



From Waste to Resource:

Restoring Our Economy with Recycling Careers

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laane»
A NEW ECONOMY FOR ALL

May 2014

Acknowledgements

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Foreword

by Van Jones

We have an opportunity to rebuild our old economy into a new and clean recycling economy.

LAANE has drawn up a blueprint for cities to create clean jobs, restore our environment, and rebuild our economy by burying less and recycling more.

We are in a natural resource crisis, and the problem is getting worse across the globe. World population and consumption are increasing. Each year, we consume 30 percent more resources than the planet can regenerate. This depletion of resources will have unforgiving impacts on our forests, waters, soils, wildlife, and the world's population.

The U.S. is one of the largest consumers of resources and sends 70 percent of our waste to landfills, more in total than any other country in the world. Just one-fourth of our materials are recycled, well behind countries like Germany and the United Kingdom which have recycling rates of 66 percent and 40 percent, respectively.

We have to manage our waste in a different way before we convert a living planet into a dead one. The problem is most urgent in major urban areas, which consume three-fourths of natural resources and produce half of the world's waste.

In every major city, our precious materials can be recycled and converted into new economic opportunities. Many materials can be recycled and reused over and over again, saving resources from going into landfills or incinerators, safeguarding natural resources, and creating a viable and profitable alternative for our trash. Manufacturers and entrepreneurs can start new businesses and create new jobs while restoring the environment.

In short: the more materials we reuse and recycle today can be an economic stimulus tomorrow. But, waste does not recycle itself.

We are also in an economic crisis. Significant parts of our population can't find family-supporting jobs, including too many chronically unemployed, thousands of returning military veterans, formerly incarcerated, formerly homeless, and young adults.

Recycling can put hundreds of thousands of people back to work. This work can teach technical and mechanical skills, advanced manufacturing skills, and engineering. Most important, this work is an opportunity for middle-class careers.

Not only can we extend the life of our resources, but we can also give a second chance to our neighbors looking for honest work and economic self-sufficiency. In return, we can move one step closer to turning our natural resource crisis into an opportunity for national economic growth.

To get there, we need what LAANE calls a **clean recycling economy**, a strategy to transform trash into resources, to position our cities as innovators and entrepreneurs, and to redesign dirty and sometimes dead-end jobs into family-sustaining careers with dignity and opportunity.

To gain the benefits from a clean recycling economy, our cities have to work towards a unified plan - a **Clean Jobs Plan**. We have to redesign our cities to manage waste as an economic opportunity as well as an environmental necessity, to protect neighborhood health from adverse impacts from trash, and to train and empower our workers on the frontline collecting and recycling our waste.

Our cities should partner with business by investing in new technology, modernized equipment, and innovative workforce training. As more recycling happens, companies can hire more people, create new jobs, and stimulate the national economy. Moving toward a clean recycling economy will pay for itself because, on aggregate, recycling our resources has proven to be cheaper than throwing it all away.

LAANE and Los Angeles are leading the way and setting an example for how to re-imagine our trash as treasure. Los Angeles can do more but so can the rest of our cities.

Everyone agrees on the merits of recycling. Now, let us work towards a clean recycling economy that creates clean recycling jobs, a healthy environment for future generations, and shared prosperity.

Sincerely,

Van Jones

Van Jones served as Special Advisor for Green Jobs, Enterprise and Innovation at the White House Council on Environmental Quality and authored The Green Collar Economy. He is President and co-founder of Rebuild the Dream, and co-founded Green for All and the Ella Baker Center for Human Rights.



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Executive Summary

In this report, the Rockefeller Foundation and the Los Angeles Alliance for a New Economy (LAANE) outline a new model for recycling job growth with the potential to encourage quality jobs and to improve the environment. LAANE is advocating for a transformation of the waste and recycling industry in Los Angeles while promoting good jobs, thriving communities and a healthy environment.

Developing a clean recycling economy can be one of the greatest economic and environmental opportunities of our time. Despite a global resource crisis, Los Angeles is on the verge of transforming its waste and recycling system into a national model that will result in maximum recycling and reuse of materials for economic benefit, with government and industry as a strategic partner in managing resources, and a sustainable workforce infrastructure for skilled laborers, entrepreneurs, and innovators.

There is a valuable economic opportunity in recycling more and wasting fewer resources. LAANE found that Los Angeles sends more than three million tons of waste every year to landfills, equivalent to the weight of at least two million cars. **Through a Zero Waste franchise plan, Los Angeles can recover as much as \$158 million in resources by ensuring that waste is recycled and manufactured into new goods (Figure 1).** By expanding beyond a Zero Waste approach, Los Angeles and other cities can achieve as much as \$650 million in economic activity each year.

With a clean recycling economy in place, even more is possible. LAANE found that cities like Los Angeles can unleash investments in the recycling economy through a pursuit of entrepreneurial and innovative opportunities with recyclable materials. As cities develop Zero Waste strategies to handle new materials, they can also encourage job growth in the collection, processing, and manufacturing of those materials.

Figure 1

Estimated Value Generated with Recyclable Materials Currently Landfilled from Los Angeles

Material	% of Total Discarded	Estimated Value (\$ million)
Paper	26%	\$90.1
Plastics	9%	\$33.2
Textiles	3%	\$12.3
Organics	35%	\$12.2
Metals	4%	\$5.8
Construction Debris	15%	\$2.1
Wood	4%	\$1.1
Glass	2%	\$0.8
Residuals	1%	\$0.4
Hazardous Waste	0%	\$0.2
TOTAL	100%	\$158.2

Recycling-related industries in Los Angeles County already have 53,000 full-time employees, 3,000 businesses, and nearly \$2.5 billion in annual wages. By building a clean recycling economy, the Los Angeles area could see the growth of around 20,000 jobs in the region (Figure 2). With a similar plan in place across the U.S., cities can grow up to a million jobs and \$1 billion in new annual wages for workers (See Methodology B).

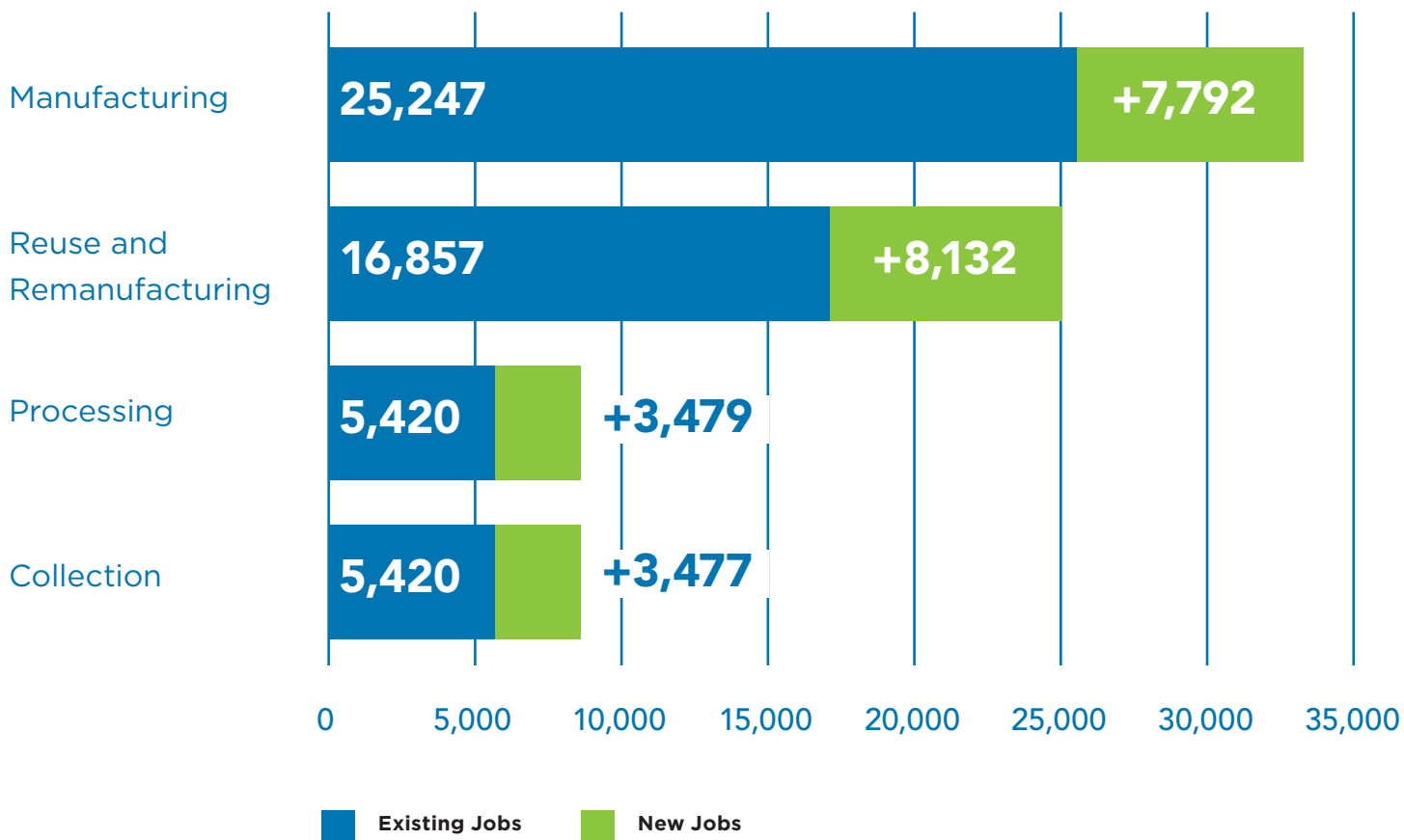
To make any economic growth sustainable, cities must ensure recycling jobs are safe, family-sustaining careers. That means creating quality jobs where workers have adequate safety training and opportunities for career advancement.

The report gives a detailed picture of where those jobs are now and identifies opportunities for growth, giving cities a roadmap to strengthen economic and workforce development strategies.

Through the Clean Jobs Plan, LAANE and the Rockefeller Foundation outline a blueprint for cities to implement a clean recycling economy. To ground the research, LAANE interviewed industry, workforce, environmental, and policy leaders in the recycling field, identified common themes, and developed four areas of recommendations to address the economic and environmental opportunities with recycling.

Figure 2

Job Growth Opportunities in Recycling Los Angeles' Discarded Materials



Summary of Recommendations: A Clean Jobs Plan

1. **Maximize recycling and achieve Zero Waste through clean methods of collecting materials and maximizing the recovery from businesses and households.**
 - **Complete implementation of a Zero Waste franchise plan for waste collection.**
 - » Manage bids for collection zones with measurable performance metrics.
 - » Evaluate opportunities for modernizing recycling facilities.
 - **Require composting and recycling collection for businesses and residents.**
 - » Upgrade customers with a three-bin system for the separation of food and yard scraps, recyclables, and mixed waste.
 - » Evaluate city-wide recycling policies to incentivize maximum recycling, including mandatory composting and recycling and Pay as You Throw.
 - **Implement recycling facility agreements.**
 - » Cities should monitor and certify the performance of recycling facilities based on quantifiable methods, like recovery rates, truck travel, and average distance to markets.
 - **Support legislative efforts to recycle all organic materials.**
 - **Support programs for material exchange and reuse programs.**
2. **Unleash investments in recycling markets to help circulate these materials in the U.S. economy.**
 - **Evaluate public purchasing standards of recycled-content goods.**
 - » Upgrade purchasing standards to include goods with higher recycled content.
 - » Coordinate with other cities to collectively purchase recycled-content goods from local and regional recycling companies.
 - **Use price incentives as short-term and catalytic investments in local recycling markets.**
3. **Modernize recycling infrastructure through a Clean Recycling Taskforce that will evaluate and adapt recycling facilities to future demands in the global market.**
 - **Coordinate a Clean Recycling Economy Taskforce.**
 - » Develop a team of policy and industry leaders to identify opportunities in recycling infrastructure.
 - » Evaluate opportunities for market development in the region.

- **Develop a Clean Manufacturing Zone.**

- » Align goals with economic development leaders, resource management agencies, and city planners.
- » Identify industrial zones to concentrate manufacturing investments.
- » Evaluate opportunities for targeted employment from areas most in need of quality jobs.

- **Recruit manufacturing businesses.**

- » Market and “brand” the City of Los Angeles as a recycling hub.
- » Align investments with venture capital and other entrepreneurial investments.

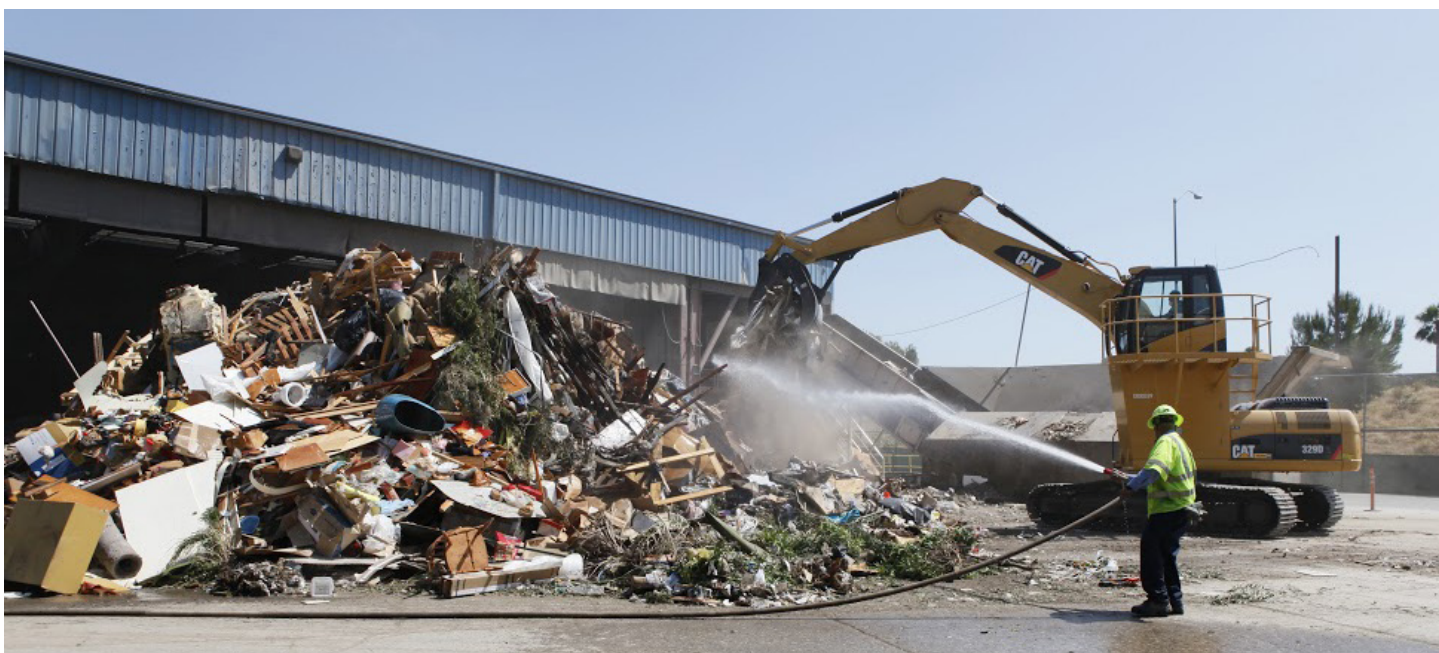
- **Coordinate with Recycling Market Development Zone Administrators.**

4. **Prepare and train workers for good jobs in the recycling economy.**

- **Coordinate a Clean Recycling Jobs Taskforce.**

- » Convene workforce, policy, and industry leaders to identify and assess workforce gaps and opportunities in the recycling economy.
- » Design training and educational programs for new and emerging jobs.
- » Identify high-poverty and low-income neighborhoods to concentrate training investments. For instance, South and Southeast Los Angeles have had double-digit unemployment for years and should qualify for training opportunities.¹

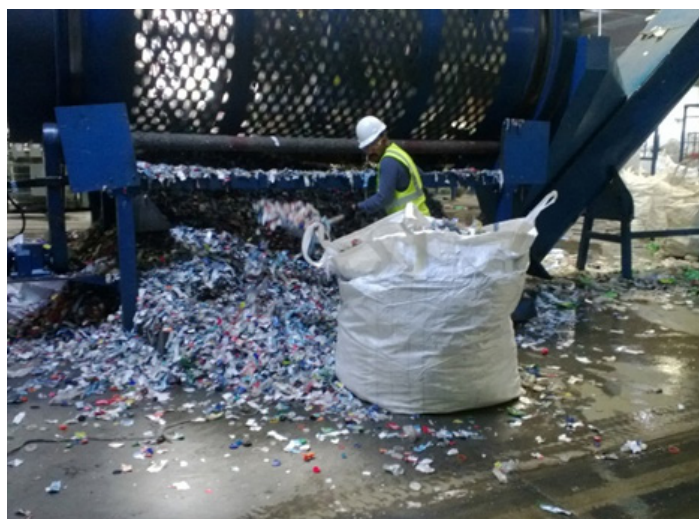
- **Partner with academic institutions and training organizations to access broader workforce assistance.**



Introduction

Los Angeles is developing a **clean recycling economy** which has the potential to revitalize and repurpose our economy, our recyclable materials, and our workforce. Part of this vision includes spurring innovative and entrepreneurial industries, protecting the environment and public health through better resource management, and equipping disadvantaged communities with career-path jobs.

Cities across the U.S. can modernize their own recycling infrastructure and meet Zero Waste goals through implementation of a Zero Waste franchise plan. Such a plan will require recycling for all, clean trucks, and recycling facility certification. But, to develop the scale and demand necessary for a system-wide transformation, cities need to innovate and invest with urgency. Fulfilling ambitious recycling goals can encourage the reuse of precious materials while a recycling-based strategy can support opportunities for business development and new job growth.



Our cities can lead the way into a recycling-based economy with LAANE's Clean Jobs Plan. Through this plan, cities can move towards Zero Waste, unleash investments in innovation and markets, partner with industry to modernize recycling infrastructure, and prepare and train workers for good jobs in the recycling economy.

In this report, the Rockefeller Foundation and the Los Angeles Alliance for a New Economy (LAANE) outline an innovative model for recycling job growth with the potential to create quality jobs and improve the environment. LAANE estimates a clean recycling economy in Los Angeles can encourage the creation of over 20,000 region-wide jobs throughout the next two decades. As cities redesign and modernize their recycling economy along the lines LAANE describes in a Clean Jobs Plan, we will continue to see the creation of good jobs across the country.



1. The Recycling Imperative

Environmental Waste

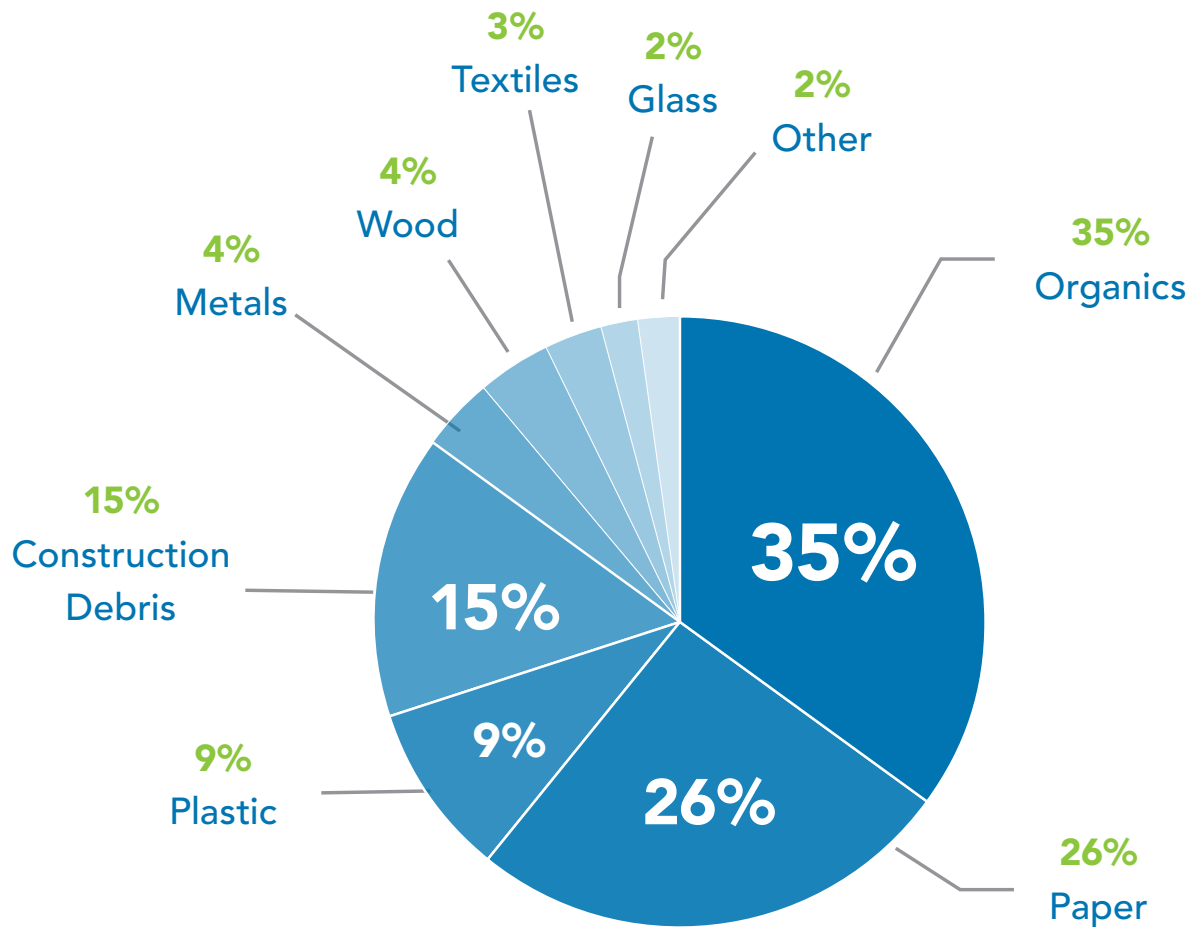
There are some bright spots in Los Angeles recycling and waste management, but there is much more to be done. Every day in Los Angeles, thousands of tons of recyclables are sorted and processed in recycling facilities called material recovery facilities (MRFs).² Recyclables are

packaged into bales, and delivered to overseas markets, or to local and regional manufacturers using recyclables as raw materials³ for production.

Recyclables are a valuable commodity. When the quality of the material is preserved, manufacturers can reuse and repurpose these more than once.⁴ Using high quality recyclables as raw materials can

Figure 3

City of Los Angeles Waste Stream, 3.5 Million Tons Sent to Landfills Every Year

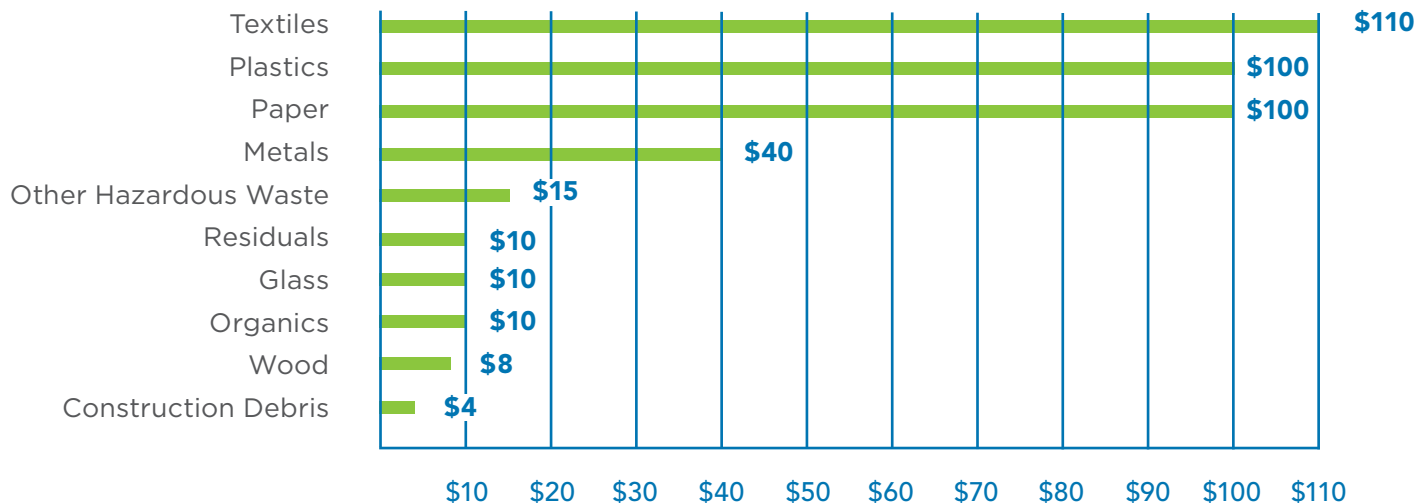


Wasted Resources

Los Angeles sends more than three million tons of waste to landfills, equivalent to the weight of at least two million cars. Most of the material going to landfill can be recycled as resources and converted into new economic opportunities.

Figure 4

Estimated Revenue for Each Ton of Recyclable Material Sold to a Market



Source: Institute of Local Self-Reliance (2007)

reduce costs for manufacturers because recyclables are more affordable than resources that have to be mined, extracted, and processed.⁵

The City of Los Angeles is a collector, processor, and supplier of these recyclables. Each year, nearly six million tons of recyclables are collected from households, businesses, and institutions,⁶ leading to the City’s 76 percent diversion rate.⁷



However, in 2011, Los Angeles still sent 3.5 million tons of waste to landfills and incinerators.⁸ At least 70 percent of landfill-bound waste comes from businesses and apartment complexes.⁹ Some of this waste currently being sent to landfills can be recycled given the region’s existing technologies and facilities.

Sending waste to landfills will become more expensive compared to recycling, according to industry trends. The country’s largest active landfill, Puente Hills Landfill located in Los Angeles County closed on October 31, 2013. Local communities now have to seek alternatives, often sending waste to remote areas for disposal.¹⁰ As local landfill space declines, the cost of landfilling trash is increasing each year (Figure 5).¹¹ Even after landfills close, costs and environmental impacts can last for decades. Long-term maintenance on closed landfills includes treatment of runoff, collection of landfill gas and monitoring groundwater.¹²

When buried, landfilled resources can impact the atmosphere. For instance, when organic materials like food scraps and yard trimmings are landfilled, the mix of decomposing material and an oxygen-deprived environment releases methane. Methane

traps heat in the atmosphere at 21 times the rate of carbon dioxide.¹³ For this reason, **landfills are responsible for more than 25 percent of methane, a key greenhouse gas, according to the US EPA.**¹⁴ Recovering organic materials can reduce the amount of greenhouse gases circulating in the atmosphere.

Landfilling also causes indirect environmental harm because of the need to extract, process, and transport raw and scarce materials to substitute for what was thrown away.¹⁵ For instance, recycling a ton of paper saves 3.3 cubic yards of landfill space,¹⁶ and saves the equivalent of 17 trees and 7,000 gallons of water from the paper manufacturing process.¹⁷

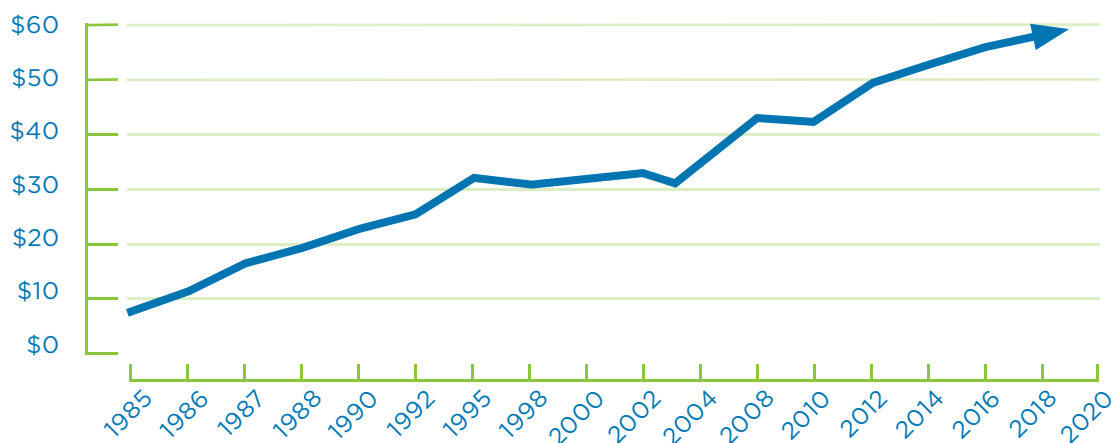
Foundation for a Clean Recycling Economy

Los Angeles is on a path towards a clean recycling economy. In 2013, the City of Los Angeles began developing an exclusive franchise plan for waste and recycling collection, a policy directly supporting recycling and waste collection for apartments and businesses, and waste reduction through Zero Waste goals (the exclusive franchise plan will be referred to as a **Zero Waste franchise plan**).

In 2008, the City of Los Angeles set aggressive goals to divert at least 90 percent of waste from landfills by 2030.¹⁸ The City is implementing a Zero Waste franchise plan for businesses and apartments.¹⁹ In meeting the City's Zero Waste goals, Los Angeles can collect and recycle millions of tons of materials by partnering with local and regional recycling facilities and manufacturers.²⁰

Figure 5

Average Landfill Fees (Dollars Per Ton) in the United States, with Future Projections



Sources:

- (1) Repa, Edward. 2005. "NSWMA's 2005 Tip Fee Survey."
- (2) BioCycle. 2010. "State of Garbage."
- (3) Waste and Recycling News. 2013. "Tipping fees up 1% over 2012."
- (4) Waste and Recycling News. 2012. "Tipping fees vary across the U.S."

The Zero Waste franchise plan will offer businesses and apartment residents with recycling and composting options, trucks with alternative fuels, smart routing for collection, and facility certification to ensure all recycling facilities are performing to high standards. This is all achievable under an exclusive franchise option.²¹ In the next three years, the City of Los Angeles will need to fully establish and implement the recycling and job standards necessary to move towards zero waste.

The City of Los Angeles can be a national leader in recycling and job creation by developing the infrastructure to recycle an estimated three million tons. The next section will elaborate on how to transform the recycling industry into a clean recycling economy to guarantee clean and safe jobs and economic development opportunities.



Zero Waste

A goal to reuse and recycle all resources for others to use, to reduce and eliminate the amount of waste we burn at an incinerator or bury in a landfill, to manage the design of products to reduce waste, and to guide people in sustainably and responsibly conserving natural resources.

2. Redesigning a Recycling Economy

Recycling is not only an environmental imperative, it is a valuable economic opportunity. Across the country, we could generate hundreds of thousands of career-driven jobs by shifting to a clean recycling economy. To accomplish this, cities can create innovative opportunities for new businesses to handle recyclable materials while encouraging job growth.

With improved recycling, Los Angeles can capture and manufacture materials worth millions of dollars in value.²² Selling and making new goods with recyclables can encourage entrepreneurialism, innovative technologies and economic development.



According to LAANE's estimates, the potential value of landfilled materials from Los Angeles is \$158 million (Table 1).²³ The estimated value could reach up to \$650 million if those recyclables are preserved in good condition and converted by local manufacturers.²⁴ Businesses can use this material for generating new economic opportunities and grow as a result of having a local supply of raw materials.²⁵ Recovering recyclables from our city's waste streams can also provide an economic stimulus as businesses expand and convert recyclables into commerce and jobs.

To maximize the economic growth, cities need Zero Waste plans, but they need also need a comprehensive resource management strategy. The critical steps involve ensuring cleaner streams of materials and addressing the quality and safety of those jobs. As cities and companies upgrade and modernize their recycling facilities, skilled and trained workers will be needed to operate the updated machinery and equipment, and new jobs will be created through the growth of manufacturing companies.

New Resources for Job Creation

With the foundation of a Zero Waste franchise plan, the national recycling economy could be expanded dramatically as cities encourage maximum

Recycling jobs include:

- Agronomists to monitor, test, and engineer the use of compost materials for landscape and agricultural application,
- Brokers to negotiate and sell baled recyclables to purchasers,
- General laborers to remanufacture or deconstruct electronics parts, and to appraise precious metals,
- Industrial and mechanical engineers to design and operate manufacturing tools and equipment,
- Machine operators to monitor and operate complex machinery at a glass processing facility,
- Mechanics to maintain, monitor, and repair machinery and recovery equipment,
- Purchasers and distributors of reusable furniture, clothes, and other household products,
- Sorters and balers to process and sort recyclables into distinct streams,
- Truck drivers to collect recyclables and waste from homes and businesses.

Clean Recycling Economy:

A strategy to transform wasted materials into a resource and promote a safe and healthy environment; to position cities as global entrepreneurs in facilitating local innovation in recycling; and, to redesign recycling jobs into family-sustaining careers.

opportunities with recyclable materials. **LAANE estimates that recycling 90 percent of landfill-bound recyclables in Los Angeles can create more than 20,000 jobs (Figure 6).**²⁶ New jobs could be created at each step, including the collection of recyclable materials, the recycling and processing of these materials at recovery facilities, and the conversion of these materials into manufactured goods.²⁷

These new jobs can be provided for people with diverse backgrounds. The jobs can include blue-collar jobs with an emphasis on technical knowledge and skilled labor, as well as jobs for engineers,

Table 1

Estimated Value Generated with Recyclable Materials Currently Landfilled from Los Angeles

Material	% of Total Discarded	Annual Tons Landfilled (Millions)	Revenue Per Ton (\$/Ton)	Estimated Value (\$ Millions)
Paper	26%	0.9	\$100	\$90.1
Plastics	9%	0.33	\$100	\$33.2
Textiles	3%	0.11	\$110	\$12.3
Organics	35%	1.22	\$10	\$12.2
Metals	4%	0.14	\$40	\$5.8
Construction Debris	15%	0.53	\$4	\$2.1
Wood	4%	0.14	\$8	\$1.1
Glass	2%	0.08	\$10	\$0.8
Residuals	1%	0.04	\$10	\$0.4
Hazardous Waste	0%	0.01	\$15	\$0.2
TOTAL	100%	3.52	\$N/A	\$158.2

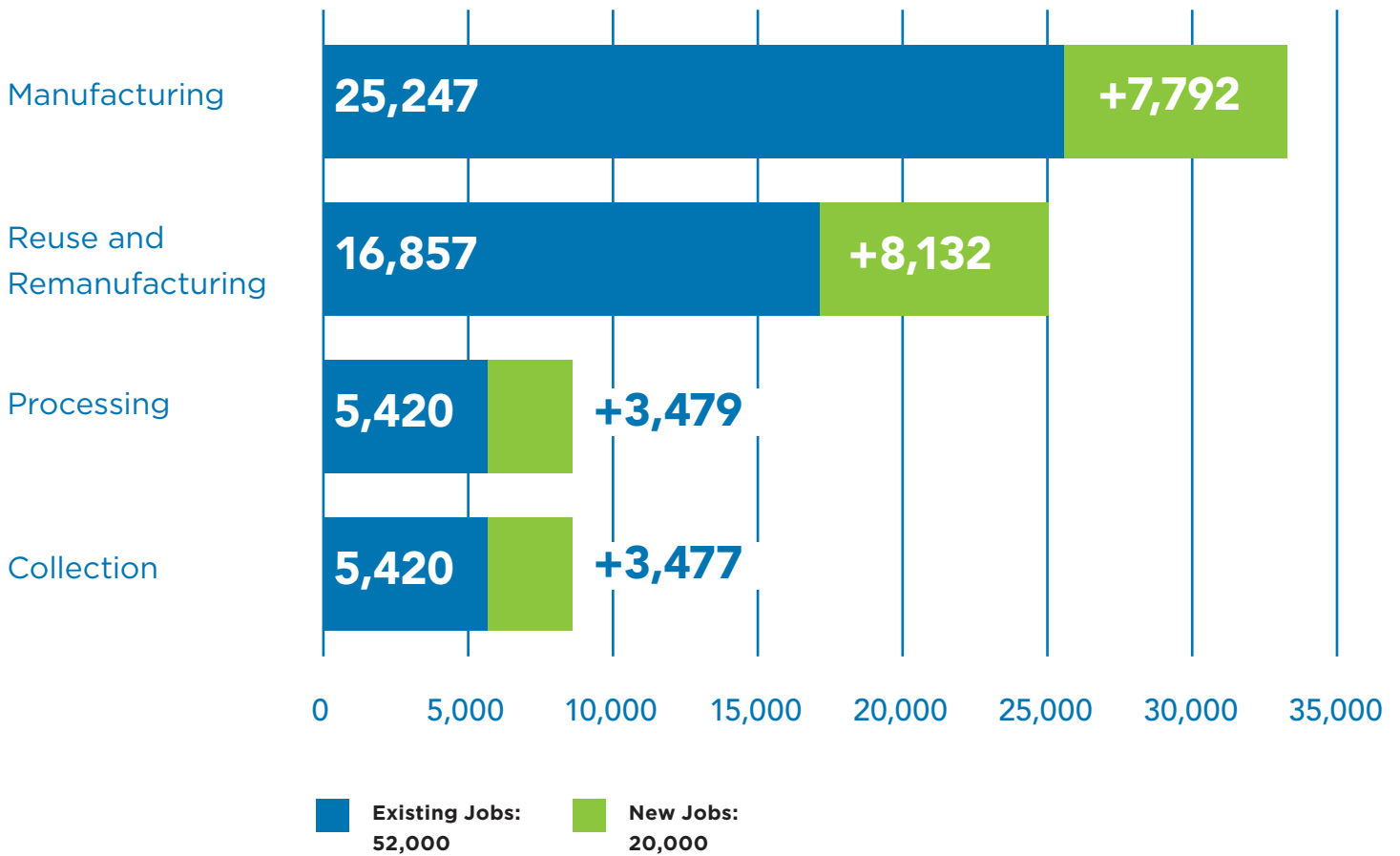
scientists, inventors and business managers.²⁸ As the recycling economy grows, people in these careers can expect lifetime work, training opportunities, and potentially a family-sustaining wage.

These jobs are bound to grow in number across the country as more cities and innovators unlock new and creative ways to recycle our resources. The next section elaborates on these economic opportunities.



Figure 6

Job Growth Opportunities with Recycling Discarded Materials from Los Angeles

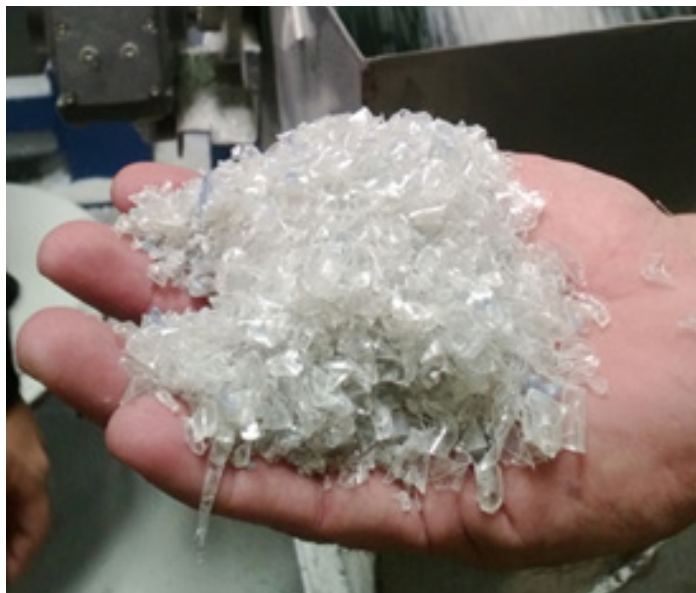


Creative Business Opportunities with Recycled Materials

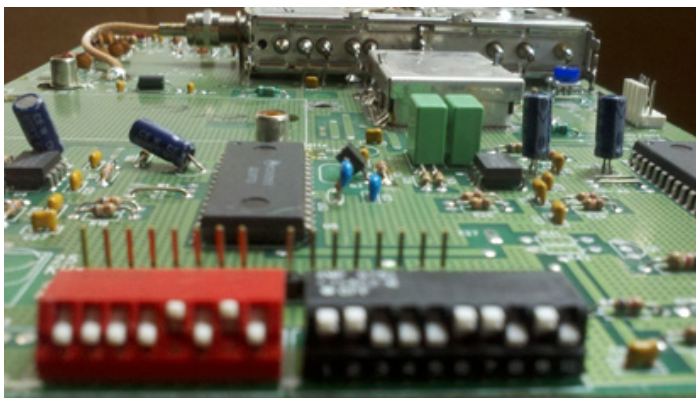
Recycling creates innovative opportunities for businesses to convert recycled materials into new ones.



Recycling **food scraps** can create rich soil for farmers,²⁹ and clean energy for the power grid,³⁰ while reducing greenhouse gas emissions from landfills and sustaining jobs.³¹



Plastics can be recycled over and over again as new materials.³³ Businesses have converted plastic bottles into household products such as new bottles, sustainable packaging, carpet, clothing, and insulation.



Raw metals are scarce.³² Precious metals recovered from **used electronics** can be sold on the commodity markets as materials for new products.



Aluminum is one of the most valuable recyclables. Aluminum can be recycled into new beverage and food containers among other goods.³⁴



Recycled **carpet** can be converted into new carpet, automotive parts, filters, concrete, and decking.³⁵



Plastics like high-density polyethylene (HDPE) can be converted into plastic lumber for park benches, fences, and furniture.³⁶



A major portion of the LA waste stream is paper. Recycled **newsprint and office paper** can be converted into new paper for government agencies and consumers.³⁷

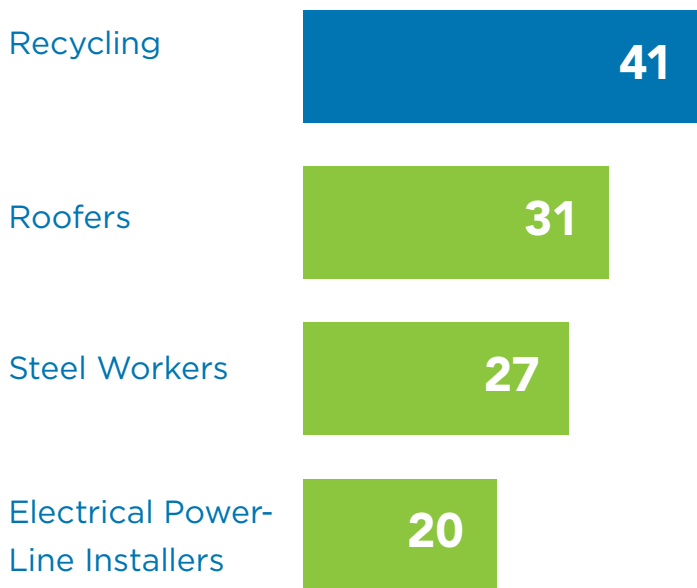
Redesigning Recycling Jobs

To make these jobs sustainable, cities must address the safety and quality of jobs in the recycling economy and transform dangerous jobs into family-sustaining careers. Healthier and better quality jobs can contribute greater economic opportunities in the form of more local spending, business expansion, and career-driven job growth.

In its annual study of occupational injuries, the U.S. Labor Department's Bureau of Labor Statistics (BLS) found the waste and recycling industry to have one of the highest rates of injuries and fatalities (Figure 7).³⁸ In 2012, the BLS found sorting and processing recyclables to be the fourth most dangerous occupation in the U.S. Injuries can include accidental amputations, fractured bones, and even fatalities from suffocation.³⁹

Figure 7

Fatalities Per 100,000 Employees



Source: Bureau of Labor Statistics. (2012). National Census of Fatal Occupational Injuries in 2011 (Preliminary Results)

"We picked up recyclables by hand from a pile of wood, rotten food, and dirty trash on the ground. Conditions were so bad, seven of my coworkers had back strains and no health compensation to cover their injuries. They kept on working despite the pain. We were expected to work even through the rain. I was embarrassed we had to sort through the pile of waste without a raincoat or umbrella."

– Former Sorter at a Los Angeles Recycling Co.

People working in recycling jobs encounter dangerous conditions when handling raw waste. Recycling jobs require lifting and sorting of bulky materials like scrap metals, carpets, and lumber, which can lead to repetitive motion injuries.⁴⁰ Recycling facilities also expose workers to toxic chemicals, fumes, dust, fungi, and dioxins.⁴¹ Overexposure to waste can result in lung and gastrointestinal illness, throat soreness, stomach problems, and diarrhea.⁴² Exposure to raw waste is worsened when workers at the sorting line are not equipped with protection like gloves, masks, safety vests, or goggles.⁴³

As cities exceed Zero Waste, better working conditions at recycling facilities can encourage more sustainable job creation and business expansion. Healthier and well-trained workers often stay longer with a company than temporary workers with minimal training.⁴⁴ This can reduce costs of transition and training for new employees and provide businesses with labor stability especially as recycling efforts scale up.⁴⁵ For instance, a San

Francisco recycling company hires their sorters from three high-poverty areas and trains them in basic safety and health standards.⁴⁶ After a probationary period, workers make a family-supporting wage and health benefits.⁴⁷ Several workers have been with the company for more than ten years, including multiple generations in some families.⁴⁸

A healthier and career-driven workforce can also be good for the economy. Recycling is one of the fastest growing green jobs sectors and can be a critical source for job growth in a stagnant economy.⁴⁹ Recycling occupations vary in skill and training requirements and can offer workers with opportunities for middle-class careers and a livable wage.⁵⁰ As more workers spend on basic necessities, money gets infused and circulated in

the local economy which generates more spending by local businesses to meet demand.⁵¹ The benefits go further: as more workers develop experience and skills at their workplace, the more likely they are to become more economically self-sufficient and spend more in the local economy.⁵²

The expansion of the recycling economy must require a redesign of dangerous recycling jobs into a sustainable source of job growth. Los Angeles is leading by example through their Zero Waste franchise plan by implementing and enforcing standards that require facilities to be safer workplaces and workers receive quality training and a living wage. A nation-wide effort to redesign recycling jobs can provide even greater job growth and a needed stimulus to the economy.



3. Careers in the Recycling Economy

Figure 8

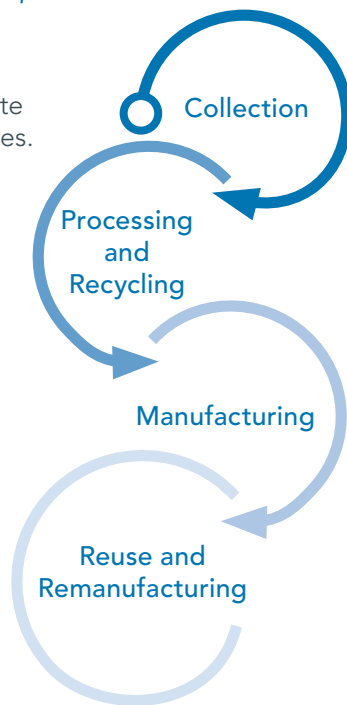
Conceptual Map of the Recycling Pipeline

1. Collection:

Collecting recyclables and organic waste from homes, apartments, and businesses.

3. Manufacturing:

Converting raw materials, including recyclables, into new and finished goods. Includes manufacturers working with recyclable materials like metals, paper, plastic, glass, rubber tires, and asphalt.



2. Processing

Sorting and preparing recyclables as a raw material for manufacturers and markets.

4. Reuse and Remanufacturing:

Reusing and repairing goods for resale. Includes industries that directly reuse electronics, vehicle parts, merchandise, clothes, and tires.

The benefits of recycling go beyond environmental merits. Recycling can encourage job and economic opportunities compared to throwing materials in a landfill. This section describes the existing jobs in Los Angeles as an example, and the potential jobs to be created in cities as they develop their recycling economy.

Generally, recycling works like a pipeline. When recyclables are kept clean and reusable, manufacturers can use these to produce new

and innovative items.⁵³ Contaminated and soiled materials clog the pipeline. Skilled and trained workers are needed to ensure materials are clean and to manage the flow of recyclables from one business to another.⁵⁴

Recycling jobs involve the collection, processing, and conversion of recyclables into new materials. Recyclables include organic matter like food and yard trimmings, aluminum cans, glass, mixed paper, many plastic resins, tires, carpet, and electronic

Recycling works like a pipeline:

Manufacturers rely on recyclables from cities as a source for raw materials - like paper, plastic, metals, and glass. To supply these materials to diverse markets, cities must have the infrastructure to collect, process, and preserve the quality and integrity of these materials. This creates jobs and economic opportunity for businesses throughout the recycling pipeline.

waste. Sorted and cleaned materials are sold as raw material to businesses and manufacturers. Workers at recycling manufacturers and remanufacturers convert recyclables into goods, many of which can be circulated in the global market.

A study commissioned by the National Recycling Coalition in conjunction with the U.S. Environmental Protection Agency (EPA), concluded that the U.S. recycling industry was a significant contributor to the country's economic growth. The study found the U.S. recycling economy generates \$37 billion in annual wages, \$236 billion in annual revenue, employs over a million people, and accounts for two percent of the U.S. gross domestic product.⁵⁵ Even with average diversion rates in most areas of California, the state's recycling-related industries encompass 84,000 jobs with 5,300 businesses and \$14.2 billion in annual revenues.⁵⁶

According to LAANE's estimates, the recycling economy in Los Angeles County employs close to 53,000 full-time workers within 3,300 public and private operations, infusing nearly \$2.5 billion in annual wages in the regional economy.⁵⁷ The recycling economy can be job-rich compared to

Los Angeles has a burgeoning recycling pipeline with opportunities for expansion:

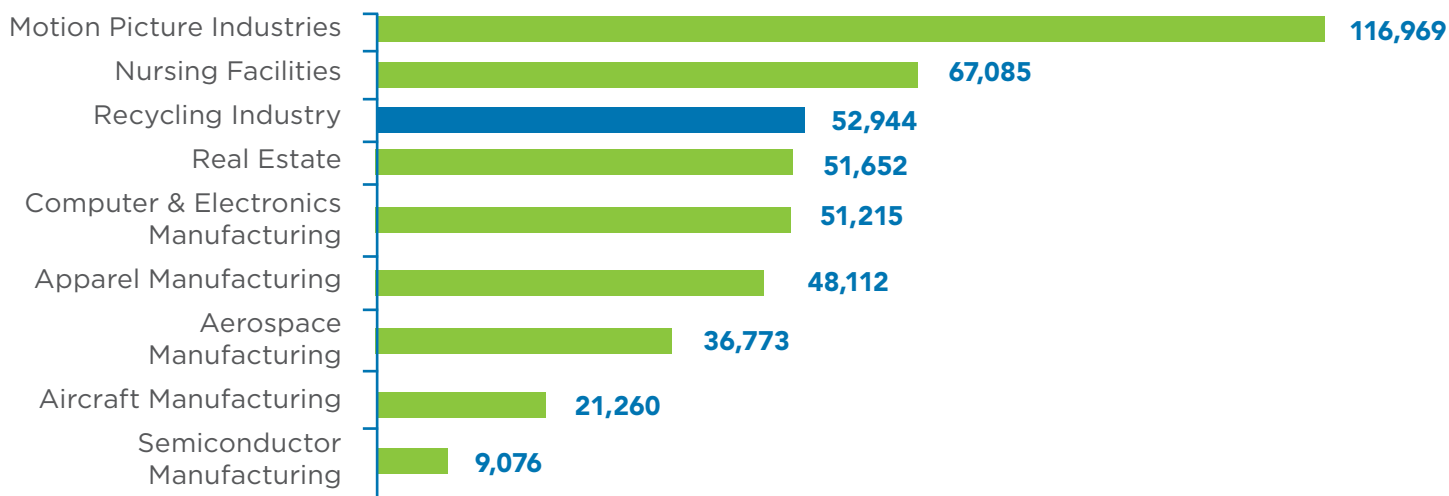
In Los Angeles County, the recycling industry encompasses 3,300 businesses, employs 53,000 workers, and generates \$2.5 billion in wages that have potential to circulate in the regional economy.⁶⁰

various manufacturing sectors like computer and electronics, apparel, food, aerospace, and aircraft (Figure 9).⁵⁸

That could be just the beginning. Achieving a clean recycling economy in Los Angeles can mean \$1 billion in new annual wages and thousands of jobs.⁵⁹

Figure 9

Recycling-Related Industry Employment in Los Angeles County, Compared to Other Industries



Source: California Employment Development Department; U.S. Census County Business Patterns

Recycling Jobs Summary

	Summary	Types of jobs	What is needed to grow jobs ⁶¹
A. Collection	Collecting recyclables and organic waste from homes, apartments, and businesses.	Truck drivers, helpers, route supervisors.	Training programs for entry-level workers.
B. Processing	Sorting and preparing recyclables as a raw material for manufacturers and markets.	Recyclable sorters, balers, forklift drivers, machine operators, mechanics, agronomists, general laborers.	Training programs for entry-level workers. More volume of materials. Unique bins (i.e. green, blue, and black) increases recycling of materials from the waste stream.
C. Manufacturing	Converting raw materials, including recyclables, into new and finished goods.	Machine operators, engineers, computer operators, general laborers, mechanics, chemists, quality control technicians.	Training programs for entry-level workers. Clean and consistent supply of raw materials, including recyclables.
D. Reuse and Remanufacturing	Reusing and repairing goods for resale. Includes industries directly reusing and repairing electronics, vehicle parts, merchandise, clothes, and tires.	Electronics demanufacturers, purchasers and distributors of reusable goods, general laborers, mechanics.	Training programs for entry-level workers. Consistent supply of reusable and repairable goods.



A. Collection

Existing Jobs: 5,420

New Jobs: + 3,477

Estimated new annual wages: \$184 million⁶²

Occupations: Truck drivers, helpers, route supervisors

Companies, along with the City, collect and process nearly six million tons of recyclables from households, businesses, and institutions each year.⁶³ The majority is collected through the City's recycling programs. In addition to the residential recycling system, programs include pilot food waste collection, recycling at schools, and a landmark construction and demolition debris ordinance. In residential areas of Los Angeles, the Bureau of Sanitation, through its "blue bin" system accepts and collects various types of recyclables ranging from plastic bottles, food cans, egg cartons, mixed paper, cardboard, and glass bottles.⁶⁴

According to City records, single-family home curbside recycling has resulted in the collection and diversion of nearly 227,000 tons of materials from landfills every year, resulting in \$4.7 million in

shared revenue for recycling facilities and the City.⁶⁵ When recyclables are separated into designated bins, the City can better track and route those materials to local recycling facilities. Educating the public on recycling can ensure materials are properly sorted at recycling facilities and not mistakenly sent to the landfill.

In Los Angeles County, collection accounts for 5,420 employees, or 10 percent of the regional recycling economy.⁶⁶ In addition, curbside collection encompasses 144 businesses and 12 percent of the total annual payroll in the Los Angeles County recycling economy at \$288 million.⁶⁷ As new materials are collected from Zero Waste programs, there is an opportunity for cities to expand these businesses and encourage job growth through recycling.

Across the U.S., the Tellus Institute estimated the collection of recyclables can create twelve jobs per 10,000 tons collected, compared to five jobs if the same amount of materials were landfilled or incinerated.⁶⁸ These jobs can continue to grow as cities expand the collection of recyclables through Zero Waste goals.



Collecting recyclables creates double the number of jobs than sending the same material to landfills.

Collection jobs are generally good and clean jobs. After decades of investments in collection technology, companies and cities have helped to standardize and automate the collection of recyclables. Yet, these jobs can still be dangerous for workers, as some companies continue to rely on manual labor involving heavy lifting and driving in uncertain road conditions.⁶⁹ Across the country, many recycling and waste companies, guided by city policies, have standardized safety training for new truck drivers. In these collection occupations, workers are provided with opportunities for professional development and a long-lasting career.

B. Processing

Existing Jobs: 5,420

New Jobs: + 3,479

Estimated new annual wages: \$161 million⁷⁰

Occupations: Recyclable sorters, balers, forklift drivers, machine operators, mechanics, agronomists, general laborers

Drivers deliver truckloads of recyclables to a recycling facility where, through a mix of machinery and hand-sorting, workers separate and categorize by type. Material recovery facilities (MRFs) are large-scale recycling facilities that can process and package recyclables for markets.⁷¹

MRFs vary in size, scale, and equipment. With specialized equipment and efficient hand-sorting by workers, some advanced clean MRFs have the potential to recover more than half and sometimes nearly all the materials they receive.⁷² Tasks include lifting and separating recyclables, operating equipment to bale recyclables, and driving forklifts to transport bales to a truck.

When materials are separated at a modern and mechanized recycling facility, a conveyor belt takes those materials through a series of screens, separators, and vibrating machines to sift out recyclable materials by type. Leftover materials are sorted and separated by hand into non-recyclables and recyclable materials. Recyclable materials may be sorted through an optimal sorting machine, operated by a machine programmer skilled in computer programming.⁷³ These machines use infrared technology to identify and sort specific types of plastics. Once recyclables are baled and packaged, truck drivers deliver the recyclables to ports and harbors for overseas purchasers, or to local, regional, and state manufacturers.

Generally, recycling work is labor-intensive and can also provide opportunities for career development.⁷⁴

Processing recyclable materials can create approximately 20 jobs for each 10,000 tons of material recycled.⁷⁵



Many jobs at recycling facilities are labor-intensive and dangerous. Training, experience, and collaboration are needed for a recycling facility to function.

C. Manufacturing

Existing Jobs: 25,247

New Jobs: +7,792

Estimated new annual wages: \$312 million⁷⁶

Occupations: Machine operators, engineers, computer operators, general laborers, mechanics, chemists, quality control technicians

Manufacturing jobs account for more than half of the employees, businesses, and payroll in the Los Angeles County recycling economy.⁷⁷ These jobs can secure entry-level training and a middle-income livelihood for thousands of new workers.

Manufacturing jobs can be a sustainable source for job growth across the country. As more recycling-related companies transition to computer-driven production, well-trained and skilled workers will be needed to program and operate machinery.⁷⁸ Some of the skills required for this field include computer numerical control programs (CNC), machine operation, and thermoforming equipment. Training for manufacturing jobs can be applicable to other manufacturers who need workers with technical expertise, promoting a culture of trainable skills with various credentials.⁷⁹

Across the U.S., the recycling-reliant manufacturing sectors can supply entry-level jobs with decent pay. In Los Angeles, recycling jobs can require less than three months of occupational training and an average \$19.41 per hour, a starting point for a middle-class income.⁸⁰ These occupations can offer longer tenure jobs and technical skills training, turning entry-level jobs into long-term careers.⁸¹

“Technology is moving to advanced machinery. We have difficulties finding qualified workers that understand recycled materials. It hurts our business.”

– Plant Manager of a Recycled Plastics Manufacturer



Manufacturing jobs can be a sustainable source of job growth. Manufacturers need workers with the skills and expertise to manage complex machinery.

Expanding the recycling economy in Los Angeles can create a scenario where these trainable, middle-income, and manufacturing jobs can be replicated across the U.S.

D. Reuse and Remanufacturing

Existing Jobs: 16,857

New Jobs: +8,132

Estimated new annual wages: \$422 million⁸²

Occupations: Electronics demanufacturers, purchasers and distributors of reusable goods, general laborers, mechanics

Reuse and remanufacturing are especially labor-intensive, providing opportunities for skills training and job growth.⁸³ Much of the work in reuse and remanufacturing includes trainable and hands-on labor like disassembly, deconstruction of electronic goods, repair and refurbishment, reassembly, and testing and inspection.⁸⁴

For instance, electronic waste (“e-waste”) is a significant portion of the U.S. waste stream. In California, nearly 200,000 tons of e-waste was sent to landfills.⁸⁵ In general, less than 25 percent of e-waste is recycled. The Institute for Local Self-Reliance estimates nearly 296 jobs are created for each 10,000 tons of electronic waste recycled.⁸⁶ Rather than sending electronic waste to landfills, more could be deconstructed in the U.S., resulting in significant job creation.



Reusing materials can create jobs, reduce landfilled materials, and promote social enterprise.

Electronics Recycling as Social Enterprise

Isidore Electronics Recycling is an electronic waste recycler in Los Angeles. The company collects and salvages electronic waste (e-waste) for component parts, such as circuit boards, processors, plastics and glass. The materials are then sold on the commodities market. E-waste is typically found in most households and businesses – it can include cell phones, televisions, computers, even cash registers.

There is an economic opportunity in recycling e-waste as resources. For example, more gold is found in one ton of electronic waste than in 17 tons of raw golden ore.⁸⁸



Since 2011, the company has collected over 230,000 pounds of e-waste. In addition to reusing the materials as commodities, the company has helped to bring previously incarcerated people into career-path jobs.

Founder and CEO of Isidore Recycling, Kabira Stokes, with the help of agencies like Friends Outside, identifies people recently released from prison and trains them in “de-manufacturing” (taking apart) e-waste, data security, warehouse safety, and electronic commerce. A job with Isidore Recycling also prepares workers with life skills like leadership development, work ethic, and teamwork.

4. Blueprint for a Clean Recycling Economy

Meeting Zero Waste goals and achieving maximum economic development from the recycling economy will require investments between government, companies, and communities. By coordinating a plan to capture today's economic opportunities in recycling, cities can encourage job creation, innovative recycling enterprises, and a modern economic development strategy.

In surveys and field visits to recycling companies in the Los Angeles region, LAANE identified four areas in which to encourage the growth of a clean recycling economy in Los Angeles and across other cities, forming a Clean Jobs Plan.

1. Maximize Recycling and Achieve Zero Waste	Through a Zero Waste franchise plan, cities can push for better and more recycling to capture materials needed by manufacturers and other businesses.
2. Unleash Investments in Recycling Markets	Cities can support emerging markets in recyclable materials by "closing the loop" with public purchasing contracts and investing in local entrepreneurial companies.
3. Modernize Recycling Infrastructure	Next, through a taskforce of industry and policy leaders, cities can design and modernize new and innovative recycling facilities.
4. Prepare and Train Workers for Good Jobs	Last, with the leadership of workforce agencies, cities can evaluate opportunities to prepare and equip workers to manage the basic functions of a recycling economy.

Blueprint Summary

1. Maximize Recycling and Achieve Zero Waste

Background

Creating economic opportunities with recycling often depends on how recyclables are treated and if they are preserved in good condition.⁸⁷ LAANE's survey and interviews with recycling businesses emphasized the importance of a clean and consistent source of recyclable materials. Approximately **88 percent of surveyed manufacturers experienced some challenge in securing and purchasing high-grade recyclables as raw materials.**⁸⁹ The survey found that with cleaner materials, businesses would be better positioned for growth and job creation.

Better quality materials improve the quality of products and reduce the maintenance costs due to equipment failures, restarts, or downtime due to problematic debris.⁹⁰ In one study, the Container Recycling Institute (CRI) estimated glass manufacturing facilities had to dispose most low-grade glass because of undesirable debris received from recycling facilities.⁹¹ In some cases, paper mills also disposed of at least half of the materials they received from recycling facilities due to overly moist and irrecoverable fibers.⁹² Without optimal recycling technologies, recyclables are likely to end in landfills or incinerators because of inadequate markets for poor quality recyclables.⁹³

Cities can ensure all customers have designated bins for recycling, organics and regular waste. With separated bins, contaminants can be screened out from the beginning, expanding the ability to fully recycle materials.

To even approach Zero Waste goals, cities must recover organics, one of the largest portions of the waste stream.⁹⁴ These can be turned into products like clean energy or rich soil. Finally, to maximize recycling and encourage sustainable jobs, cities must implement recycling facility agreements to track recycling efforts and to supply workers with basic training and safety.

Recommendations

- **Require Designated Bins for Recyclables, Organics, and Mixed Waste**

Separating recyclables from waste can drastically increase recycling for cities. A cleaner stream of recyclables can improve the volume and value of recycled materials, improving business prospects for companies involved.⁹⁵ Guaranteeing designated bins for recycling and organic waste at all homes and businesses can increase recovery of recyclables and help to create demand and certainty for recycling businesses.



Cities that process recyclables separated from waste and green waste can achieve an increase in recycling and can create economic opportunities out of throw-away materials.

- **Restrict Disposal of Organic Materials in Landfills**

Cities should ensure organics are processed in the best way possible. Organic materials naturally create carbon dioxide as they decompose. Landfilling these materials traps the carbon dioxide without any oxygen and creates methane, a greenhouse gas 21 times more potent than carbon dioxide. Restricting the disposal of organic materials in landfills can redirect this material for beneficial reuse in compost, landscape applications, and clean energy.

- **Implement Recycling Facility Certification**

The certification of recycling facilities can ensure higher standards for recycling and encourage a safer workplace.⁹⁶ Cities can enforce compliance with current municipal laws and regulations and set goals for diversion and worker health and safety standards.

Workers play a key role in maximizing recycling at facilities. Quality training, adequate staffing, controlled line speed, experienced workers, and staff collaboration can contribute to more effective recycling.

Public Support for Private Infrastructure Case Study 1: Peninsula Packaging

Located in Turlock, Peninsula Packaging processes PET and services plastic processors throughout the western U.S.

The company purchases billions of California's plastic bottles, and produces see-through containers from plastic flake. These containers can be used for packaging fruits, vegetables, and other foods in supermarkets. The plant is designed to process 80 million pounds of plastic bottles a year. The California Department of Conservation supported Peninsula with a grant of \$4.9 million. The company employs 60 people.

2. Unleash Investments in Recycling Markets

Background

Cities, as some of the largest suppliers of recyclable materials to the global market, have a critical opportunity to invest in recycling markets. Two important trends are happening: more manufacturers are finding cost-savings in the use of recyclable materials (especially as the cost of raw materials increases)⁹⁷ and more consumers today than ever before are making purchasing decisions based on environmental values.⁹⁸ With price incentives and public purchasing of recycled-content goods, cities can significantly increase demand for recycled-content products and generate the supply of recyclables to manufacturers.

Recyclable materials have the potential to create many more jobs when used in local manufacturing than when sent to landfill.⁹⁹ For instance, the Plastic Market Development (PMD) program was designed to spur investments in recycled plastics, particularly the manufacturing of recycled plastics

Public Support for Private Infrastructure Case Study 2: Recology

San Francisco, national leader in recycling, has benefited from California's robust tax incentive structure. Recology, the sole waste and recycling partner of San Francisco, is better equipped to reach their diversion goals and to creating good jobs in innovative sectors, like composting, because of strategic public investment by the state. To date, the CPCFA bond program allocated up to \$150 million for Recology to upgrade its recycling facilities.¹¹²

With upgrades to their collection and processing equipment, Recology has supported around 250 jobs for residents of San Francisco.¹¹³

Recycled-content products include products made of post-consumer materials (i.e. what homes and businesses throw away). For example: carpet made from recycled carpet, office supplies made of recycled plastics, office paper made from post-consumer paper, and soil amendments made from composted organic materials.

In a **closed loop model**, recyclables are remanufactured into new goods by local manufacturers, for purchase by local consumers and other businesses as well as by public agencies through procurement contracts. Developing a closed loop model can result in more recyclable materials circulating in the regional and state economy, less landfilling of materials, and more economic development opportunities.

into finished goods. As a result, the PMD program diverted 40,000 tons of plastics from the landfill, and directly supported 20 plastics processors and manufacturers and 750 jobs.¹⁰⁰ The progress of the Plastic Market Development program underscores the potential and need for price incentives with new recyclable materials.

Public purchasing can support the growth of the recycling economy. Government agencies and departments are some of the largest purchasers of recycled-content goods.¹⁰¹ Purchasing goods made from recycled-content or post-consumer waste can reduce the mining and extraction of natural resources, support local and regional businesses



“When we ship used soda and water bottles to China, we are exporting thousands of jobs overseas that could just as readily exist in California if the appropriate investments were set up to support it.”

– Assemblyman Rich Gordon,
(Menlo Park, California)

and manufacturers, and encourage the demand for more affordable recycled products.¹⁰²

In order for cities to generate the economic opportunities through recycling, recyclable materials should be circulated and converted to new products in the regional economy. It is important that cities, through incentives and public purchasing, strengthen the supply of recyclables and support the expansion of businesses throughout the recycling economy

Recommendations

- **Expand Public Purchasing of Recycled-Content Goods**

Cities can use purchasing power to scale up the recycling economy by encouraging demand for recycled-content goods.¹⁰³ Contracts and consumer purchases for recycled-content goods can “close the loop” on recyclables and encourage manufacturers to scale up production to meet demand for recycled-content goods.

- **Support Price Incentives as Financial Tools**

Price incentives issued on a short-term basis can encourage the growth and expansion of manufacturing businesses reliant on recyclable

materials.¹⁰⁴ Cities can utilize incentives as a financial tool to unleash strategic investments in the recycling economy.

For instance, California subsidizes the collection and use of recyclable plastics collected from within the state. The goal of the incentive is to supply local manufacturers with recyclable materials that would have otherwise traveled overseas. These incentives are intended to be catalytic in nature and supportive of the expansion of manufacturers. To unleash investments for the local manufacturing of recyclable materials, local policymakers should evaluate the use of incentives for other major recyclable materials.

To continue investing in local and regional markets, cities should target price incentives towards recyclables with large markets (for example, paper, plastics, and aluminum) and with emerging markets like e-waste and carpet.

Public Purchasing

The City of Los Angeles purchased an estimated \$12.8 million in recycled-content products, according to City documents.¹⁰⁵ Specifically, Los Angeles requires all departments to purchase items with at least 20 percent of recycled-content materials. This requirement is applied to office products like paper, office products, glass, plastic products, compost, aggregate base, cement and concrete, and remanufactured toner cartridges. As a result, purchasing goods with recycled-content resulted in cost savings. For instance, a contract with an office supplies company for recycled paper and pens resulted in a \$100,000 savings.

3. Modernize Recycling Infrastructure

Background

Upgrading material recovery facilities and other recycling infrastructure can be rewarding investments. However, new facilities require expensive capital investments and businesses are not investing fast enough to meet projected Zero Waste goals.¹⁰⁶ Cities can help address this by partnering with businesses to evaluate financial and business needs and streamline the building process.

To concentrate the necessary investments in public and private recycling infrastructure, cities should consider joint investments in construction and equipment upgrades, streamlined permitting, and recruiting manufacturing companies of various scales and sizes. Through a Clean Recycling Taskforce, cities can partner with industry and policy leaders, entrepreneurs, and workforce agencies to secure land and financial assistance, while also identifying opportunities for regional economic development.

Recommendations

- **Establish a Clean Recycling Economy Taskforce**

Cities should develop a team dedicated to identifying the opportunities and needs in recycling-related industries. These could

“We need to improve recycling facilities in the U.S. We have lost a lot of production – and our markets are hurting right now because our production has shrunk so much over the years. There’s no production in the U.S. like it used to be.”

– *Owner of a Recycling Business in Los Angeles*

“The recycling industry needs technology investments and most of all: partnerships. The technology exists to effectively and more efficiently process plastics. But the technology is in China and Europe. Not many have implemented these technologies in the U.S. and in California. But the potential is there – and it is expensive. We need partnerships to reduce the anxiety of making big investments. We can benefit from government partnerships and private investments to support expansion and upgrades.”

– *Facility Operator for a Plastics Manufacturer in Southern California*

include industrial land for manufacturing uses and supplying investors and entrepreneurs with technical and business assistance. Part of this team’s tasks should include studying the opportunities for regional market development, streamlining development and permits, accessing and applying to state and federal funding for building and modernizing recycling infrastructure, and partnering with companies, industry associations, and investors to attract recycling businesses and manufacturers.

- **Develop a Clean Manufacturing Zone**

Cities and companies should identify and preserve industrial land for recycling-related manufacturing. Creating a Clean Manufacturing Zone can align planners, economic development officials, and recycling professionals in a common goal of

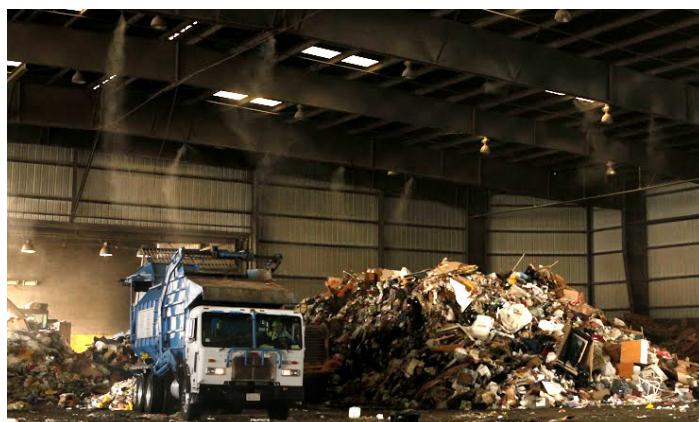
recruiting and expanding recycling businesses. A designated area for recyclers can help reduce costs of transportation of recyclable materials, concentrate financial assistance in one area with like-minded businesses, and provide companies with the security needed to pay back investments.¹⁰⁷ Cities should also explore how Clean Manufacturing Zones can outreach and hire people from local neighborhoods.

- **Coordinate with Recycling Market Development Zone (RMDZ) Administrators**

The Recycling Market Development Zone (RMDZ) can be a financing tool for manufacturers who convert recycled materials. The RMDZ program offers direct loans, technical assistance, and product marketing to recycling-reliant manufacturers seeking to expand or upgrade their equipment.¹⁰⁸

In California, loans are available at a maximum of 75 percent of the project's cost, or \$2 million. Manufacturers must be located within the zone and can apply for equipment purchases,¹⁰⁹ leasehold improvements, purchasing recycled materials, or property purchases. In general, according to the Governor's Office of Business and Economic Development, the purpose of the RMDZ loan is to "promote market development for post-consumer and secondary waste materials and divert waste from non-hazardous California landfills."¹¹⁰

The California RMDZ has supported thousands of businesses, and since 1989, the RMDZ has added an estimated 15,000 jobs, mostly in manufacturing



of recyclable materials, and diverted 10.5 million pounds of materials from the landfill.¹¹¹

To remain competitive, cities should access similar local and state assistance to help upgrade and modernize recycling infrastructure.

"Building an electronics recycling plant will cost up to \$5 million to handle tens of thousands of pounds of electronic waste per year. While we recycle that amount, we can also employ up to 175 people. Having a more consistent supply – and city agreements for tax release or capital financing for a recycling plant – can help to better justify our investments."

– *Executive of an Electronics Recycling Company in California*

Public Support for Private Infrastructure Case Study 3: CarbonLITE

With plastic supply from the Plastic Market Development program, CarbonLITE produces bottle-grade PET pellet and flake from post-consumer PET bottles.

The company had invested \$40 million in equipment and requested \$47 million from the California Pollution Control Financing Authority in 2011. CarbonLITE is expected to process more than two billion plastic bottles from California's Curbside and Redemption Value programs. The facility supports around 100 jobs, a number expected to increase with higher recycling rates.

4. Prepare and Train Workers for Good Jobs

Background

As cities begin drafting or continue plans for Zero Waste, it is important to address the future workforce of the recycling economy. In addition to developing a manufacturing infrastructure and a clean source of recyclable materials, cities can target training resources toward projected job availability and to meet the needs of job seekers and of businesses.¹¹⁴

A variety of jobs require a higher level of skills and training, as identified in LAANE's industry interviews. Cities should study the feasibility of building on these occupations, especially in regards to training jobs related to recycling and processing, like sorting, baling, and forklift operations. Broadly, some of these high-demand jobs include:

- **Recycling sorters**
- **Recycling balers**
- **Recycling forklift operators**
- **Mechanical and industrial engineers**
- **Quality assurance technicians**
- **Machine operators**
- **Electronics demanufacturers**
- **General laborers**

Demand and technology will shift over time, so there should be regular and ongoing coordination between the city, recycling-related businesses, and education and training institutions.

Recommendations

- **Coordinate a Clean Recycling Jobs Taskforce**

As cities expand their recycling efforts, policy and workforce leaders should study and establish specific goals for aligning recycling job training programs with emerging growth in recycling jobs. City leaders should coordinate with their workforce agencies, resource management agencies, research and academic institutions, community colleges and

occupational college networks. Together, they can identify workforce needs and demand for skills in demand in the recycling economy.

Manufacturers and recycling facilities need workers with the experience and training to work with recycled materials. Within recycling-reliant manufacturing, employers need well-trained machine operators, engineers, and general laborers who know how to work with complicated recycled materials.

The standardizing of workforce training and skills can meet the increasing demand for recycling in cities. To better align public interests with the private sector, cities should create a joint taskforce with existing companies and industry associations. Working with these companies and industry leaders can help to establish skills training goals.

- **Partner with Academic Institutions**

Cities should access and supply workforce agencies and academic institutions with state and federal assistance centered on recycling careers.

For instance, Santa Monica College in coordination with the California Works Alliance, received a \$4.87 million Community-Based Job Training Grant from the U.S. Department of Labor. In meeting the grant's goals, Santa Monica College launched its "Jobs Through Recycling" program aimed at training and placing more than 400 individuals in recycling careers.¹¹⁵

A Clean Recycling Jobs Taskforce can help access and compete for similar funding sources to support academic and occupational training institutions according to projected industry demand.

Conclusion

Los Angeles is leading the way toward a clean recycling economy. It is not only addressing an environmental crisis and the urgent challenge of the closure of landfills, it is encouraging job growth and economic opportunities.

In the next year, Los Angeles is positioned to drive the modernization of its own recycling infrastructure – and meet its Zero Waste goals – through the full implementation of the Zero Waste exclusive franchise plan. Through taskforces, specific workforce and industry needs can also be addressed.

Overall, LAANE estimates that building a clean recycling economy can spur and sustain over 20,000 region-wide jobs through the next two decades.

Similarly, cities across the nation should launch a comprehensive effort to redesign and modernize into a clean recycling economy that diverts resources from the landfill into our economy – and opens up pathways for our unemployed to move into good careers in a growing recycling economy.

Creating a clean recycling economy is no small task. It requires investments and partnerships between government, companies, and non-profit groups. The recycling industry is growing, and there is a clear mission for cities, workforce agencies, policy leaders, and industry groups to shape its expansion for the betterment of the environment and for good jobs.

Through policies and partnerships, cities can address the workforce and economic needs of the recycling economy and be better positioned to manage waste as resources and encourage good job growth and economic opportunities.

With partners and a blueprint for growth, cities can set a model for shared prosperity through recycling with LAANE’s Clean Jobs Plan.



Methodology

With the guidance of the Rockefeller Foundation, LAANE set out to understand and study new models for recycling as an instrument for economic development. In this study, LAANE analyzed the existing industry, projected emerging job growth, and contacted and communicated with industry representatives and executives and managers of recycling-based businesses. In brief, we calculated the value of landfilled recyclables, calculated the projected growth in recycling jobs and the current composition of the industry in Los Angeles County, and surveyed and identified challenges faced by the recycling industry in Southern California.

Methodology A: Value of Landfilled Recyclables

The estimated \$158 million value of landfilled recyclables uses the methodology developed by the Institute for Local Self Reliance (ILSR).¹¹⁶ The ILSR calculated the value of recycled materials based on correspondences with mills and brokers in the Mid-Atlantic Region and reviewed monthly revenues from the Delaware Solid Waste Authority (DSWA). Recyclables have a wide range of resale value, depending on the global market conditions, and more importantly, China's demand.¹¹⁷ Although these estimates are in another U.S. region, ILSR's estimates supply a valuable baseline for calculating the value of landfilled recyclables in Southern California.

A second value was calculated to estimate the range of the value of landfilled recyclables from the City of Los Angeles. In 2011, As You Sow calculated the commodity market value of discarded recyclables.¹¹⁸ Specifically, As You Sow calculated the commodity prices from the most current prices for U.S. industry averages. For the second alternate calculation of the estimated value of landfilled recyclables, the lead author integrated other market prices for paper, plastics, and conservative estimates for metals. As indicated by the green areas in Table 4, the estimated revenue per ton increased from: \$100/ton to \$235.3/ton for paper,

\$100/ton to \$1,050/ton for plastics, and \$40/ton to \$448.33/ton for metals.

Table 2

Estimated Value of Discarded or Landfilled Recyclables, Calculated by the Institute for Local Self-Reliance (2007)

Materials	Revenue \$/Ton
Textiles	\$110
Paper	\$100
Plastics	\$100
Metals	\$40
Other Hazardous Waste	\$15
Organics	\$10
Glass	\$10
Residuals	\$10
Wood	\$8
Construction Debris	\$4

Data Collection and Analysis

The lead author calculated the actual tonnage for materials delivered from City of Los Angeles, based on the City’s 2006 analysis of 3.5 million tons of landfilled material.¹¹⁹ Using the ILSR (2007) landfilled materials estimates, the lead author calculated the estimated market value for each material category by multiplying the annual tons of landfilled materials from City of Los Angeles and the estimated revenue per ton in dollars. The result was an estimated value per million dollars in lost opportunities each year. A second analysis

was done using the three commodity values for paper, plastics, and metals developed by As You Sow (2011) and explained in the previous section. As a result, the first estimate resulted in \$158 million dollars in market value, while the second estimate resulted in \$654 million in market value. Both are valuable calculations and, as a whole, show an estimated range of the landfilled commodities or discards resulting from the City of Los Angeles landfilled waste stream.

Table 3

Estimated Value of Recycling Discards Currently Landfilled in Los Angeles; Based on ILSR (2007)

Material	% of Total Discarded	Annual Tons Landfilled	Revenue Per Ton (\$/Ton)	Estimated Value (\$ Millions)
Paper	26%	900,633	100	\$90.1
Plastics	9%	332,360	100	\$33.2
Textiles	3%	112,185	110	\$12.3
Organics	35%	1,223,924	10	\$12.2
Metals	4%	144,374	40	\$5.8
Construction Debris	15%	528,439	4	\$2.1
Wood	4%	138,984	8	\$1.1
Glass	2%	84,192	10	\$0.8
Residuals	1%	44,376	10	\$0.4
Hazardous Waste	0%	11,182	15	\$0.2
TOTAL	100%	3,520,649	N/A	\$158.2

Table 4

*Estimated Value of Recycling Discards Currently Landfilled in Los Angeles;
Based on ILSR (2007) and As You Sow (2011)*

Material	% of Total Discarded	Annual Tons Landfilled	Revenue Per Ton (\$/Ton)	Estimated Value (\$ Millions)
Paper	26%	900,633	\$235.3	\$211.9
Plastics	9%	332,360	\$1050	\$349.0
Textiles	3%	112,185	\$110	\$12.3
Organics	35%	1,223,924	\$10	\$12.2
Metals	4%	144,374	\$448.33	\$64.7
Construction Debris	15%	528,439	\$4	\$2.1
Wood	4%	138,984	\$8	\$1.1
Glass	2%	84,192	\$10	\$0.8
Residuals	1%	44,376	\$10	\$0.4
Hazardous Waste	0%	11,182	\$15	\$0.2
TOTAL	100%	3,520,649	N/A	\$654.9



Methodology B: Recycling Jobs Industry Calculation for Los Angeles County

The composition of the recycling industry (and all related sectors) is based on the California Recycling Economic Information (REI) study sponsored by the National Recycling Coalition in 2001. This methodology was developed by the Northeast Recycling Coalition (NERC) for the US EPA. Several reports across the country use similar methodologies to measure the economic impacts of the recycling economy within a certain geographical scope in reports known as a “Recycling Economic Information Study.” These reports include those sponsored by the Northeast Recycling Coalition (2009),¹²⁰ the National Recycling Coalition (2001),¹²¹ Florida Department of Environmental Protection (2000),¹²² Illinois Recycling Association (2010),¹²³ and the Environmental Improvement and Energy Resources Authority (2005).¹²⁴ The recycling industry NAICS codes were derived from the previously mentioned studies and are listed in Table 6.

The NAICS codes are associated with the recycling collection, processing, manufacturing, and reuse and remanufacturing sectors. The “support businesses” category was not included in this analysis, partly because these sectors did not primarily include recycling-related businesses, and the totals would have skewed the jobs count.

Data Collection and Analysis

The lead author collected data from the U.S. Census County Business Patterns, 2010, for various recycling-related sectors, and analyzed the composition of the recycling industry in Los Angeles County based on the REI methodology. The total number of employees includes all full-time employees, total number of establishments includes all establishments for the given NAICS codes, and payroll, by the definition of the US Census, includes the gross earnings of all employees paid during the calendar year for the associated NAICS codes. Results are in Table 5.

Estimated annual wages was calculated by multiplying the average wages for each sector by the estimated number of new jobs. See Table 5.

Table 5
Estimated New Annual Wages with New Job Creation

	Existing jobs	New jobs	Average payroll	Estimated new annual payroll
Collection	5,420	3,477	\$53,087	\$184,581,870
Processing	5,420	3,479	\$46,525	\$161,862,080
Manufacturing	25,247	7,792	\$40,063	\$312,169,797
Reuse and remanufacturing	16,857	8,132	\$52,012	\$422,964,341
TOTAL				\$1,081,578,088

Table 6

Recycling sectors and NAICS Codes - Pt. 1

Industry sector	Sector	NAICS	NAICS - Detail
Recycling Collection			
	Government staffed residential curbside collection	562111	Solid waste collection (without disposal)
	Private staffed residential curbside collection	562111	Solid waste collection (without disposal)
Recycling Processing			
	Compost and miscellaneous organics producers	325314	Fertilizers (mixing only)
	MRFs	56292	MRFs
	Recyclable material wholesalers	42393	Recyclable material wholesalers
Recycling Manufacturing			
	Glass container manufacturing plants	327213	Glass containers
	Glass product producers (other recycled uses)	327212	Pressed and blown glass and glassware
	Nonferrous secondary smelting and refining mills		Miscellaneous secondary nonferrous smelting, refining, and alloying
		331314	
		331423	
		331492	

Table 6

Recycling sectors and NAICS Codes - Pt. 2

Industry sector	Sector	NAICS	NAICS - Detail
	Nonferrous product producers		Miscellaneous nonferrous products
		331421	
		331315	
		331316	
		331319	
	Nonferrous foundries	331521 - 331528	
	Paper, paperboard, and deinked market pulp mills		
		322121	Paper mills (except newsprint)
		322122	Newsprint mills
		322123	Paperboard mills
	Paper-based product manufacturers	322299	Other converted paper product manufacturing (egg cartons, molded pulp)
	Pavement mix producers (asphalt and aggregate)	324121	Asphalt paving mixtures and blocks
	Plastics reclaimers	325991	Custom compounding of purchased plastics resins
	Plastic converters	3261	Plastics product manufacturing
	Rubber product manufacturers	3262	Rubber product manufacturing
	Steel mills	331111	Iron and steel mills
	Iron and steel foundries	331511 - 331513	Iron and steel foundries
	Other recycling processors and manufacturers	Various	Various

Table 6

Recycling sectors and NAICS Codes - Pt. 3

Industry sector	Sector	NAICS	NAICS - Detail
Reuse and remanufacturing			
	Computer and electronic appliance demanufacturers		
		421690	Other electronic parts and equipment wholesale
		811212	Computer and office machine repair and maintenance
	Motor vehicle parts	42114	Motor vehicle parts (used) wholesale
	Retail used merchandise sales	45331	Used merchandise stores (excluding pawn shops)
	Tire retreaders	326212	Tire retreading
	Wood reuse		
		32192	Wood container and pallet manufacturing
		321999	Wood products
	Materials exchange services	54199	All other professional, scientific, and technical services
Support businesses			
	Recycling and reuse equipment manufacturers and vendors	333	Machinery manufacturing
	Consulting and engineering services		
		54133	Engineering services
		541611 - 541614	Management consulting services
	Transporters	481 - 484	Air, rail, water, and truck transportation
	Other support businesses	Various	Various

Table 7

Recycling industry composition in Los Angeles County - Pt. 1

	Employees	Establishments	Payroll (\$1,000)
Collection			
Curbside collection	5,420	144	\$287,729
Sub-total	5,420	144	\$287,729
Percent of Total	10%	4%	12%
Processing			
Compost and organics producers	441	15	\$25,140
MRFs	422	35	\$14,404
Recyclable material wholesalers	4,557	347	\$212,624
Sub-total	5,420	397	\$252,168
Percent of Total	10%	12%	10%
Manufacturing			
Glass manufacturers	2,700	76	\$119,986
Metals (foundries and mills)	4,807	134	\$194,594
Paper mills and manufacturers	980	33	\$26,278
Pavement producers	605	15	\$8,353
Plastics reclaimers and converters	13,951	370	\$567,391
Rubber manufacturers	2,204	77	\$94,865
Sub-total	25,247	705	\$1,011,467
Percent of Total	48%	21%	42%

Table 7

Recycling industry composition in Los Angeles County - Pt. 2

	Employees	Establishments	Payroll (\$1,000)
Reuse and remanufacturing			
Computer and electronic demanufacturers	9,458	879	\$611,259
Motor vehicle parts	579	97	\$23,336
Retail used merchandise	3,013	384	\$63,908
Tire retreaders	114	11	\$3,770
Wood reuse	1,650	101	\$46,974
Materials exchange services	2,043	595	\$127,525
Sub-total	16,857	2,067	\$876,772
Percent of Total	32%	62%	36%
TOTAL	52,944	3,313	\$2,428,136



Methodology C: Industry Surveys and Interviews

LAANE conducted interviews and field visits with over 35 recycling and waste related businesses - approximately 21 site visits and 18 phone or e-mail interviews. This data collection and analysis was led by LAANE research associate Erika Patterson and lead author John Guevarra. The research team accessed the most up-to-date databases of MRFs, organics processors, recycling-reliant manufacturers, and remanufacturers from various public sources. In total, the authors contacted over 140 recycling-related businesses across California.

Several participants requested anonymity.

Interviewees were associated with businesses that process, use, and produce goods made of recyclables, including carpet, steel, plastic, paper, textiles, rubber (tires), compost, and glass.

Data Collection

The research team accessed contact information for recycling-based companies from the CalRecycle Recycling Market Development Zone and the Plastic Market Development Program, both publicly accessible databases. Next, the authors compiled a database of recycling-reliant manufacturers and procurement participants using the CalRecycle State Agency Buy Recycled Campaign (SABRC) and the Recycled-Content Product Directory. Lastly, the authors used a snowballing method to contact California-based and out-of-state businesses recommended by earlier participants. Several industry associations, academic institutions, and organizations were helpful in data collection, including: California Association of Recycling

Market Development Zones, CalRecycle, Association of Compost Producers (ACP), Container Recycling Institute (CRI), Californians Against Waste (CAW), University of California Los Angeles (UCLA), University of Southern California (USC), Global Alliance for Incinerator Alternatives (GAIA), and the Recycling Market Development Zone (RMDZ) liaisons for City of Los Angeles and Los Angeles County. Over nine months, the researchers communicated with participants by both phone and e-mail. The author's priority was to interview and visit survey participants at their workplace. In some cases where participants were not able to meet in-person, the author conducted a phone or e-mail interview. The authors of this report remained in contact with these participants for any follow-up questions.

Interview questions included:

- 1. Are you experiencing challenges in securing high-grade materials? High-grade materials defined as an acceptable raw material to industry standards and the company being interviewed.**
- 2. Have you experienced challenges in finding and training people? What occupations? Where can workers be trained?**
- 3. How have California's recycling policies affected your business? Do you project using more recyclable materials in the future? Why?**
- 4. Has your business experienced any challenges securing supplier or customer contracts? Who are your main suppliers? Main customers? What trends do you project for these contracts?**

Table 8

Industry Outreach Contact List - Pt. 1

Activity	Type	Site Visit	Interview (Phone or E-mail)	City	State
Processing	Broker		X	Long Beach	CA
Processing	Broker		X	Manhattan Beach	CA
Processing	Broker		X	Long Beach	CA
Processing	Broker		X	Gardena	CA
Processing	MRF	X		Anaheim	CA
Processing	MRF	X		Los Angeles	CA
Processing	MRF	X		Austin	TX
Processing	MRF	X		Austin	TX
Processing	Collection Center	X		Austin	TX
Processing	MRF	X		Huntington Beach	CA
Processing	MRF	X		San Francisco	CA
Processing	MRF	X		Oakland	CA
Processing	MRF	X		Industry	CA
Processing	Compost	X		Oxnard	CA
Processing	Compost	X		Vacaville	CA

Table 8

Industry Outreach Contact List - Pt. 2

Activity	Type	Site Visit	Interview (Phone or E-mail)	City	State
Manufacturing	PET	X		Chino	CA
Manufacturing	PET and HDPE	X		Oxnard	CA
Manufacturing	PET and HDPE	X		Orange	CA
Manufacturing	PET	X		Compton	CA
Manufacturing	Textiles		X	Vernon	CA
Manufacturing	Metals		X	Ventura	CA
Manufacturing	Rubber		X	Ontario	CA
Manufacturing	Metals	X		Industry	CA
Manufacturing	Glass		X	Commerce	CA
Manufacturing	Carpet	X		Vernon	CA
Manufacturing	Carpet	X		La Mirada	CA
Manufacturing	Glass		X	Seattle	WA
Manufacturing	Glass		X	San Diego	CA
Manufacturing	Metals		X	Pacifica	CA

Table 8

Industry Outreach Contact List - Pt. 3

Activity	Type	Site Visit	Interview (Phone or E-mail)	City	State
Reuse and Remanufacturing	Electronics	X		Los Angeles	CA
Reuse and Remanufacturing	Electronics		X	Los Angeles	CA
Disposal	Landfill	X		Los Angeles	CA
Disposal	Landfill	X		Los Angeles	CA
Consulting	Recycled-Content Products		X	Van Nuys	CA
Consulting	Rubber		X	Olivenhain	CA
Consulting	Glass		X	Mount Shasta	TX
Consulting	Wood		X	San Rafael	TX
Consulting / Printing	Paper		X	Los Angeles	TX
Consulting / Printing	Various		X	Oakland	CA

Analysis

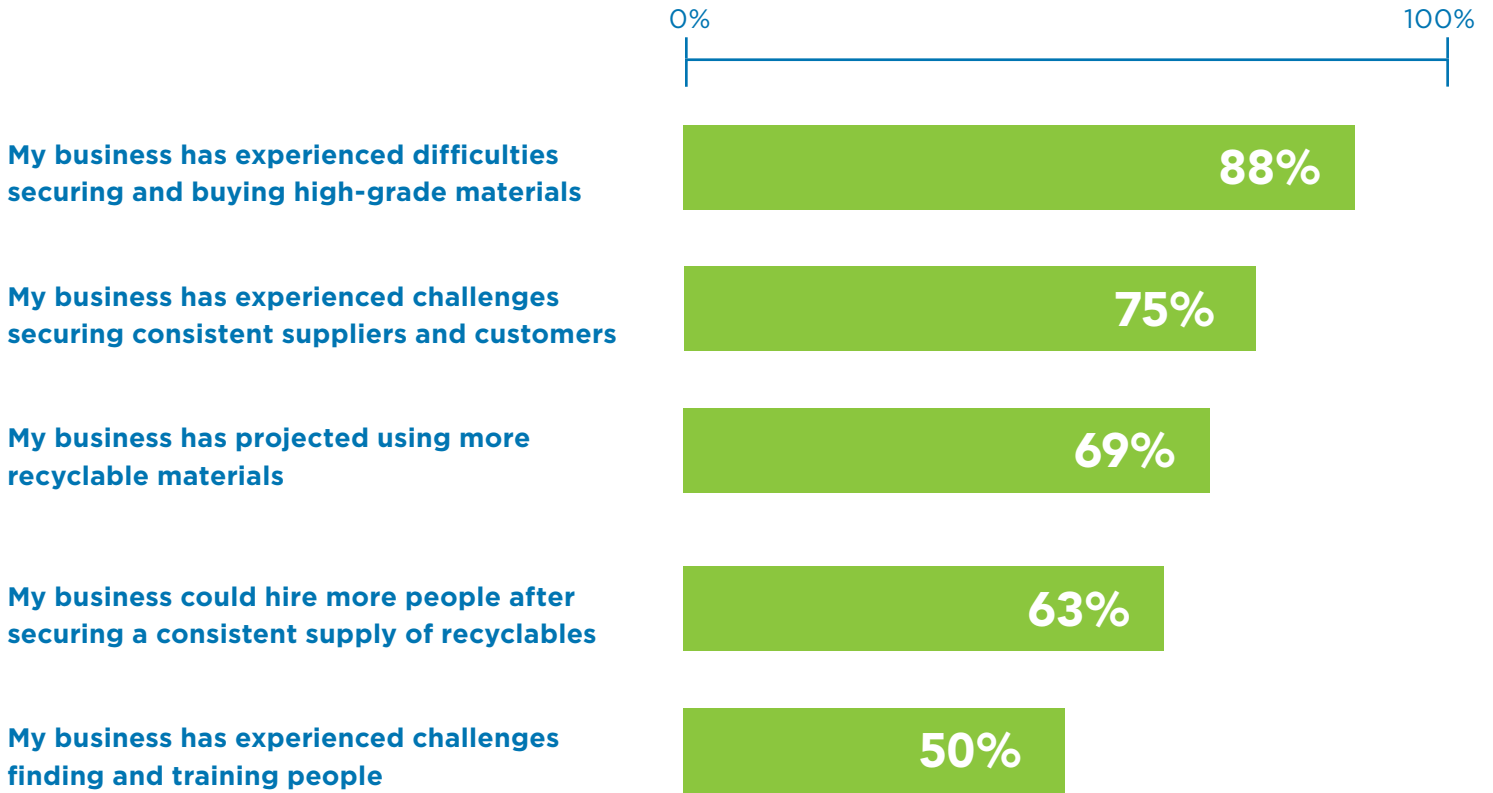
First, the researchers conducted interviews and collected as many responses as possible. Interviews lasted between one to four hours. Second, the lead author created a coding scheme to identify emergent themes. Then, the researchers collected the responses from all interviews and coded the interviews. The emergent themes included workforce training gaps especially for manufacturing operations, challenges securing consistent and reliable suppliers and customers,

a projected demand for utilizing more recyclable materials, and a challenge in securing acceptable quality of raw materials. Third, the research team interviewed and corresponded with major state industry associations, recycling-focused organizations, and government officials to elaborate on and confirm the five emergent themes. Lastly, the lead author reviewed the interviews and the coding of the results. Results are listed in Table 9.

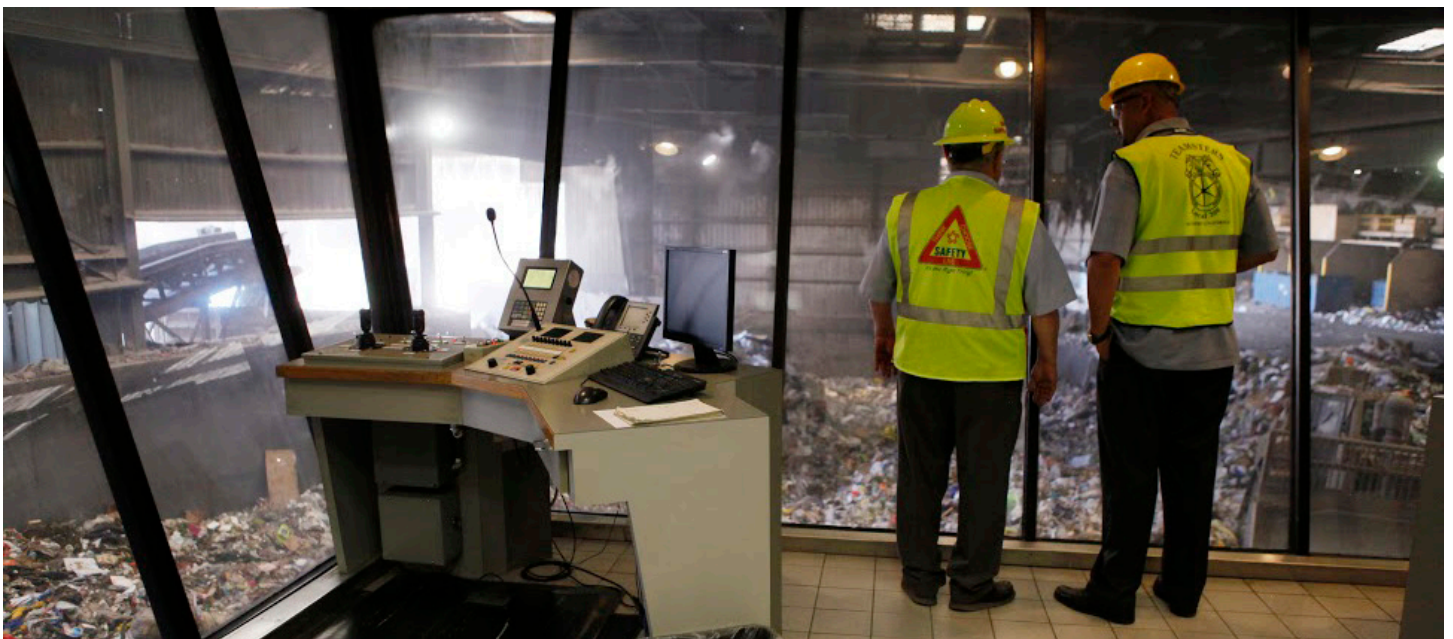
Table 9

Results of LAANE's Industry Survey

Percent of manufacturers and remanufacturers who strongly agree with the following statements:



Note: LAANE conducted interviews and field visits with over 35 recycling and waste related businesses in California, 16 of those included end-users such as manufacturers and remanufacturers.



Methodology D: Recycling Jobs Projections

The lead author estimated recycling jobs growth based on how much of the City of Los Angeles waste stream could be recycled. This calculation was based on the “More Jobs, Less Pollution: Growing the Recycling Economy in the U.S.” report by the Tellus Institute (2011). Tellus Institute’s job multipliers per 1,000 tons recycled and disposed

are in Table 10. In short, the lead author calculated the number of recycling jobs generated when 90 percent of what City of Los Angeles throws away as discards is collected, processed, and remanufactured. Data about the City of Los Angeles waste stream was gathered and analyzed from the City of Los Angeles (2006).

The results of the analysis are included in Table 11 below.

Table 10

Jobs Created and Sustained per 1,000 Tons Collected, Processed, and Manufactured - Pt. 1

	Job multipliers per 1000 tons recycled				TOTAL
	Collection	Processing	Manufacturing	Reuse and Remanufacturing	
Paper	1.23	2	4.16	NA	7.39
Glass	1.23	2	7.85	7.35	18.43
Ferrous metals	1.23	2	4.12	20	27.35
Aluminum	1.23	2	17.63	20	40.86
Other nonferrous metals	1.23	2	17.63	20	40.86
Plastics	1.23	2	10.3	20	33.53
Rubber and leather	1.23	2	9.24	7.35	19.82
Textiles	1.23	2	2.5	7.35	13.08
Wood	1.23	2	2.8	2.8	8.83
Other	1.23	2	2.5	NA	5.73
Food scraps	1.23	0.5	NA	NA	1.73
Yard trimmings	1.23	0.5	NA	NA	1.73
Misc. inorganic wastes	1.23	0.5	NA	NA	1.73

Table 10

Jobs Created and Sustained per 1,000 Tons Collected, Processed, and Manufactured - Pt. 2

	Job multipliers per 1000 tons disposed			TOTAL
	Collection	Landfill	Incineration	
Paper	0.56	0.1	0.1	0.76
Glass	0.56	0.1	0.1	0.76
Ferrous metals	0.56	0.1	0.1	0.76
Aluminum	0.56	0.1	0.1	0.76
Other nonferrous metals	0.56	0.1	0.1	0.76
Plastics	0.56	0.1	0.1	0.76
Rubber and leather	0.56	0.1	0.1	0.76
Textiles	0.56	0.1	0.1	0.76
Wood	0.56	0.1	0.1	0.76
Other	0.56	0.1	0.1	0.76
Food scraps	0.56	0.1	0.1	0.76
Yard trimmings	0.56	0.1	0.1	0.76
Misc. inorganic wastes	0.56	0.1	0.1	0.76

Table 11

Jobs Growth Analysis Based on Tellus Institute (2011) Methodology and City of Los Angeles Waste Characterization (2006)

Jobs created under Zero Waste System (90% diversion)

	Collection	Processing	Manufacturing	Reuse and Remanufacturing	TOTAL
Paper	994	1,616	3,362	NA	5,973
Glass	91	148	580	543	1,361
Ferrous Metals	42	69	142	690	944
Aluminum	9	15	133	150	307
Other Nonferrous	7	12	105	119	244
Plastics	367	596	3,070	5,961	9,994
Textiles	68	111	138	407	724
Wood	115	187	262	262	826
Food scraps	949	386	NA	NA	1,334
Yard Trimmings	538	219	NA	NA	757
Misc. Inorganic Wastes	296	120	NA	NA	417
Total	3,477	3,479	7,792	8,132	22,880

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as many as 220 full-time jobs. Compost use and production can encourage carbon sequestration and the reduction of decomposing matter in landfills.

from carpet and sold to various end markets as engineered resins.

32. Jones, N. (2013, November 18). A Scarcity of Rare Metals is Hindering Green Technologies. http://e360.yale.edu/feature/a_scarcity_of_rare_metals_is_hindering_green_technologies/2711/, accessed January 10, 2014. This article found that the average price of rare metals increased by 750 percent in one year due to a slowing down of trade from China. China controls as much as 90 percent of rare earth mining and production; PricewaterhouseCoopers (PwC). (2011, December). Minerals and Metals Scarcity in Manufacturing: The Ticking Time Bomb. https://www.pwc.com/en_GX/gx/sustainability/research-insights/assets/impact-of-minerals-metals-scarcity-on-business.pdf, accessed January 10, 2014. PwC reported that global manufacturing companies were concerned for the scarcity of minerals and metals in the supply chain. PwC found that the “risk of scarcity” is increasing and will lead to “supply instability and potential disruptions in the next five years” (p. 5).
33. Eureka Recycling. (2012, April). Recycling Plastics: Complications & Limitations. http://www.eurekarecycling.org/imageupload/file/Plastics_Fact_Sheet-2012.pdf, accessed January 10, 2014. This report found that many plastics can be recycled when collected in good condition. However, some plastics are problematic and near impossible to recycle. In these cases, Eureka Recycling recommends shifting the design of plastics for recyclability rather than for disposal; Hopewell, J., Dvorak, R., & Kosior, E. (2009). Plastics recycling: Challenges and opportunities. *Phil. Trans. R. Soc. B*, 364, 2115-2126. This article finds that plastics can be recycled over and over as they are derived from petroleum. However, the researchers find that at least 50 percent of plastic products are for single-use purposes like packaging and a challenge to recycle without the adequate infrastructure.
34. American Chemistry Council. (2013). 2012 United States National Post-Consumer Plastics Bottle Recycling Report. <http://plastics.americanchemistry.com/Education-Resources/Publications/2012-National-Post-Consumer-Plastics-Bottle-Recycling-Report.pdf>, accessed January 10, 2014.
35. EBA Engineering Consultants Ltd. (2012, May). Recycling Market Study. <http://www.metrovancouver.org/services/solidwaste/planning/Documents/RecyclingMarketStudyReport.pdf>, accessed January 10, 2014. Several components can be separated
36. American Chemistry Council. (2013).
37. Environmental Defense Fund. (1995). Paper Task Force Recommendations for Purchasing and Using Environmentally Preferable Paper. <http://epa.gov/epawaste/conserves/tools/warm/pdfs/EnvironmentalDefenseFund.pdf>, accessed January 10, 2014. The Environmental Defense Fund convened a task force of companies and academics including Duke University, Johnson & Johnson, McDonald’s, the Prudential Insurance Company of America, and Time Inc. to study and provide recommendations for government agencies to purchase and use paper made from post-consumer content.
38. Bureau of Labor Statistics. (2012). National Census of Fatal Occupational Injuries in 2011 (Preliminary Results). <http://www.bls.gov/news.release/pdf/cfoi.pdf>, accessed October 14, 2013.
39. LAANE’s analysis of Occupational Safety and Health Administration (OSHA) records, using specific search terms (NAICS code 562920; Date Range: January 1 to December 31 for the requested year; All Offices: California). Data source: Occupational Safety and Health Administration. (2013). <https://www.osha.gov/>, accessed October 14, 2013.
40. Gladding, T., Thorn, J., & Stott, D. (2003, June). Organic dust exposure and work-related effects among recycling workers. *American Journal of Industrial Medicine*, 43 (6), 584-591.
41. Jacques, L., Dunkerley, C.J., Kosatsky, T., & Defresne, A. (2006). Exposure to aerosolized bacteria and fungi among collectors of commercial, mixed residential, recyclable, and compostable waste. *Science of the Total Environment*, 370, 23-28.
42. Gladding, T., Thorn, J., & Stott, D. (2003, June).
43. Identified in LAANE’s interviews with waste and recycling sorters in Los Angeles.
44. Patrick Engineering Inc. (2005, September). Best Operational Practices Manual for Materials Recovery Facilities and Recycling Drop-off Facilities. <http://www.csu.edu/cerc/researchreports/documents/BestOperationalPracticesManualForIllinoisRecyclers.pdf>, accessed January 10, 2014. This national study of best practices at recycling facilities found that providing an “environmentally comfortable and safe working environment” for recycling workers can result in “increased productivity as tiredness and strain are reduced, and overall physical comfort is

maintained or increased.” In addition, “the use of personal protective equipment reduces the risk of injury, which in turn reduces the potential of worker compensation claims, lost time on the job, and increased insurance rates” (p.22).

Facilities and Recycling Drop-off Facilities. <http://www.csu.edu/cerc/researchreports/documents/BestOperationalPracticesManualForIllinoisRecyclers.pdf>, accessed January 10, 2014.

This study of best practices at recycling facilities found that “appropriate training and instruction to sorters” are needed to create maximum efficiency on the sorting line.

45. Sasha Corporation (2007). “Compilation of Turnover Cost Studies.” <http://www.sashacorp.com/turnframe.html>. Replacing a worker costs an estimated 30 percent of a worker’s annual salary.
46. Interview with a material recovery facility operator in San Francisco and Kevin Drew of the Department of Environment, City of San Francisco.
47. Ibid.
48. Interviews with a facility manager and executive of a recycling company in Northern California.
49. Pollack, E. (2012, October 10). Counting Up to Green. <http://www.epi.org/publication/bp349-assessing-the-green-economy>, accessed October 14, 2013.
50. Identified in LAANE interviews with material recovery facility floor managers.
51. Flaming, D. & Burns, P. (2013). Effects of a Fifteen Dollar an Hour Minimum Wage in the City of Los Angeles. <http://www.economicrt.org/>, accessed January 10, 2014. This report finds that increased local spending can encourage economic growth.
52. Ibid. The Economic Roundtable report finds that “businesses will benefit from having a higher-paid labor force that is more stably housed, reducing employee turnover and the associated costs for recruiting and training new employees. It costs an estimated 30 percent of a worker’s annual salary to replace that worker, so reducing the frequency of worker turnover results in significant cost savings for employers.”
53. Patrick Engineering Inc. (2005, September). Best Operational Practices Manual for Materials Recovery Facilities and Recycling Drop-off Facilities. <http://www.csu.edu/cerc/researchreports/documents/BestOperationalPracticesManualForIllinoisRecyclers.pdf>, accessed January 10, 2014. This report on best practices for material recovery facilities finds that better product quality of commodities “translates to higher revenues, positive long-term relationships with markets, and a decreased potential for a reduction in market revenues or having commodities rejected” (p. 11).
54. Patrick Engineering Inc. (2005, September). Best Operational Practices Manual for Materials Recovery
55. R.W. Beck, Inc. (2001, July). U.S. Recycling Economic Information Study: Prepared for the National Recycling Coalition. http://www.epa.gov/wastes/conserves/tools/rmd/rei-rw/pdf/n_report.pdf, accessed on October 14, 2013.
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57. See Methodology B, Table 5.
58. Based on LAANE’s analysis of the recycling industry in Los Angeles. According to recent data published by the California Economic Development Department, nursing facilities and real-estate industries increased in employment size between 2000 and 2010. Nursing industries grew 1.52% each year, from 58,239 to 67,085 employees; and the real-estate industry grew from 49,526 to 51,652 employees, or %0.43 each year. Analysis uses employment data from the California Economic Development Department, and are based on paid full-time employees for associated NAICS codes: computer and electronics product manufacturing (NAICS 334) ; apparel manufacturing (NAICS 315) ; food manufacturing (NAICS 311) ; aerospace product and parts manufacturing (NAICS 3364); aircraft manufacturing (NAICS 336411); real estate services (NAICS 531); and nursing facilities (NAICS 623). See Methodology for details on industry jobs calculations.
59. See Table 5 of Methodology B.
60. See Methodology B, Table 5.
61. Identified in LAANE’s industry survey. See Methodology section.
62. See Methodology B and Table 5 for results.
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67. Ibid.
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71. Recycling Marketing Cooperative for Tennessee. (2003, December). Material Recovery Facility Handbook. <http://ctasgis02.psur.utk.edu/Environment/solid%20waste%20documents/recycling/material%20recovery%20facility%20handbook.pdf>, accessed January 10, 2014.
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80. Burns, P., and Flaming, D. (2006). Jobs in LA's Green Technology Sector. http://www.economicrt.org/summaries/Green_Tech_synopsis.html, accessed October 14, 2013.
81. Good Jobs First. (2009). High Road or Low Road? Job Quality in the New Green Economy. <http://www.goodjobsfirst.org/sites/default/files/docs/pdf/gjfgreenjobsrpt.pdf>, accessed October 14, 2013.
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- and plastic – from the landfill. The funds raised from the program are used to reduce the costs of curbside collection, litter reduction grants, quality incentive payments, and price supports like the Plastic Market Development program. However, despite its success, the Beverage Container Recycling Program is at an annual structural deficit of approximately \$100 million. In other words, the program is spending more than generated revenue. That said, given the importance of the program to price supports, and the need for new recycling facilities, the state should continue to evaluate the barriers and opportunities to expand, rather than deprive, the BCRLRA program.
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