developed than the industry in the United States or in Japan. Research efforts have been recently expanded past traditional water and air related areas. They are now focused on waste management and measurements.

A variety of skilled and high paying jobs were created from the growth of this industry in Germany. The level of education of employees in the German green industry sector is generally higher than in other industrial sectors. The types of jobs created vary with each sector of environmental goods. For example, the environmental service sector (e.g. engineering) requires a higher level of education than the equipment-manufacturing sector. In addition, there is variation in skill levels required within these sectors. For example, within the equipment-manufacturing sector there is a higher degree of skill required for measurement and analysis technologies (OECD, 1996).

The city of Los Angeles can learn from Germany's innovative planning and the implementation of the business park. This is most relevant when considering not just companies that provide environmental goods and services to the area, but also companies

that are consumers of such goods. These are environmentally friendly companies. Such companies are essential to the promotion of sustainability in Los Angeles.

The ability to derive valuable lessons from a comparative analysis is difficult at the international level. At the most simplistic level, there are data difficulties in comparing national economic indicators with local ones. Economic trends are harder to isolate at the national level where not only regional activities must be considered, but the entire realm of international economic activities such as importing and exporting activities impact development strategies. These comparisons are also difficult considering the vast difference in histories of economic development and political and cultural structures.

However, the comparative analysis does present opportunities to generate innovative ideas for tackling problems. Despite difficulties, it is still valuable to examine international examples. At the most basic level it is valuable in terms of seeing what makes countries more sustainable. It may elucidate what drives sustainability efforts. This is essential for our purposes because we must figure out what pushes cities to adopt sustainable practices, including measures to draw environmental goods and services into the city. At its very root, it also proves how important government action is to achieving sustainability objectives.

Domestic Comparison: Santa Monica

Although Los Angeles can learn from international examples, much of the politics and economic factors that underlie programs can undermine real potential for applications.

It is most applicable to examine the largest metropolitan areas in the United States. Their size and scope make findings more relevant and applicable to the city of Los Angeles.

The degree of sustainability programs varies widely throughout these metropolitan areas. Sustainlane has developed a sustainability index to determine where the largest metropolitan areas in the United States fall. They looked at 25 cities across 12 major categories in order to measure their levels of sustainability. Sustainlane considered a variety of factors that relate directly to green industries including U.S. Green Building Council's LEED (Leadership in Environmental & Energy Design)ⁱⁱ building certification and renewable energy for buildings and vehicles (Sustainlane, 2004).

Sustainability ratings range from 4 to 30. The index number and the degree of sustainability within a community are inversely related. Cities that range from 4 to 5 are considered "sustainability leaders". Cities that range between 5 and 10 are "Mixed sustainability progress." Cities with an index number above 15 are either "sustainability laggards" or "sustainability in danger." Cities are then ranked out of a total of the 25 largest metropolitan areas in the United States. San Francisco tops the list with a sustainability index of 4.9. Portland and Berkeley are first and second runners up. Houston comes in last place with a ranking of 18.9 (Sustainlane, 2004).

Los Angeles has a sustainability rating of 13.2 and therefore falls somewhere in the middle of the spectrum. With a rank of 18, Los Angeles is moving towards sustainability. Its sustainability rating can be broken up into a number of subcategories. Los Angeles has a 14 in transportation, a 22 in top water quality, a 24 in air quality, a 18 in LEED building, a 1 in solid waste, a 24 in food and agriculture, a 3 in zoning, a 12.5 in land use, a 13 in

planning, a 5 in energy and climate policy, a 9 in city innovation and a 13 in knowledge-base (Sustainlane, 2004).

Comparing the sustainability ratings of Los Angeles with other large cities shows that Los Angeles has a long way to go. A move towards encouraging green business should bolster this rating substantially. By looking at programs enacted in cities ranked higher in the sustainability spectrum, we can field potential programs for the city of Los Angeles.

The city of Santa Monica provides an appropriate municipal comparison because of its close proximity to Los Angeles. Santa Monica has enacted progressive programs and has a sustainability rating of 8 and a national rank of 5. Los Angeles can follow Santa Monica's lead in developing an entire package of environmentally sustainable programs (Sustainlane, 2004).

The environmental industry in the city of Santa Monica is centered primarily on the city's Sustainable City Program. In 1994, the Santa Monica city council, with the support of the citizens, created the Santa Monica Sustainable City Program (SCP) with the sole purpose of helping the community to begin to "think, plan, and act in a more sustainable manner" (City of Santa Monica, no date). The program began with eight guiding principles, four goal areas, and eighteen indicators. Initially, the four goals included: resource conservation, transportation, pollution prevention and public health protection, and community and economic development.

The city of Santa Monica did not stop after the initial creation of the program; it continues to better understand the necessary goals and indicators through progress reports,

which are used to update and expand on the original sustainability program. Less than 10 years after the programs initiation, the city recognized the need to develop the long-term nature of Santa Monica's vision. Therefore, the city developed the *Santa Monica Sustainable City Plan*. The plan added to the list of indicators. It also created the Sustainable City Working Group and an interdepartmental staff. The new goal areas were expanded to include: open space and land use, housing, community education and civic participation, and human dignity (City of Santa Monica, no date).

The Sustainable City Plan has allowed Santa Monica to introduce many environmental policies and has placed Santa Monica at the forefront of environmental preservation efforts in California and in the United States. The sustainability program has met a variety of sustainability goals in general and is particularly relevant to our purposes in a several categories including:

- *Resource Conservation (including renewable energy sources)*—The city chose to introduce renewable electricity to 100% of its industries and has reduced greenhouse emissions by more than 6% by the year 2000. Santa Monica's waste and recycling programs have come to be among the top in the nation. Water usage throughout the city has also been reduced by 6% by the year 2000 (Le Van, 2003).
- *Green Purchasing Strategies*—The city began purchasing green products and services including custodial services, fleet maintenance, alternative vehicles and fueling systems, and integrated pest management (Pollution Prevention Information Clearing House, n.d.). Although traffic and energy inefficiencies obviously still persist, the city has made a dent in the transportation sector by purchasing

alternatively powered vehicles. Approximately 20% of Santa Monica's vehicles are powered by alternative fuel. (Le Van, 2003). Many private businesses have also begun to incorporate sustainable practices in purchasing decisions (City of Santa Monica, 2004).

- *Green Building*- The city has helped to introduce affordable green housing into the city (Le Van, 2003). Much of these efforts fall under the Santa Monica Green Building LEED™ Grant. The program encourages private sector builders to build sustainable buildings (“green buildings”) with the same quality as any other structure while reducing stress on the natural environment. The program works by giving out Green Building Grants to successful applicants and is directly linked to the city of Santa Monica. The overseer is the LEED division of the United States Green Building Council (Le Van, 2003).
- *Community Education and Civic Participation*—the residents of Santa Monica are committed to the development of “green” industries; the city has much-admired citizen participation and voting rates (City of Santa Monica, 2004).

There is much for the city of Los Angeles to learn from its small neighbor. The Santa Monica Sustainable City Plan lays the foundation for the birth of a similar plan for the city of Los Angeles. The strategy employed by Santa Monica determined the principle, goals, and indicators and subsequently updated and reviewed its progress. Moreover, the fact that the residents of Santa Monica supported the sustainable program was crucial to its success. The city of Los Angeles needs to develop a similar plan and needs to get its residents involved in the large picture that includes leading environmentally sustainable

lifestyles. And in addition to Santa Monica's strategy, Los Angeles also needs to find a method to bring the larger private corporations into becoming "green" companies for successful transformation.

PART FOUR: CURRENT PROGRAMS AND POLICY RECOMMENDATIONS

The Current Situation

The city of Los Angeles is currently engaging in a variety of activities aimed at achieving sustainability goals and that may lead to the bolstering of green industry in Los Angeles. A variety of disparate programs have been enacted in the region as a result of the city's efforts. These programs provide the starting point for any policy recommendations. And, much of these recommendations will lead to the consolidation of these various disparate programs. Significant players and programs within city government include:

Los Angeles Department of Water and Power

Although they are often inefficient and disparate, LADWP programs have been at the forefront of pushing for a greening approach to the city. Their Green LA program, although severely flawed, must be considered as a starting point for programmatic change.

Programs through Green LA include:

- Trees for a Green LA - is a program that provides free shade trees to residents of Los Angeles. The trees provide shade and consequently reduce the need for air conditioning. Businesses can also apply for this free program.
- Energy Efficiency for a Green LA - is a program designed to encourage consumers to save resources such as water by giving them tips/information on how to save

energy/resources. For example, the program pushes consumers to use energy saving appliances. This program can also be tailored to businesses.

- Solar Energy for a Green LA - is a program that encourages both consumers and businesses to install solar panels. Currently, this program is installing, on a large scale, solar panels on municipal buildings such as office buildings, libraries, community centers etc. The program aims to install enough solar panels each year for the next five years to generate 1 - 1.5 mW.
- Electric Vehicles for a Green LA - is the leading program in the promotion of electric vehicles. It primarily aims at replacing the City's fleet of over 300 transportation vehicles. This program is also aggressively pursuing the construction of charging stations / installation of charging stations at public sites and city facilities in the Southern California area.
- Recycled Products for a Green LA - is a program that purchases recyclable materials as well as promotes the consumption of recyclable materials. The DWP decided to do this after Resolution #214, "Closing the Loop", was passed on April 4th, 2000 by the Board of Water and Power Commissioners.
- Educational Services for a Green LA - is a program that promotes education on topics of recycling and energy-saving. The program is primarily aimed at elementary school aged children. In order to promote this, DWP hosts science bowls, teacher training workshops, electric safety programs, poster contests, internships and field trips.

Green Power for a Green LA - a voluntary program designed to have residents and businesses purchase energy from wind power and other alternative energy sources. The residents and businesses have to volunteer for this program however. Alternative energy sources cost more than conventional coal and oil sources.

The green power component is arguably most relevant to green industry considerations. Renewable energy provides more opportunities for green industry growth than some of the other categories like recycling and educational services, which have a

municipal component. Green Power is a voluntary environmentally-friendly program started in 1999 and aimed at replacing conventional energy sources by allowing customers to choose from cleaner sources of power such as those produced by the sun, wind and water (for 2004 only wind power was used). These unconventional energy sources, however, are more expensive than the conventional coal and oil (City of Los Angeles, 2006).

The LADWP intends to cover this cost by shifting it over to the customers who voluntarily pledge themselves to the program without having subsidization from general ratepayers. The LADWP website quotes that the average customer with a monthly electric bill of \$50 would pay an additional 6% or approximately \$3 more each month (3 cents per kilowatt-hour). Non-Residential customers rated “medium” can also pledge themselves by purchasing at least 500 kWh while those considered “large” at least 1000 kWh. This extra cost will also go toward the purchase of more renewable-energy producing machines (City of Los Angeles, 2006).

The program is relatively new and attempts to operate on a large public scale. This may lead to limited effectiveness in the short run. The *2004 Green Power Annual Report* stated that in June 2004 that Los Angeles passed a resolution that supports the Renewable Portfolio Standard (RPS). The California Legislature originally passed the RPS in 2002 as Senate Bill 1078. The Green Power Annual Report states that the RPS mandates “all investor-owned utilities to increase their use of renewable resources by at least 1% per year, until 20% of their retail sales are procured from renewables, which must occur by 2017” (City of Los Angeles, 2006)

Office of the Mayor: Office of Economic Development and Housing

The Office of Economic Development and Housing would likely lead efforts aimed at attracting green industry into the city. According to Sophia Heller, at the Mayor's Office of Economic Development and Housing, the city of Los Angeles recognizes the importance of sustainable development and has linked the production of environmental goods and services with this theoretical conception about how economic goals should be met. The very idea of the green industry cluster is part of a greater effort to make the city of Los Angeles more sustainable. Attracting green industries is one practical application of sustainability objectives.

However, there is no clear indication as to how this can be achieved. This confusion has stalled efforts by the city to enact economically and politically feasible policies to attract green industry and to further all types of sustainable development. This is particularly evident for businesses that provide green construction. The city has deemed the LEED certification process valuable. However, certifying a large number of properties has proven to be difficult. According to Krista Kline at the Office of Economic Development and Housing, "It is just an outcome at this point. We need to figure out strategies in order to expedite the LEED certification process." The problem extends to all aspects of sustainability and to efforts to attract environmental goods and services.

The mayor's office is moving in the right direction and has incorporated green industry within its larger economic development program. As stated at the outset of the paper, the recent mayoral election of Antonio Villaraigosa is galvanizing new development

efforts in the city of Los Angeles. Heller is heading an effort to develop a comprehensive economic plan that will divide the economy into different economic sectors or industries. Growth sectors include: international, tourism, entertainment, biotech, green, fashion and digital. The city will focus its efforts on these particular industries as a way to garner more specific economic policy. At the same time, these targets will be integrated together in one comprehensive economic development strategy.

In addition to the broad economic development plan, the city is also actively involved in environmental issues around the ports. Officials at the city of Los Angeles have targeted the port as a potential source of job generation and face a variety of environmental issues. A variety of laws have been passed in order to clean up the port. Government directed pollution control will create the demand for green industries. They are needed in order to clean up the ports.

Recent programs include:

- Near-Term Air Quality Measures - The Port of Los Angeles has recently increased the funding for its “Port of Los Angeles Clean Air Program”(POLACAP) to accelerate the measures taken to reduce pollution-emissions at its various complexes. Other than the transport vessels themselves, the cargo-handling equipment at these ports creates the most diesel emissions and particulate matter. The new measure will attempt to reduce the pollution created by the auxiliary port equipment by replacing older, more polluting machinery with newer environmentally-friendly machines that run on either cleaner natural gases or electricity. This will be done with an additional \$52 million of funding through the

POLACAP program through 2008. Estimates of the program's results suggest the removal of approximately 2,623 tons of nitrogen oxide and 270 tons of diesel particulate matter emissions by 2008 (The Port of Los Angeles, 2006).

- Clean Truck Program- Similar to the program above, the Clean Truck Program aims to the replace older diesel trucks that are a major regional contributor to port-related air pollution by investing 14.7 million dollars into a Truck Fleet Modernization program. The Port provides incentives of 20-50k to commercial truck owners for trading in their pre-1984 vehicles for new, cleaner models. So far, more than 220 trucks have been replaced which will lead to the removal of an estimated 812 tons of nitrogen oxide and 200 tons of particulate matter emissions by 2008 (The Port of Los Angeles, 2006).

This legislation and assortment of programs create demand for green industry. For example, some green goods and service provider will have to provide the new technologies stipulated in regulations. Although not all companies will be located in Los Angeles, the necessity of the proximity to the port will motivate a large number of these businesses to locate in Los Angeles and generate jobs for the city. Thus, these programs will both directly and indirectly bolster green industry in Los Angeles.

Environmental Affairs Department

The Environmental Affairs department is the primary governmental body in the city that deals with environmental issues. The Environmental Affairs Department oversees a large amount of programs and initiatives under five categories: 1) air quality management, 2) solid and hazardous waste management, 3) water and natural resources management, 4)

business assistance and 5) environmental information. The department operates a number of programs that address sustainability issues and indirectly fuel green industry.

- **Brownfields Program**-Although not directly supervised by the EAD, this program has many key EAD personnel working in collaboration to other similar departments to ensure the efficient reclamation of brownfields, especially those in "disadvantaged communities". "Brownfields" are, as stated on their website, "real property, the expansion, redevelopment, or reuse of which may be complicated by presence or potential presence of a hazardous substance, pollutant, or contaminant." This program utilizes 3.65 million dollars from the Los Angeles Brownsfields Revitalization Fund, "which can be used for assessment, acquisition, remediation, and community involvement activities at brownsfields sites." The renewal of brownfield sites may provide earning opportunities for green industry (City of Los Angeles, 2006).
- **Hazardous and Toxic Materials Office** - This office is a division of the EAD. According to the City of Los Angeles' website, the office is a non-regulatory and non-enforcement program. The office works directly with businesses by providing free, confidential and technical resource assistance on pollution prevention. This program has won the State of California's Pollution Prevention Week Award from 2000 to 2002. Its philosophy is to prevent pollution before it is created by "reducing raw material use, lowering the amount and toxicity of waste generated, lowering energy costs, lowering associated disposal costs, and decreasing environmental compliance costs" (City of Los Angeles, 2006).The HTM office offers free on-site

technical assistance and on-site training. They also conduct public workshops and trade show presentations and provide vendors database access for "environmental consulting services, hazardous waste treatment, hauling, disposal and recycling services, and pollution prevention and control equipment." Lastly, the HTM provides "technical library access for pollution prevention case studies, financial resource publications, hazardous waste regulations, industry-specific fact sheets, waste reduction and compliance checklists and videos." All this is done in collaboration with the Environmental Business Assistance Office (EBA) whose website conveniently offers: downloads for permit applications, information on regulations, a list of equipment and service providers, list of upcoming workshops and publications.

- Los Angeles Energy Climate Action Plan (Energy C.A.P.) - is one whose goal is to reduce emissions of the city to 30% of 1990 levels by the year 2010. This plan includes the introduction of alternative energy programs, energy efficiency programs, recycling programs, transportation programs and tree planting programs. The results so far are promising. According to the City of Los Angeles' Website (2006) "A look at CO2 emissions from municipal operations in 1990 vs 1998 (as documented in the Energy C.A.P.) shows a slight drop over the eight-year period (from 1.33 million tons per year to 1.32 million tons per year)..." Although this number may seem little, 0.01 million tons per year = 10,000 tons. Take also into consideration the fact that there has been a 7% population increase over the same period of time. These figures however, only take into account emissions associated

with power use by City-run facilities and other City operations. It does not account for the LADWP. So far the forecast for 2010 using 1998 numbers for data projection will show a potential reduction of 734,000 tons of emissions relative to 1990 figures. The website states that without this program (2006), "1990 emissions would have increased by more than 100,000 tons of CO₂ per year, and over the period of 1990-2010, emissions would have climbed by 16%, according to projections."

Air Quality Management District and the Air Resource Board

Both the Air Quality Management District (AQMD) and the Air Resource Board (ARB) are involved with the green industry that provides technological innovation to reduce air pollution. Although operating outside of city bounds, the air quality management district and the air resource board are fueling demand for environmental goods and services through extended regulations. Much like in the port, these regulations require technological improvements and thus extend the need for green goods and services. They will also expand the demand for categories of environmental consulting as cities in the county including the city of Los Angeles must brainstorm for ways to meet regulations.

Some of the most stringent regulations include:

- Carl Moyer Air Quality Standards Attainment Program³ - Established in 1998, this program encourages the use of alternative fuel vehicles. Funds from ARB are distributed to the South Coast Air Quality Management District (AQMD), who in turn administers a portion of these funds to the Carl Moyer Program. The program itself

uses the funds to purchase new alternative fuel engines, parts and even new vehicles. New vehicles that qualify for this program are those that achieve a 30 percent less Nox emissions than the current emission standards. However, new alternative fuel engines are usually given funding priority. These new and retrofitted vehicles must operate for at least 5 years and have 75% of their use in the South Coast Air Basin (Air Resource Management Board, 2006).

- Prop 65 and the Dump Dirty Diesel Campaign - This campaign is headed by the Natural Resources Defense Council (NRDC) and the Coalition for Clean Air. The program calls for the adoption of AQMD rules that aim to replace six different fleet types of diesel vehicles from street sweepers to airport shuttle vans with cleaner alternative fuel vehicles that are predominantly run on natural gas. In 2002, the Engine Manufacturers Association sued to overturn the new regulations. NRDC defended AQMD in an appeal to the case to the Ninth Circuit Court of Appeals. The court reaffirmed the lower court's decisions. Proposition 65, which was debated in ongoing court cases, was completed. It set the stage for enforcing Southern California supermarket distribution centers' use of cleaner alternative fuel trucks. A third focus of the DDDC is the call to renovate the Port of Los Angeles before its lease to China Shipping Group. The port, which had not been properly assessed for diesel exhaust, stopped its construction of the China Shipping facility after the group was sued by NRDC on behalf of a coalition of plaintiffs (Air Resource Management Board, 2006).

POLICY RECOMMENDATIONS:

How can the city of Los Angeles stimulate expansion of its existing green industry and attract companies that provide green goods and services, and thus take full advantage of the benefits of green industry? The city of Los Angeles can engage in a variety of actions in order to bolster green industry and achieve eventual sustainable development

Changing the Rhetoric and the Way of thinking to an Ecosystems Approach

The city must adopt the rhetoric of sustainability within its economic development programs. The city should emphasize a strong linkage between economics and the environment. In the words of Edward B. Barbier and David Pierce in Blueprint for a Green Economy (1989: 23), "Growth frequently conflicts with environment because all too often little effort is made to see how the environment might be integrated into capital investments and other decisions at the outset... In short the issue is not whether we grow or not, but how we grow." The city should emphasize sustainable growth as growth that benefits both the economy and the environment.

This also comes with adopting the rhetoric of an ecosystems approach for industry. According to Gibbs (2002: 97). One approach to moving towards greater sustainability in economic development is that of industrial ecology. Industrial ecology essentially argues for a major restructuring of economic activities (especially in manufacturing industry)...Industrial ecology approaches to sustainable local economic development rely upon utilizing materials and waste streams, so that manufacturing byproducts became the raw materials of subsequent processes leading to reduced or eliminated waste."

Departments, and city officials within these departments, need to adopt this from both an ideological and rhetorical standpoint. This needs to include all of the departments

currently operating in the interest of the environment, along with programs focusing on economic development and job growth within the city.

Recommendation:

Consolidate Programs: As described above, Los Angeles currently has a number of disparate programs that push for sustainability, but virtually no programs that push for green goods and service industry growth. Instead of operating these programs separately with inadequate funding and human capital across the board, it would be more efficient to consolidate programs under a common band of sustainability. I recommend that this consolidation likely fall either within the Environmental Affairs Department, or within the Department of Water and Power. These agencies should be charged with implementing the broad sustainability framework and goals for establishing green industry mentioned above.

Coalition Building In order to Push for the Greening of Industry

The city needs to develop a coalition of influential stakeholders within the city pushing for sustainability. According to members of the Community Forest Advisory Committee (a committee dealing with urban forestry that falls under the purview of the Board of Public Works), one of the biggest issues in protecting the environment is finding the funding for programs. Programs are attached up to the general fund. Each year budgeting is allocated and budgets can alter dramatically from year to year. This funding uncertainty makes the planning process difficult.

Recommendations:

Establish a broad coalition supporting programs. This will help to eliminate in-fighting and help to coordinate efforts in an effort to reach further efficiency. Funding uncertainty and deficits engender at the budget making process where groups compete for funds. By eliminating competition, or at least softening it by fostering agreement between a broad group of government departments, funding will be both increased and more predictable.

The coalition can be similar to recent successful efforts through the Clean Cities Program. In February of 1996, the City of Los Angeles joined the US Department of Energy's Clean Cities Program by forming the City of Los Angeles Clean Cities Coalition (LACCC). This program was designed to replace the city's vehicle fleets with alternative fuel vehicles (AFVs). By June 2005, there were over 2400 AFVs in the City's fleet and by October of the same year, LACCC celebrated its "Beyond a Billion Event" where it recognized the City's accomplishment of saving one billion gallons of gasoline by using alternative fuels. Other awards granted to Los Angeles include recognition by the DOE as one of the "Top Ten Clean Cities in 2000." The Clean Cities Program was created initially in 1994 under the auspices of the Department of Energy (DOE) and aims to, "1) progress toward attainment of federal and state air quality standards; 2) enhanced penetration of clean fuel vehicles; 3) energy security and resource conservation; and 4) economic stimulation in areas that have been heavily impacted by the economic recession and cutbacks. There are currently 88 Clean Cities Coalitions throughout the United States. DOE requires Clean Cities Coalitions to report regularly on activities and achievements and appoint a Clean Cities Coordinator." (Los Angeles, 2006)

Reach out to Nonprofits: By incorporating nonprofits and the environmental community into the process, the city can gain valuable information and recommendations from the community. This will further bolster the political feasibility of programs within the city of Los Angeles. More widespread support will put further pressure in order to garner more funding in the budgeting process. It will also help to motivate city employees to reach sustainability goals. The city needs to identify the most powerful nonprofit interests in terms of political power and resource availability.

Open the Dialogue up to Green Businesses -The city should go directly to green businesses to see what their goals and objectives are. The city should express their own desire for green products as a starting point for attracting additional green businesses into the city. In order to do so, they city should begin to compile contact information drawing on the lists of establishments established above through analysis of NAICS data.

Green Purchasing Strategies: Demand Side Activities

Much of the key to attracting companies that provide green goods and services and taking full advantage of the benefits of green industry comes with generating or bolstering demand for these industries. This will attract new industry and will spur the expansion of existing industry. Stimulating demand, at least theoretically, will create the incentive to move towards a more sustainable industrial cycle. It is a case of "if you build it, they will come." If the demand exists for green products, so too will the industry.

It has been established that in general, that there is some preference for more sustainable goods across the board. Companies, consumers and the public sector evaluate products in a variety of ways. Principle methods include:

- Procuring “eco-labeled” products or services. Energy Star, Green Seal, Blue Angel, Eco-Mark, and LEED™ programs indicate whether or not a product is environmentally friendly and therefore assist organizations in purchasing decisions. They serve as the first step towards green procurement. Many of these products tend to be consumer commodity goods like paints and office supplies.
- In-house product/service evaluations. Organizations develop tools, procedures, standards, restriction/bans and the like in order to effectively screen and evaluate the environmental performance of potential purchases. Often, decisions are based upon whether or not the product is ecolabelled (thus, having an in house policy that only products that are ecolabelled are acceptable purchases). This is often used by organizations that operate in special areas such as metals, chemical, services and substances. This allows organizations to cater their purchases to their own individual needs.
- Third-party product/service evaluation. This requires a third party to evaluate the purchases of a corporation. Customers sometime require manufacturers to mandate third-party testing of their products (Five Winds International, 2003).

These decisions are made by three categories of individuals that each independently, and in conjunction with one another, help to bolster demand for green industry.

1) Municipal.

The city has significant buying power. Governments, according to Wasik (1996), have significant buying power and have made some dent in the race towards sustainability. Public green procurement practices can: lessen the consumption of materials, resources and energy; spur the development of new product/service markets; stimulate “green” and innovate product development; improve public agency’s environmental performance. Green procurement strategies can save money through reduced energy consumption, resource use, and material management (Five Winds International, 2003). According to Bleischeitz and Hennicke (2004:141)“Governments as well as large (and proactive) enterprises Influence the frameworks conditions for small medium enterprises (SMEs) through their strong buying power. Thus governmental and business purchasing strategies focused on environmental performance can have a more direct effect on SMEs than any other type of environmental pressure.”

As a side note, the city can also benefit from an improved image by engaging in environmentally friendly purchases. And, this image will have market benefits. Businesses are more likely to move in if they think that they will be entering a friendlier environment.

Recommendation: Mandate green purchasing strategies for the city of Los Angeles.

The city should establish itself as the leader in green purchasing strategies. If it expects to push private corporations to adopt strategies, it must first be a consumer of its own information. Therefore, the city should engage in green purchasing at all levels. Relevant city employees should be educated about green purchasing strategies so that they can make environmentally sustainable purchases. The city should also continue

implementing the construction of LEED certified buildings. Although, in the past, most of this has been focused at schools, all new government facilities should be LEED certified in the future (City of Los Angeles, 2006).

2) Consumer Based

The United States is one of the largest markets for green products. Studies indicate the majority of Americans make purchasing decisions partially based on the environmental friendliness of a product.

Consumers are less receptive to green product claims and messages that come from manufacturers. Therefore, these messages may be better seen by the city itself. This has been referred to as progressive green management. Independent third parties, environmental groups and international business/standards organizations give messages credibility (Wasik,1996).

Recommendation: Reach out to Consumers through Education and Ecolabeling of Green Goods and Services

The city of Los Angeles needs to brainstorm for ways to reach out to the public in terms of sustainability goals. According to Gibbs (2002), the city can concentrate on supply side development. The city can provide advice, loans and infrastructure support. They can also bolster the demand side developments by disseminating information about green consumerism.

One of the quickest ways to reach out to the public is by holding events and by

updating the website. By centralizing information about sustainability, the public can find relevant information easily. This website can have links to companies that provide green goods and services. Some of the cost of the website could be defrayed by having companies contribute to the development. They can use this as another advertising platform.

3) Company based.

At both the international and national level, strategies for sustainable business have become increasingly important. Businesses themselves can derive value from engaging in environmentally friendly practices and utilizing green purchasing strategies. According to Bleischwitz and Hennicke (2004: 171):

“In this context, proactive strategies for sustainable business development are of increasing relevance for companies and markets, and for future business opportunities, as with, for example, the adoption of environmental management (sustainability) objectives and even through there is no apparent attempt by governments to regulate the issues under consideration. A company may act proactively because, for example, it wishes to position itself as environmentally friendly or more broadly sustainable on the market, or because it has realized that achieving environmental objectives is linked to economic gains (a win-win solution).”

Like in the public sector, green procurement activities involve the purchasing of eco-labeled products or services, in-house or third party evaluations of the product or

service or supply chain initiatives (Five Winds International, 2003). Green purchasing improves efficiency along the supply chain including both the actors and the flows (material, information, and monetary). A supply chain is defined as a network of suppliers and producers and distributors that buy materials. They then make these materials into finished products. These finished products are then distributed to customers. Green purchasing creates an opportunity to improve the profit margins for both the corporation purchasing the product, and definitely for the corporation providing this green service (Bleischwitz & Hennicke, 2004).

This strategy was recently used by the Xerox Corporation. A \$10 million investment in recycling toner cartridges led to a profit of \$200 million (Waslik, 1996).

Recommendation: Provide Information and training

The city of Los Angeles needs to build partnerships with the local business community that foster creativity and innovation in order to lead to further development of green industry. The city may want to consider entering into voluntary agreements with businesses to purchase green goods and services in order to bolster the demand. This has been successfully done in Germany (Gibbs, 2002).

The city of Los Angeles needs to demonstrate to companies that they can indeed benefit from integrating environmentally friendly strategies into their corporation's operations. However, the government does face some challenges to distributing this information. Just as consumers find governmental information more reliable, businesses prefer to receive information from other businesses. The most reliable way to disseminate

information is through existing information chains. This includes local business organizations and supplier chains. This is particularly true for small medium enterprises (Bleischwitz & Hennicke, 2004).

The city of Los Angeles should engage in a number of business support measures. According to Gibbs (2002:99), “local and regional governments can provide services for support and development of SMEs, including support for new firms and community businesses. The aim should be to promote organic growth of the local economy, taking a proactive approach to business support and incorporating environmental good practice and social responsibility into this.” He advocates a variety of measures that readily apply to the city of Los Angeles. Measures can include, and are not limited to, “encouraging responsible business practice, through the example of a local authority’s own operations, selectively assisting firms which demonstrate this and encouraging firms to introduce positive approaches to working conditions. Government bodies should take advantage of new service and product opportunities to encourage new start-ups and focus inward investment” (Gibbs 2002:99).

The city of Los Angeles should also help to unite employers with suitable employees. This will help to bolster the economy by providing valuable jobs. According to Flaming and Burns (2006:39), the city should:

identify how Los Angeles’ job training, economic development and business assistance programs can be used to support the growth of green technology businesses. This includes training programs that give residents a foothold on green technology career ladders and

economic development strategies that are both community- and industry-specific for supporting the growth of green industries.

Minority populations could be targeted through outreach through community colleges, WorkSource centers and community based organizations. This can be built upon the current efforts by the Environmental Affairs Department described in the previous section.

Strategically Focus on Only a few Categories of Green industries.

It is both politically and economically infeasible to concentrate on every environmental goods and services possibly provided on the market. Focusing on all industries is far too impractical and not a politically viable alternative for the city of Los Angeles.

Recommendation:

Under-represented industries and upstream industries

According Flaimng and Burns (2006:39), the city of Los Angeles should "investigate opportunities for economic growth in industries that provide important green technology inputs but are under-represented in the local economy." They found that this includes "upstream" suppliers of green technology industries.

Focus on industries that provide higher paying jobs

Referring back to the section on job growth, six industries provided high wages (instruments manufacturing; electronic component manufacturing; water, sewage systems; waste treatment and disposal, electronic equipment repair and electrical equipment

manufacturing.) According to Flaming and Burns (2006)," these high-wage industries, especially the ones with the largest and/or growing employment, represent the best initial targets for expanding the green technology sector in the City of Los Angeles." This makes good economic sense in terms of bolstering job growth.

Focus on Renewable Resources

Support for greater use of renewable energy has increased and was bolstered as a result of the recent energy crisis. The state, and the city of Los Angeles, has become vulnerable to natural and corporate induced fluctuation of gas prices. According to Eli Richlin and Bernadette Del Chiaro at the Public Interest Research Group Charitable Trust (2002: 17) "In this context, renewable energy has become an attractive alternative to conventional, fossil-fuel resources." Given the recent hike in gas prices and the political consensus present pushing for lower gas prices, it is appropriate to concentrate on this category of industry.

Support, and feasible programmatic change can be grounded in an existing program put forth by the governor. Governor Gray Davis signed a bill on September 12, 2002 in order to push California towards a more sustainable future. Investor owned utilities Southern California Edison and San Diego Gas and Electric are now required to double their investments in renewable energy over the next fifteen years. Los Angeles's programs to attract this type of green industry, therefore, has state level support and a basic basis upon which new programs bolstering renewable energy sources can be build on (Richlin & Chiaro, 2002).

LADWP has already initiated plans to establish a renewable target of 20% by 2017. Not only will this program not raise rates, but it also will likely save customers money in the long run. Expected costs for conventional energy sources span from \$44/MWh to \$67/MWh. Alternatively, expected costs for renewable energy sources span from \$38/MWh (10-year landfill gas project) to \$52/MWh (20-30 year geothermal or wind project) (Marcus, 2003).

And, of course, bolstering renewable energy will yield positive environmental standards. Renewable energy will help reduce air pollution. It will also help cities meet targets to limit carbon dioxide emissions (Marcus, 2003).

Out of all of the categories of renewable and alternative energy sources, it may be advisable to concentrate on solar energy. Southern California boasts some of the nation's best resources for concentrating solar power and effective usage of photovoltaic systems. Solar power peaks in the heat of summer afternoons along with energy demand. This allows Los Angeles to avoid the waste inherent in polluting plants that also have to operate beyond peak hours because of start-up and shutdown procedures. Expensive transmission and distribution infrastructure costs are also avoided (Alonso et.al, 2005).

Appendix: Further Defining Green Industries

The Economic Roundtable has defined the categories in the table as follows. Definitions are extracted from their report on Green Technologies.

Alternative Fuel Vehicles: This group includes the design and manufacturing of:

- Engine and exhaust systems and parts designed to reduce vehicle emissions, such as fuel cell, hybrid (combination gas and electric) and compressed natural gas

power sources.

- Vehicle emissions testing equipment, such as onboard emission sensors.
- Rechargeable battery systems that collect and store energy.
- Electric vehicle conversion kits.
- Electric propulsion systems and conversion kits for bicycles and scooters.

Biomass / Waste-to-Energy Power: Processing organic matter (tree cuttings, household garbage) or industrial waste products to yield electrical energy, usually through burning to produce heat or steam energy that is then converted into electricity by turbines.

Construction: Building residential or commercial buildings that incorporate designs, materials, or technologies that use less energy for heating, cooling, lighting and appliances, and produce fewer pollutants in the form of sewage, gray water, ash, solid waste, and smoke. The construction establishments of the Los Angeles' green technology sector include:

- Foundation drilling/environmental services.
- Environmental and pollution control relating to construction equipment.
- Installers of blowers, fans and air purification equipment for buildings.
- Soundproofing with fiberboard panels made from biodegradable rice straw.
- Environmental engineering services company, remedial construction.
- Design and installation of radiant heat, and general "green materials" construction.

Environmental Components Manufacturing: Manufacturers of green technology products and components. These establishments are competing to design, test, manufacture and market new technologies for applications such as air filtering systems used in commercial buildings and water filtering systems used in waste water treatment facilities.

Environmental Components Distribution: Marketing, wholesaling and retailing green technology products, generally without changing the products themselves.

Fuel Cells and Batteries: Fuel cells convert hydrogen and oxygen into water, capturing the electrical energy from this chemical reaction, which is about twice as great as the heat energy captured by an internal combustion engine using the same amount of fuel.

Solar Power: Manufacturing, distributing and installing devices using photovoltaic cell technology, which converts sunlight into electricity.⁴ These establishments include photovoltaic cell engineers and manufacturers, solar panel installation companies, and utility companies that purchase solar power and distribute it across their power grids.

Waste Disposal: Handling the waste products of other businesses, processing garbage for municipalities, and cleaning-up emergency spills and contaminated soils. These remediation and waste management services also include water filtration services and handling the industrial pollutants particular to the ports.

Water Purification: The water purification group captures two types of services:

1) cleaning polluted water from industrial sources so that it can be discharged into municipal sewer systems, and 2) further treating and purifying water so that it is of sufficient quality to be used as drinking water.

Wind Power: “Small-scale” wind power consists of small wind turbines that provide less than one megawatt of electricity. “Utility scale” wind power, the type that is of most interest to the DWP, consists of "wind farms" with large-scale turbines capable of generating up to several hundred megawatts of electrical power for the grid.

Notes

ⁱ Please see following discussion for relevant definition of sustainability.

ⁱⁱ LEED (Leadership in Energy and Environmental Design) is a rating system through the Green Business Council. The Council defined LEED as "a voluntary, consensus-based national standard for developing high-performance, sustainable buildings. Members of the U.S. Green Business Council representing all segments of the building industry developed LEED and continue to contribute to its evolution."

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