



Towards a Roadmap to Green Manufacturing in Los Angeles: A Preliminary Assessment

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LOS ANGELES ALLIANCE FOR A NEW ECONOMY

GREEN FOR ALL

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Manufacturing in Los Angeles:
A Preliminary Assessment**

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Introduction

From the halls of the White House to the streets of South Los Angeles, green jobs have been hailed as though they are a “green bullet” solution to poverty, climate change, and economic recession, but the green jobs promise is wearing thin and wearing out people’s hopes and expectations. Call it poor timing or an unfortunate confluence of events; green jobs burst onto the national center stage just before the nation plunged into the worst economic downturn since the Great Depression. So a solution that was just that – a solution, not *the* solution – is increasingly being questioned and dismissed.

But green jobs should be part of an equation towards greater equity, climate justice, and economic growth. In particular, we should look at strategies for revitalizing and transforming our domestic manufacturing base to create quality careers for those struggling in poverty, as well as to support a transition to cleaner, more sustainable urban communities. There are no magic-bullet or one-off solutions, but the problems are not unsolvable.

With funding from the Surdna Foundation, Los Angeles Alliance for a New Economy (LAANE), USC Program for Environmental and Regional Equity (PERE), Green For All (GFA), and UCLA Urban Planning have embarked on a project to develop a roadmap for transforming Los Angeles into a manufacturing hub of suppliers for a new generation of transit and alternative fuel vehicles. We hope to contribute to national and local efforts targeting climate change and transportation-related policies and investments to catapult out of an economic crisis and provide real opportunities for those seeking a toehold on the ladder to the middle class.

We look at Los Angeles not only because it is the city in which our organizations are based but also because the region sits at the confluence of many capacities that, if channeled strategically, could actually deliver results while providing a roadmap for other metropolitan regions across the country. There are three key ingredients – or comparative advantages – that make Los Angeles a region of particular opportunity.

First, despite widely-held beliefs that manufacturing in the region is dead, Los Angeles leads the nation as a manufacturing hub, followed by Chicago and Houston (Sidhu et al. 2011). Waves of economic restructuring and recessions have indeed changed both the nature and scale of manufacturing: During the previous decade, Los Angeles lost over one-third of its manufacturing workforce. Yet, as Mark Twain once said “the reports of my death were greatly exaggerated,” so too has manufacturing’s death knell been preemptively rung. Manufacturing, although diminished, still accounts for over 640,000 jobs within the five-county Southern California region and six percent of the nation’s manufacturing employment.¹

Second, Los Angeles has a comparative advantage by virtue of its location within the state of California and its cutting-edge policies and commitment to environmental protection and regulation. Strong environmental legislation, such as the AB 32 Global Warming Solutions Act, SB 375 Sustainable Communities and Climate Protection Act, and SB 118 Alternative and Renewable Fuel and Vehicle Technology Program, is helping to fuel clean energy technology research, development, and

¹ PERE analysis of 2010 Quarterly Census of Employment and Wages (QCEW) data, Bureau of Labor Statistics.

manufacturing. This is further bolstered by a relatively robust venture capitalist sector in the state (Henton et al. 2008). In the way that information technology revolutionized the way we live and work – and created the Silicon Valley, it is not far-fetched to envision Los Angeles as the Clean Tech corridor.

Third, billions of dollars are earmarked for transportation projects in Los Angeles. Despite teetering at the edge of an economic recession, in 2008 Los Angeles County voters overwhelmingly agreed to raise our sales tax for 30 years in order to invest in rail and highway improvements. Estimated to bring in \$40 billion over 30 years, Los Angeles City Mayor Antonio Villaraigosa is spearheading what is now a national effort, America Fast Forward, to get the federal government to loan Los Angeles the money up-front in order to speed up the completion of improvement projects from 30 years to 10. (Los Angeles' plan is aptly called the "30/10" initiative).² Partly as a result, Los Angeles County Metropolitan Transit Authority (Metro) issued a request for proposals valued at \$335 million for the purchase of 78 light rail vehicles up to about one billion dollars for 235 vehicles for the current and planned transit expansion projects. Moreover, high-speed rail – an "on-again/off-again" effort – is at play in California.

This report is an attempt to capture our preliminary analysis with regard to the current state of the local manufacturing supply chain, avenues for further exploration, and likely roadblocks. While the project includes three areas of work, research and analysis, campaign planning and advocacy, and coalition building, this report includes only the findings and analysis based on the first six months of research work.³ Our hope is that discussions generated by limited circulation of this report will help sharpen and focus the next year of investigation and exploration.

The key takeaway is as follows: Solving the workers problems (access to quality, career-path jobs) requires increasing business for the region's employers. Increasing business for the region's employers (to maintain or create new jobs) requires reaching beyond the region to spur national demand for transit and alternative fuel vehicles. So while local demand, such as Metro's investment of up to one billion dollars for the purchase of railcars, may provide opportunities for employment that should be capitalized on, much larger-scale and sustained demand is needed – as are incentives or regulations to ensure economic growth is captured domestically.

A comprehensive strategy is needed that addresses both the demand-side and the supply-side of the labor market; employer concerns as well as worker interests; and policy solutions as well as organizing efforts. This report offers a preliminary framework for defining a roadmap for the region that we expect will evolve as we gather additional data and deepen our analysis. The directions for further development identified include: advocating for federal, state, and local policy changes to generate large-scale demand (federal transportation reauthorization, local hiring, domestic content, state and local environmental regulations); aggregating public procurement of new vehicles and ongoing maintenance at scale; and addressing myriad industry/supply-chain challenges (financing, intellectual property, land use and availability, workforce development, and vehicle standardization and certification). Finally, we note that

² For more see The City of Los Angeles' 30/10 Transportation Plan website: <http://mayor.lacity.org/Issues/Transportation/3010/index.htm>.

³ This report is based on five longer memos that are available upon request.

new forms of organization are needed: new strategies to better organize employers and employees and to forge a new relationship between management and workers.

Manufacturing Opportunities: Railcars, Buses, and Heavy-Duty Alternative Fuel Vehicles

We focus on the tier 2 and tier 3 suppliers –the component part manufacturers –for three types of transit and alternative fuel vehicles (AFVs): railcars, buses, and heavy-duty AFVs (which include haulers and refuse collection trucks). These three types are based on LAANE’s preliminary assessment of the vehicle procurement needs of 13 public agencies (see Appendix A for a summary of findings) and a literature review, which identified California and Los Angeles as home to alternative fuel vehicle and railcar parts manufacturers (Gereffi et al. 2008, Lowe et al. 2010).

Railcars

When looking at the region’s demand for transit and AFVs across agencies, Metro takes the uncontested lead. According to Metro’s adopted 2009 Long Range Transportation Plan, it has committed a total of \$13.9 billion towards capital bus and rail transit projects for the fiscal years 2010-2019. Spending on rail will be prioritized at Metro, with rail related projects receiving approximately 81 percent of capital expenditure funds. Metro’s Planning Department estimates that of the \$9.3 billion in committed funds for bus and rail project purchasing, approximately \$1.1 billion will go towards the procurement of 250 light and heavy rail cars in the next 10 years. Under the 30/10 initiative, an estimated \$1.9 billion would be spent towards the procurement of 400 light and heavy rail cars.⁴

Buses

Although regional dollars invested in rail projects far outweighs that which will be spent on buses, bus services will continue to be significant to the operations of public agencies such as Metro, Los Angeles Department of Transportation and Los Angeles Unified School District. At Metro, bus replacement is an agency priority, with a steady replacement rate of 150 – 200 buses per year at an average cost of \$400,000 - \$500,000 each for standard 40-foot buses. There is currently a \$330 million RFP out for the purchase of 700 40-foot clean natural gas (CNG) buses which will cover the agency’s replacement needs until 2015. On average, regardless of financial challenges at Metro, approximately \$60 - \$100 million is spent on new buses each year.

Heavy-Duty Alternative Fuel Vehicles

Stringent emissions and particulate standards set by the California Environmental Protection Agency (CalEPA), California Air Resources Board (CARB) and South Coast Air Quality Management District (AQMD) require the region’s public agencies to increase investment in AFVs. The region will need to decrease emissions by an additional 70 percent if it is to meet 2013 goals. As a consequence both the natural (due to age and mileage) and early replacement of vehicles (due to regulatory demand) with

⁴ Nguyen, L., 2011. Memorandum Exploring Regional Demand for Transit and Alternative Fuel Vehicles. Memo prepared for LAANE and PERE. Los Angeles, CA: Los Angeles Alliance for a New Economy.

alternative and clean fuel vehicles by public agencies in the Los Angeles metropolitan region tend to be concentrated on heavy-duty vehicles and equipment.

While there is substantial pressure on public agencies to purchase transit and AFVs, demand is often constrained by funding shortfalls. Transitioning from dirty diesel to cleaner fuels is commonly cited as being cost prohibitive, often forcing non-revenue generating agencies to push back vehicle retirement age and even reduce fleet size. Technological limitations and difficulty sourcing vehicles and specialized equipment are also frequently referred to as considerable obstacles to meeting regional emissions standards.

Identifying Industries and Firms: A Supply Chain Approach

Methodology

Using data from the Quarterly Census of Employment and Wages (QCEW), County Business Patterns (CBP), and American Community Survey (ACS), PERE conducted an analysis of the manufacturing industry and four transit-related manufacturing subsectors in the five-county Southern California region: primary metals (NAICS 331), fabricated metals (NAICS 332), electrical equipment (NAICS 335), and transportation equipment (NAICS 336).⁵ The manufacturing sectors were derived from the detailed subsectors identified by Fitzgerald et al. (2010) that would generate the most employment from increases in the domestic purchase of railcars, buses, and trucks.

Because standard industry codes such as those found in the North American Industry Classification System (NAICS) do not sufficiently capture tier 2 or tier 3 firms in the transportation manufacturing sector (Lowe et al. 2010), we compiled a list of firms from three sources: 1) tier 2 suppliers for rail identified by the Center on Globalization, Governance & Competitiveness (CGGC)⁶; 2) Metro databases of bus and rail vendors, approved Disadvantaged Business Enterprises, and companies that downloaded its 30/10 RFP; and 3) contacts made at transit-related conferences and through referrals.

To filter for as many relevant firms as possible, PERE, with assistance from LAANE, cross-referenced the list with information available on Lexis-Nexis and a 2010 ESRI/Infogroup USA business database and assembled basic information for each firm, including street address, NAICS code, sales volume/assets, employee size, and business square footage.⁷ PERE narrowed down the list to include all firms in the five-county Southern California region that reported a manufacturing or transportation-related NAICS code and/or were CGGC-identified tier 2 suppliers. This resulted in a database of 105 firms. Of these,

⁵ The five-county region includes Los Angeles, Ventura, Riverside, San Bernardino, and Orange counties.

⁶ Lowe et al. 2010.

⁷ ESRI – InfogroupUSA Business Locations and Business Summary Database, 2010. Redlands, CA: ESRI. Queried data for the five-county Southern California region.

PERE prioritized larger firms (by sales volume and/or employee size) and those with the most relevant NAICS codes. This generated a list of 71 firms that were targeted for interviews.⁸

Of the 71 firms, PERE contacted 63 by phone or email. Of those contacted, 14 were screened out because they did not produce transportation-related products, were not currently manufacturing locally (or considering it), or were no longer in business. The remaining either declined our request for an interview or did not respond after multiple attempts.

PERE and Goetz Wolff of UCLA Urban Planning conducted a total of 20 interviews. The final interview sample included eleven firms identified through the process described above and nine through referrals. Thirteen interviews were conducted on-site and included a facility tour; seven were conducted by phone. Interview topics included: the history of the firm, key products and processes, customers and markets, suppliers, relationship to transportation-related supply chains, employees, locational factors, and future plans. To protect the confidentiality of interviewed firms, we provide only summary information in this report with no identifiable business information.

Related Industries

According to the Los Angeles Economic Development Corporation (LAEDC), if the five-county Southern California region were a state, its manufacturing workforce would be larger than the industrial states of Ohio, Illinois, and Pennsylvania. Los Angeles County alone would rank between Wisconsin (no. 10) and Georgia (no. 11) (Sidhu et al. 2011). However, following U.S. trends in manufacturing, the region has seen a significant decline in its manufacturing activities. Between 2000 and 2010, the Southern California region lost over one-third of its manufacturing workforce, or 355,000 jobs. Similarly, in Los Angeles County the number of establishments and employees decreased by 31 and 39 percent, respectively.⁹

Yet, the region's strengths are many, from computer and electronics to apparel, transportation equipment, fabricated metal products, and food manufacturing –many of which supply to the transportation manufacturing sector.

Table 1 below summarizes the current state of the four manufacturing sectors and relevant subsectors that are most closely associated with the production of railcars and buses: primary and fabricated metals, electrical equipment, and transportation equipment.

Of these four sectors, the region's strongest manufacturing activity is in fabricated metals and transportation equipment, although both were not immune from industry contraction. The fabricated metals sector –which machines, forges, and stamps transit-related component parts – is large, employing nearly 75,000 workers. While regional fabricated metals employment accounts for 6 percent of national activity, most of this activity is housed in small establishments with fewer than 20

⁸ Low-priority industries included paint companies, cleaning product suppliers, sign manufacturers, and printing companies, among others.

⁹ PERE analysis of 2000 and 2010 QCEW data.

employees.¹⁰ Employees of fabricated metals establishments have less formal education and have lower annual earnings (\$50,000 per year) than those in other manufacturing sectors.

Similar to the fabricated metals industry, the region’s transportation equipment manufacturing sector is also relatively sizable; but unlike fabricated metals manufacturing, which has several larger subsectors, transportation manufacturing activity is dominated by the aerospace sector. Activity in the aerospace industry, which has deep roots in the Southern California region, accounts for three-quarters of transportation equipment manufacturing activity. Despite cuts to defense and space programs, it also continues to account for a significant share of national employment activity within aerospace (10 percent). While many aerospace firms do not primarily produce ground transportation-related parts, the production (or expanded production) of such parts is feasible.¹¹ With the exception of motor vehicle parts manufacturing, many of the subsectors most directly associated with transportation-related manufacturing, such as railroad rolling stock production and motor vehicle manufacturing have little local activity. The high skill level required for many transportation manufacturing positions translates into high annual earnings –with earnings in the aerospace industry among the highest (at over \$80,000 annually).

The region has less activity and comparative advantage in primary metals and electrical equipment manufacturing, particularly in those subsectors related to transportation.

Table 1. Transportation-Related Sectors: A Southern California Snapshot

Sector	Employees 2010	% Change in Employment 2000-2010	Establishments 2010	Share of Natl. Employment 2010
Manufacturing	640,069	-36%	22,629	6%
Primary Metal Manufacturing	12,226	-40%	383	3%
Iron, Steel Mills and Ferroalloy Manufacturing	2,087	3%	74	2%
Foundries	4,409	-47%	147	4%
Fabricated Metal Product Manufacturing	74,997	-30%	3,704	6%
Forging and Stamping	5,950	-24%	196	7%
Architectural and Structural Metals Manufacturing	13,869	-32%	687	4%
Spring and Wire Product Manufacturing	1,818	-46%	86	4%
Machine Shops, Turned Product, and Screw/Nut/Bolt Mfg.	23,898	-9%	1,512	8%
Electrical Equip. and Component Manufacturing	17,519	-38%	546	5%
Electrical Equipment Manufacturing	4,878	-28%	160	4%
Transportation Equipment Manufacturing	66,369	-39%	1,062	5%
Motor Vehicle Manufacturing	1,248	-37%	32	1%
Motor Vehicle Body and Trailer Manufacturing	4,795	-40%	94	4%
Motor Vehicle Parts Manufacturing	8,383	-61%	348	2%
Aerospace Product and Parts Manufacturing	49,409	-30%	448	10%
Railroad Rolling Stock Manufacturing	*	*	4	*

Source: PERE analysis of 2000 and 2010 QCEW. *A small share of employment is not disclosed in iron and steel mills and ferroalloy manufacturing, electrical equipment manufacturing, motor vehicle manufacturing, motor vehicle body and trailer manufacturing, and railroad rolling stock manufacturing.

¹⁰ PERE analysis of 2009 CBP data.

¹¹ Interview with a marketing executive of thread rolling manufacturer on July, 8, 2011.

This industry analysis suggests that Los Angeles has the potential to build its transportation-related supply chain. To better understand how these industries are related, or not, to the supply chain and what the implications are for a regional strategy, we gathered data at the firm-level.

Classifying Manufacturing Firms: A Typology of Suppliers

Within industrial supply chains there are several tiers of activity. In transportation manufacturing, tier 1 firms, also called the original equipment manufacturers (OEM), at a minimum, are responsible for the shell design and final assembly (Lowe et al 2010).¹² Tier 2 suppliers, in general, produce component systems, such as the propulsion, electronic, and body and interior. Tier 3 suppliers produce the source materials and parts for tier 2 firms. Although understanding the nature of lead, tier 1 firms in the supply chain is important, we focused on the activities of their suppliers, the tier 2 and 3 suppliers, which account for the majority of employment and economic activity within the U.S. transportation supply chain.

Based on our interviews with tier 2 and tier 3 suppliers and potential suppliers, we developed a typology of firms that we describe below. The purpose for this typology is to highlight distinct characteristics of firms and to classify them so as to identify opportunities and challenges in building up a transportation-related supply chain in the region. Not all firms fit neatly into just one classification and there will be outliers, but we found that most firms could be characterized by one of three types: innovative start-ups, established companies with a niche, and job shops without a niche.

Type A: Innovative Startups

California is the leader in this industry because of some of these [environmental] regulations – if we could just figure out the manufacturing piece. We kept some manufacturing here – mainly prototypes – to control the intellectual property and quality. There is certainly some inefficiency in shipping between Los Angeles and China: first, to ship raw materials, then to receive components for final assembly, then back to customers in Asia.

President of an electric vehicle components manufacturer

These companies are, first and foremost, characterized by their innovative products, and many produce products which help polluters meet and exceed current environmental regulations. For example, an electric vehicle (EV) manufacturer interviewed noted that the rise and fall in demand for EVs directly parallels the strengthening and weakening of California’s Zero Emission Vehicle (ZEV)

China has taught us a lot about manufacturing. It has both its strengths and weaknesses. The costs there are very low, although they are rising.

Executive of a Los Angeles-based manufacturing firm with facilities in China

¹² However, the degree of vertical integration varies by firm; for example, auxiliary power units, and signaling systems.

mandate, which targets mobile sources of air pollution to improve air quality and address global warming. Similarly, the 2008 California Air Quality Board (CARB) Port of Los Angeles' air quality standards created the market for a variety of products that reduce emissions, from propane engines to oil filters, and some companies contract directly with the California AQMD. Among the firms interviewed were several with operations at the Port of Los Angeles and Long Beach. Most are newly established and trying to scale up and solidify their niches.

Type A: Innovative Startups

Founded recently, often by individuals with deep ties to Southern California industry, particularly the aerospace industry

Primary products are the systems and technologies for electric and hybrid vehicles

Overview **Compete by delivering high-tech, high-quality goods**; firms are price setters, but still figuring out their price point; some firms have a monopoly in the marketplace

Nature, extent and location of future manufacturing operations uncertain; many are considering both local and international options

Customers include drayage truck, auto, bus, and long-haul ground transportation companies

Customer base is geographically diverse; they have a local customer market but also have global customers in Europe and Asia; in the future, global customer base may expand

Customers **Piloting products**; initial orders often small as companies are testing out new products and searching for multiple industrial applications for their products

A single customer with a large order can propel company operations forward and shape the trajectory of their growth (e.g., their markets and product specifications)

Growing new customer relationships is vital

Suppliers **Supplier base is geographically diverse**; many firms purchase locally-produced fabricated or primary metal pieces

Type A: Innovative Startups (continued)

Small operations (1-50 employees)

Employees **Primary occupations include: research/development, business/marketing, and legal activities;** as they scale up, firms anticipate needing a highly-skilled production workforce

Certifications - Associations **No industry certifications;** firms are uncertain of what industry certifications, if any, they might need in the future; they are familiar with ISO certification, but not yet sure if they will implement the standard

Make-it-or break-it mode

Future Prospects **Environmental policies drive growth;** growth will continue to stem, in part, from environmental regulations and firm's ability to finance operations
Ready and willing to scale up; firms are eager and willing to take on additional orders

Scaling up would require a significant shift in operations; these firms have little experience with large-scale production and facilities are not necessarily equipped to scale up immediately

Type B: Established Firms with a Niche

"Consolidation is occurring in our market (in the form of mergers and acquisitions and firm failures), and we are well-positioned to stay afloat and grow during this period. We primarily serve the aerospace industry, and are focused on maintaining the flow of projects—to have the machines running as frequently and consistently as possible. I wouldn't say we specialize in high-end parts, but we are cautiously innovative. Innovation takes time and resources, but (innovation) can be worth it. We are normally price and process takers ... mostly. But we can control the prices and order size to a certain extent—thanks to the uniqueness and quality of our product."

Marketing director at a thread rolling and machining company

The second category of companies is well-established firms who remain competitive by serving niche product markets. These firms, which often serve the aerospace and electronics industries, are poised to expand and grow their operations in the future –if they can remain ahead of the curve in both product and process innovations.

Type B: Established Firms with a Niche

Primary products are systems and parts for the aerospace and electronics industries

Compete on the basis of quality and speed; often supply high-precision parts to the medical, military, and aerospace industries

Few competitors; often their customers pay a premium for their quality products

Overview

Many have implemented lean production strategies; workstations utilize automated machinery and are designed to minimize human movement, maximizing efficiency and reducing labor needs

Another lean strategy, "just-in-time delivery" means that only essential stock is kept on hand

Adopting lean manufacturing methods requires time, staff and a commitment to remaining flexible and open to changing production methods and flows; front-of-the-house management and engineering staff, which often includes a logistics or supply chain manager, are responsible for the implementation of these systems and note the shift in company culture which accompanies the implementation of lean manufacturing methods

Customer base is geographically and industrially diverse

Customers

Most firms are new to transportation-related manufacturing; historically have served the medical, aerospace, military and energy industries

Customers are new and existing; most have a well-established sales/marketing team; tradeshow and conferences are important for business development

Order size varies by industry; firms emphasize that they seek out repeat customers, whose orders will keep their workflow steady; part of their business success is predicated upon correctly anticipating and efficiently employing their labor and capital needs and resources; **repeat customers are preferred** because drumming up new business is expensive

Suppliers

Suppliers are heavily local, especially those in primary and fabricated metals; many firms work with local job shops and cite it as one of Los Angeles' key locational advantages.

Suppliers are not exclusively domestic or local, particularly when it comes to sourcing electronic components, which are often purchased from Asian suppliers

Type B: Established Firms with a Niche (continued)

Mid-sized operations (70 persons or more)

Employees

Degree to which workers need to be skilled or specialized varies; floor workers are compensated well for their work

Well-developed on-the-job training; some of these firms have on-site classrooms

Most important: Employees must “fit in” with the company’s work culture, which makes good employees hard to find according to the employers; most shops have tried to hire a “superstar machinist”, but find that the true predictor of success is someone’s ability to fit into their (lean) way of working; executive staff noted they strive to create a “family-like culture”

Company culture is defined by a mixture of historical practices, staff personalities, and lean operating methods

There is greater racial and ethnic diversity at these shops, when compared to some of the job shops

ISO certification often necessary

Certifications -
Associations

Some firms are part of the Southern California Manufacturing Group, a small trade group; members of the group do not compete directly and in turn, are very open about sharing information about production processes

Future
Prospects

Poised for growth and look to grow internationally; will selectively take on new orders, but most importantly want workflow regularity

Companies know that the market for new, innovative goods is fragile and that securing a foothold, as many plan to do, might be difficult

For some companies growth has occurred due to industry consolidation; in many metals-related industries, tier 2 shops have picked the debris from a wave of tier 3 closures

Firms willing to supply to government contracts, although skeptical of the future of mass transit in the U.S.; many supply to the transportation industry and have worked on public contracts; while they generally have a favorable view of supplying to transit orders, they think that "scaling up" transportation manufacturing in the U.S. will be difficult due to the small size of the domestic industry

Los Angeles is a challenging and rewarding location in which to operate; its high costs (namely, rent and labor) are balanced by the benefits (the huge pool of skilled labor and innovative marketplace)

Type C: Jobs Shops without a Niche

We've been on the same street since our inception – we own three buildings here. There are benefits of locating here: we typically have a good relationship with the community, and our employees live here. We've tried to stay here at the cost of lower profits, because it's home to everybody; we're in the business of making money and also of supporting people – the familial aspect is just as important as the bottom line.

Customer service manager for a family-run manufacturer of finishing tools

The third category of firms is small job shops and established firms without a niche. These firms are called to mind when most people think of traditional manufacturing—metals manufacturing performed on mechanized (rather than automated) machinery. These are firms which used to house much of the middle class manufacturing workforce U.S., but over time grown smaller in size and number. Many of the remaining shops maintain their presence through long-established relationships with local firms. Although shrinking, these firms are still an integral part of manufacturing in Southern California.

Type C: Job Shops without a Niche

Established operations; are many family-owned

These are often “job shops” which take on on custom, job-specific orders; they often have wide-ranging product lines

Primary products include fabricated and finished metals and rubber products for a variety of industries

Overview

Once had a niche, but they now face a significant number of competitors

Compete largely on price and speed

Their products feed local tier 2 firms, such as Type Bs

Machinery less automated, more manual

Type C: Job Shops without a Niche (continued)

Customers and suppliers are predominantly local; many firms have long-standing relationships with both their suppliers and customers

Customers

They are more open to taking new orders than Type Bs

Orders are diverse in size, but typically turned around quickly

Companies supply to a diverse set of industries; **have produced transportation-related parts** and worked with tier 2 companies

Suppliers

Their suppliers are typically local and often supply primary materials

The majority of firms are small (with 20-30 employees or less) although we interviewed larger firms (with 60-70 employees)

Employees earn lower wages than those in Type B companies

Employees

A higher share of workers are in production occupations compared to Type B firms

Employees are highly-skilled -yet not high-tech- craftspeople working on mechanized equipment, rather than automated

Training is on-the-job; companies report replacement issues due to the aging of the workforce

Certifications -
Associations

Not ISO certified and do not see it as a necessity; there is not a single industry association to which most firms belong; a number of the fabricators and primary metals firms are members of California Metals Coalition, a metals industry lobbying group

Future
Prospects

Trying to "get by"; while they are in various states of financial health, many are trying to simply maintain, rather than grow; staying afloat and staying relevant as they face competition from offshore companies is key

Los Angeles' pool of skilled workers is a strong locational pull as are their established customer relationships in the region

Preliminary Findings

Our goal was to gain enough of an understanding of the present state of manufacturing in Los Angeles in order to assess what strategies are most feasible to pursue. We realize we are not the first to tread this ground. Over the past 20 years, there have been several attempts to transition the region's aerospace industry into new technology-driven industries (for example, fuel-cell bus technology and electric passenger vehicles) that failed due to a lack of understanding of the current state at the firm-level and future strategic directions (Wolff et al. 1995).

Our key takeaways are three-fold:

Finding #1: There is not a well-organized, transportation-related supply chain in Los Angeles.

Few companies exclusively serve the transportation industry; in fact, most companies we interviewed do not even identify with the transportation industry, which became evident from our initial phone screening process. Many firms which do make component parts for transportation products did not self-identify with the transportation manufacturing sector. With few exceptions, those who produce transportation-related component parts do not earn the majority of their revenue from these operations. For example, a leading manufacturer of lighting applications supplies to a range of customers including public agencies, defense-related companies, and transportation-related companies like Caterpillar.

The lack of an established and cohesive transportation supply chain presents difficulties in finding ways to intervene and influence the development of the industry. The region lacks industry-specific capacities such as business associations, lobbying firms, workforce development programs, and even labor unions that could be leveraged as part of a regional strategy. For example, business associations tend to be organized by industry (e.g., California Metals Coalition) or by geography (e.g., Torrance Chamber of Commerce). The supply chain articulation between tier 2 and tier 3 suppliers requires a multi-industry and regional approach.

Finding #2: Large-scale, sustained demand is needed in order to grow and better organize a transportation-related supply chain in Los Angeles.

Both our field research and the literature find that large-scale, sustained demand is needed in order to stimulate growth and private-sector investment in the transportation-related manufacturing industry at scale. While the United States had historically been home to a vibrant railcar manufacturing sector, we have lost most of our domestic production largely due to unstable demand (Fitzgerald et al. 2010). Insufficient demand for rail equipment – and even buses – has pulled the rug out from under domestic companies such as Pullman and Budd Company and has had ripple effects down the supply chain.

Temporary increases in demand – like the Metro's current RFP – are not sufficient to influence firms' investments in increasing capacities. Type B firms are in a position to turn down contracts if they find them irregular, too small, or packaged with stipulations which would require a change of business practices. The firms interviewed emphasized the importance of managing the production workflow, and

specifically mentioned their desire for continuous and substantial jobs orders. If an order requires a lot of upfront investment and customization, but is relatively short-term, it may be turned down. Furthermore, Metro's investments, when distributed across hundreds of subcontractors, are unlikely represent a large share of any single firm's business activity. Larger and sustained demand is required in order to influence firm decisions regarding staying and expanding in Los Angeles and in the U.S.

Finding #3: Each firm type has unique challenges and opportunities that need to be addressed in a regional strategy.

The future of Type A firms is uncertain; most are in "make-it-or-break-it" mode –and most firms do not have local manufacturing operations and are uncertain if they will in the future. Some have expanded in other countries; others are still in the research and development phase. But Southern California has been "a hotbed for this kind of innovation," to quote one company executive, and should continue to cultivate resources to retain and grow such operations. The future of Type C firms is also bleak. Many of these firms are growing smaller every day with increasing international competition from countries with lower wages. Yet they are the most embedded in the local economy and buy from and supply to local businesses, including many of the Type B firms. By effectively targeting Type B firms, the supply chain ripple effects would benefit Type C companies.

The opportunities for focusing on Type B are as follows: Companies often have hundreds of employees so could have a greater impact on the labor market; innovative products and processes drive firm growth rather than heavy cost-cutting; many have an established network of local suppliers so could generate greater regional economic growth. For firms that are already manufacturing AFV and railcar component parts, targeted policies could help scale up their capacity. For aerospace-related and other manufacturers not already in the supply chain, whether or not they can be retooled and repositioned needs further investigation.

There is no magic-bullet or one-off solution to developing a vibrant transportation-related manufacturing industry in Los Angeles, but the problem is not unsolvable. Any strategy will need to address both the demand-side and the supply-side of the labor market; employer concerns as well as worker interests; and policy solutions as well as organizing efforts. The following sections offer a preliminary framework for defining a roadmap for the region.

Creating Demand: Policy and Procurement

Both the literature and our field findings confirm that large-scale, sustained, and predictable demand for equipment and products is needed to drive the market. In this section, we highlight the current policy debates and procurement opportunities that can help drive the labor market demand for manufacturing-related employment in Los Angeles. While local demand from Metro and other agencies may provide opportunities for employment in manufacturing that should be capitalized on, the greatest opportunities will likely come from a concerted effort to serve and build a burgeoning national-scale, domestic market – and export markets – to grow and stabilize demand for vehicles and their component parts.

The impact of the work by numerous organizations across the country – such as the BlueGreen Alliance (merged with the Apollo Alliance and its Transportation Manufacturing Action Plan campaign), Transportation Equity Network (TEN), Transportation For America, Green for All, LAANE, and labor unions – that highlight the need for smarter transportation investments has elevated the dialogue for a national transportation policy. This includes highlighting the importance of building out a domestic transportation manufacturing supply chain.

Based on an analysis by Green For All, the following are two relevant and current policy debates at the national level:

Federal Transportation Reauthorization

Federal funding for local transit projects and procurement is tied to the federal surface transportation reauthorization bill, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), which expired in September 2009 and has been extended seven times through September 2011. In its proposed fiscal 2012 budget, the Obama Administration outlined a blueprint for a six-year \$556 billion bill, which includes a 66 percent increase in transportation funding over current spending levels. The proposal included \$53 billion for high-speed and passenger rail and \$119 billion for public transit, both large increases. But the Senate and House deliberations will be a messy process; three Senate Committees have jurisdiction over surface transportation reauthorization – Banking; Commerce, Science, and Transportation; and Environment and Public Works.

The major fights are over costs, duration, and most likely, the scope of what gets included and what gets left out. Perhaps the largest roadblock is identifying revenue sources. The Federal Highway Trust Fund (HTF) is largely funded by an 18.4 cent gas tax that has not been raised since 1993. Revenues to the HTF have not kept pace with the outlays, dropping sharply in 2008 when fuel hit record-high prices and consumption dropped. Transfers from the general fund have kept it afloat but if nothing changes, the HTF is anticipated to be insolvent in 2013.¹³

¹³ Preparata, C., 2011. Transportation Manufacturing Research: Political Landscape and Literature Review. Memo prepared for LAANE and PERE. Oakland, CA: Green For All.

The reauthorization of a new six-year transportation bill in 2011 that includes funding increases for transportation project is unlikely. A two-year bill may be the alternative that gets beyond the 2012 elections but fails to allow for the long-term planning required for smart infrastructure investments – investments that can create consistent demand, and subsequently, increase our domestic manufacturing capacity.

Federal Local Hiring, Targeted Hiring, and Domestic Content Provisions

The Reagan Administration eliminated local hiring language for transportation projects. Currently, Federal Transportation Administration (FTA) procurement guidelines prohibit local preferences because they are deemed “exclusionary and discriminatory” practices. The primary obstacle to changing these guidelines is political. For both sides of the aisle, the concern is that local hiring language jeopardizes the Interstate Commerce Clause and pits state against state.

A coalition of national organizations is advocating changes in the federal transportation reauthorization bill to facilitate local hiring. In April 2011, a leaked version of the Obama Administration’s transportation draft bill included language that provides the Department of Transportation (DOT) Secretary of Transportation discretion to consider other factors that are “in the public interest.” The draft language applies only to Federal Highway Administration (FHWA) projects and the coalition is pushing for greater discretion for FTA projects and allowing local recipients greater discretion around local hiring efforts. In June 2011, Senator Sherrod Brown (D-OH) introduced Senate Bill 1210, Strengthening Manufacturing and Rebuilding Transit Act of 2011 (SMART), which provides preference to transportation projects if the manufactured goods to be purchased have a domestic content percent that exceeds current federal requirements. And, a new DOT-DOC effort, the Next Generation Rail Supply Chain, seeks to develop a domestic rail and locomotive-manufacturing supply base in an effort to move towards a federal goal of 100 percent domestic content.¹⁴

State and Local Environmental Regulations

Field interviews confirm that California’s stringent environmental policies have played a predominant role in creating the market for some suppliers, especially the Type A Innovative Startups. LAANE’s survey of local public agencies also confirms that it influences public purchasing: Stringent emissions and particulate standards set by CARB and AQMD require that the region’s public agencies increase investment in transit and AFVs in order to meet the 2013 goal of decreasing emissions by 70 percent.

At the local level, Los Angeles World Airport’s AFV conversion policy requires that tenant-owned vehicles and equipment be alternative fuel-powered and it may help drive demand for heavy-duty AFVs in the private sector (similar to that of the clean truck program at the Ports). Another potential driver of demand for clean trucks is AQMD rules, which apply to all private haulers with a fleet of 15 or more refuse collection trucks.

¹⁴ United States Department of Transportation, 2011. Next Generation Rail Supply Chain - Railcar Supply Chain Webinar.

For the long-term, policies that encourage sustainable, transit-oriented urban development will also help generate demand for transit vehicles. This was not a focus of the research at this time but should be looked at in the future.

Aggregating Public Procurement

Los Angeles manufacturers would have to serve many urban centers across the region in order to reach economies of scale. Potential policy solutions should facilitate collaboration and information sharing around transportation projects and needs. The industry could be bolstered significantly if local municipalities could gather and collect a central clearinghouse of information on planned procurements and try to dictate a schedule of procurement. By developing and making such a schedule publicly available, manufacturers can predict demand and invest with a lower risk portfolio.

Part of aggregating public procurement is also capturing the preventative maintenance need. As a result of historically contracting public transit budgets, many domestic transit agencies shifted funding from procurement of buses and railcars to preventative maintenance and necessary infrastructure. According to Worldwatch Institute's recent study, more than half of the rail vehicles currently in service should be replaced within the next six years, and upwards of 41 percent of U.S. transit buses are in –at most – marginal condition (Fitzgerald et al. 2010). Additionally, the Federal Transportation Administration's 2010 National State of Good Repair Assessment estimates \$41 billion needed to meet the backlog and maintain the existing fleet of buses and \$5.8 billion in rail over the next six years. Even without expanding services, this amounts to a large, medium-term investment to keep services at a minimum.

Standardization of Requirements

Developing a strategy around manufacturing should also consider the problems with the customization of products procured by government agencies including, buses, rail, and AFVs. Research indicates that transit agencies have the tendency to require customized features in their buses and railcars. They find that this increases production costs by 20 to 30 percent, increases production and delivery time, requires additional engineering work, and makes mass production of the equipment impossible.

Bolstering information sharing around transportation equipment needs can also include the adoption of cooperative standards for equipment (Fitzgerald et al. 2010). Moving in the right direction, Amtrak recently developed "Next Generation" design standards, which are intended to standardize new equipment across state boundaries. Further research could examine this process.¹⁵

Subsidizing industry certification could also help enhance quality and standardize practices within the market. International Standard for Organization (ISO) certifications can give a firm a competitive advantage; however, these certifications are expensive to implement and require one or more full-time

¹⁵ For more on the design standards see:

<http://www.dot.ca.gov/hq/paffairs/news/pressrel/11pr43.htm>.

workers to manage the standardization process. Helping firms to implement this certification (or other industry certifications) by subsidizing and defraying some of the costs associated with implementation would be helpful. The firms most likely to need assistance are the smaller Type B Established Firms with a Niche.

Supporting Firms: Gaps and Needs

Financing

Funding is a major roadblock to large-scale and sustained procurement both for new vehicles and for the backlog of maintenance needs. Part of the solution is increased investment at the federal level which is discussed above. Addressing the fiscal crises facing Los Angeles and other local and state governments also needs to be part of the roadmap.

Other funding mechanisms at different scopes and scales of government are also critical to fostering economic opportunities: loan guarantees, bonds, grants, tax incentives, or any combination of these or other investments. Further research should examine the most efficacious combination of financing tools for Los Angeles. Although the research is mixed around the success of economic incentives (Gabe & Kraybill, 2002), some cities have successfully developed innovative funding mechanisms that might be applied to Los Angeles. The \$8 million Grow Seattle Fund provides low interest financing to established small-and medium-sized manufacturers through a partnership between Seattle's Office of Economic Development (OED), the Seattle Foundation, and the National Development Council's Grow America Fund. Since its establishment in 2009, the program facilitates outreach and networking through a range of tools including formal consultations (Mistry & Byron, 2011).

Intellectual Property

The use of technology transfer agreements has been a key component domestically and internationally in the rail car manufacturing industry and could be considered as a component of a viable strategy. There have been some recent successful efforts to bring transportation-related manufacturing to the United States through the use of technology transfer agreements paired with local content considerations.

United Streetcar was established in 2007 as the United States' first modern streetcar manufacturer. It specializes in metals and weldings. In 2009, Portland Oregon opened the first U.S.-made streetcar. The company is currently building six additional streetcars in Portland and seven additional streetcars for Tucson. In order to develop the first prototype car, United Streetcar entered into a technology transfer agreement with Czech railcar firm Skoda. The company has innovated the initial design and has now integrated more U.S. components. Through the use of federal funds, United Streetcar is partnering with Rockwell Automation to develop new U.S. made propulsion systems that will increase the U.S. content from 70 to 90 percent. Thus, innovation and growth for United Streetcar capitalized on targeted federal funding and industry partnerships with global companies. Existing technologies were improved through

innovation and economic development, and opportunities were successfully tied to the local context (Lowe, 2010).

In fact, United Streetcar demonstrated how locally produced content can actually be used as a marketing tool and as a comparative advantage. City governments domestically are the largest consumers of these products and will generally show preference for domestic supply chains. Federal funding, again, is tied to domestic content. Local companies such as United Streetcar can benefit from Buy America requirements and similar local content requirements. Through these types of policies, domestic manufacturers are handed a niche market. Los Angeles can seek to attract and develop these types of manufacturers and utilize this government-generated demand as a strategy to grow manufacturing opportunities (Lowe, 2010).

Land Use

Locating industrial land appropriate for transportation-related manufacturing is a keystone in the development of a comprehensive approach to transportation-related manufacturing. Some communities have been historically resistant to the development of industrial land. However, it is essential in order to provide the space needed for manufacturing (Kotval & Mullin, 1994). In fact, appropriate infrastructure for manufacturers is important when compared to other industry types. The use of regional cluster analysis may also be particularly important within the manufacturing realm where such geographic proximity may be linked with the sector's ability to innovate, expand, and leverage their comparative advantage. Within the Los Angeles area, there is a need to consider the dwindling availability of industrial land (Mistry & Byron, 2011).

Clean tech corridors, eco-industrial parks, and business incubators are potential areas that are somewhat land-use driven and which may provide benefits to manufactures. CleanTech LA and the emergent incubator at the San Pedro Bay Ports may provide initial opportunities to build green manufacturing within Los Angeles. Moreover, in this vein, one potential strategy is the use of nonprofit industrial developers to help facilitate needed land acquisition (Mistry & Byron, 2011).

There is a bevy of potential opportunities in geographically-concentrated approaches around the development of a manufacturing cluster for Los Angeles. At PortTechLA, the incubator associated with the Port of Los Angeles, a team specializes in business development and marketing. One of its strategies is helping firms expand by moving towards foreign exporting. However, the incubator's role as a labor market intermediary could be expanded. The incubator could help firms establish local manufacturing operations, develop the local supply chain, and provide support in submitting competitive applications for local transportation RFPs.

Workforce Development

Developing a skilled and readied workforce around manufacturing for transportation-related components is a key supply-side issue and must also be a part of a comprehensive strategy towards

transportation-related manufacturing. Opportunities and challenges exist in building a workforce for transportation-related manufacturing.

Some firms we interviewed have found that there is not a queue of qualified workers to fill the positions of retiring workers. Employment training is needed across occupations, from technicians to those in management, marketing, or administrative positions. However, this is not an issue for all firms. Some firms report less trouble recruiting workers; these are the firms in which less specialized labor is needed. However, even these firms report that they have trouble finding workers that fit their company culture, suggesting that they, too, could benefit from soft skills training. Training funding could be allocated through a variety of sources, such as a Workforce Investment Board (WIB) or Employment Training Panel (ETP).

Given the size of the workforce, training might have the most impact in larger firms with a niche, given that these firms have a large number of employees and a high number of professional and technical staff members. Innovative startups might also benefit from a program which helps them establish their approach to training. Lastly, smaller job shops could benefit from learning about and implementing best practices from supply chain management, as they may not have staff dedicated to these tasks. Here, training could include both hard and soft skills training. On the hard skills side, technicians could be trained in the use of excel and project management software, while managers might benefit from taking Spanish courses (or conversely workers could take ESL courses). Soft skill development is also important, and could take the form of time management, work skills, and team building training.

New Forms of Organization

Even with demand in place, there are various challenges by sector to establishing a large number of quality jobs along the supply chain. New forms of organization may be needed to provide the political will and organizing necessary that include new ways to organize employers, employees, and to forge a new labor-management relationship.

For employers, industry associations help form business' identity and are a place to share best practices and industry trends. A few interviewees belonged to the Southern California Manufacturers Group (SCMG) which provides members with mentorships and solid strategies for growth and defensive moves to get through the downturn. In Europe, there are transportation associations that include not only manufacturers but also government and transportation consulting groups. They are facilitated by the government's transportation plan. They have successfully helped to unify the industry, bringing together firms around transportation.

For employees, there are challenges to organizing. Job shops often house a lower paid, sometimes temporary, labor force. And while these are the workers who would traditionally be candidates for organization and unionization, it may prove difficult given the small firm size. Among the larger established firms with niche, the data and observations suggest that many technicians in aerospace and electronics companies are well-compensated for their work making them less likely to unionize. Also,

among the innovative shops and established companies with a niche, the number of floor workers is substantially smaller and growing smaller when compared with engineering.

New labor-management relationships are needed for industry development to be most effective and work in the joint interests of workers and employers. Both need to understand the specific technical requirements of transportation-related manufacturing parts. While aerospace and defense firms may be willing and interested in taking on transportation-related orders, they may have to adjust their business and production processes; traditionally, these firms have produced high spec and high cost products, and have often operated in a “cost-plus” environment, where cost minimization is less important than high quality production. In contrast, in the private sector, the cost is the bottom line and less technical precision may be required. This has been somewhat of a tension historically in conversion efforts. There are concrete ways that labor and management can work together towards their joint interests. More investigation into innovative approaches is needed.

Conclusion

In sum, a comprehensive strategy is needed that incorporates the aspects above in order to develop a transportation-related manufacturing core within the Los Angeles region. Los Angeles, including city and other levels of government, can play a guiding role in the development of a transportation-related manufacturing industry. The local and regional government can assert influence in a multitude of ways but a national strategy is critical.

Based on our preliminary assessment, we suggest the following directions for further exploration and engagement: identifying and advocating for federal, state, and local policy changes that will generate large-scale demand (federal transportation reauthorization, targeted hiring, domestic content, state and local environmental regulations); aggregating public procurement of new vehicles and on-going maintenance at scale; and addressing the myriad industry/supply-chain challenges (financing, intellectual property, land use and availability, workforce development, and standardization and certification). Finally, we note that new forms of organization are needed: new strategies to better organize employers and employees and to forge a new relationship between management and workers, and to engage other key stakeholders such as employment and training agencies, business associations, civic leaders, research institutes, and others that can play a critical role in better understanding the opportunities and challenges of growing Los Angeles’ manufacturing industry and helping to make the case so that manufacturing’s death knell is not preemptively rung.

Appendix: Transit/Transportation Spending by Agency

Transit/Transportation Spending by Agency

	Agency	Fleet Size	Primary Vehicle Type	Avg Annual Funding For Vehicle Purchase (millions)	Current Funding For Vehicle Purchase (millions)	KEY FINDING(S)
CITY OF LOS ANGELES	Port of Los Angeles & Long Beach	Unknown	Staff Passenger Vehicles	No direct funding at scale.	No direct funding at scale.	Spending on clean and alternative powered vehicles limited to support of pilot projects.
	Los Angeles Fire Department	350	Ambulances	Unknown	Unknown	Emergency response vehicles are exempt from regional air quality standards.
	Los Angeles Police Department	4,700	Pursuit Rated Sedans	\$25 - \$32 in City General Funds	\$0 allocated from General Funds	Emergency response vehicles are exempt from regional air quality standards.
	General Services Department	11,000 (Excludes Fire, Police, DWP, LAWA & Ports)	Passenger Vehicles	\$30 in City General Funds	\$0 allocated from General Funds	Shortage in availability of alternative fuel heavy-duty vehicles and complex emissions calculations make anticipating demand difficult.
	Los Angeles World Airports	1,300	Passenger Vehicles	Determined annually by the Board of Commissioners and Finances.	\$1.6	LAWA has a policy that may have similar potential to Clean Truck Program at the Ports which require that tenant owned vehicles and equipment be alternative fuel powered.
	Department of Water and Power	6,000	Heavy-duty Vehicles	Between \$25 - \$30. Propriety department is revenue funded.	\$25 - \$30	DWP serves as part of the state's emergency response team and much of the fleet is exempt from regional air quality standards.
	Los Angeles Department of Transportation	470	Buses and Shuttles	Highly variable; dependent upon need and annual funding levels.	\$70	By the end of the year LADOT will have replaced most of its retirement aged buses with CNG, limiting potential demand.
	Bureau of Sanitation	535	Refuse Collection Trucks	\$20 annually; funded by waste collection fees.	\$80	BOS has a steady replacement rate of 80 trucks annually. AQMD rules also apply to private haulers; a potentially significant stream of demand.
	COUNTY OF LOS ANGELES	Los Angeles County Sheriff's Department	5,000	Pursuit Rated Passenger Vehicles	Unknown	Unknown
Los Angeles Unified School District		3,584	Buses	Unknown	Unknown	Budget issues, difficulty sourcing clean buses and need for infrastructure upgrades make fleet greening difficult.
Department of Beaches & Harbor		163	Passenger Vehicles	\$1 State Funded	\$0 allocated from state fund	Department is ahead of AQMD replacement schedule; will have minimal demand for AFVs.
Los Angeles County Metropolitan Transportation Authority		Unknown	Rail Cars and Buses	\$170 in Measure R and Federal Funding	\$170 allocated from Measure R and federal funds	Between \$9.3 - \$9.9 billion allocated for rail and bus project related purchases between 2010 – 2019.
SOUTHERN CALIFORNIA	Metrolink	150	Rail Cars	Unknown	Unknown	Metrolink has recently purchased enough new rail cars to replace its entire fleet. Demand for new rail cars going forward will be limited.

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