REUSE AND RECYCLING

OPPORTUNITIES IN NEWARK

COMMUNITY DEVELOPMENT STUDIO 2014

RUTGERS
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1 INTRODUCTION

In partnership with Newark's Office of Sustainability, the Spring 2014 Community Development Studio explored opportunities to productively reuse materials that flow through the city's solid waste stream to: (1) Create new businesses and jobs in Newark; (2) Divert waste from landfills and incineration; and (3) Strengthen Newark's manufacturing sector. Newark is home to more than 400 manufacturing firms that provide a significant portion of the city's total employment (Mistry, 2013; Ford, 1874). Newark's relatively low property costs and access to regional, national, and international markets via an expansive transportation infrastructure along with a growing local support system found in organizations like Made in Newark, Brick City Development Corporation, NJ Manufacturing Talent Network, and Newark's Office of Sustainability make it an appealing place for manufacturers. The Office asked us to investigate if manufacturing discards could be incorporated into existing production processes and/or used to create new firms.

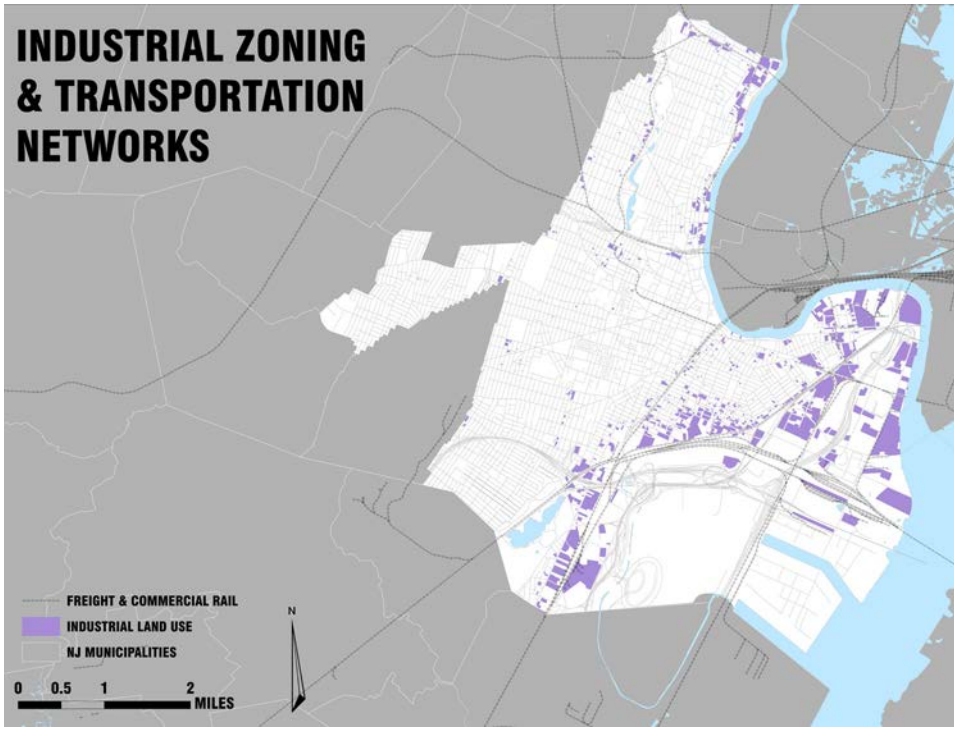
But preliminary research the studio conducted prompted the consideration of a reuse strategy that was not confined to discards from Newark's manufacturing sector. The small sample of manufacturing firms the team visited in the fall demonstrated that Newark manufacturing firms are efficient and their sophisticated material management results in few discards. With this in mind, the team developed a broader research approach with four main objectives. First, we sought to develop an understanding of what manufacturers discard and the processes by which discards are removed from manufacturing facilities. We describe the methodology for this part of the study in the next report section.

Second, we sought to identify existing recycling and reuse firms in Newark. Our definition of recycling and reuse encompassed artists working with found objects, firms engaged in refurbishing pallets, and firms engaged in e-waste and carpet recycling. We sought to understand what is reused and how firms and individuals connect with reused or recycled items. We made six site visits and conducted four interviews with people who provided insight into why Newark is a desirable place to conduct business and discussed the challenges they experienced working with discarded items. We visited two recycling centers, one working with e-waste and the other with carpet, and four art galleries and studio spaces, and conducted phone interviews with three pallet distributors and a textile recycler. We documented meetings and interviews with field notes and photographs.

Third, we wanted to understand how and why waste flows into and through Newark, and what is in that waste that could potentially be reused or recycled. We relied on publicly available documents including legislation, waste and recycling regulations, judicial decisions, transportation schemas, and statistical information on waste types and amounts to

answer our questions. We began our research on waste policies and flows at the state level and worked through the successive governmental layers until we reached Newark. We interviewed personnel at the New Jersey Department of Environmental Protection (NJ DEP), but did not talk with firms involved with the waste infrastructure such as waste haulers, transfer facility operators, or waste processing facilities. We attempted to fill in this gap by using print and online media sources and company websites.

Fourth, we sought to understand how other cities, businesses, and organizations reuse and repurpose discarded materials. We conducted case studies of businesses and organizations that incorporate reuse into their operations to acquaint ourselves, and by extension the Office of Sustainability, with the way reuse strategies have been implemented in other cities (see appendix, pg 44-76). The case studies also provided information regarding policy and regulatory approaches that facilitated the profiled reuse efforts. This facet of our research relied upon publicly available primary and secondary documentation, company and organizational websites, legislative and policy documents, as well as online media sources. Twelve phone interviews were conducted with representatives of different organizations and focused on three primary questions: (1) What types of existing facilities recycle materials for reuse? (2) What did they need and how did they start their programs? (3) How has their model been successful with respect to job creation, economic development, and waste reduction, including reductions in general environmental pollution.



This report presents the findings in two parts. Part I describes the results of our manufacturing survey including an overview of byproducts and discards and the networks and processes that handle them. It closes with a discussion about the manufacturing sector's efficiency and suggests that any reuse strategy will have to extend beyond manufacturing discards. Part II suggests that Newark's centrality in the region, and the proximity of the city to some of the busiest ports and transportation networks on the East Coast, has resulted in the development of an extensive infrastructure for processing the region's waste, which offers many as yet untapped economic development opportunities. Hard-to-process materials could be diverted from landfills and incinerators while generating jobs, and we profile Newark firms that are working with some of these materials. Closing the second part of the report is a look at opportunities that Newark's arts and education organizations present as a foundation for creative reuse of discards. We conclude with consideration of the role that the city might play in achieving the goals of waste diversion and economic development.


REINER

2

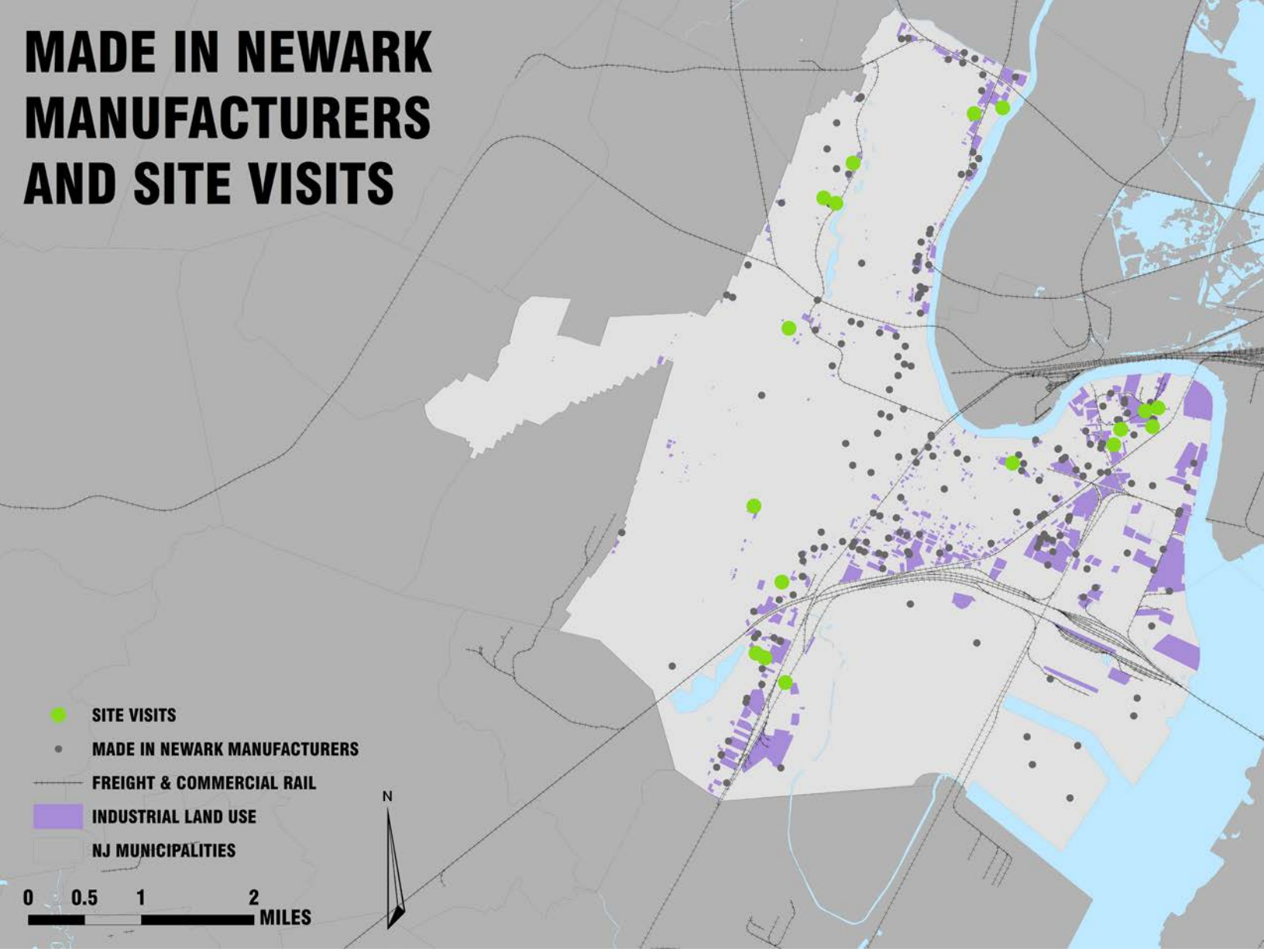
MANUFACTURING DISCARDS AND REUSE NETWORKS

SITE VISIT METHODOLOGY

To better understand how a materials reuse program could meet the city's goals of creating jobs, diverting waste, and supporting the existing manufacturing sector, we conducted in-depth, on-site interviews with Newark manufacturers. In planning these site visits, we drew on the earlier investigative work of the Fall 2013 Studio, whose members had refined this methodology, conducted preliminary site visits, and developed an appropriate interview instrument. During the site visits we gained extensive and detailed information about each company's production process; this allowed us to develop appropriate questions and clearly communicate the city's goals to manufacturers. Additionally, this approach allowed for photography of discards and waste removal infrastructure, which added a visual storytelling element to the documentation process and helped minimize lost information. Interview questions focused on learning what products are manufactured and how, collecting information on byproducts and disposal methods, and gauging firms' interest in a reuse program.

For our research, we contacted over 180 Newark-based manufacturers and set up interviews with sixteen firms. We identified participants through Made in Newark, a coalition of local manufacturing businesses seeking to foster collaboration across companies and to inform Newark residents about the wealth of manufacturing in the area. We also asked the firms we visited for referrals to other manufacturing businesses who might be interested in participating. Two to three members of the studio team conducted each interview, which lasted between 30 and 60 minutes. We spoke with business owners in many cases, but also with other employees familiar with the firm's durable byproducts and waste removal processes.

Although we used convenience sampling and limited our visits to the manufacturers most receptive to our calls, our sample encompassed a variety of firm types, company sizes, and geographies. Of the companies visited, five worked primarily with metals, six produced paper or cardboard products, four used textiles, and one was a food factory. Some firms we visited had fewer than ten employees, while others had more than one hundred. Some are Newark-based while others are subsidiaries of national and international firms. As the map illustrates, we visited firms throughout Newark; many were located along major rail corridors or on the Passaic River.



The following section details our findings from the manufacturer survey. We begin by categorizing byproducts and discards according to their raw material types, including wood, paper, plastic, metal, textiles, and rubber. We discuss the many forms that such discarded materials take and briefly outline the different disposal or reuse processes corresponding to each of these raw material categories. Next, we delve further into the existing reuse and recycling networks that handle manufacturing discards, exploring manufacturers' varied systems for discarding, reselling, or donating materials, as well as the motivations, usually economic, that underlie their waste management decisions. Finally, we analyze key trends and takeaways from our site visits, which revealed that the firms generate little waste and already reuse materials when economically feasible. We conclude Part I by discussing the implications of these findings for a reuse program in Newark.

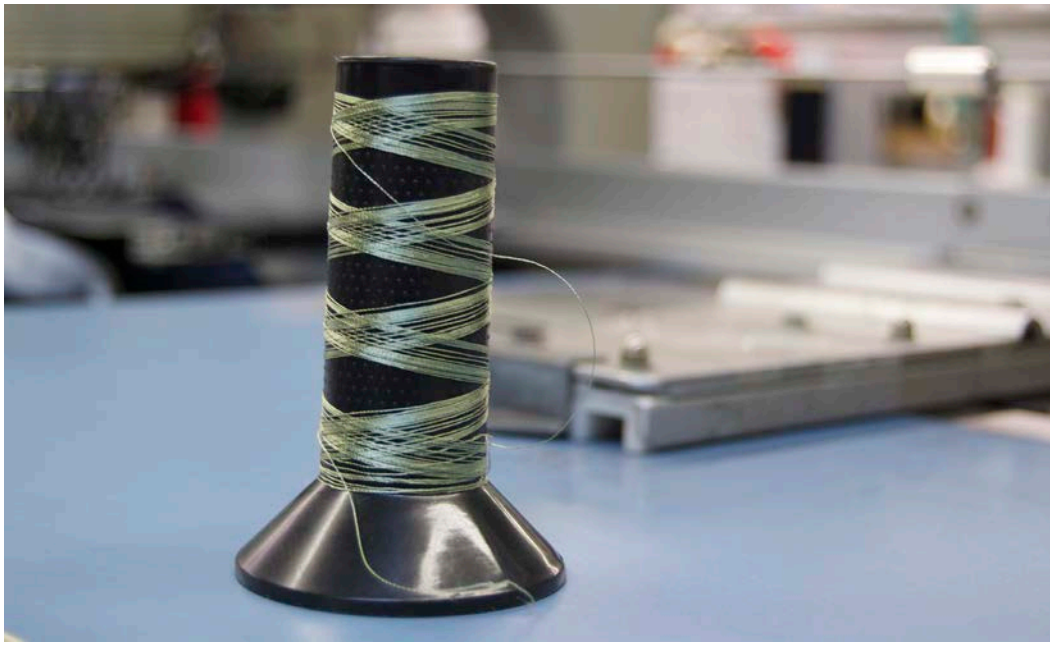
DISCARDED MATERIALS AND DISPOSAL PROCESSES

Our site visits revealed that Newark manufacturers' discards include a wide range of raw material types. Among the firms we visited, byproducts and shipping materials can be found in many different forms, which correspond with different disposal, recycling, and reuse practices.

Wood is the most common byproduct. Almost all manufacturers discard shipping pallets, which are used to transport inputs and finished products and measure approximately 48 by 40 inches. Many different disposal and reuse avenues exist for pallets, including resale to a pallet repair company or supplier such as

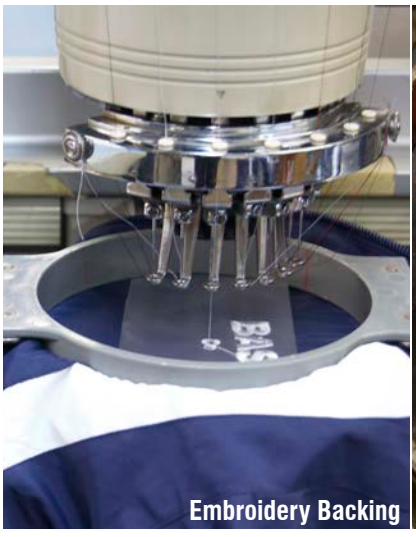
Delisa Pallet, National Pallet LLC, or D&H Pallet Company; collection by truck drivers; internal reuse to ship new orders; long-term storage at the facility; traditional recycling as wood; or simple disposal. Traditional waste haulers, like Waste Management and T. Farese & Sons often pick up pallets. In addition to pallets, we found wood in the form of sticks, sample moldings, die cutting boards, and spools, which may be held in storage, thrown away, or given to employees for reuse at home.

After wood, paper, paperboard, and cardboard were the most common discards we found. Many firms receive a large and steady supply of cardboard boxes from shipped inputs. Textile companies also have paper and cardboard byproducts including patterns, scrap embroidery backing, and cardboard spools, which are discarded, internally reused, or recycled. We visited a few paper and cardboard manufacturers that generate large volumes of irregular paper and cardboard scraps. These firms recycle their byproducts through companies such as Newark Boxboard and Newark Recycled Fibers Group. In contrast, a few companies have coated, unrecyclable paper scraps, which they discard.



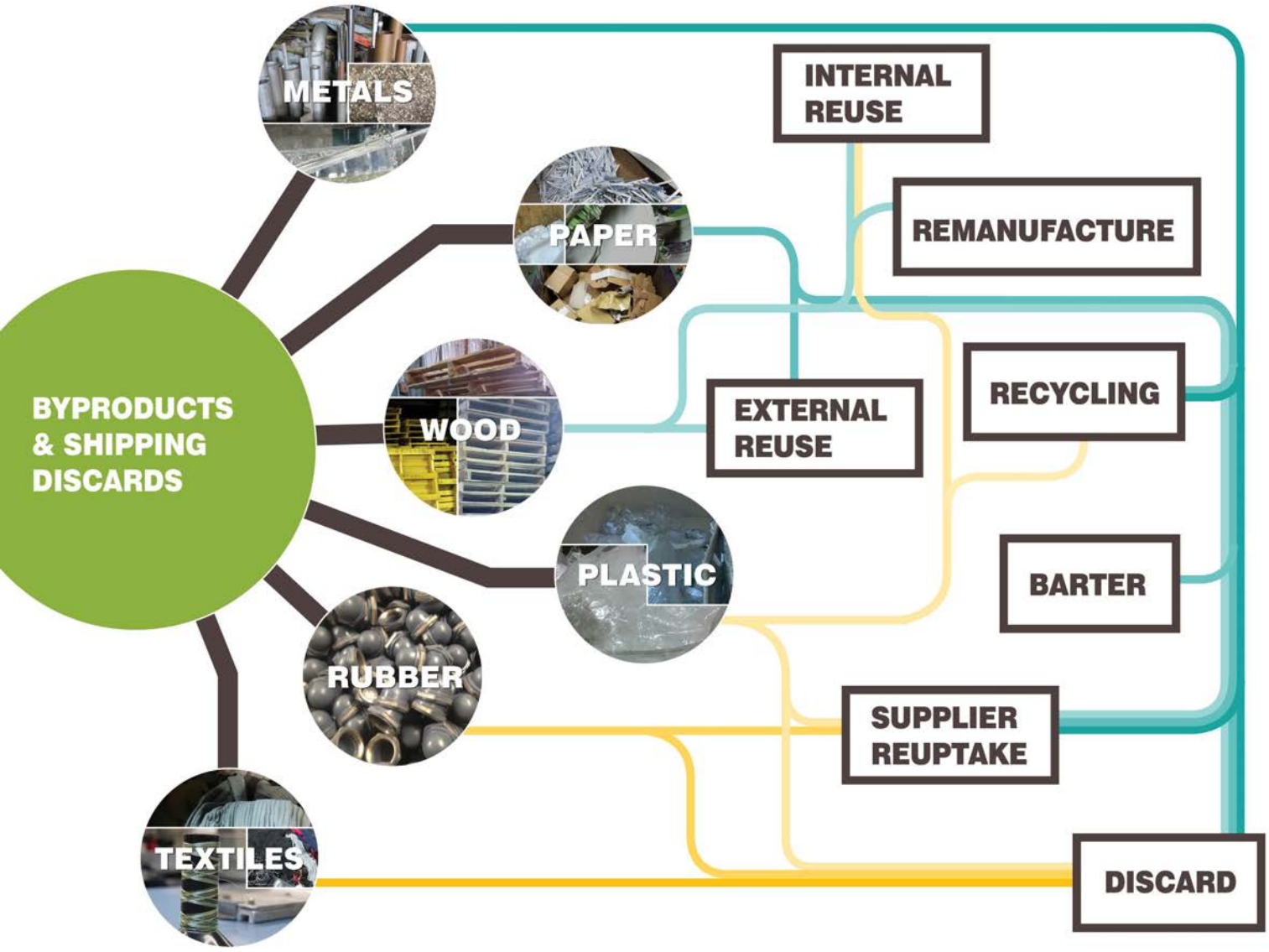
While we did not visit any plastic product manufacturers, many companies use plastic components in their production processes. Plastic byproducts include solvy, a film used in embroidery, polyester and nylon thread, and polyester labels used on fishing boats. Plastic shipping materials, such as bags, shrink wrap, bubble wrap, and foam, are also common. Most plastic is discarded, but we saw exceptions in two cases. One company reuses some of its plastic bags to ship items to clients. Another recycles all of its plastic and has developed a comprehensive plastic collection process for shrink and bubble wrap, plastic bags, and plastic water bottles. This plastic was picked up for free, but by whom was not specified.

Metal byproducts exist in all types of manufacturing facilities. We expected to find these byproducts at the companies whose products included metal components, and were surprised to see items such as metal caps from paper rolls and metal scraps at textile manufacturers. The majority of the metal byproducts we observed were stainless steel, but we also found copper, zinc, aluminum, and plain steel. Sizes range from zinc ash to ½-inch diameter pipe pieces. Because of the high market value of these materials, metals are almost always recycled. They find their way to scrap metal dealers, with the manufacturers often collecting a small profit. One company donates its metal scraps to a charity organization that resells them, while other companies sell scraps to a third party, who picks them up. Metal recycling companies include Shamrock Technologies (through Metals USA), Waste Management, and Sims Metal Management.



Embroidery Backing

Metal Shavings



Textile byproducts were found only at textile firms. Examples include fabric scraps, leftover thread, samples, and rejects. Sizes vary as these companies manufacture a range of products such as embroidery and blankets. Quantities and frequencies depended on the size and consistency of the orders. Most textile materials are discarded, but one company reused fabric scraps internally for mock-ups.

Among our site visits, only one manufacturer produced rubber components. The rubber byproducts were resin shavings and circular pieces with punched-out holes, consistent in size and quantity. Two other companies had very small amounts of discarded rubber. One of these firms replaces rubber machine belts every few years, returning the used belts to the supplier. The other uses wire with rubber insulation which generates little discarded material.

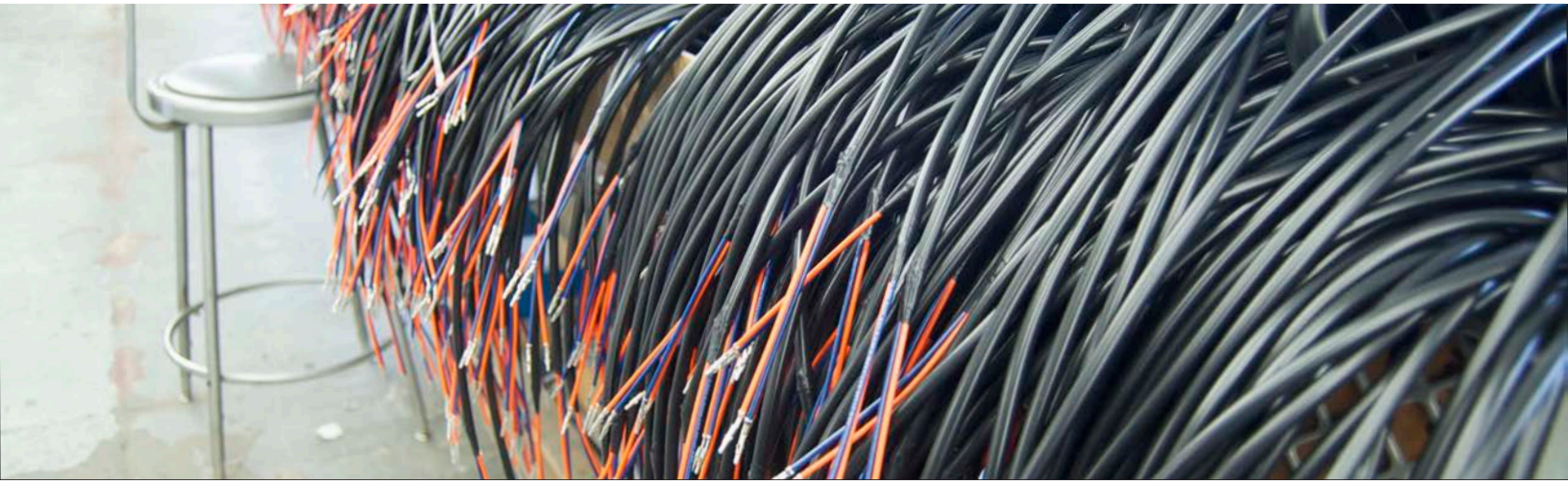
As the discussion above alludes to, the path that each of these materials took out of the factory was contingent upon several factors. The amount and type of material that was discarded prompted management to make decisions about what could be disposed of at a cost and what materials could offer them a return. These decisions also relied upon the existence of markets for the materials they discarded; where they generated enough recyclable material to garner a return that offset the expense of sorting and handling discarded materials, they engaged with other firms in the area to do so. Where these markets did not exist, they either threw discards away with their weekly pickups or had a relationship with individuals who would pick this material up at little to no cost. We observed that certain practices were more common to some firms than others, a discussion to which we now turn.

MANUFACTURER DISCARD NETWORKS

The Newark manufacturing firms we visited demonstrated a degree of efficiency with respect to their discards. This is the result of established markets for many manufacturing byproducts and manufacturer efforts that minimized waste in their production processes to maximize profit. Even so, all firms generate some waste that makes its way to the landfill or incinerator. The waste management businesses charge based on the volume of waste generated and the number of weekly pick-ups. This is incurred at a relatively low-cost for all but the largest firms we visited. Next we describe how manufacturers handle discarded material.

We visited some larger firms that have fairly steady production volumes and generate significant amounts of byproducts. These firms recycle much of this material to minimize the solid waste they send to landfills and the associated costs. The fact that they generate larger quantities of materials provides an incentive to capture monetary gain from their byproducts through recycling and reducing their solid waste disposal costs. We observed that these firms most commonly recycled metal and paper. The existence of large paper and metal recycling facilities that are willing to transport and pay manufacturing firms for their material demonstrates that the concomitant circumstances of a viable market and sufficient quantity prompts firms to make decisions that positively impact their bottom line. Some of these firms have developed elaborate systems to ensure that materials are separated by type; one firm has conveniently located receptacles for various waste types throughout the facility, and another designed an elaborate vacuum system to capture paper scraps from production lines.

Many of the small- to mid-sized firms we met with generate relatively small amounts of waste that are cost-effectively handled by once- or twice-weekly waste pick-up; this was the most common waste management practice we observed. Some of these firms recycle the most valuable materials, such as metal, while throwing away paper and plastic. Insufficient quantities of materials means that these firms would have to pay to have them recycled at an additional cost not offset by a reduction in the firms' solid waste disposal costs. But some firms have relationships with individuals who voluntarily pick up and presumably aggregate and recycle materials.

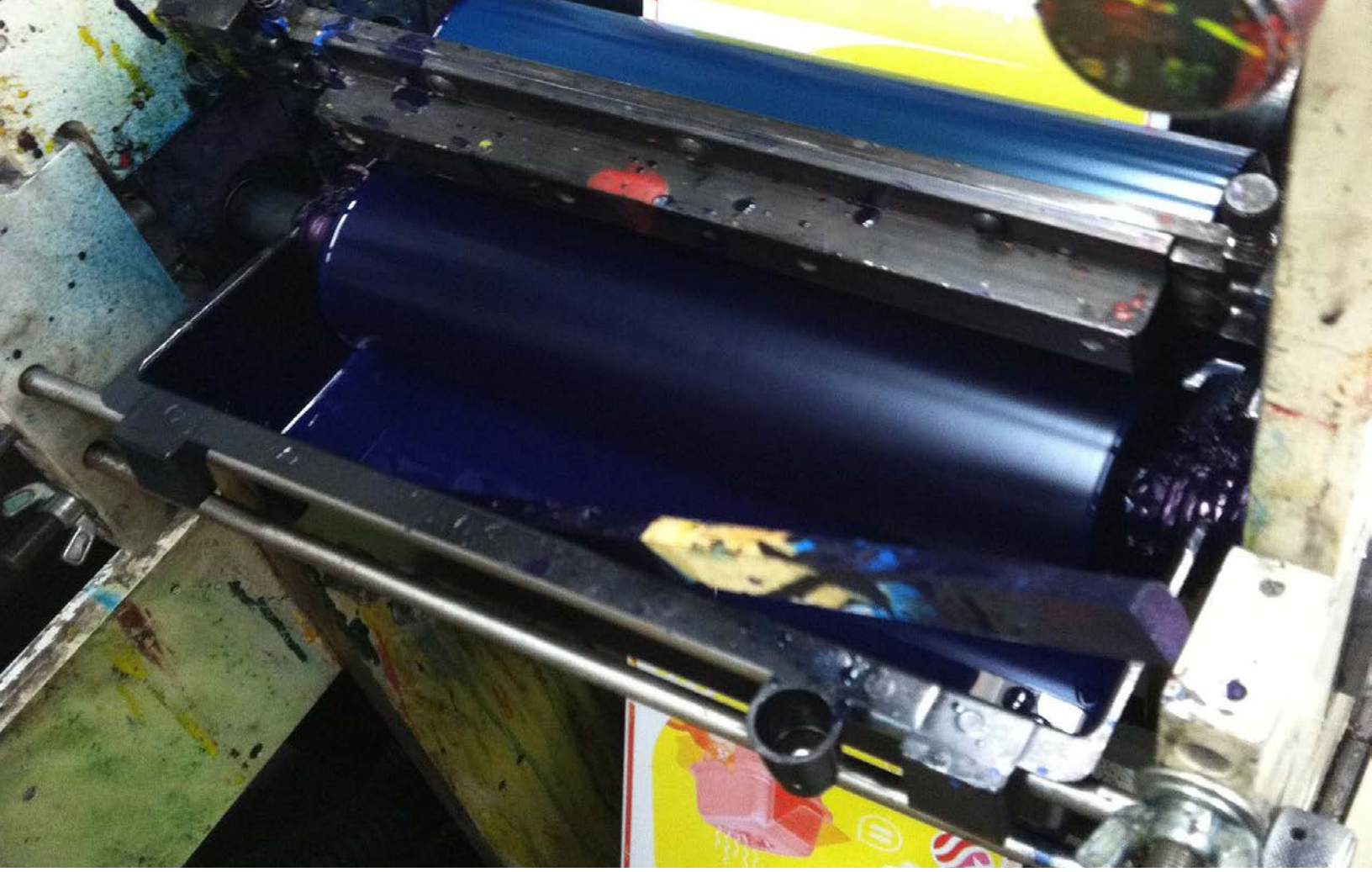


Sufficient quantity is not the only issue that prevents materials from being recycled; some materials don't have a well-developed market or are only recycled when nested in a broader recycling model. Textiles, which were prevalent in our fieldwork, are an example of this. Textile recycling occurs in New Jersey, including the shredding of irregular scrap for other uses, but the model relies on the ability to acquire textiles in the form of clothing that can be resold as clothing or ragstock to offset the minimal return that shredded textiles offer (Stubin, E 2014). These examples underscore the economic motivation for smaller and mid-sized firms to engage in recycling only as an ancillary activity of convenience, if at all. The firms we met with feel they have a reliable model for handling their byproducts that fits their pricing, production methods, and business approach. A couple of firms are committed to recycling discards at an additional cost or donating valuable recyclables, like metal. These firms may be situating themselves as environmentally-conscious businesses, and making these decisions about recycling fits their business approach or owners' commitments. The most common arrangements involved manufacturers contracting with waste hauling firms to recycle their wastes such as office paper and consumer plastics and metals.


Respooling Machine

As we mentioned earlier, many firms have relationships with individuals who remove materials from their facilities for little or no cost. When asked, representatives of these firms responded to our question about what happens to certain byproducts and discards with variations of "some guy takes them." Exactly what "some guy" did with them was often unknown by the person we were speaking with, but some speculated that they recycled and received money for them. Considering that there are established markets for many materials in Newark, and limited employment opportunities for some residents, this makes sense.

A number of materials found their way out of firms in this manner, including metal, paper, cardboard, plastic and wood. Some firms offer items to their employees, such as larger wooden and cardboard spools that hold wire or thread. Other items are disposed of through incidental interactions; one such example is when firms offload pallets to truck drivers because they do not have a relationship with a pallet distributor, do not have enough of them, or the pallets are not of a desirable dimension. Some manufacturers made a point of mentioning that disposing of discards through these relationships could be stressful and inconvenient because they disrupt workflow. Once a relationship between an individual and firm has been established a tendency for the individuals removing the discards to become demanding was pointed out by more than one person we spoke with. This including requests to store materials in particular ways as deviations from manufacturing processes cost time and money. Another issue is the inherent unreliability of the networks. While some firms have fairly regular interactions with the people who remove waste from their facilities, often the schedule of pick-ups is much more sporadic which can affect their operations.



The firms we observed operate under a common rationale in terms of making decisions regarding their waste management practices; any efforts to reuse, recycle, and minimize waste entering the solid waste stream is generally based on a firm's economic calculations. Manufacturers are in business to generate profits and this is reflected in their decisions about how they manage their discards. This extends to firms with environmentally-conscious management and principals; they too must keep an eye on the impact of reuse and recycling actitvities to their bottom line. While this presents challenges, our research indicates that many firms are interested in working with Newark to further reduce discards.

The development and implementation of discard diversion programs and policies must also consider that Newark's manufacturers have developed an array of pathways for dealing with their discards. While many of the approaches firms have taken are not ideal when measured against a "zero-waste" goal, they are often innovative given the pressures to remain profitable in a challenging economic environment. Firms have analyzed and assessed the potential to reuse and recycle, and, where it has made sense, do so through formal or informal means. The challenge for Newark involves developing partnerships that ensure manufacturers will continue to see Newark as an appealing setting for their operations which means that any proposals have to minimize the bureaucratic obstacles and anything that might minimize a firm's productivity.

TRENDS AND KEY FINDINGS

Although manufacturer byproducts and facility operations vary across the firms we visited, we nonetheless identified some important trends. Based on our observations, we drew four broad conclusions about discarded materials and disposal processes among Newark manufacturers.

First, the manufacturers we visited collectively generate little waste. Across the board, firms maximize profits and minimize expenses by using inputs efficiently and to the fullest possible extent. This is true for costly raw materials, such as metal, and for cheaper inputs. In some cases, companies invest in technology, such as reth-

reading machines, to avoid wasting materials. In addition to making the most of their inputs, firms cut costs and minimize waste by selling or donating their byproducts. They use existing reuse and recycling networks comprised of scrap metal dealers, paper and cardboard recyclers, pallet refurbishers, and individual salvagers who pay for high-value byproducts or pick them up for free.

Second, materials that reach the dumpster are generally small scraps, irregular in size and shape, that have little economic value. Manufacturers intentionally produce little scrap to decrease costs. There are no standard sizes for such trimmings and shavings across firms as each produces unique items and has different processes for minimizing waste. Many manufacturers, especially textile firms, do custom work and their discard streams may vary significantly from week-to-week depending on order size and type. Where companies have repeat orders that produce a steadier flow of discards, such as the larger paper and cardboard manufacturers, we observed that they establish a systematic recycling process for their byproducts.

Third, shipping materials constitute a very large and fairly consistent portion of the waste stream across the firms we visited. In fact, the majority of discarded items were shipping-related materials, and included wooden pallets, cardboard boxes, plastic wrap and bags, and metal drums. Because these materials are standard to all firms, the existing recycling infrastructure absorbs many of them. For the remaining shipping materials, such as plastic bags, there is little reuse or recycling potential.

Fourth, waste disposal costs are low and would be difficult to further reduce for most firms. Each of the manufacturers we visited contracts with a private hauling company for once- or twice-weekly pick-ups. Emptying the dumpster at least once a week is necessary to dispose of organic waste. For the firms we visited, the most commonly employed hauler is T. Farese & Sons, closely followed by Waste Management. These haulers charge a flat fee depending on the number of pick-ups and container size and the price of waste disposal does not vary with small fluctuations in volume or weight.

CONCLUSION

Our survey of Newark's manufacturing sector has shown that firms are not generating waste in significant quantities, and that firms reuse and recycle when it makes economic sense to do so. The lack of discard generation is attributable to the economic imperative to minimize the amount of raw materials that are lost through production processes. A set of formal and informal networks predicated on the type and volume of discards facilitates disposal of the limited discards firms generate. The formal sector also has a set of actors that are often not thought of as partners in efforts to remove discards from the waste stream, to which scrap metal dealers and pallet distributors and refurbishers belong. Informal networks

are a part of many firms' discard practices; this arrangement allows firms to divert waste from their dumpsters, landfills and incinerators, with little cost to the firm. The materials that remain in the waste stream, from plastic shipping materials, textile scraps, and wood from shipping pallets and crates, are largely there because the economic incentive to keep them out of the waste stream does not exist.

One of the initial goals of this project was to understand how manufacturing discards might be reincorporated into the manufacturing sector, but the limited amount of durable material, without an established pathway for reuse or recycling frustrates this goal. Our investigation into the discard practices of Newark's manufacturers necessitated a better understanding of the pathways taken by manufacturing waste, and municipal solid waste generally. The combination of research on Newark's waste infrastructure, businesses already engaged in reuse and recycling, a vibrant arts scene, as well as a range of case studies outside of the region, have opened a new line of possibility. If the hopes for reuse in the manufacturing sector have been dashed, we have found opportunity in Newark's waste stream. Part II of this report presents aspects of this opportunity.

Floto + Warner, IceStone

3 OPPORTUNITIES FOR REUSE

Looking beyond manufacturing waste, we see several opportunities on which to build a materials reuse strategy in Newark: (1) The city's extensive waste management infrastructure, (2) The construction and demolition waste stream, (3) Other hard-to-process materials, and (4) Creative reuse activities. Our discussion of these opportunities draws on Newark's assets for a reuse program, and our research into reuse models in other cities.

NEWARK'S WASTE INFRASTRUCTURE

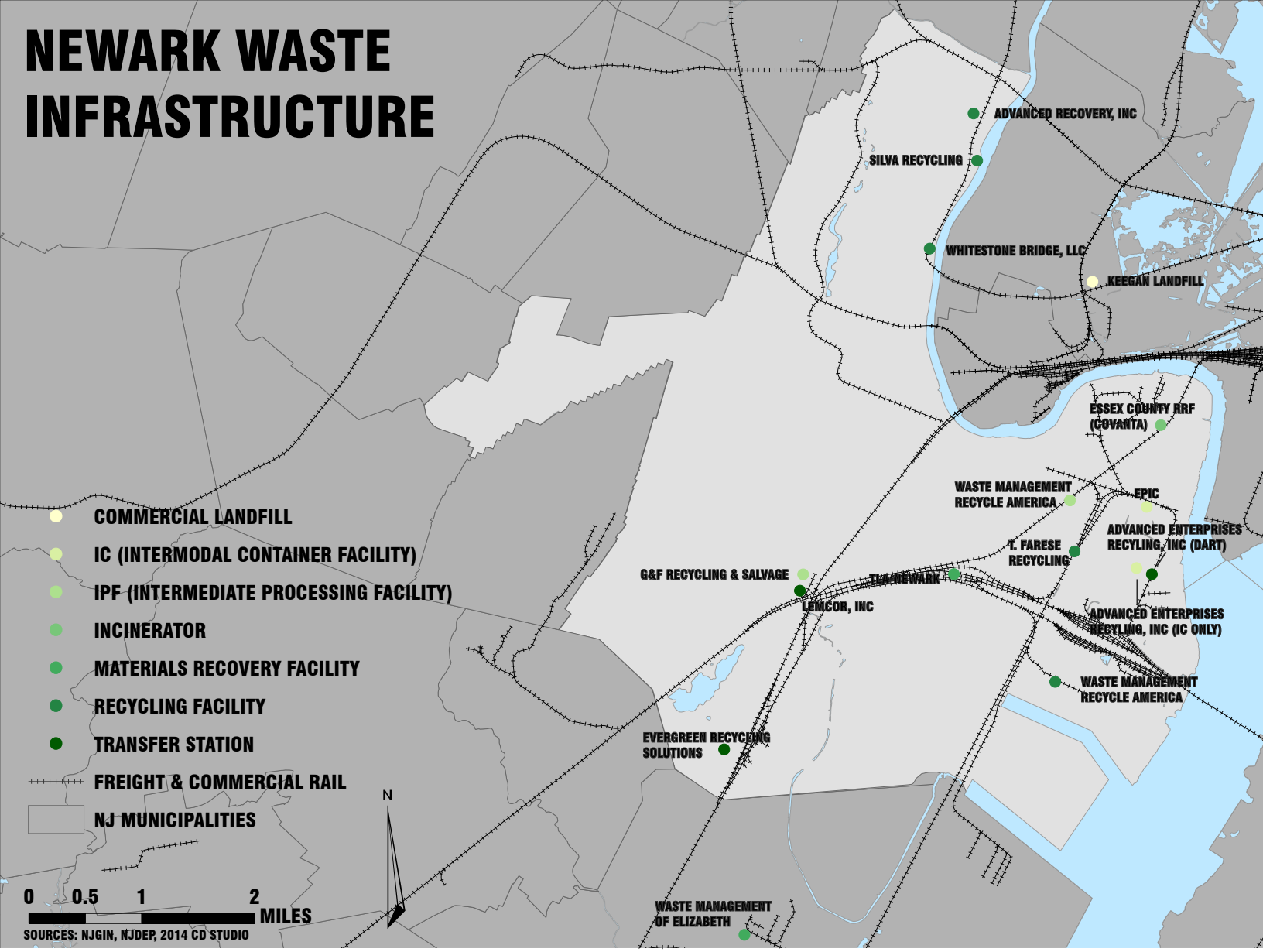
Newark is a hub for waste management in the Tri-State area. Supported by an extensive network of roads, rail, and ports, the city's multiple waste facilities serve the full range of waste processing activities from collection and sorting to disposal. High volumes of waste flow through Newark's facilities, which accept a broad range of waste types that originate not only in Newark, but throughout the region. Newark's waste infrastructure is a significant asset upon which a materials reuse program could be built, as it offers access points to capture valuable materials after they have been discarded and before they reach the landfill or are incinerated. Many successful organizations and businesses divert waste for productive reuse in this way, often profiting through resale or remanufacture of salvaged materials. In this section, we profile Newark's waste management infrastructure and the opportunities it presents for economic development through materials reuse.

WASTE FACILITIES & SOURCE POINTS

Home to New Jersey's largest incinerator, three waste transfer stations, and seven recycling facilities, Newark aggregates, distributes, and disposes of well over one million tons of solid waste each year (NJ DEP, 2012). Here, we present an overview of the city's major facilities and the waste streams they process.

Essex County Resource Recovery Facility (ECRRF), the incineration complex, is Newark's largest processor of waste by volume. As the table on page 15 illustrates, ECRRF received 824,954 tons of municipal solid waste (MSW) and dry industrial waste in 2012, or approximately 54 percent of all solid waste handled in Newark facilities that year (NJ DEP, 2012). The facility is located along the Passaic River in the city's East Ward, at the confluence of Interstate 95 and US Routes 1 and 9 (see map at top of pg 14). ECRRF employs a waste-to-energy model, combusting 2,800 tons of solid waste per day and generates approximately 65 megawatts of electricity (Covanta, 2014).

NEWARK WASTE INFRASTRUCTURE



Newark's three transfer stations, also located in the city's East Ward (see map at top of pg 14), are Doremus Avenue Recycling and Transfer (DART), Lemcor Solid Waste Transfer Station (Lemcor), and Evergreen Recycling Solutions (Evergreen). Transfer stations are the first stop on the path from waste collection to final disposal site (such as an incinerator or landfill). These facilities bale solid waste into larger loads and send the bales to a secondary treatment or disposal facility, typically via rail (US EPA, 2014). Some transfer stations also operate as material recovery facilities (MRFs), with the additional task of sorting waste by material type for more specialized handling. Recycling facilities are another prominent feature of Newark's waste network. There are five standard recycling facilities located throughout the city, and two that also serve as intermediate processing facilities – recycling facilities that receive source-separated and commingled recyclable containers to process into their component materials (NJ DEP, 2014).

Collectively, these facilities process a portion of Newark and Essex County's waste, but a substantial percentage of the material they receive originates in northern New Jersey counties, New York City, and elsewhere in the Tri-State area. Of the nearly 100 municipalities that send waste to ECRRF, New York City accounts for over half of the incoming volume; the majority of the remainder comes from Essex County, and Newark-sourced waste constitutes less than 15 percent of ECRRF's total intake (NJ DEP, 2012). The transfer stations handle much less waste from Essex County, and receive virtually no materials from Newark sources. DART, the largest of the stations by incoming volume, primarily receives municipal solid waste (MSW) from Hudson County and other northern New Jersey counties. Lemcor processes a mix of MSW, bulky waste, and construction and demolition (C&D) debris from

central and northern New Jersey (predominantly, Passaic, Bergen, and Somerset Counties). Evergreen is Newark's newest transfer station, opened in March 2012, and handles primarily C&D waste from throughout central and northern New Jersey (NJ DEP, 2012).

The significant volume of regional waste Newark's facilities handle is dictated, in part, by waste flow controls. Flow controls are legal provisions that allow local governments to designate where municipal solid waste is sent for processing, treatment, or disposal (US EPA, Flow Control and Municipal Solid Waste). The New Jersey Solid Waste Management Act of 1978 granted counties the authority to implement solid waste management plans that use flow control to avoid depending on out-of-state disposal (Essex County Solid Waste Management Plan). Not all counties adopted flow control measures but those that have, hold multiyear contracts with one or more waste processing facilities, which are identified as the exclusive destination(s) for the county's waste. Essex County's flow controls designate that its municipal/household, vegetative, and dry industrial waste are sent to ECRRF, and direct its commercially generated solid waste, bulky waste, C&D debris, and other materials not suitable for incineration, to facilities outside of Newark (the Waste Management MRF in Elizabeth, NJ or Keegan Landfill in Kearny, NJ). DART receives no material from Newark, and is Hudson County's MSW designated waste flow control point. Some non-Newark-sourced waste arrives in Newark facilities without flow control mandates. Passaic, Bergen, and Somerset Counties, for instance, do not use waste flow controls, and simply contract with Lemcor to accept their MSW (NJ DEP, County Plan Summary). Facility operating requirements present an additional reason for the influx of waste from elsewhere. The discards ECRRF receives from Newark and elsewhere in Essex County do not provide sufficient tonnage to operate the incinerator at optimum capacity; ECRRF contracts with other localities in the region to meet this minimum volume (Covanta Energy, 2013). As mentioned above, New York City is ECRRF's largest municipal source, accounting for over half the facility's intake.

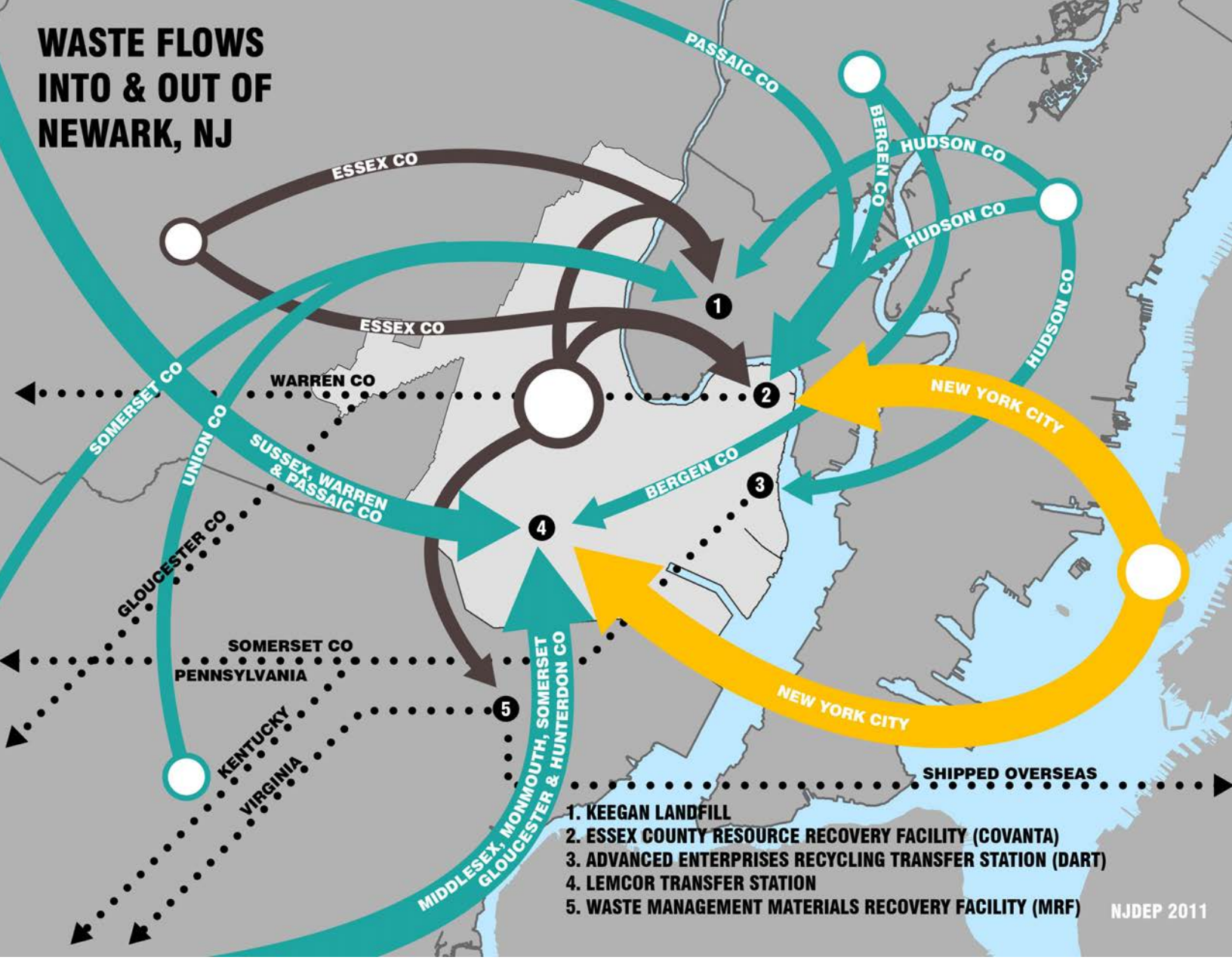
IMPLICATIONS FOR REUSE

While the siting of multiple waste management facilities in and near Newark has placed heavy environmental burdens on the city and its residents, Newark's waste management infra-

NEWARK SOLID WASTE FACILITIES: 2012 TONNAGE RECEIVED

FACILITY	WASTE TYPE	VOLUME (TONS)*	ORIGIN
Essex County Resource Recovery Facility (ECRRF) Owner/Operator: Covanta	Municipal, Dry Industrial	824,954	**New Jersey:** Bergen, Camden, Essex, Middlesex, Passaic, Somerset, Sussex, Warren **Other:** New York, Pennsylvania, International
Lemcor Transfer Station	Municipal, C&D, Bulky Waste	120,501	**New Jersey:** Atlantic, Bergen, Burlington, Camden, Essex, Gloucester, Hunterdon, Mercer, Middlesex, Monmouth, Ocean, Passaic, Salem, Somerset, Sussex, Warren **Other:** New York, Pennsylvania
Doremus Avenue Recycling and Transfer (DART)	Municipal, C&D, Bulky Waste, Dry Industrial	473,302	**New Jersey:** Bergen, Camden, Essex, Hudson, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Ocean **Other:** New York
Evergreen Recycling	Municipal, C&D, Bulky Waste, Dry Industrial	96,211	**New Jersey:** Atlantic, Bergen, Essex, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Union, Warren **Other:** New York
	TOTAL	**1,514,968**	

* Reported volume received January - November 2012
** Evergreen began operations in March 2012
Source: NJDEP, 2012



structure provides an opportunity to access materials for environmentally and economically productive reuse activities. Berkeley, California-based Urban Ore provides an example of leveraging waste facilities for positive reuse activities. Incorporated in 1981, Urban Ore is a for-profit salvage and retail enterprise with a mission to "end the age of waste" (Urban Ore, 2014). A city contract to salvage raw materials and reusable items at the municipal transfer station's tipping area allows the company to subsequently resell these goods, extracting economic value from Berkeley's waste flows. In 2013, Urban Ore employed 38 people and captured $2.6 million in revenue. The company began as a small-scale operation based at the municipal landfill, and has become a profitable reseller of high-value building materials and household items, about a quarter of which it still sources from waste facilities. While Urban Ore refurbishes or disassembles much of what it salvages before reselling, the company estimates that five percent of a transfer station's incoming waste can simply be dusted off and resold as-is (Knapp, 2014).

Because the waste Newark facilities process is sourced regionally, local reuse operations have the opportunity to access material discarded in Newark and in surrounding counties. Some facilities may be willing to set aside a hard-to-process material because it saves them the cost of handling it. Other materials may be more challenging for a city-led or supported reuse initiative to access. Unlike the Urban Ore example, none of Newark's waste management facilities fall under municipal control or ownership. In such cases, discussions with waste-source jurisdictions or waste hauling companies are other ways to explore the possibility of waste diversion for reuse.

CONSTRUCTION & DEMOLITION MATERIALS

Urban Ore salvages a range of discards including construction and demolition materials. C&D is a broad category; it includes rubble and debris from building construction, renovation, and tear-down, a good portion of which many cities recycle. In Newark, "concrete/asphalt/brick" was the most recycled material category in 2011 with a total of 193,304 tons reported, roughly 40 percent of the total volume recycled (NJ DEP, 2011). The C&D waste stream also includes decorative and structural building fixtures, non-ferrous metals (such as copper pipes) and other reusable and high-demand materials. As Urban Ore and many other successful groups across the country illustrate, reuse and recycling enterprises can create jobs and divert waste by salvaging valuable C&D materials. C&D discards are prominent in the waste that flows through Newark. In 2012, they represented 85 percent of the incoming waste to Evergreen transfer station and 46 percent of Lemcor's intake (NJ DEP, 2012). In this section, we will discuss two C&D reuse applications Newark could explore to leverage this waste stream: resale operations and deconstruction. We also discuss policy interventions to support these activities.

RESALE

There are many building materials resale operations across the country, with Habitat for Humanity's ReStores being the most ubiquitous. Managed by Habitat's local affiliates, hundreds of ReStore locations across the US and Canada sell surplus and used building materials and fixtures to the public at discounted prices (Habitat for Humanity, 2014). Unlike Urban Ore, which sources approximately a quarter of its inventory from the transfer station and provides some compensation for resalable donated items, ReStores, and most other resale operations, rely almost entirely on donations for their inventory (Knapp, 2014). Donors are motivated by a few economic factors. Contractors and haulers may donate materials because they would face fees or increased transportation costs to deposit their C&D waste at landfills or other conventional waste management facilities. There are also tax benefits because many resale operations incorporate as nonprofits; donors receive a tax deduction for the value of the materials donated.


Urban Ore

One such nonprofit is Build It Green! NYC (BIG), which is a retail outlet for salvaged and surplus building material with locations in Astoria and Brooklyn. Founded in 2004, BIG accepts, sorts, and sells a wide range of donated items in its two retail warehouses, from reclaimed wood floors and light fixtures to high-end appliances and theater props. They sell these materials at deep discounts, and are open to the public seven days a week (Build it Green, 2014). BIG operates a sawmill at the Astoria location, where a small staff transforms old scaffold planks and other reclaimed wood into wall paneling and other value-added products that contribute to the resale revenue stream. In partnership with GrowNYC, BIG assembles raised gardens from salvaged wood and compost from its on-site vermiculture compost program to support community gardens in New York City (Welch and Luscombe, 2014).

ReBuilding Exchange (RX), another nonprofit resale enterprise, was borne out of the City of Chicago's initiative to reduce the high volume of C&D discards in its waste stream. The city partnered with Delta Institute, an organization that promotes and funds sustainable economic development projects in the Great Lakes region, to launch RX in 2009. The RX business model is similar to BIG's; the organi-

Build It Green NYC

zation receives donations of reclaimed building materials and fixtures and sells them to the public from a retail warehouse. Since its inception, RX has diverted approximately 11,000 pounds of C&D materials from landfills. To promote sales, it maintains an online catalog of currently available materials. Taking advantage of its extensive inventory, RX recently launched a project called RX Made to 'upcycle' salvaged wood and other materials into furniture that can be purchased in the retail warehouse, online, or by custom order. The RX Made workshop also provides over 100 DIY classes each year, teaching local community members how to embark on their own reuse projects and promoting reuse activities and awareness (ReBuilding Exchange, 2014).

In addition to waste diversion impact, many resale operations emphasize job training and employment. Urban Ore's staff has grown from 4 employees in 1981 to 38 in 2014, and is comprised mostly of full-time, hourly workers (Knapp, 2014; Green America, 2014). Typical of resale operations, jobs at Urban Ore are low-skill and range in physical requirements, from retail to warehousing positions (Knapp, 2014). The nonprofit resale outfits we researched have fewer employees than Urban Ore, but many promote workforce development by operating or partnering with job training programs. ReBuilding Exchange, for instance, has 14 staff members, and supplements this workforce with a cadre of volunteers, approximately 100 in total. Excluding its own staff and volunteers, RX has provided job training for more than 80 individuals with barriers to employment, such as formerly incarcerated individuals and those struggling with homelessness and substance abuse (Lepeska, 2012). With funding from several national and local foundations, the organization partners with workforce development groups to provide training in building deconstruction, retail, carpentry, and other related fields (ReBuilding Exchange, 2014). Build It Green! NYC and other resale operations provide similar training with the support of public and private funding and job training initiatives (Luscombe and Welch, 2014).

DECONSTRUCTION

Deconstruction is one source of materials donated to resale operations. Deconstruction differs from demolition in that it involves taking structures apart carefully by material type, which results in much higher rates of intact material recovery. Because deconstruction requires more time and more highly-skilled labor than demolition, it creates more and typically higher-paying jobs. And deconstruction training prepares individuals for a range of work opportunities: it provides a specialized skillset in a growing industry, and it arms trainees with skills valuable in many building-related trades. Decon-

struction yields tax benefits for those renovating or removing buildings when, as discussed previously, they donate salvageable building materials to a nonprofit resale operation or other 501(c)3 organization. The practice offers subtler social benefits. Because deconstruction is a quieter, more delicate process than demolition, it has been hailed by neighboring residents as a more respectful and less traumatic form of structural removal, particularly in communities struggling during the housing crisis (Bayne, 2013).


Build It Green NYC

Deconstruction contractors range from small 2-person dismantling teams to larger firms that might provide deconstruction and building services. The ReUse People (TRP), a non-profit based in Oakland, CA, takes a comprehensive approach that includes deconstruction work, resale, and extensive support for the growing industry. From its 14 locations across the country, TRP appraises buildings to assess the value of salvageable materials, deconstructs to remove materials in a reusable form, and resells those materials at its own retail warehouses. It estimates it can salvage approximately 80 percent of materials from a given deconstruction project, creating a high volume of inventory for its retail outlets and generating significant waste diversion benefits. Between 1993 and 2013, its efforts helped divert 370,000 tons of waste from landfills. Through its Reuse Institute, TRP has trained over 500 unemployed, underemployed and low-skill workers since 1993. To help create jobs for these trainees, the organization has provided deconstruction training for over 70 traditional contractors (The ReUse People, 2014). Workshops are also offered in retail warehouse operations, and TRP is working with the Building Materials Reuse Association to develop a program that will help managers of building material reuse enterprises better understand the laws, technicalities, and other issues associated with hazardous materials (Reiff, 2014).

The ReUse Institute consults with local governments and private groups interested in launching or growing deconstruction efforts, and could provide helpful technical assistance if the Office of Sustainability were to consider a deconstruction strategy in Newark (The Reuse People, 2014). The city has many properties that will be in need of renovation or removal, owing in part to its aging housing stock and the foreclosure crisis. Renovation projects in the communities surrounding Newark could provide additional demand for deconstruction; indeed, much of TRP's deconstruction work is done in wealthier suburban areas. This landscape could prove a fertile deconstruction training ground for Newark's large and relatively low-skill workforce, and could generate a stream of materials to resell or otherwise productively reuse. To help launch such deconstruction activities, the Office of Sustainability can leverage state and federal funding sources that support workforce development and waste reduction activities, as have been used by the groups we researched (Reiff, 2014; ReBuilding Exchange, 2014; Build It Green, 2014). For instance, the Department of Environmental Protection's Region 2 (which includes Newark) provides financial support to incubate deconstruction firms through its Small Business Innovation Research (SBIR) program (US EPA, 2014). The Office can also build partnerships and awareness to develop the secondary markets (such as resale operations) necessary for deconstruction to have the desired environmental and economic impact.

POLICY SUPPORT

Even where cities and other actors have tapped the aforementioned funding sources and built the infrastructure to support deconstruction activities, demolition maintains a significant cost advantage. The time- and labor-intensive nature of

deconstruction makes it a lengthier and more expensive process than demolition. This price disparity can exist even when factoring in a potential tax break for donating salvaged building materials. To make deconstruction more economically viable, and thus promote waste diversion and job creation, local governments have developed supportive policies that reduce contractors' time and costs, which ideally allows the contractors to lower their deconstruction fees. Seattle, for example, lowers demolition permit costs for projects that use deconstruction, and allows deconstruction during the rainy season, when demolition is not permitted due to seismic considerations. Los Alto Hills, CA expedites plan checks for projects that include deconstruction (Reiff, 2014).


Build It Green NYC

Many cities, counties, and states have enacted rules that require property owners divert a certain percentage of construction or demolition waste. These diversion ordinances are typically fee-enforced, and the diversion quota varies by location and project type. Seattle's municipal code requires contractors to recycle or reuse all asphalt, brick, and concrete and 50 percent of other building materials. The city tracks compliance by requiring an initial waste diversion plan and a final diversion report (Seattle Department of Planning and Development, 2014). Cook County, Illinois' ordinance mandates that 5 percent of materials be reused, in addition to a 70 percent recycling requirement (Cook County Board of Commissioners, 2012). Some municipalities, including Plano, TX, structure their waste diversion programs as construction and demolition deposit (CDD) ordinances. The rules require that property owners pay a deposit when they apply for a building or demolition permit; the municipality returns this deposit at project completion if the property owner can demonstrate that they diverted the specified amount of C&D waste. To encourage compliance, municipalities set the deposit higher than the cost of diverting project debris. And some issue a list of approved recovery and reuse facilities, which help property owners and contractors meet diversion requirements and support local material recovery businesses (Day, 2014). Some of the reuse practitioners we spoke with cited public awareness and technical assistance as critical to their success and continued growth.

HARD TO PROCESS DISCARDS

The previous section described the opportunity that may exist with respect to Newark's C&D waste stream and aging housing stock. C&D waste is one type of hard-to-process material, materials that are labor-intensive, costly, or otherwise difficult for facilities to handle or dispose of, that could be a source of waste diversion and job creation, but it is but one subset of waste types that have that potential. As the case of Urban Ore highlighted, C&D material can maintain its value when commingled with other waste types, but that isn't true of all discards. Other hard-to-process materials such as glass, mattresses, carpet and e-waste lose all or some of their potential value when mixed with other waste types. Despite the challenges, reuse enterprises have developed efficient means of capturing these materials from the waste stream, often achieving job creation and waste reduction outcomes. Ideally, these waste types are captured prior to entering the waste stream. Glass tends to be recycled less than in the past because the commingling of the different colored glasses, which

have different melting points, through single-stream recycling frustrates recycling efforts. This has resulted in glass being used as alternate daily cover in landfills throughout much of New Jersey. But one company in New York City, IceStone, uses recycled glass to make countertops. Another example of working with hard-to-process materials is the St. Vincent de Paul Society of Lane County, Oregon, which diverts more than 170,000 mattresses annually, breaking down their cotton, foam, wood, and steel components for recycling. In so doing, the organization creates entry-level jobs for individuals who have difficulty finding work, and keeps millions of pounds of material out of landfills (St. Vincent de Paul Society, 2013). There are also firms in Newark that are attempting to capitalize on the opportunity that hard-to-process materials present. We profile two firms working with hard-to-process materials present in Newark's waste stream, carpet and e-waste. Profiling these firms is not intended to suggest that these particular businesses should be replicated, but instead the intention is to highlight that firms working to develop a viable model using waste as an input experience a set of challenges that are diverse in origin and effect. We also want to convey that despite these challenges, firms find Newark a suitable location because of its reasonable real estate costs, proximity to major regional markets, and access to other firms engaged in recycling activities and that despite the challenges of these materials, firms are developing ways to recycle them.

CARPET

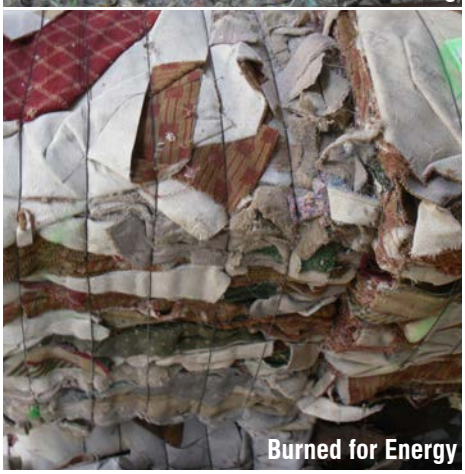
Disposing of post-consumer and post-industrial carpet (herein simply referred to as post-consumer) is problematic because it is a high-volume, non-biodegradable material (nearly 95 percent of all carpeting is made of plastic). In addition to taking up valuable space, disposing of carpet in landfills increases the potential that chemicals from carpet will be released into waterways and underground aquifers (Eggen et al., 2010). Recycling carpet is an option, but the extent to which carpet fibers, backing and padding can be recycled is contingent upon the method of installation, the materials it is made of, and the degree of contamination (which occurs through daily use and disposal). Some of the most common uses for recycled carpeting and its components are molded plastics, new carpet system components (fiber, backing, cushion/padding), and as an alternative energy source, but carpet recycling is currently limited to about 7 percent of the 4 billion pounds of discarded carpet annually (Muzzy, 2005; Realff, 2011; CARE, 2011). This is largely a function of the disproportionate cost of transportation and handling of post-consumer carpet in relation to the relatively low production costs of new synthetic polymers for carpet (Subbiah, 2008; Trezza, 2014). In response to these challenges and the desirability among government, industry, and consumers for recycling, there has been a coordinated effort to find ways to increase the landfill diversion rate of carpet through recycling.

Although carpet continues to present a significant challenge to the goal of waste diversion, we identify a nationally-based public-private partnership that serves to further these goals. The Carpet America Recovery Effort (CARE) is a public-private partnership between the carpet industry (90 percent of US carpet manufacturers are represented by CARE) and government agencies. Between 2000 and 2010 CARE has diverted 2 billion pounds of carpet from the waste stream for recycling and reuse (Petru, 2011). While regulation and policy that makes carpet recycling more economically viable has been fairly limited in the US, California has enacted legislation in partnership with CARE to address this obstacle to carpet recycling. The California Carpet Stewardship Bill (AB 2398) requires that carpet manufacturers collect $0.05 per square yard of carpet sold. CARE collects this fee, which is then distributed to carpet recyclers; carpet manufacturers can construct their own recycling plans if they choose not to coordinate with the CARE initiative. Within this public-private agreement, the California

Countertop made from recycled glass - IceStone


Pellets


Padding


Burned for Energy

Department of Resources Recycling and Recovery (CalRecycle) oversees the process rather than actively facilitating it. In this unique role as a passive state agency, CalRecycle is responsible for monitoring the program's progress, ensuring that all carpet manufacturers are treated equally, and overseeing plan review and approval. Despite the absence of comparable legislation in New Jersey, one Newark firm has found a way to divert carpet from landfills while creating jobs through their carpet recycling operation.

CarpetCycle built a business model that has endured since 1999. Always a New Jersey company, CarpetCycle relocated to Newark in 2012 and is the only firm in New Jersey that recycles post-consumer carpet, and only one of a few that does so between Boston and Washington, D.C. The firm is engaged in three primary activities: recycling carpet, recycling ceiling tiles, and working as a sub-contractor for the removal of ceiling tiles and carpet. The sub-contracting division of the firm is the most profitable aspect of their business but finding profitable ways to recycle much of the reclaimed carpet has proven challenging. One of the most challenging aspects of the business results from the fact that carpet is often disposed of at no cost to the consumer via municipal pick-up or removal by the carpet installer, which puts firms like CarpetCycle at a competitive disadvantage because the costs of transportation and handling make individual home or business pick-up relatively expensive. As a result, most of their business is with large institutions and companies that are not able to use municipal waste services and must contract the removal separately. Under such an arrangement CarpetCycle can remove post-consumer carpet for approximately $40 per ton, a significant savings over municipal waste removal costs that are roughly twice that amount. Absent regulatory reform and partnerships with municipalities and counties that would increase the amount of carpet diverted from landfills, the firm is currently operating well below capacity. With access to approximately only 10 percent of the New Jersey's post-consumer carpet, they are operating at about 30 percent of their capacity with carpet originating in New Jersey constituting about half of that. Even at this reduced capacity, the firm employs nearly 40 employees and hopes that they can find ways to work with counties and municipalities to capitalize on their operational capacity in Newark and bring more jobs to the city.

E-WASTE

Electronic waste, or "e-waste," is one of the most difficult and expensive material types to process, and, if not disposed of properly, can be a major source of toxins and carcinogens harmful to human and environmental health. It also, however, contains many valuable secondary raw materials. Many profitable e-waste recycling companies have capitalized on this residual value and regulations that restrict e-waste disposal. They collect a wide range of discarded electronics, refurbish them for resale if possible, and strip their component raw materials for sale when restoration is not viable. Some businesses have incorporated a workforce development component. Los Angeles-based Isidore Electronics Recycling provides job training and employment opportunities for formerly incarcerated Angelenos (Isidore Electronics Recycling, 2014a). While e-waste is a relatively small percentage of total municipal solid waste, the annual volume collected in New Jersey is still significant (48.1 million pounds in 2012) (Lawson, 2014). Further, a state statute amended in 2009 requires that manufacturers of "covered electronic devices" (televisions, computers and computer monitors, laptops, tablets) establish a recycling program. An e-waste salvage business willing to operate such a program

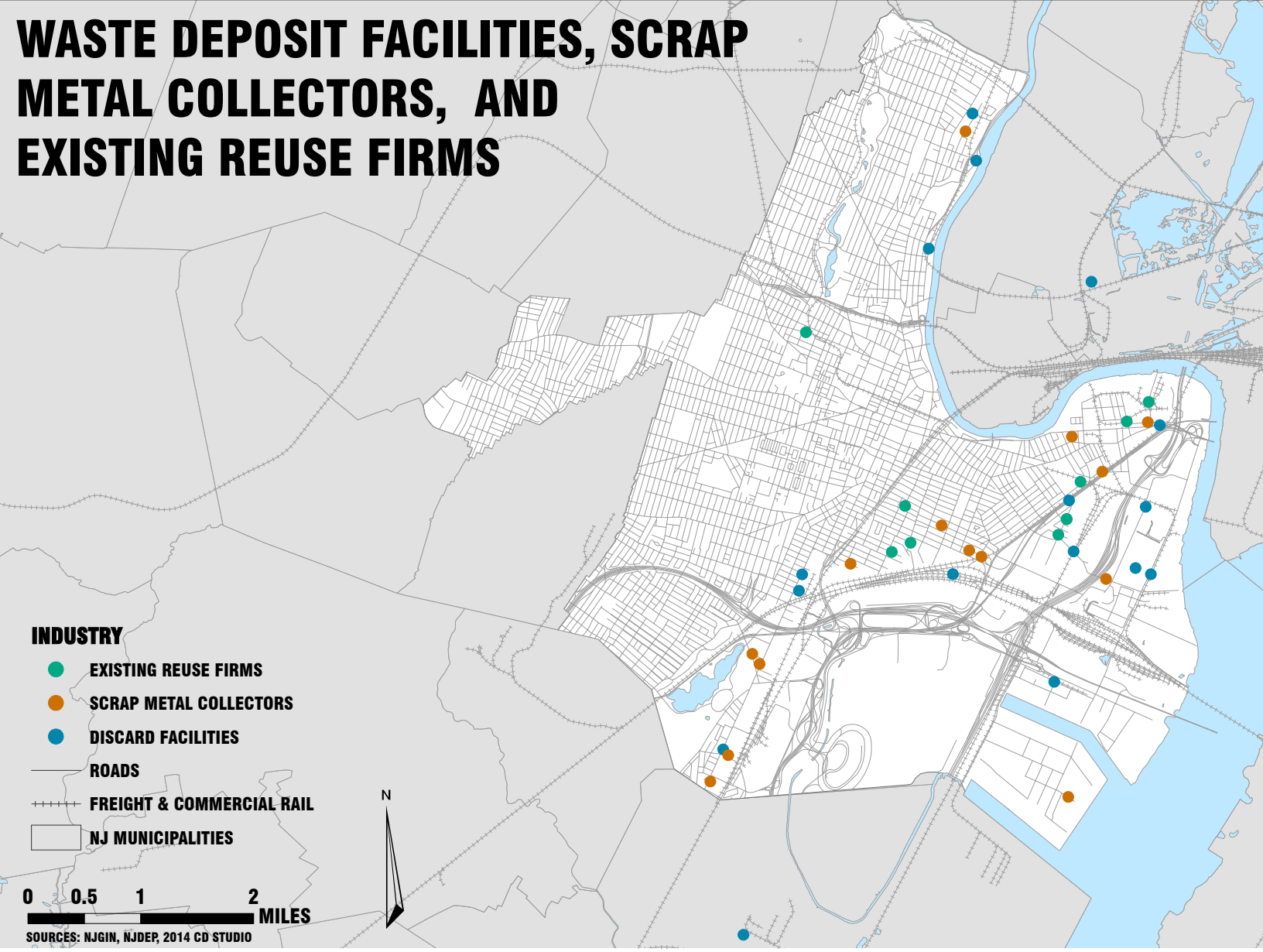
could find collaboration and a steady supply of material from these manufacturers, but there are challenges with electronic device manufacturer compliance including illegal dumping and state licensing structures that require recyclers to pay fees that neighboring states don't.

The market structure that allows e-waste recycling firms to exist is largely a result of legislative action. The regulatory framework established in New Jersey through the Electronic Waste Management Act, and its subsequent amendments, requires that manufacturers of covered electronic devices (CEDs) assume responsibility for the creation and management of electronic waste recycling programs in the state. Some of the key features of the legislation is that e-waste recycling be made available to state residents at no charge, that the manufacturer obligation for recycling is based upon the previous year's market share (converted into weight), and that collection and recycling operations can be contracted out to third party firms (NJ Electronic Waste Management Act, 2008, 2009, 2010). Another set of regulations govern the third party firms that manage e-waste collection and recycling. An amendment to the 2002 Universal Waste Rule classified e-waste as a universal waste (UW), which prevents it from being handled with municipal solid waste. Within this classification two categories exist: small quantity handlers (which possess at any given time less than 5,000 kilograms of UW and are permitted to demanufacture e-waste), and large quantity handlers (those firms that hold at any given time more than 5,000 kilograms of universal waste and are prohibited from demanufacturing e-waste). The fees for either classification are less than $1,000 per annum (NJ Universal Waste Handler fee schedule, 2014). Any firm classified as a large quantity handler of e-waste (a category of UW) that would like to begin demanufacturing e-waste has to be licensed as a Class D recycling facility which entails annual fees that total nearly $20,000 for state administration and compliance (NJ Recycling Rules § 7:26A-2.1, 2012). Of note is the fact that in the state of New York those engaging in similar work, either consolidation or demanufacture of e-waste, are subject to a one-time $250 fee (NY Environmental Conversation Law § 27-2613.3, 2014). The state of New York has a CED manufacturer law that is very similar to that of New Jersey requiring that CEDs be recycled predicated upon the firm's market share and allowing for third party collection and recycling firms to be contracted for this obligation (NY Environmental Conversation Law § 27-2603, 2014). Newark is home to a firm that has realized the opportunity that the mandates for e-waste recycling offer while navigating New York and New Jersey's regulations to maintain its economic viability.

In operation since 1991, Advanced Recovery relocated from Belleville, NJ into the Mount Pleasant neighborhood of Newark in 2002 as part of an expansion plan. At this location, the firm accepts unwanted consumer electronics which it sends to its location

in Port Jervis, NY for demanufacture or resells on an auction website from its location in Newark. The amended NJ statue that required manufacturers to establish a CED recycling program allowed Advanced Recovery to partner with nearly 30 municipalities, but this number has dwindled as the competition for contracts between third party recyclers like Advanced Recovery and electronic manufacturers has reduced the price per pound by over 70 percent since the enactment of the amendment. The concomitant factors of low contract values from CED manufacturers and the costs of handling and transportation to their Port Jervis, NY recycling facility has limited the firm's ability to expand their operations in the City of Newark, despite a voiced desire to do so. Advanced Recovery finds Newark a great place to do business; not only are they able to access reasonably priced space for their operation, nearly all of the recycling firms they work with are located in Newark (after extraction of the recyclable e-waste elements in Port Jervis, NY, they transport them back to Newark for sale to recyclers). If they could find a way to address the state regulatory structure, they said they would like to relocate their recycling operations to Newark, thus creating more jobs and reducing the transportation effects of trucking material in and out of the city.

Hard-to-process materials are called that for a reason; not only do their physical characteristics present problems for handling and disposal, but their potential for reuse is measured against the cost of using virgin materials. The margins for recycling carpet are thin and rely heavily upon proprietary methods of separating carpet fibers from backing. CarpetCycle loses money when it is not able to consolidate truckloads of carpeting for shipment to its facility or augment its recycling work with removal and demolition contracting. E-waste is viable because of the precious metals that are extracted and the monies received from manufacturers, but this is contingent upon a firm's business model, location, and other factors that can influence its expenditures and revenues. The firms we have profiled in Newark find significant benefit in Newark as a suitable site, but this is relative and part of a range of circumstances that influence how they make their business decisions. Changes in the cost of real estate, market value of their processed materials, regulation, and transportation costs are just a few of the external factors that could benefit or adversely impact the economic viability of these firms. There are also internal factors including productivity, research and development, and organizational structure that can affect how successful these firms are at diverting waste and contributing to Newark's economy. The profiles in this section have offered illustrations of how hard-to-process materials, with some intrinsic value, have become central to the operation of some firms in

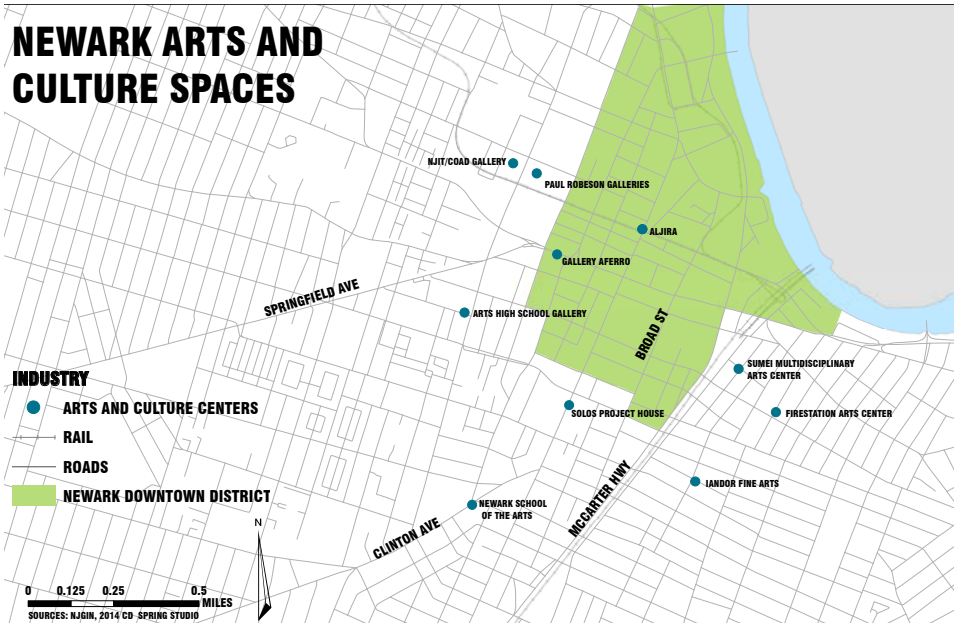


Newark. Our earlier discussion of the limited value of some materials, such as textile scraps, points to the need to consider how some materials, in the manufacturing and municipal waste streams, have limited intrinsic value and might only find reuse within a model that is not only motivated by profit. Creative reuse is one such possibility.

CREATIVE REUSE

In cities throughout the United States there are efforts to divert waste from landfills and incinerators while fostering and supporting local artists and art communities. This opportunity has relied upon an extant arts infrastructure and the inevitable discarded items that are found throughout cities and regions. Within Newark there is a vibrant art scene comprised of activities including galleries, educational institutions, arts-themed redevelopment districts, events and shops. Located near Downtown (see map at top of pg 26) are formal gallery spaces, such as Aljira, that host some of Newark's more established artists while another set of galleries, located in or near the Arts District, are more oriented toward cultivating up-and-coming local artists and developing ties with Newark's diverse communities. The range of spaces that host Newark's burgeoning artists is diverse; located in Downtown, the Gateway Center exhibits art installations throughout its skyways and the Prospect Street Firehouse in the Ironbound neighborhood has been repurposed into a gallery that specializes in displaying local and regional art (Prospect Firestation). Galleries such as City WithOut Walls provide support for Newark's art scene that includes outreach and mentoring in the public schools, exhibition programs, internships, artist residency and apprenticeship programs. City WithOut Walls also partners with community organizations for afterschool

programming that features youth employment and training to foster the connection between participants and their neighborhoods (City WithOut Walls website). Another innovative approach has been the integration of artist studio space with the function of a gallery. This has been achieved in two ways; one is through the creation of Solos Project House, which primarily functions as artist studios, but a communal space has been preserved for "meet the artist" events and exhibitions of local artists' work. The other is through the annual Open Doors events coordinated and hosted by Newark Arts Council that brings the public into the studio spaces of local artists (McGlone, 2013). The Artisan Collective is a retail outlet for locally produced goods owned by four local artists. It serves not only as a place to purchase arts and crafts, some of which are produced with found objects, but it also offers social events that brings together artists and their patrons (The Artisan Collective website 2014). The local art scene also has a set of more institutionalized forms anchored by the public Arts High School, the Newark School of the Arts, and New Jersey Institute of Technology's (NJIT) School of Art and Design (Arts High School website; Newark School of the Arts website; NJIT website). The city has also demonstrated its dedication to art and culture by making it a central feature of urban redevelopment efforts with the establishment of the Lincoln Park/ Coast Cultural District (LPCCD) in addition to its prominence in recent city planning (LPCCD website; Newark Dept. of Housing and Economic Development 2008, 2009 & 2012). Newark's already existing set of arts and culture assets in combination with an established understanding of the importance of art for the city's future may prove to be valuable when considering how to deal with some of the manufacturing discards entering the waste stream.



As mentioned earlier, part of our research involved talking to people involved in the Newark arts scene to determine if there might be interest in some of the discards coming out of the city's manufacturing sector. One of the ways we did this was to determine if found objects were already being used by Newark's artists. In our discussions with gallery managers and artists we discovered that a number of up-and-coming artists were incorporating found objects into their art, and there are nationally recognized artists, such as Chakaia Booker and Willie Cole, who have had tremendous success using found media. In addition to this, we also tried to gauge the interest of artists in having access to discarded materials, and while our conversations were general, our questions about this aspect of the project were met with interest and enthusiasm. The strength of Newark's burgeoning art scene, the voiced interest in access to discarded materials, and the presence of local artists working with found objects suggests that considering fostering collaboration between the manufacturing and art communities may be productive.

The combination of a burgeoning art scene, and municipal and manufacturing waste streams, suggests creative reuse might be an avenue for achieving multiple goals - namely strengthening the vast art scene and diverting discards from the waste stream. While we are not prescribing creative reuse as a panacea or a specific reuse model that the city should pursue, it may be beneficial to understand how other places have approached the creative reuse of normally discarded materials. In New York City, the nonprofit Materials for the Arts (MFTA) has been able to capitalize on the vast amount of discarded items throughout the city and a well-established arts scene to provide materials at no cost to artists, students, and educators engaged in some form of "public art." In addition to providing a range of art supplies and materials, the organization also provides on-site and off-site opportunities for children in the city's schools

while also training teachers in how to incorporate discarded materials into their teaching (MTFA, 2014). MFTA was launched by the NYC Department of Cultural Affairs (NYC DCA) in 1978 and operates with the mission to promote "creative reuse" while diverting hundreds of thousands of pounds of waste from landfill each year (MTFA, 2011). Collaboration with different city departments, including the NYC DCA, Dept. of Sanitation, and Dept. of Education, and a range of donors and supporters, has contributed to the ongoing success of MTFA's efforts to encourage a reevaluation and redefinition of what constitutes waste and art materials (MTFA, 2012). Much of the foundation funding that MTFA has been able to obtain is the result of grant programs to encourage the inclusion of art in education (Kaiser, 2014).

Materials for the Arts


Olek, Materials for the Arts

The Scrap Exchange in Durham, NC presents another take on the non-profit creative reuse model. Instead of offering free materials to those engaged in "public art," The Scrap Exchange retails its items at deeply reduced prices and offers fee-for-service programming. The Exchange is almost fully self-funded, with the majority of its funding generated by these two key revenue streams. Their educational work on the viability of discarded items for use in art is similar to that of MTFA. The Exchange leads instructional art events through its "Events by the Truckload," where staff bring materials and hold creative play sessions at partnering schools and lead instructional creative art sessions at their warehouse (Woodward, 2014). These services are also provided to the general public, within Durham and the larger region. Educating potential users of discards for art is not the only challenge that exchanges face; issues concerning space, coordinating pick-up/drop-off and processing discards for reuse and initial start-up support are real challenges.

Although there are similarities in the activities of MFTA and the Exchange, there are distinctions in the two models. The main differences lie in the public's access to materials, types of materials collected, funding structure, programming and outreach activities, and geographic scope of operations. The MFTA has a focused mission, which requires a public purpose for the use of the materials that it donates to qualifying individuals or organizations. However, these materials are then provided at no cost. The Exchange has no stipulations on who has access to the materials, but they do not provide the materials for free. Because of the availability and location of the Exchange within a larger art center (with neighboring art galleries and event centers), the center serves as a cultural and entertainment destination for downtown Durham. Additionally, the MFTA primarily receives post-consumer goods, where the Exchange collects and accepts durable discards from manufacturers, in addition to residential post-consumer goods. Both

entities rely on outside grant funding, but the Exchange supports much of their efforts through retail, fee-for-service and other outreach programming. Finally, the MFTA focuses its efforts largely on the city of New York, where the Exchange more broadly focuses on serving a regional need for waste diversion, art education and outreach programming.

Successful development of an arts exchange or arts reuse program hinges on the degree to which the initial challenges for such an effort can be lessened. Our research has identified the need for low-cost space as one of the foremost elements of a creative reuse endeavor. The space needed to provide the items to users, sort donated items, and store unsorted items can be significant depending on the scope of the project. Newark's stock of lower-cost property is an asset for a project of this nature, but tension between a convenient and accessible location and redevelopment efforts in areas that might fit this requirement may pose a challenge. This could be overcome by linking an arts reuse center to an existing or new reuse business that has additional space, such as a thrift store or other used product resale center. Such a space would also have to take into consideration how materials will reach the facility; on-site donations will have to accommodate a variety of vehicle types without posing traffic-related problems for other businesses or people living nearby. While on-site donations may reduce the need for vehicles and employees or volunteers to perform donation pick-ups, if manufacturers are a part of the donation stream, they will find little incentive to abandon their current mode of discard disposal if they incur additional costs through participation. The Scrap Exchange has been successful in working directly with manufacturers to incentivize participation in a collection program, by providing collection services at no cost, containers for the storage of discards until ready for pickup, and a tax letter for the value of the donation (Woodward, 2014). Start-up support will vary and there is no way to predict the number of meanings this may have for an endeavor like this in Newark. Nonetheless, the Office of Sustainability may be able to assist the development of an arts reuse project by helping develop the exchange and building local government collaborations. In addition, the broad collaboration seen with MTFA could prove helpful for a similar endeavor in Newark, but the potential for collaboration between the various city departments will need to be realistically appraised by those involved in the planning of such an effort. Newark has a number of assets that make the consideration of creative reuse activity feasible, but recognition of the challenges is essential.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There are a few points that must be made with regards to creative reuse models more generally. First and foremost, there are a variety of creative reuse models and the cases presented serve as possible examples, but do not capture the entire realm of possibilities for creative reuse. The amount of waste that can be realistically diverted from the waste stream varies and is subject to a range of factors; MTFA diverts nearly 500 tons each year, whereas The Scrap Exchange diverts 70 tons annually. Measured against the more than one million tons that flow through Newark each year, the impact that such an approach can have to waste diversion could be limited. The scale and scope of the program will likely determine the potential for the model to serve as an economic or community development driver; job creation can vary substantially. MTFA and The Scrap Exchange employ a number of individuals for their reuse efforts and outreach programming, but the organizations still rely on a substantial amount of volunteer hours to preform critical work such as sorting and cataloging donated items (MTFA, 2012; Woodward, 2014). The largest impact from the development of a project of this type may be the value that it has to act as a resource for the local community, serving as a destination for guests and locals seeking entertainment, but also

entrepreneurs, artists, teachers, and community members seeking access to raw materials or training in a specific craft. Depending on the location of such a resource, bringing more people to an area might invigorate the local economy. In addition, a creative reuse center could enhance the image of Newark's arts community and as a city concerned with waste diversion. Pursuing this as an avenue for the cultivation of this image should rely upon the existing arts infrastructure and include a range of participants in planning for such a project. Tapping those in the arts community, reaching interested parties throughout Newark's city departments, and working with manufacturers can be a foundation for not only a program that meets the varied needs of those involved, but also a way of capitalizing on the available governmental and foundation grants that will be essential to the fiscal viability of a creative reuse program.

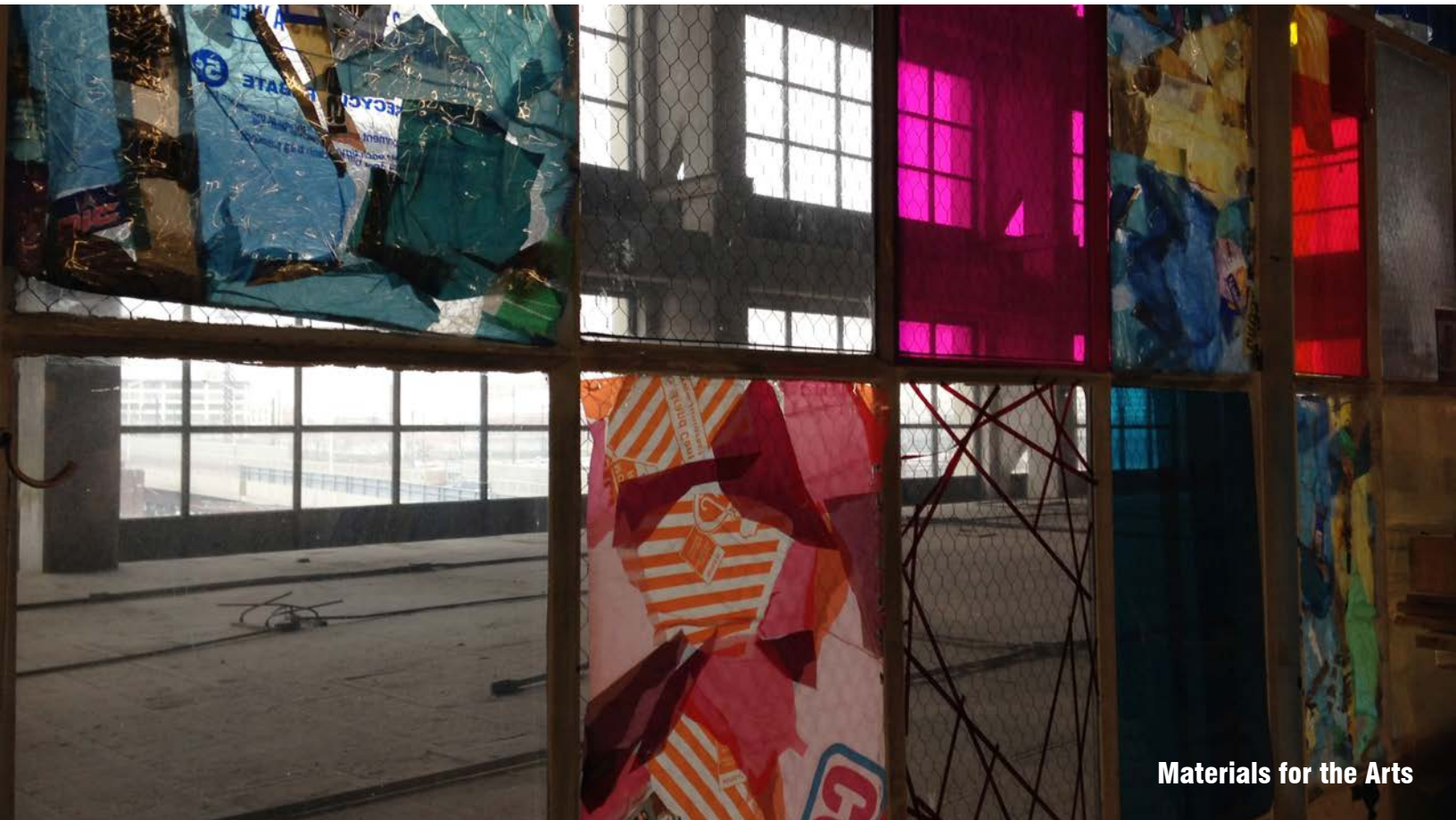
CONCLUSION

The Office of Sustainability and other city entities can do a number of things to leverage the opportunities for reuse and recycling activities discussed above. The table on the bottom of page 30 illustrates this range of local government assistance, identifying the forms of municipal support that have been critical to some of the reuse businesses and organizations we researched. Full case studies in the appendix offer other examples of how municipalities have supported, enhanced, and in some cases operated reuse programs and businesses. Here, we summarize these city government roles, which we broadly group into policy approaches and program/business development activities.

POLICIES AND REGULATION

Mindful of limited landfill space, costly waste management practices, and growing global warming and environmental health concerns, many cities have adopted policies designed to reduce their waste streams and foster job creation. As discussed previously, many of these policies concern construction and demolition discards and the secondary markets for their reuse. More broadly, we found policy interventions such as landfill bans and "pay-as-you-throw" policies to discourage conventional disposal of hard-to-process or hazardous items, comprehensive recycling mandates and "Zero-Waste" initiatives supported by public awareness campaigns, and comprehensive initiatives designed specifically to drive economic development through waste diversion.

California's Recycling Market Development Zones (RMDZ) program, developed to help meet statutory recycling and waste reduction targets, exemplifies this comprehensive approach. The RMDZ program provides low-cost financing, tax abatements, product promotion, and other incentives to businesses that



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locate in designated districts and divert materials from the traditional waste stream (CalRecycle, 2014a). While the program is administered by the State and relies considerably on state and federal funding, municipalities provide many additional incentives, such as relaxed building codes and land use controls, streamlined permitting processes, and tax abatements (CalRecycle, 2014a). Much of the support provided by regional "zone administrators" in the California model (such as business guidance and marketing assistance) could also be implemented at the local level. The RMDZ program is not only a model for supporting waste-diverting businesses, it also illustrates the benefits of developing geographic hubs around infrastructure advantageous to material reuse and recovery activities—much like Newark's existing transportation and waste management networks. Such hubs provide opportunities for resource-sharing, co-promotion, and other collaboration amongst recycling and reuse firms.

PROGRAM & BUSINESS DEVELOPMENT

Through our case study research, we identified numerous municipal actions that proved integral to incubating new reuse programs and businesses or to strengthening existing materials recovery


Urban Ore

activities. Some of the most effective and predominant include granting direct or indirect financial support, providing guidance and technical assistance, and fostering partnerships and larger networks to support these entities.

Direct financial assistance is an obvious means of supporting new and existing reuse activities. While funding for general operating support was scarce in our scan, some cities provide restricted funding for capital projects, programming, or other specific uses. The Scrap Exchange, for instance, benefitted from annual grants from the city to sponsor a volunteer coordinator position (The Scrap Exchange, 2014a). Restricted or not, direct financial support is not often a feasible alternative for budget-constrained municipalities. Indirect assistance is typically more viable, and might include providing reduced-cost real estate or eliminating permitting and licensing fees. As mentioned above, The Scrap Exchange and Urban Ore both operated from donated spaces for the first several years after their founding, and each cite this assistance as critical to their current success and self-sufficiency (The Scrap Exchange, 2014a; Knapp, 2014). Finding affordable, well-located space can be difficult for any small business or organization; many reuse and recycling enterprises have the added challenge of needing easy access to waste streams as well as a location convenient for employees and, where relevant, customers. They also often require secure space to

ORGANIZATION	GOVERNMENT SUPPORT				
	FUNDING	SPACE	CONTRACTS	REGULATION	TAX RELIEF
The Scrap Exchange	✓				✓
Isidore Electronics Recycling	✓			✓	
IceStone	✓				
The ReUse People	✓				✓
Urban Ore		✓	✓	✓	
Rebuilding Exchange	✓			✓	✓
Materials for the Arts	✓	✓			✓
Build it Green NYC	✓		✓		✓

warehouse materials and possibly remanufacture items or display inventory. These requirements cannot always be met by one facility; Urban Ore maintains a warehouse near the transfer station tipping floor in addition to its primary retail warehouse (Knapp, 2014). This potential need for multiple locations makes city assistance to secure free or reduced-cost space all the more helpful.

Many of the successful reuse examples we reviewed received valuable technical assistance and business guidance from local government. Whether through occasional meetings or a more formal business incubator, municipal entities can help reuse enterprises establish or improve business plans, navigate local regulation and zoning, and locate and train employees. Isidore Electronics Recycling, for instance, participated in the LA CleanTech Incubator, a City of Los Angeles-run business development program (Stokes, 2014). Many reuse firms and organizations we spoke with also lauded the public awareness efforts and promotional help local government agencies provided. Firms gained publicity and new business, for example, from being included on the lists of local materials reuse and recovery businesses that municipal planning departments issue to support compliance with C&D waste diversion requirements. Cities can also be helpful in connecting reuse operations with funding and training resources they might not otherwise be aware of or able to access. Newark is already home to a number of groups offering business development assistance and program support, including New Jersey Institute of Technology's Enterprise Development Center, Brick City Development Corporation, and a new manufacturing resource center at Rutgers Business School. And there are many efforts focused on expanding jobs and job training programs. The Office of Sustainability might consider collaborating with one or more of these groups to increase support for reuse- and recycling-related enterprises and increase opportunities for job training and jobs.

Photo + Warner, IceStone

4 CONCLUSION

To begin our investigation into the potential for materials reuse activities in Newark, the Office of Sustainability asked us to explore opportunities in the city's manufacturing sector. Manufacturing firms work with valuable raw materials and inevitably discard some of those materials post-production—the hope was that some of these discarded byproducts might be sufficiently abundant, regular, and salvageable to become inputs in other manufacturers' production processes. This exchange would not only offer the receiving firm more affordable raw materials, but could also mean reduced waste disposal costs for the generating business. Indeed, this "byproduct synergy" model has proven successful in other areas of the country with a significant concentration of industrial businesses (and even between production divisions in a single large firm). However, our site visits to 16 Newark manufacturing businesses showed that these particular firms generate relatively little waste, and that only a small portion of what is thrown out could be productively reused beyond what the reuse networks already in place. If this is representative of the rest of Newark's manufacturers, manufacturing discards alone may not be sufficient to sustain a materials reuse program, and it highlights a strength of Newark's manufacturers: firms already use their resources efficiently, limiting waste and reusing materials as far as economically feasible. To do this, they rely on formal and informal networks made up of recycling and reuse businesses already operating in and around Newark. To achieve its goal of strengthening the city's manufacturing sector, the Office of Sustainability can support these existing reuse businesses and help to incubate new firms that make things with materials salvaged from the waste stream.

Looking beyond manufacturing discards, there are several other opportunities for materials reuse that the City might consider. These include sourcing materials from Newark's vast waste infrastructure; using deconstruction or other methods

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to access high-value construction and demolition materials (either for resale or new production activities); incubating or supporting businesses that reuse hard-to-process materials such as glass, mattresses, carpet, or electronics; and developing a creative reuse center to leverage discarded materials for cultural and educational programming. These opportunities draw on Newark's existing assets, and have each proved a promising basis for reuse activities elsewhere.

To leverage these opportunities, the City of Newark can promote, incentivize, and support reuse and recycling through a variety of complementary strategies—ideally in combination. Across the country, local governments have used approaches ranging from offering small business funding to introducing new policy and regulatory initiatives. Other municipal support, such as technical assistance, relationship building between different actors, and public awareness campaigns, are also critical. Austin, TX has created a full-time Recycling and Economic Development Liaison position to manage and coordinate these types of support as the city develops its reuse and recycling sector (Rhodes, 2014b). The groups we interviewed often cited these "softer" interventions as integral to their individual start-up and continued operation and essential to the development and growth of the broader waste diversion and materials reuse industry. We hope that the Office of Sustainability will find our research helpful as it develops a strategy to expand Newark's own reuse and recycling sector, divert waste from landfill and incineration, and generate jobs for local residents.

Build It Green NYC

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CASE STUDIES

ORGANIZATION		The Scrap Exchange	Isidore Electronics	Ice Stone, LLC
GEOGRAPHIC SCOPE	Primary Location	Durham, NC	Los Angeles, CA	Brooklyn, NY
	Service Area	5 Counties 6 States	-	Product delivered nationwide
FOUNDED		1991	2011	2003
TYPE		Nonprofit, 501-c3	For profit	For profit
ACTIVITIES	Remanufacturing			✓
	Retail	✓	✓	✓
	Deconstruction		✓	
	Refurbish & Repair		✓	
	Byproduct Exchange			
	Salvage			
	Arts & Education	✓		
	Community Development	✓		✓
JOBS	Training		✓	✓
	# of Employees	32*	8	40
PRIVATE FUNDING		✓	✓	✓
GOVERNMENT SUPPORT	Funding	✓	✓	✓
	Space			
	Contracts			
	Regulation		✓	
	Tax Relief	✓		

*The Scrap Exchange employees additional staff throughout the year to assist with special projects. The organization iss
** BIGNYC also employs 2-4 interns yearly for their milling work and around 20 annually for other projects. This is in co

The ReUse People	Urban Ore	Rebuilding Echange	Materials for the Arts	Build it Green NYC
San Diego, CA	Berkeley, CA	Chicago, IL	Long Island City, NY	Astoria & Brooklyn, NY
Pimarily East Coast	Berkeley, CA	-	Greater New York	Greater New York
1993	1981	2009	1978	2005
Nonprofit, 501-c3	For Profit	For Profit	For Profit	For Profit
✓	✓	✓	✓	✓
✓		✓		✓
✓	✓	✓	✓	✓
			✓	
✓		✓	✓	
✓		✓		✓
15	38	14	?	30**
		✓	✓	✓
✓		✓	✓	✓
	✓		✓	
	✓			✓
		✓		
			✓	

ued a total of 63 W-2 tax forms in fiscal year 2012
njunction with a job training program with NYC.

1 REPURPOSING MATERIALS

BUILD IT GREEN! NYC (ASTORIA, NY)

SNAPSHOT

Build it Green! NYC (BIG) is a New York City-based non-profit that specializes in salvaged and surplus building materials. BIG's mission is to divert construction materials, fixtures and appliances, and wood from the waste stream and to provide job training for people who are difficult-to-employ. It consists of a deconstruction and retail division, compost, and a lumber mill. It operates two retail warehouse locations in Queens and Brooklyn, and a sawmill and compost in Astoria (Build It Green, 2014).

BUSINESS MODEL

BIG's business model includes three main lines of business. First is the retail division in which BIG resells fixtures, wood, appliances, lumber, cabinets, countertops and other deconstruction materials in its two warehouses. BIG's in-house team is trained to salvage material and BIG accepts donations from individuals, companies, and through well-developed partnerships with arts and theater companies. They are selective about what they accept and they keep a close eye on their warehouse inventory to know what sells and what does not (Rubenstein, M 2014). Second, BIG uses the sawmill to rehabilitate old wood from deconstruction projects into new, high value-added decorative wood. For example, using the sawmill, BIG repurposes deconstructed bowling alley lanes into new bar surfaces, scaffolding into wall paneling, and redwood boards, deconstructed from an old water tower, into expensive raw wood for new projects. This capitalizes on the trend of using weathered and distressed wood for aesthetic purposes and finds new value in old wood like redwood that is preserved. This is a niche market with growth potential and they hope to operate at a profit in about a year (Rubenstein, M 2014). Third, BIG operates a vermicomposting system in which mass quantities of worms turn food waste into nutrient-rich fertilizer (Working Worms, 2014). The compost is used throughout the city and for community gardening projects along with reused wood in BIG! Blooms raised bed gardening projects.

START-UP & HISTORY

A partnership with Community Environmental Center, a Queens-based nonprofit that seeks to promote a more affordable and sustainable built environment, facilitated BIG's startup (Build It Green, 2014a). CEC secured a grant from the Durst Foundation in 2005 that funded temporary storage space and provided a contract for deconstruction services with the foundation. The first project yielded more than 70 tons of salvageable materials and CEC sold what was salvaged at a profit. When it outgrew that space, it moved to a larger space in Astoria, Queens (Build It Green, 2014b). BIG

Build It Green NYC

works closely with funders, administrators, and their employees to ensure the company's growth and they have expanded their services while continually improving quality (Rubenstein, M 2014).

PEOPLE

BIG's staff is comprised of approximately 30 employees who work as retail staff, deconstruction team, and donation coordinator among other jobs. BIG hosts two internship programs. The first is the Young Adult Internship Program, a subsidiary of the NYC Department of Youth and Commercial Development. Two-to-three times a year, approximately four interns work with BIG to learn valuable job skills. This program is based in the sawmill and focuses on teaching safety and basic tool use. BIG also provides an internship with the Consortium for Worker Education, which employs approximately 20 interns annually (Rubenstein, M 2014).

PLANET

By acquiring materials through deconstruction, BIG diverts materials from landfills which lessens their impact on the environment. BIG estimates that more than 4,000,000 pounds of reusable materials was diverted from the waste stream as of 2013 (Build It Green, 2014).

CHALLENGES

One of the challenges BIG faces is suitable space. With their growing programs, their current Queens location is insufficient to house a full sawmill as they lack space to fully market the product to potential customers and outdoor storage. They are searching for a new larger affordable space. Another challenge is balancing the cost of deconstruction and profit generation. When deconstructing a building, not all C&D material is suitable for resale and BIG has to be selective to ensure that deconstruction costs do not exceed the sale of the salvaged materials (Rubenstein, M. 2014).

TAKEAWAYS

BIG NYC deconstructs, sells, and planes wood and other deconstruction materials and provides training for hard-to-employ individuals. Working in the city offers benefits such as close proximity to scaffolding companies that, by regulation, use wood scaffolding for only a short period of time before replacing it, and to theater and movie companies that donate materials and purchase fixtures and furniture as props. But adequate space is difficult to find especially given the high cost of city real estate. BIG is finding success through its high value-added sawmill, especially given the robust number of restaurants and bars that want reused materials. Should Newark follow this model, its low land costs and space are assets but salvaging and selling C&D waste requires building partnerships and the environment for donating and purchasing will be different than in NYC.

MATERIALS FOR THE ARTS (LONG ISLAND CITY, NY)

SNAPSHOT

Materials for the Arts (MFTA) is a New York City public arts reuse project that diverts items such as art supplies, theater lighting, paint, paper, office furniture and supplies from the waste stream and redistributes them to those working in non-profit arts. MFTA displays donated items in its warehouse and people who work in non-profit arts based programs can schedule appointments to "shop" for the free materials. In 2002 MFTA collected 600 tons of materials from artists, manufacturers, theater productions and companies. Recipients include schools, community art organizations, and non-profit theater groups. In-house teaching artists show teachers, children, and community artists how they can reuse materials to create art in classes offered at the warehouse and within communities. A resident artist, with space at the warehouse, uses materials to inspire others. When we visited, the resident artists was constructing sculptures (MFTA Annual Report, 2013; Kaiser, J 2014).

Materials for the Arts

BUSINESS MODEL

MFTA is part of New York City government and receives funding from the Departments of Cultural Affairs, Sanitation and Education. It works in partnership with Friends of Materials for the Arts, a non-profit organization, and receives financial gifts from corporations, foundations, and individuals. Volunteers sort and display materials and help shoppers (MFTA, 2012). MFTA receives donations, which are tax deductible. Based on the size and type of material, items may be shipped to or dropped off at the warehouse or qualify for a free pick up. MFTA also facilitates direct donations, especially of large or heavy items, between donors and recipients. And it provides referrals for materials it cannot or does not accept (MFTA, 2014). Warehouse items vary week-to-week and MFTA organizes and displays materials with aisles for trimmings, thread, fabric, paint, paper, electronics, furniture, and other materials. The clients are limited by how much they can carry, and they can put larger items on hold for pick up. The cyclic nature of donations ensures that no two visits to MFTA are exactly the same (Kaiser, J 2014).

Olek, Materials for the Arts

Materials for the Arts

START-UP & HISTORY

MFTA's roots date to 1978 when Angela Fremont, a young artist who was working at the Department of Cultural Affairs, made a radio appeal for a working refrigerator. From this, the idea of developing a resource for the trade of materials and goods was born. Director Susan Glass ran with the idea and established partnerships with other NYC agencies such as the Department of Sanitation. By 1997, MFTA had formed linkages with the Department of Education (MFTA, 2014).

PEOPLE

MFTA's commitment to people is their commitment to education and culture. They run classes for children and school groups and offer professional development courses (P-credit) for public school teachers. The education component is a core element in creating demand for already used items. MFTA's classroom space is decorated with past projects including an empty compact disk case repurposed as an art square (Kaiser, J 2014).

PLANET

MFTA diverts items from the waste stream such as difficult-to-process items like lighting equipment and promotional books and estimates that they diverted 1,630,000 pounds of materials in 2013 (MFTA, 2014).

CHALLENGES

Because MFTA's focus is educational and cultural and it charges nothing for the discarded materials, it depends on public and private dollars. Declines in city budgets or a change in policy can mean fewer resources and working with private donors requires staff effort to build relationships (Kaiser, J 2014).

TAKEAWAYS

Manufacturing for the Arts is a city-operated entity with multiple objectives including reducing the waste stream and supporting arts and education. It receives support from multiple city agencies towards these goals. Materials for the Arts has established partnerships that make its donations and "shopping" possible and it benefits considerably from its location in NYC. It draws from film and theater and gets materials from large funded productions back into use in communities that lack the resources to purchase equipment and arts materials. It doubles the materials budget for public schools by providing paper and arts supplies and provides education classes. MFTA grew slowly and Newark could build the core elements of a similar organization and grow it slowly in ways that make sense for Newark.

ICESTONE (BROOKLYN, NY)

SNAPSHOT

IceStone manufactures recycled glass and cement based slabs to be used for countertops and backsplashes that are used both in commercial and residential properties. The slabs can be used in kitchens, bathrooms, as tables, or counter space in any room. The slabs are created in the Brooklyn Navy Yard and delivered to local fabricators and retailers. After purchase the local fabricators cut the slabs to specifications, install and seal the slabs for their customers (IceStone, 2014).

BUSINESS MODEL

IceStone's model is to reuse material. Because IceStone knows that its consumers are buying an idea about living differently, as well as high quality beautiful products, it markets to reach those customers. It earned a Silver Cradle-to-Cradle certificate, assists in LEED-certified projects, and is characterized as a B Corp for its socially responsible work (New York Enterprise Report, 2010; IceStone, 2014). A Cradle-to-Cradle certificate states that a company is socially and environmentally friendly, protects the earth, uses materials that can be reused, and manufactures in a non-polluting way (Cradle to Cradle Products Innovation Institute, 2014).

They produce the slabs in the Brooklyn Navy Yard and deliver them to local retailers. Tile and countertop distributors on the East Coast, West Coast and in Texas display IceStone's most popular items, and IceStone trains them in fabrication of the products. Fabricators cut the slabs to specifications and install and seal them (IceStone, 2014). IceStone also works with commercial developers, local architects, and designers to create custom countertops.

Even though IceStone makes high-quality products, produced in an environmentally friendly way, and it has high profile clients like Starbucks and the Bill and Melinda Gates Foundation, it has not been consistently profitable. Sarah Corey (2014) says that when IceStone was founded, they focused on mastering the process and becoming technologically competitive and less on marketing. The recession has cut into business as some clients opt for less expensive products and Hurricane Sandy left production at a standstill for 6 months last year.

START-UP & HISTORY

IceStone uses green practices throughout its operations. The original owners and Co-CEOs, Miranda Magagnini and Peter Strugatz, bought the failing company at auction for $25,000 in 2003, with the objective of creating a socially conscious business. With their combined work and investment history, they both had worked with socially responsible businesses, they decided to run their own company (IceStone, 2014; Perlman, 2009; Salant, 2009;Weinstein, 2011). After investing their own money, they received more than $6 million dollars from colleagues, social entrepreneurs, and angel funders such as Stonyfield Farms, Ben & Jerry's and the Vermont Bread Company, which they used to transform the old manufacturing space into an environmentally friendly manufacturing plant. Another $500,000 from the State of New York ($200,000 from the Environmental Investment Program) was used for research and development which enabled them to streamline manufacturing, purchase equipment, and increase productivity. They built business relationships with the Brooklyn Development Corporation, Brooklyn Chamber of Commerce, and New York Industrial Retention Network. The Brooklyn Navy Yard, an industrial park, helped find funding, workers and negotiated a lease.

IMPACT

IceStone markets itself as a triple bottom line company, focused on the three P's: advancing people, planet and profits (Russo, 2004; Corey, 2014). It provides employee programs including immigration services and life-skills training (IceStone, 2014). They currently have 40 employees. Twenty-five jobs are in operations and maintenance and 15 are in the management team. Many employees are Tibetan refugees. Every Wednesday an ESL teacher provides English lessons during lunch and they offer translation services at their weekly employee "town meetings." They also offer lean manufacturing and forklift safety classes. Each unskilled worker starts at $15 per hour, which can increase quickly with training and experience. IceStone is looking to cross-train employees and to strengthen their management team. Currently they are looking into hiring an Architectural and Design Representative to create relationships with design and construction businesses (Corey, S 2014).

In 2011, Dal LaMagna became CEO and refocused attention on balancing the budget and tightened spending. IceStone provides health care plans on a progressive scale; those with higher salaries pay higher amounts than those with lower salaries. This

saved IceStone money, and it helped 17 employees who had opted out of the previous plan to sign up and pay for healthcare. LaMagna took away employee cell phones and cut spending on technology. Additionally, IceStone is working on creating an employee appreciation stock program. When the business becomes profitable, employees will be able to participate in a profit sharing plan, owning 10 percent of the company (Corey, S 2014).

PLANET

IceStone reuses materials and reduces the negative impacts of production and its products. IceStone makes its surfaces using 75 percent recycled glass, 17 percent to 18 percent white Portland cement, pigment and proprietary ingredients (IceStone, 2014). Heritage Environmental Services in Indianapolis delivers cleaned and crushed recycled post-industrial glass. IceStone has reused 13 million pounds of it in the last 10 years (Sarah Corey, 2014). IceStone also uses a soy-based machine lubricant, cement waste is reused in roads, and water is recycled for cutting, recycling 85 percent or 5 million gallons annually. They work in a 55,000 square foot building with natural light which allows them to run a full shift without turning on a light. In 2012, IceStone recycled 97 percent of its waste. In the near future, they hope to reduce the roughly 85 percent of mined stone they import, which is a carbon-intensive process (Hess, 2009).

CHALLENGES

To combat the effects of the recession and Hurricane Sandy, IceStone developed a few strategies. They reduced in-house spending and focused on marketing and building connections in the construction industry. They reduced prices to appeal to the residential market to expand their consumer base. Although commercial projects are profitable, the negotiations and construction can take up to 18 months and budget restrictions late in the development stage sometimes cause clients to cancel orders. Refocusing their business model on residential customers is intended to correct this by producing many smaller jobs that could prove equally profitable in the aggregate. IceStone was founded about 10 years ago and it has struggled to become profitable. To support the company, the Brooklyn Navy Yard forgave more than $300,000 in back rent, and renegotiated IceStone's lease for 10 more years at its current rental rate. This enabled IceStone to focus on strengthening its business and repairing facilities damaged by Hurricane Sandy (Corey, S 2014).

TAKEAWAYS

Although IceStone is still working on becoming profitable, it demonstrates how a pre-existing business can incorporate green practices. It added skylights to reduce energy use, invested in a water reuse system and created a culture of recycling. Membership in small business organizations like B Corp and ASBC provide beneficial networking opportunities that strengthen businesses and their market reach. Policies that help small business find and lease usable space, in areas with public transportation and resources for workers, are critical. The Navy Yard is a great model of business incubation by providing competitive rent, easy access to subways, buses and interstate highways, and neighboring communities that are flourishing as well as those that are in need of stable, high paying jobs. Glass recycling might be an opportunity for Newark. IceStone sources glass from the midwest because there are no businesses in the New York Metropolitan area that provide high volume glass recycling and cleaning services. IceStone pays $0.25 per lb (approximately $625 per container) for standard glass (specialty glass is more expensive) (Corey, S 2014).

2 DECONSTRUCTION

REBUILDING EXCHANGE (CHICAGO, IL)

SNAPSHOT

With an inventory of salvaged building materials and designer furniture made with 'upcycled' salvaged materials, Rebuilding Exchange has diverted approximately 22 million pounds of construction and demolition material from landfills, making over $2 million worth of consumer goods since 2009. Combining these efforts with the objectives of boosting local employment, Rebuilding Exchange has provided job training in deconstruction, carpentry and retail to more than 82 people who are hard-to-employ. Rebuilding Exchange has also successfully leveraged $6 million dollars in public and private investment (Rebuilding Exchange, 2014).

BUSINESS MODEL

Rebuilding Exchange is a non-profit enterprise the Delta Institute, a Chicago-based organization that aids in the establishment of sustainable economic development projects, created in Chicago. It receives funding from private donors and it sells salvaged deconstruction materials donated by contractors (Lepeska, 2012; Hellstern, 2014). Their retail warehouse is located in Chicago, where salvaged C&D items, including old growth lumber, are sold to the public. In addition to Rebuilding Exchange's retail warehouse operation, it operates RX Made which is a furniture building operation that builds custom furniture with reclaimed wood from their warehouse. This operation creates additional revenue for Rebuilding Exchange's operation by creating higher-value upcycled items for retail sale and demonstrates the potential for salvaged C&D discards. Rebuilding Exchange also provides job training in the deconstruction sector to people with barriers to employment, and it holds more than 100 community workshops to teach people how to complete their own reuse projects (Rebuilding Exchange, 2014).

START-UP & HISTORY

Rebuilding Exchange was born out of the City of Chicago's initiative to reduce the high volume of construction and demolition (C&D) discards in the waste stream. The City of Chicago partnered with Rebuilding Exchange to develop the infrastructure for a Chicago-based deconstruction and reuse program. With the Delta Institute's logistical support, Rebuilding Exchange secured funding over three years and began operating in February of 2009. Funding included a $30,000 grant from the Illinois Department of Commerce and Economic Opportunity Recycling and Modernization (REM) program and a $39,000 grant from the US EPA. In total, Rebuilding Exchange leveraged $6 million dollars in public and private investment and the Delta Institute donated warehouse space. Bank of America, The Boeing Company, The Lloyd A. Fry Foundation, Northern Trust, and Polk Brothers Foundation fund the organization (Rebuilding Exchange, 2014; Gowing, 2010).

The Rebuilding Exchange obtains salvaged C&D items through donation and picks up materials for a fee of $25-35 dollars (Rebuilding Exchange, 2014). They get C&D materials from large public or private entities that are demolishing or deconstructing large properties, demolition-specific contractors, and people who support the idea of reuse and receive a tax-deduction for donating to Rebuilding Exchange (Bayne, 2013). Rebuilding Exchange sells the donated materials in its warehouse and uses it in RX Made furniture (Lepeska, 2012).

The City of Chicago supports programs that encourage deconstruction. "These programs include ordinances and building standards that provide education, recommendations for C&D recycling and reuse, and demolition deterrents such as demolition tax to low income housing" (Gowing, 2010). The Cook County Demolition Debris Diversion Ordinance, passed on July 24, 2012, with the assistance of the Delta Institute, supports deconstruction (Bayne, 2013). The ordinance specifies that for residential demolitions, a minimum of 5 percent of C&D materials must be reused and a minimum of 70 percent of materials must be diverted from the waste stream; for non-residential demolitions there is a minimum requirement for 70 percent recycling of C&D waste, and reuse is encouraged (Cook County Board of Commissioners, 2012). Penalties include: 1) up to $5,000 for demolition violations; 2) Up to $1,000 for not submitting a 'Demolition Debris Diversion Plan' or failure to provide required information in the report; and 3) a $500 fine for late submission of a Debris report (Illinois Environmental Law Blog, 2014).

IMPACT

Rebuilding Exchange employs 14 staff members and relies on about 100 volunteers who assist with the day-to-day business operations. Job training is a high priority and, in partnership with The Cara Program, Building Materials Reuse Association, Greater West Town Training Partnership, OAI Inc, and OBI Deconstruction, they have trained 82 people, who have barriers to employment, in deconstruction, retail, carpentry and related fields. Job training was initially focused on ex-offenders but the program has been expanded through a partnership with The Cara Program to include people who struggle with substance abuse and homelessness (Rebuilding Exchange, 2014; Lepeska, 2012).

In addition to the community development efforts that Rebuilding Exchange provides through its job training initiatives, they provide a more subtle, yet socially-therapeutic service: the process of deconstruction. Elisa Zelechowski suggests that in communities ravaged by the foreclosure crisis, deconstruction is less traumatic and abrupt than demolition and respects homes and the community. She explains: "Deconstruction isn't going to save that house in place, but there's something interesting about the materiality, the slow process of deconstructing versus crushing something, which is so immediate and aggressive and intense" (Bayne, 2013). Although difficult to quantify, deconstruction cannot be overlooked as providing community benefit.

PLANET

Rebuilding Exchange has diverted 22 million pounds of C&D material from landfills since its inception in 2009. They promote reuse, deconstruction, and upscaling at the local and national levels. A major component of Rebuilding Exchange's mission is to provide job training in deconstruction and upscaling to community members with barriers to employment. Rebuilding Exchange offers more than 100 workshops each year that educate and train people about reuse. RX Made upcycles salvaged C&D materials into custom furniture that is sold at the Rebuilding Exchange warehouse (Rebuilding Exchange, 2014).

CHALLENGES

Although reuse and deconstruction are priorities for the City of Chicago, challenges remain (Bayne, 2013). The City of Chicago lacks reuse infrastructure and efficient permitting (Gowing, 2010). Although Rebuilding Exchange is still in its infant stage of development, the enterprise will have to overcome its reliance on external subsidies.

TAKEAWAYS

Rebuilding Exchange demonstrates how a city can facilitate the development of reuse infrastructure. The City of Chicago's partnership with the Delta Institute shows a public private effort to incubate the Rebuilding Exchange. Additionally, the City of Chicago's role in the development of incentive programs that simultaneously promote the practice of deconstruction and incentivize it through regulatory processes reveal another crucial role that the City of Newark can undertake in its effort to develop a reuse sector. Supra-city assistance has also been shown to be beneficial, particularly in the realm of funding. For example, a large portion of initial external funding for Rebuilding Exchange came from a state-based recycling grant as well as a grant from the EPA (Gowing, 2010). With respect to the latter, for the purpose of establishing a similar enterprise in the City of Newark, EPA

Region 2 and US EPA provide grant money toward the development of deconstruction enterprises (New York Wa$teMatch, 2004). Rebuilding Exchange's model of focusing job training on populations with barriers to employment could be a community development tool in Newark; the Rebuilding Exchange's job training efforts rely heavily on partnerships and external funding (Rebuilding Exchange, 2014).

A highly important, yet difficult to quantify benefit of deconstruction is captured by statements made by residents of Chicago who describe deconstruction as more respectful and less traumatic than demolition. These statements reveal a poetic aspect of deconstruction that endorses deconstruction as a way to mend some of the trauma created by wide-scale housing decline. Given the troubled state of housing in many parts of Newark, the social benefits of deconstruction verse demolition might be considered.

In a different vein, yet also related to Newark's housing stock, the City of Newark has many wood structures that are candidates for deconstruction rather than demolition. Furthermore, many of these structures are several decades old, and as such, are made up at least partially of high-value, old growth lumber. This observation is intended only to highlight additional potential benefits and opportunities for deconstruction in the City of Newark given the initial success of Rebuilding Exchange in a city with a comparable housing stock. However, deconstruction could be costly given that older structures were probably painted with lead-based paint and may have other materials such as asbestos that have to be handled with the utmost care.

THE REUSE PEOPLE (OAKLAND, CALIFORNIA)

SNAPSHOT

The ReUse People (TRP), with locations in 10 states, appraises, deconstructs, and resells building materials for reuse and provides training in deconstruction.

START-UP & HISTORY

The ReUse People started as an organized effort of the mayors of Tijuana and San Diego, the San Diego Chamber of Commerce, the County Board of Supervisors, San Diego Gas and Electric Company, Waste Management, and the Building Industry Association to provide flood relief for the people of Tijuana. They organized the Project of Valle Verde, which coordinated deconstructed building material donations from residents, contractors and public/private organizations (ReUse People, 2014). Ted Reiff, a local philanthropist and businessman, saw an opportunity to start a new business in the project's success and he wrote a business plan to get this idea off the ground (Building Materials Reuse Association, 2014). In 1993, he incorporated as a nonprofit, slowly collected deconstructed materials to sell, and, in 1995, added construction to steady the stream of incoming materials. The demand for deconstruction, and an influx of materials, made it possible to open a second branch in Oakland, California where they moved their main office in 2003. Tedd Reiff rewrote the business plan to incorporate training for local contractors in 2004 which provides another revenue stream and materials source. TRP partnered with service and non-profit organizations, such as the California Conservation Corporation in 2007, and they help train youth 17-24 in deconstruction practices. Since then, TRP has been viewed as a nonprofit focused on saving the planet and training a competitive workforce in this emerging market (Reiff, 2014). Today, TRP has 14 locations in 10 states with locations in the West and Midwest and one on the East Coast.

BUSINESS MODEL

The ReUse People (TRP) is 100 percent financially stable with revenues from the retail store, deconstruction projects, and training activities. The numbers can fluctuate, but, in general, retail is the most profitable, followed by deconstruction, and training. Deconstruction is more costly and time intensive than demolition and public policy shapes the deconstruction market so that TRP and other small deconstructor businesses are competitive. For example, along with diversion requirements, Seattle charges less for deconstruction permits and allows deconstruction during the rainy season when demolition is not allowed (if deconstruction does not involve demolishing a foundation, there is no concern about erosion). Los Alto Hills meanwhile processes plans for deconstruction projects more quickly (Reiff, 2014). These policies encourage the development of deconstruction and the many lines of business that emerge from it.

IMPACT

In each location, TRP hires about 15 people; half work in an office handling day-to-day operations, while the others, who are often lower skilled, work in the warehouse or on deconstruction projects. Pay starts at around $8 to $11 an hour and employees receive training to build their skills. TRP is a starting off point where lower-skilled workers build skills to get higher paying jobs in construction. Employees get paid days off, and after two years, TRP pays 100 percent of health insurance (Reiff, 2014).

The Reuse Institute, TRP's training arm, provides on-site and classroom training for laborers, contractors, and crew chiefs in best deconstruction practices. It has trained more than 500 un/underemployed or low-skilled workers since 1993 and 71 contractors who can then employ the newly trained labor force (ReUse People, 2014). Economic organizations, community colleges, towns, and grants request and fund the training (ReUse People, 2014). TRI also offers programs for municipal workers and organizations on strategies and best practices in operation and regulation of deconstruction businesses and in retail-warehouse operations. They work with the Building Materials Reuse Association to create training for higher level managers to better understand laws, technicalities and issues with hazardous materials. The relatively short trainings provide a wealth of information and value to this field, cover all areas of deconstruction and create a strong environment for deconstructing businesses to thrive (Reiff, 2014). As this type of business spreads throughout the country, businesses will be looking for a labor force that understands and completes demolition projects with deconstruction abilities.

PLANET

TRP helped divert 370,000 tons of waste from landfills between 1993 and 2013. At each project about 80 percent of materials can be saved which means a high potential for reselling. The deconstruction process has increased visibility and strength in recent years due to increasing interest in green building practices. Construction businesses view it as profitable, and homeowners see it as a tax deduction. Local policies further spur demand. Boulder, Colorado, requires that 65 percent of materials are diverted. In Cook County, Illinois, on top of a 70 percent recycling requirement, an additional 5 percent must be reused. These ordinances support the deconstruction industry and help divert materials from landfills (Nusser, 2013; Reiff, 2014). A culture of recycling and reuse practices also supports deconstruction. Oakland, California, has created policies to reduce city waste since 1995 and comprises 30 to 40 percent of TRP's deconstruction projects annually (Reiff, 2014).

CHALLENGES

One of the Reuse Peoples biggest challenges is the time and effort it takes to start in a new location. Although they tailor their business model to fit in context with the area they serve, it can take years of building relationships with government, non-profit organizations and construction companies to make a profitable, self-sustaining program. Additionally, sometimes it is hard to persuade someone to do deconstruction instead of demolition. Income and tax liabilities can play a major role in an individual's construction/renovation choice.

TAKEAWAYS

The ReUse People have successfully replicated their business model all over the country. They are on the forefront of deconstruction and are spurring job development in an emerging market. The ReUse People are continuously looking to bring their business model to new areas. While they provide staff and money to get the business off the ground, they depend on local government support. This job training and job creation approach might be useful in Newark given unemployment and the aging housing stock. Additionally, there is a lot of wealth in the surrounding areas that can support the growth of the "deconstruction industry." The deconstruction field in California is primarily fueled by renovation or total demolition projects in wealthier areas. The culture of wanting to be an environmentally friendly homeowner has led to many projects for TRP.

3 POLICY AND REGULATORY ACTIONS

RECYCLING ECONOMIC DEVELOPMENT PROGRAM (AUSTIN, TX)

SNAPSHOT

The City of Austin, Texas, created the Office of Recycling and Economic Development within its Economic Development Department as part of a Zero Waste Master Plan adopted in December of 2011. The Office has a dedicated full time staff member to coordinate economic development opportunities derived from diverted waste and has access to city marketing, business development, and real estate development resources. Austin is working on several projects to attract and expand local recycling, remanufacturing and reuse businesses based on the principle of finding the highest and best use for materials in its waste stream. Austin provides a notable model as perhaps the only city with a full-time staff member devoted to this work.

BACKGROUND

Austin's Zero Waste Plan seeks to divert 95 percent of recyclable materials from the waste stream by 2040, up from the current rate of 40 percent. The main elements of the plan are a comprehensive curbside recycling program and a universal recycling ordinance (URO) covering municipal, commercial and government waste. The plan recognizes that by more efficiently collecting recyclable and reusable waste, the city will create an opportunity for businesses to use its large and stable waste stream as an input for new production (City of Austin, TX, 2011).

The 2011 Plan includes several elements related to remanufacturing and reuse: the establishment of resource recovery centers to salvage reusable items from current bulk collection; the creation of materials reuse centers and a creative reuse center to distribute reusable items; a construction and demolition ordinance to encourage the diversion of C&D materials and to provide a stable source of inputs for reuse businesses; the promotion of local reuse and remanufacturing businesses such as upcyclers and repair shops; a technical assistance program for local businesses to meet the URO requirements and to locate opportunities for materials reuse and exchange; and the creation of an eco-industrial park on an old landfill designed to attract recycling, reuse and remanufacturing businesses that can make use of Austin's waste streams (Austin, TX, 2011).

CURRENT PROJECTS

In January of 2013, Austin created the Recycling and Economic Development Liaison as a full time position to coordinate the economic development aspects of the Zero Waste Master Plan. Several initiatives proposed in the 2011 plan, including the construction & demolition ordinance, the resource recovery

centers, and the material reuse centers have been slow to develop, though, they are still being pursued. The current principal areas of focus are the Austin [Re] Manufacturing Hub (an eco-industrial park), the Austin Materials Marketplace (an online exchange), LocallyAustin (a marketing campaign for reuse businesses), a series of events and conferences to promote reuse in Austin, and direct efforts to link waste generation with potential reuse applications (Rhodes, 2014b).

[RE]MANUFACTURING HUB

Austin is moving through the site planning process to redevelop a 107-acre decommissioned landfill into an industrial park that will focus on attracting recycling, remanufacturing and reuse businesses. Austin hopes to meet several needs with this project. First, as Austin improves the collection of recyclable waste it currently pays to ship out of the city, it will reduce city costs and the general lifecycle costs of production and disposal. Second, although Austin's labor market is increasingly saturated with demand for high-skilled labor, there is an unmet need for low-skilled jobs with livable wages. By attracting businesses to reuse Austin's waste locally, the city hopes to save money and increase jobs. Based on an analysis of the local waste stream, Austin is seeking to attract businesses in construction and demolition debris recycling, plastics processing, paper conversion, wood salvage and re-milling, glass processing and manufacture, appliance repair, scrap tire recycling, and electronics repair and remanufacturing companies. Based on the city's commitment to highest and best use practices, there are no plans for waste-to-energy conversion.

Land prices in Austin are relatively high and are prohibitive to most firms in recycling and remanufacture. The principle benefit to businesses locating in the park will be low land costs subsidized by city development of the site. Austin is making a $10 million investment and has received a $1 million grant from the State Economic Development Authority. Other significant challenges include a stable supply of source materials collected under the city's zero waste commitment; the benefits of colocation for similar industries and a planned non-profit and small business incubator program. Neither Austin nor Texas have specific grants or subsidy programs for recycling and reuse; however, businesses will be able to take advantage of existing business programs including a small business loan program, industrial revenue bonds and city-sponsored forums to connect companies with investors. Austin expects to create 1,250 direct new jobs when the industrial park is fully occupied (Rhodes, 2014a, Rhodes, 2014b).

AUSTIN MATERIALS MARKETPLACE

The city is seeking an outside contractor to develop an online materials marketplace for matching discards with reuse and remanufacturing opportunities. The plan intends to create an online tool for posting and searching materials, and also requires contractors to provide a knowledgeable staff person to make links between companies. The contract is not yet final but the city hopes to include a certain number of matches as a required deliverable. Currently, the expected focus for materials is on wood including pallets, glass and ceramics, construction and demolition materials, business furniture and equipment, and other industrial byproducts (solvents, paints, oils or waxes). However, this will evolve as the program develops. The Materials Marketplace will work in concert with the city's reuse marketing program (Rhodes, 2014b).

LOCALLYAUSTIN REUSE CAMPAIGN

Austin hosts an online local business directory and marketing program called LocallyAustin (http://locallyaustin.org). Starting in April of 2014, the city is adding a special section to the site to highlight three categories of existing businesses: remanufacturing and up-cycling; sharing services; and repair and refurbishment. The initial list and categorization was derived by searching through the current LocallyAustin directory to identify relevant companies. The contractor for the materials marketplace will be responsible for maintaining and expanding this list. Companies engaged in the program will have access to general city business development programs and a marketing campaign being developed specifically around reuse and remanufacture (Rhodes, 2014b).

PROMOTION OF REUSE AND FINDING LINKAGES

The Office of Recycling and Economic Development works mainly to promote reuse within the city and to find links between waste streams and reuse opportunities. The Office recently hosted a webinar on opportunities afforded by reuse for social entrepreneurship; local events highlighting existing upcycling businesses and a recycling innovation investment forum. In addition, there are plans for annual city-wide reuse days beginning in October of 2014--the same month as the bi-annual ReuseConex international reuse conference and exposition

(Rhodes, 2014a).

In an effort to promote diversion and higher use, the Office is working with the Texas Department of Transportation (TxDOT) to find recycled material sources for civil engineering applications like using crushed glass as drainage medium. Texas is a leader in providing statutory specifications for the use of recycled materials in transportation and civil engineering. However, TxDOT tends to default to standard new material suppliers. The Office has set up tours of materials recovery and recycling facilities for TxDOT staff to familiarize them with recycled materials supply opportunities (Rhodes, 2014b).

TAKEAWAYS

The City of Austin perceives the main market barriers to local reuse and remanufacturing businesses to be high land costs and an inconsistent supply of recycled materials. Improved efficiency of diversion and collection through the universal recycling ordinance is expected to create a more consistent and attractive material supply. The city-developed [Re] Manufacturing Hub that is intended to provide favorable land costs. In addition to market barriers, there are significant information barriers to using discards in new production. One of the key principles of Austin's effort is that ongoing, knowledgeable staff efforts are required to identify materials with the greatest potential for reuse and remanufacture and match those materials with existing and new businesses.

4

RECYCLING AND RETAIL CENTERS

ISIDORE ELECTRONICS RECYCLING (LOS ANGELES, CALIFORNIA)

SNAPSHOT

Isidore Electronics Recycling is a full service e-waste electronics company that prides itself on being a "for profit triple bottom line social enterprise" (Isidore Electronics Recycling, 2014a). Isidore Electronics Recycling believes in the inherent value of the materials it recycles and the people it employs (Cavassuto, 2014). It hires and provides on-site job training for formerly-incarcerated people who gain transferable employment skills. Since its formation in 2011, the company has diverted 250 tons of e-waste and currently employs eight people (Stokes, K 2014).

BUSINESS MODEL

Isidore collects large donations of business, government, non-profit, education and residential e-waste materials for free and picks up larger donations at competitive rates (Cavassuto, 2014; Stokes, K 2014). About ten percent of the donated computers, cell phones, digital cameras, keyboards, mice, toner cartridges, copiers, printers, servers, and microwaves are refurbished (Isidore, d). Their trained staff deconstructs, sorts, and sells the rest to an end-of-life recycling firm; although, they would like to recycle more of this themselves in the future. Reselling items in their ebay store and through local resellers accounts for 60 percent of the company's revenue; 35 percent comes from reselling scrap materials in the commodity markets. The most profitable items are refurbished Apple products, of which they receive few, such as iPads and iPhones. Other products they sell through the ebay store include refurbished ink cartridges, computer parts and hard drives (Stokes, K 2014). Isidore also works with firms that upgrade their electronics; they securely remove data from hard drives, resell the unwanted electronics and share the profits with the firms. This "asset management" line of business produces a small portion of revenue. Lastly, the firm leverages their proximity to the entertainment industry. It has a contract with MGM to do prop rental. Isidore works with Virgin Airlines, American Apparel, The California Endowment, LA Car Guy, MGM, Los Angeles County Museum of Art (LACMA), Rainbow Environmental Services and the Los Angeles County Sheriff's Department. The company is a member of the Coalition for American Electronics Recycling and the Los Angeles Chamber of Commerce (Isidore Electronics Recycling, 2014c).

START-UP & HISTORY

Kabria Stokes and co-founder Aaron Mallory started Isidore Electronics Recycling. Isidore's mission is to "make recycling electronics easy and accessible, while creating employment opportunities for people exiting California's broken correctional system" (Isidore Electronics Recycling 2014b). Family and angel funding of about $450,000 helped the company get off the ground (Lynell, 2014; Stokes, K 2014). Isidore's advisory team, Gregg Keesling,

owner of Recycle Force, and staff were integral in the company's founding. The Recycle Force model, which inspired Ms. Stokes, provides workforce training to previously incarcerated people in the deconstruction and recycling of e-waste and other recyclables (Stokes, K 2014). Ms. Stokes worked with Recycle Force staff members to better understand the e-waste industry and job training model. Isidore also benefited from its relationship with American Apparel, which provided its industrial infrastructure (loading docks, pallet jacks, security guards, forklifts, etc.) and Isidore was initially located in American Apparel's Los Angeles warehouse. Isidore also participated in the LA CleanTech Incubator, a city-run business incubator program (Stokes, K 2014).

Shortly after Isidore's founding, they lost their 5,500 square feet of retail space to a fire and are currently in a new warehouse space which offers pallet racking, large (4x4) boxes to store the electronics materials, ground level doors, proper lighting and office space for the administration of the business (Cavassuto, 2014; Mazzoni, 2014). Otherwise ideal, the space does not have a loading dock. Other technology necessary for processing and repair include screwdrivers, soldering irons, specific tools required to repair iPad and iPhone screens, and data wiping machines (Stokes, K 2014). The company does not currently have any special electricity needs, but would if it increased capacity to handle material shredding.

IMPACT

Core to Isidore's message and business model is the belief that people, not just materials, are precious resources. The company partners with the Coalition for Responsible Community Development (CRCD), Homeboy Industries, CHRYSALIS, REDF, Laane, and Assembly Member Jimmy Gomez that help previously incarcerated people and others become "job ready" and Isidore provides on-site job training (Mazzoni, 2014; Isidore Electronics Recycling, c). As cited on the company's website and in promotional videos, "for every 50,000 pounds of e-waste, Isidore can hire a new worker" (Isidore Electronics Recycling, a). Since inception, the company has hired 7 previously-incarcerated persons, with 3 resulting in what the company terms "success stories" (USC, 2014). The organization currently employs 8 people, 4 in the warehouse and 4 in the administrative office. Pay for the warehouse positions ranges from minimum wage ($8/hr) to $11.50. Los Angeles residents, typically full-time, with the exception of one part-time office intern, have these jobs (Stokes, K 2014).

PLANET

The company recognizes that it could do more to help offset the environmental impacts of hauling the e-waste materials it collects. However, Ms. Stokes stated that the company aims to make sure that pallets and trucks are as full as possible to reduce the number of trips. The company only sells to environmentally-certified recycling centers (R2 and E-Stewards) to ensure that materials are handled in an environmentally sustainable manner, even though it could get more money per pound with alternative buyers (Cavassuto, 2014). Ms. Stokes feels strongly about the company's role in creating local jobs by processing e-waste in the city, where residents can benefit from the jobs, instead of just experiencing the negative impact of moving these materials through the city and out with concentrated environmental impacts (2014).

CHALLENGES

As with any for-profit firm, financial sustainability is key. For Isidore, they need large amounts of e-waste to process. The company gains its largest profits from refurbishing electronics and reselling these materials. However, these materials only make up about 10 percent of the materials collected and require staff time to resell. The other 90 percent of materials must be sorted and sent to a downstream recycler, which are then resold in the commodities market. The company would like to expand in the future to process these materials in-house (Stokes, K 2014). However, adding the infrastructure to process and shred these materials would require a substantial capital investment.

TAKEAWAYS

It is likely that Isidore's ability to acquire large amounts of e-waste for processing can be attributed to California's regulatory environment. Under California law, it is illegal to throw electronics in the trash. The first state to pass such legislation, retailers collect a small fee at the point of sale for certain electronics, which then helps to pay for collection and recycling at the end of product life (Californians Against Waste, California Department of Toxic Substances Control). Local government policies and a city-run business incubator program, LA Cleantech Incubator, further help the business (Stokes, K 2014).

Cities interested in forming an e-waste recycling company need to understand how e-waste flows in the city and if, given the regulatory environment and physical space, it can be processed locally. Ms. Stokes recommended that a government agency might start

with the e-waste it generates before expanding. In addition, creating a social mission that fits with the city's priorities is key. Once a mission is developed, local government agencies or startups would benefit from exploring what state or federal subsidies might support the mission such as working with and providing job training to at-risk populations (2014).

5 REUSE CENTER AND EXCHANGE

THE SCRAP EXCHANGE (DURHAM, NC)

SNAPSHOT

The Scrap Exchange is an "award winning nonprofit creative reuse arts center" which seeks to "promote creativity, environmental awareness and community through reuse" (The Scrap Exchange, 2013). Diverting nearly 70 tons of waste from the landfill in 2013, the Exchange warehouses and resells residential and industrial discarded material. The Exchange collects material discards from local manufactures and residential drop-offs at its warehouse location in Durham, North Carolina, and at outreach events throughout the region. In addition it provides programming services and space for the creation of art, upcycled products and educational activities. Within its 22,000 square foot warehouse location, the Exchange provides: two community rooms that are used as open studio space for parties and educational workshops; an art gallery displaying work of local artists that rely on reused or recycled materials; and an "Artists' Marketplace" selling local artisan products that incorporate reused materials (The Scrap Exchange, 2014a).

The Exchange has extensive partnerships with the local arts and business communities, hosts annual fundraiser events such as a homebrew beer festival; a "smash fest" event that encourages participants to buy breakable items that are smashed and then put to a productive reuse; community clothing swap; and swing dance fundraiser (The Scrap Exchange, 2014b). However, the Exchange is unlike other non-profits in that it is almost fully funded (90 percent) by the organization's retail and fee-for-service programming, with external donations making up the rest. In operation since 1991, the Exchange now offers a "creative reuse center boot camp," a four day workshop where participants learn how to start and run a reuse center in their own community. The Exchange is a cultural, retail and entertainment destination (Woodward, A 2014).

BUSINESS MODEL

For fiscal year 2012, the Exchange experienced a total income of almost half a million dollars (~$448,000) and welcomed over 60,000 visitors to its reuse center. Materials sold in the store are deeply discounted, from 50-70 percent off of retail value. Sales from the retail store made up almost half (~45 percent) of all income for the organization in 2012. Of these sales, the vast majority of revenue (~91 percent) is generated from in-store sales. Profits from the Artists' Marketplace, online store sales (ebay, Etsy, Craigslist), and the Green Gallery make up the rest of the revenues from retail sales (listed in order of largest profit). Sales from the Artists' Marketplace are based on a consignment model with a 60/40 split, where the artist and Exchange earn 60 and 40

percent from each sale, respectively. Income from the Exchange's outreach efforts, which includes programming services, totaled over 87,000 dollars in 2012. Of the Exchange's programing efforts, the "Events by the Truckload" were by far the most profitable, with the revenue generated from these events amounting to over half of all programming income (~$49,000) (The Scrap Exchange, 2012).

For the collection of materials from businesses, the Exchange provides bins to companies for the use and storage of materials. Once the bins are full, the company calls the Exchange to come and pick them up. Businesses who donate to the exchange are provided with a tax receipt for their donation, with the company assessing the value of their donation. The software program Filemaker is used to help track the supplier profiles and collection process. For companies just exploring the idea of zero waste, the Exchange will work directly with company to explore the possibility of reusing their discarded materials (Woodward, A 2014).

For drop-off donations to the reuse center, a staff member designated to receive donations logs the individual/company making the donation, weighs the donation, notates the zip code of where the waste is originating from (location of company or household making donation), and inquires as to whether the individual would like to be added to the Exchange's monthly e-newsletter. The Exchange saw an increase in drop-offs from 942 to 2,200 from fiscal year 2012 to 2013. Executive Director Ann Woodward attributes this to streamlining the process, where the total time needed to execute receiving a drop-off averages a mere 1-5 minutes. This data is aggregated on a monthly basis using Excel and has become a powerful tool in tracking the geographic scope of the organization and waste diverted (the process can be seen in the "drop-off donations" section of the 2012 Annual Report). So far, the Exchange has used this data to apply for grant funding from the North Carolina Department of Environment and Natural Resources, the County, and the City of Durham. The Exchange would also be eligible to apply for federal funding from the Environmental Protection Agency, but has yet to apply (Woodward, A 2014).

Of the 70 tons of materials donated to the Exchange in 2013, 26 tons were from company donations and 44 tons from residential (Woodward, A 2014). The types of materials donated tell a story of the type of economic activities of Durham and the larger Research Triangle Area. For example, the organization often receives materials from automobile manufacturers and the remains from the decommissioning of research laboratories (Triangle Downtowner Magazine, 2013). The center accepts clean, safe, reusable discards and finished products from manufacturers. Other materials collected include fabric, craft and art supplies, paper, vintage items, packaging materials, small metal scraps, glass jars, bottle caps and twist ties, beads, tiles, styrofoam, records and CDs, etc. (The Scrap Exchange, 2014e). Many of these materials are sold by the pound and are sometimes cut into smaller pieces by the Exchange for easier selling. The store serves as a resource for the entire Durham community, but some of its most frequent customers include teachers, artists and entrepreneurial business owners (Woodward, A 2014).

START-UP & HISTORY

The organization was founded by Chris Rosenthal, who modeled the Exchange off of an organization she founded in Australia called The Reverse Garbage Truck (Triangle Gives Back). In the 1980s, The Australian Arts Council provided a grant for Chris to travel to the United States to share the model and start other creative reuse programs; Chris and her husband settled in Durham shortly thereafter. Other integral supporters included an environmental artist, Bryant Holsenbeck, a local educator, Joe Appleton, and early board and executive staff members (Woodward, A 2014). The purpose of the organization in its early stages, was to provide a "sustainable supply of high-quality, low-cost materials for artists, educators, parents, and other creative people" (The Scrap Exchange, 2014c).

Although largely self-sustaining, the organization has received support from local government agencies, nonprofit organizations, and numerous partnerships throughout the region. It received donated space for its first nine years in a local mall and other support from the City of Durham, The Durham Arts Council and the North Carolina Arts Council, a division of the Department of Cultural Resources for the State of North Carolina. In 2006, the organization received annual grant funding from The City of Durham for four years to sponsor a volunteer coordinator to support outreach programming (The Scrap Exchange, 2014a). Starting in 2007, and continuing today, the organization receives operating support from The Durham Arts Council and the North Carolina Arts Council. The Exchange received a 10 percent matching grant from the North Carolina Department of Environment and Natural

Resources (NCDENR) to purchase a new building, and relocated in 2012. Other partner organizations include Target, Keep Durham Beautiful, along with many others that sponsor annual events (Woodward, A 2014; The Scrap Exchange, 2014d).

IMPACT

With a reach spanning five counties and six states, the exchange partners with many organizations and communities, including the Durham public school system, Durham county, senior centers, hospitals, and corporations to provide arts programming for the region. These outreach services help spread the message of reuse and take place at the reuse center and at on-site locations for the communities served (Woodward, A 2014). One popular service offered by the Exchange is the "Events by the Truckload," where the Exchange brings a "truckload" of materials and skilled instructors to lead creative play and art activities. In 2012, the Exchange held 63 "Events by the Truckload," 14 of which were held with schools, serving 50,000 participants (The Scrap Exchange, 2013). In addition to its fee-based programming events, in 2013 the organization made more than 60 charitable donations to other civic organizations, including schools, art councils, artists, social service programs, hospitals and prisons. For over 10 years, the Exchange has co-sponsored free yoga sessions during summer months in Durham's Central Park for the local community (The Scrap Exchange, 2013).

The Exchange employs approximately 32 workers, with 10 core staff members and 22 part-time employees. Additional workers are hired throughout the year to assist with special projects. In 2012, a total of 63 W-2 tax forms were issued. Some key activities include 1) managing the retail store, including the coordination of donations and volunteers; the sale of materials, both in store and online; and managing the in-store gallery, 2) managing outreach and events programming and, 3) oversight of the organization as a whole through the administrative office. The Exchange also relies on the assistance of volunteers to help sort collected materials. In 2013, volunteers logged over 5,320 hours (The Scrap Exchange, 2012, 2013; Woodward, A 2014).

The Exchange sees some turnover in part-time seasonal staff, but core staff members and some retail store workers have been with the organization for years, which might be attributed to the Exchange's progressive personnel policy, what Executive Director Ann Woodward, describes as a "worker's rights advocacy policy." The Exchange provides generous benefits for its full-time staff, including paid time off, health and dental insurance, and a recently added sabbatical policy. For employees working at least 20 hours, paid time off and workers compensation is included. The Exchange is proud to provide wages that are average market-rate and adjusted for inflation, with a reevaluation of these rates every two years. A financial education series is also offered by the Exchange for its staff, including topics on fiscal management, for example, how to buy a home or invest in a 401K program. The Exchange also provides its workers access to a zero interest emergency loan and a discount in the retail store. Almost all of the employees are local residents of Durham and for part-time positions, are often educators and artists. Although dependent on the position and department, the Exchange does not offer a large scale job training program. However, the organization encourages its employees to seek out the training they need to do their jobs. This could include attending annual conferences or receiving training from other organizations. Some occupational hazards exist with working at the Exchange given the nature of the work and scale of the operation with 150,000 visitors frequenting the retail store and moving 70 tons of materials annually (Woodward, A 2014; The Scrap Exchange, 2013).

The Exchange also provides opportunities for local artisans to display and sell their work in the reuse center's Green Gallery and Artists' Marketplace. In 2013, the Exchange displayed and sold the work of 180 local artists specializing in art incorporating reused materials. In 2012, the Exchange held 12 open gallery events where the community was invited to explore the gallery, participate in art-making, and enjoy light refreshments. The gallery events are free and open to the public. The Exchange also hosts an "artist in residence" program, working most recently with co-founder of the organization and internationally renowned environmental artist Bryant Holsenbeck (The Scrap Exchange, 2013; Woodward, A 2014).

PLANET

In 2013, the Exchange diverted a total of 70 tons of industrial and residential discards that would have otherwise gone to the landfill. Of this tonnage, 2,200 drop-off donations were made to the reuse center and 193 pick up collections from businesses, industry and residents. The collection of materials is conducted by Exchange staff using cargo vans. Through the use of its programing events, monthly newsletters, website and social

media platforms, the Exchange is able to promote public awareness and involvement about the importance of reuse (The Scrap Exchange, 2013). The Exchange is deeply involved in the national and local environmental and reuse community, including the Reuse Alliance and local environmental affairs boards for the city and county. The Exchange encourages all workers to participate in the reuse movement themselves, whether through social media or strategic positions in state and local environmental initiatives (Woodward, A 2014).

The Exchange also serves as a national model for creative reuse. In 2012, the Exchange provided information to twelve different individuals and organizations exploring creative reuse in their communities. Eight total exchanges have been formed over the years, from individuals that have either obtained information from The Scrap Exchange, were affiliated with the Exchange, or used the Exchange as a model for the founding of a reuse center in their community (The Scrap Exchange, 2012). Of these exchanges, five are operational, two are in various stages of opening/reopening, and one has closed. The Exchange has most recently launched an official "boot camp" for individuals looking to start a creative reuse center in their community. The training occurs at The Scrap Exchange's center in Durham. Over the four day training, participants are immersed in the Exchange's operations, gaining an understanding of various business model options, collection and materials management, financial and data management, options for programming, facilities issues and many other best practices (The Scrap Exchange, 2014f).

CHALLENGES

Some challenges of running a creative reuse center involve the management of a continuously changing and irregular inventory. The cataloging, development of pricing schemes, and marketing of these materials takes a substantial amount of time and resources. In addition, a strong connection to the local arts community is necessary to ensure that artists not only frequent the store, but also possibly seek employment with the center. The Exchange often employs local artists and educators to work for the center and lead outreach efforts (Woodward, A 2014). Lastly, acquiring a large space for the storage and retail of the collected materials can be expensive and difficult for organizations to provide for themselves initially. One of the largest challenges is getting people to understand the value of the materials that are traditionally discarded, with education, outreach and marketing as key components to the success of a creative reuse center business model. Once the word is out about the center, the problem is not necessarily acquiring the materials, but putting them to a productive reuse. Cities looking to start a creative reuse center should match the approach to city needs. If there is interest in The Scrap Exchange Model, The City of Newark might first look to more recent startups, such as the Cary Reuse Center in Cary, North Carolina to get an understanding of what the first years of the program might look like (Woodward, A 2014).

TAKEAWAYS

The Scrap Exchange exemplifies how a creative reuse center might benefit a city diverting not only materials from the landfill, but serving as a valuable community resource and creating jobs for local residents. The Exchange's operations are almost fully self-funded, with nearly half coming from the sale of materials that would otherwise be discarded. Materials accepted by the Exchange are irregular in type, reflect the local economic activity, and lack an established market. The City of Newark, whose manufacturing discards appear irregular in type and quantity, might benefit from a reuse center that could serve as a catchall for such discards.

Continued investments from the public sector, such as grants for programming, outreach, and building purchase have enabled the Exchange to focus on providing extensive outreach programs to local residents and progressive benefits to its workers. Depending on a reuse center's scope of work, the job creation potential could be substantial. The Exchange's model has been successfully replicated nationally and internationally and it offers an immersive "how to" training for individuals interested in forming their own creative reuse center.

URBAN ORE (BERKELEY, CA)

SNAPSHOT

Incorporated in 1981, Urban Ore is a for-profit salvage and retail enterprise in Berkeley, California with a mission to "end the age of waste" (Urban Ore, 2014). Its founders were idealistic, self-taught salvagers seeking to capture the economic potential of the municipal landfill, which they saw as a mine of valuable raw materials and reusable items (Knapp, D 2014). Today, Urban Ore is a licensed salvager contracted by the city, and a successful retailer of salvaged and donated reusable goods. It supports 38 full-time employees and its annual profits total $2.6 million.

BUSINESS MODEL

Urban Ore resells a wide variety of household items and building materials from its "Ecopark Store," currently comprised of a 30,000 square-foot warehouse and a larger outdoor sales floor on a 3-acre lot. Approximately three-quarters of its inventory is sourced from direct donations. Donors include carpenters, remodelers, dumpster divers, informal waste haulers, or other Berkeley residents, who receive cash or store credit for their donations. The remaining one-quarter is sourced from the tipping floor at Berkeley's waste transfer station, to which Urban Ore has exclusive access thanks to a long-standing contract with the city (Pelissier, 2010). Every day, the company hauls one to three full trucks from its 15,000 square-foot space at the transfer station to its main facility for processing and resale. Urban Ore also salvages some non-reusable materials, which are recycled on-site (Knapp, A 2014).

Despite its social mission, Urban Ore is a fully self-sufficient, financially sustainable for-profit company. During its first year, Urban Ore paid employees only $4 per hour, while company income was $150,000 (Urban Ore, 2014). Earnings gradually increased to $300,000 in the second year and $400,000 in the third. In 2013, Urban Ore earned approximately $2.6 million in revenues. Building materials are among Urban Ore's most common and profitable items. For example, in 2014, Urban Ore had 6,000 intact doors and 8,000 windows in its inventory, accounting for 35 percent of its total income (Knapp, A 2014; Pelissier, 2010).

Over the years, Urban Ore has also generated fiscal benefits for the city and other levels of government. The company pays approximately $95,000 annually in property taxes. It generates approximately $22,000/month in federal payroll taxes, $4,000/month in state payroll taxes, and $17,000-$20,000/month in sales taxes (Knapp, A 2014).

START-UP & HISTORY

Urban Ore did not initially require large infusions of capital or equipment. In its early years, the company evolved from its founder's environmental activism and individual experience salvaging materials from landfill. Dr. Daniel Knapp, an environmentalist and former sociology professor, with no formal business training, credits his instruction in metal salvaging to his "hippie dumpster-diver" mentor in Lane County, Oregon. When he hitchhiked to Berkeley, California, in 1979, Dr. Knapp discovered that the landfill, waste disposal, and salvage processes were "like the Wild West": largely unregulated and with very little oversight (Knapp, 2014; Rosos, 2011). Individual salvagers could make a living by rescuing metals and other valuable items from the public tipping floor at the landfill, some of them as contract workers for a newly formed nonprofit salvage enterprise, the Bay Cities Resource Recovery Depot. Working alone, Dr. Knapp began salvaging metals and reselling

them, hiring private haulers to cart them to markets six miles away. Because he had no storage space, all salvaged items had to be immediately resold. Over time, he developed relationships with some trash haulers, who agreed to grant him a first look through their waste before dumping (Knapp, 2014).

By 1980, the nonprofit Bay Cities Resource Recovery Depot was floundering as a result of inexperienced leadership and lack of oversight. When the organization declared bankruptcy, Dr. Knapp and two partners stepped in to continue its operations. Realizing that they must be liable for sales tax on resold items, they registered for a sales tax number and incorporated as a business in 1981 under the name "Urban Ore" (Knapp, A 2014; Knapp, 2012).

At the same time, Dr. Knapp was gaining public notoriety in Berkeley as a protestor. In 1980, Berkeley's City Council voted to start the procurement process for a garbage-burning power plant to be sited next to the landfill. Dr. Knapp attended public meetings to lobby against the incinerator, as well as writing and distributing a pamphlet about its expected negative environmental impacts (Knapp, 1981). Due to his and other activists' efforts, a public vote about the incinerator was eventually included on the ballot, and 63 percent of Berkeley residents voted to delay its construction. Meanwhile, in 1983, the Berkeley landfill closed on schedule and was replaced by a new waste transfer station (Knapp, A 2014). These two developments profoundly influenced the city's waste management system and shaped the trajectory of Urban Ore.

After the defeat of the incinerator, pragmatic considerations drove the City of Berkeley to establish a formal relationship with Urban Ore, offering assistance that proved essential to the company's growth. The incinerator had been slated to occupy a 66,000 square-foot warehouse located next to the landfill, and now the city needed to find an alternative use for the site. Despite Urban Ore's then-adversarial relationship with local public agencies, city officials recognized it as a promising prospective tenant for a property that few other businesses would be willing to occupy. They devised a rental agreement that would allow Urban Ore to use the space rent-free until its monthly earnings exceeded $11,000. Once monthly earnings exceeded $11,000, Urban Ore would pay the city 10 percent of its gross profits in rent. The city also contracted Urban Ore as a salvager, granting it licensed access to the tipping floor at the new waste transfer station (Knapp, 2012). This assistance from the city was essential in enabling Urban Ore to scale up its operations and retail facility. By the time the company relocated in 1989, it was paying nearly market-rate rent (Knapp, A 2014).

IMPACT

Over time, Urban Ore's staff has grown from 4 employees in 1981 to 38 in 2014. The majority of these are full-time employees, and all are hourly workers (Knapp, A 2014; Green America, 2014). Urban Ore prides itself on paying all employees a Berkeley-defined living wage, currently set at $13.34 per hour plus a medical benefit (City of Berkeley Finance Department, 2013). Staff members also benefit from profit-sharing performance incentives: 9.5 percent of the company's gross income is divided between employees in every paycheck, and employees share 10 percent of annual profits (Green America, 2014). Although the company describes its staff as "ethnically diverse," it has identified a problem with retention of female employees (Knapp, 2014). In 2012, 62 percent of Urban Ore's income went toward paying salaries and staff expenses (Green America, 2014).

Jobs at Urban Ore are specialized and fall under one of several company divisions: Building Materials, General Store, Salvage and Recycling, Receiving, and eBay Sales. Jobs moving heavy building materials

around the outdoor sales floor require considerable physical strength, while selling lighter items indoors at the General Store is much less physically demanding. Salvage and recycling staff must make daily trips between the transfer station and Urban Ore's on-site recycling facility. Sorting and managing inventory are particularly labor-intensive. Urban Ore receives donations labeled as hardware, housewares, or arts & media, and funnels these boxes to three main sorting stations, while smaller areas are designated for sorting books and clothing. The smallest division is eBay sales, which allows the organization to access larger markets for some of its products, and is currently solely staffed. Because all employees specialize within a single division of retail sales or receiving, they become familiar over time with the consumer demand for certain items. Pricing is done by "rule of thumb," and can be very difficult for items with subjective value, such as artwork (Knapp, A 2014).

In addition to the jobs it creates directly, Urban Ore generates potentially significant but unmeasured secondary employment. Although the magnitude of this multiplier effect is unknown, Dr. Knapp estimates that at least half of Urban Ore's customers buy reused items for income-generating purposes. Among the customer base are thrift store owners who buy and resell items, construction workers and carpenters who use salvaged construction materials in their production, and individuals who buy items to list them on eBay (Knapp, A 2014). Mother Jones profiled one such Urban Ore customer, interior decorator Linda Levitsky, whose use of exclusively reused goods allows her to furnish and decorate homes at much lower prices than her competitors (Broydo, 1996).

PLANET

Urban Ore successfully diverts approximately 7,000 tons of reusable and recyclable goods from landfill and incineration each year (Pelissier, 2010). It ensures productive uses for materials that would otherwise have been thrown out, and its on-site recycling facility is able to process some materials that conventional recyclers typically ignore (Knapp, A 2014). This positive environmental impact may be offset to some degree by the trucking required: Urban Ore receives donations from up to 100 vehicles daily (Green America, 2014), and hauls up to three of its own daily truckloads between the transfer station and its Ecopark. Urban Ore's store may also generate increased car traffic in the area, as many customers come to purchase and transport bulky items.

CHALLENGES

Finding an optimal space for Urban Ore's salvaging, warehousing, and retail operations was, for many years, one of the organization's greatest challenges. The company has also attempted separating the pieces of its business and operating them from multiple locations. In its 33-year history, it moved its General Store three times and its Building Materials Exchange four times. In order to warehouse an inventory of bulky items, Urban Ore requires a large space. Sufficient parking for company vehicles and customers is also essential (Knapp, A 2014; Urban Ore, 2014). When selecting a site, Urban Ore ultimately found that accessibility to customers was more important than proximity to the waste transfer station. However, it continues to operate a small 15,000 square-foot space at the transfer station, from which it can truck salvaged materials to its main warehouse. Although the company has periodically wanted to further scale up its operations, this has ultimately been problematic due to space constraints (Knapp, A 2014).

Security can also be challenging. Urban Ore invests in a security system, but still occasionally loses inventory due to break-ins. A particular target for thieves is the non-ferrous scrap metal warehoused on the premises. Because scrap metal can be resold for cash with minimal effort, it requires

extra security precautions (Knapp, A 2014).

Urban Ore has found it both challenging and rewarding to collaborate with the City of Berkeley in multiple capacities. It has retained active roles as both an environmental policy advocate and a city contractor through the Department of Public Works. The city's financial support and contracts have been crucial to the company's long-term development. Urban Ore sees part of its role as filling gaps in "the City's institutional memory" when it comes to resource recovery programs. Its first-hand knowledge of previous municipal waste management approaches can be helpful, as City departments have seen frequent turnover since Urban Ore's inception. The company's managers have worked closely with 8 different recycling coordinators since the 1980s (Knapp, A 2014).

Meanwhile, Urban Ore can be heavily affected, for better or for worse, by shifting city policies and regulatory decisions. In the late 1980s, the city shut down Urban Ore's compost farm due to fires and neighbors' complaints about the smell; this aspect of its business has never been revived. By contrast, Urban Ore's move to its current location was enabled by a 1999 zoning amendment that allowed Materials Recovery Enterprises to occupy mixed-use light industrial land (Knapp, 2012). In recent years, the city's waste management operations have fallen into fiscal difficulties: Because revenues from waste disposal had historically subsidized the cost of recycling, Berkeley residents' decreases in disposal and increases in recycling eventually led to unbalanced budgets. In order to cut costs, the city considered taking over the salvage operations that it had been contracting to Urban Ore. Although it ultimately renewed Urban Ore's contract in 2012, the terms were less financially generous than in previous years (Knapp, 2012). Its partial reliance on city support makes it pragmatic for Urban Ore to play an active role in researching and proposing laws and policy initiatives. It has played an ongoing role in advocating for policies that favor reuse and recycling, and is currently encouraging the city to adopt its proposed redesign of the now-outdated Berkeley waste transfer station (Knapp, A 2014).

TAKEAWAYS

Urban Ore's example illustrates how waste transfer stations and other waste management facilities may provide valuable inputs for a salvage, retail, or recycling business, sufficient to sustain a for-profit company. Dr. Knapp estimates that 5 percent of any transfer station's incoming waste is valuable enough to be dusted off and resold as-is (2014). However, to the extent that such a business depends on continued city contracts, city fiscal or operational issues may affect its viability. In Newark, lack of city control over local waste management facilities would likely make start-up for a similar salvage business more challenging, as it would need to negotiate with higher levels of government or private ownership.

In addition to pulling materials from the tipping floor at the waste transfer station, Urban Ore depends on an even larger stream of donated items, ranging from household items to building materials. Unlike nonprofit retailers that incentivize in-kind donations through tax deductions, Urban Ore uses cash and store credit to pay back donors, both of which have been successful in encouraging repeat donations and attracting customers to the Ecopark Store. Urban Ore has been successful in attracting consistent donations from informal haulers by rewarding their efforts with small cash payments. This strategy might potentially be successful in Newark, where the waste disposal landscape includes many small, informal haulers.

In its 33-year history, Urban Ore has benefited from continued city support in the form of generous contracts, discounted rent on an appropriately located facility, policies that mandated reuse and recycling over incineration, and a zoning amendment that expanded locational options for Materials Recovery Enterprises. As Newark looks to support newly formed reuse organizations, it might consider these (as well as other) initiatives that could provide assistance to fledgling businesses. Providing multiple forms of support, in conjunction with removing regulatory obstacles to success, would likely require coordination across city departments, but may ultimately be necessary to ensure the success of start-up reuse operations.

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INTERVIEW MATERIALS

GUIDE FOR MANUFACTURER INTERVIEWS

OBJECTIVES

Gain as comprehensive as possible an understanding of:

- The manufacturer's durable byproducts (type, volume, frequency of production)
- The manufacturer's waste removal processes and costs
- The manufacturer's interest in a reuse program (incentives, challenges, feedback)

INTRODUCTION

We are graduate students at Rutgers' Bloustein School of Planning and Public Policy. We are working with the City's Department of Sustainability to investigate the durable byproducts and other materials that Newark manufacturers discard. The city would like to support manufacturers by redirecting some of their waste away from landfills and into a reuse program, hopefully generating cost savings and increased efficiency through minimized waste removal needs. The goal is that these discards be reused as raw products by other manufacturers, and that more manufacturing jobs and businesses will be created as a result.

We've come to visit you because we would like to:

- Better understand your manufacturing process, the durable byproducts that you generate, and what you do with them;
- Gauge your interest in a reuse program that would recycle manufacturing byproducts; and,
- Learn how the City might structure a reuse program to maximize your cost savings and other potential benefits.
- Before beginning the interview, have the manufacturer read and sign the IRB consent form. Ask permission to take photos, prioritizing photos of byproducts and removal processes.

QUESTIONS

MANUFACTURING PROCESS, BYPRODUCTS, AND DISCARDS

- What products do you make?
- Can you walk us through your manufacturing process for these products?
  - ☐ What are the raw inputs? Where do they come from? In what packaging materials are they delivered?
  - ☐ Do you use any recycled materials in your production process?
  - ☐ Who are your buyers? How do their needs/preferences affect your production process?
- What are your byproducts?
  - ☐ Which byproducts do you generate regularly? Which are one-time or infrequent byproducts?
  - ☐ What volume of each byproduct do you typically discard? Are the volumes constant, or do they vary depending on your current orders (or something else)?

WASTE REMOVAL PROCESSES AND COSTS

- Where do you store byproducts after the manufacturing process? How do you dispose of them?
  - ☐ Are different byproducts stored separately, or are they combined?
  - ☐ How often are byproducts taken to the dumpster?
  - ☐ Is there any chance of contamination, either between byproducts or by any other types of waste? Are byproducts exposed to food waste?
- How do you dispose of shipping and packaging materials?
- Who is your trash hauler?
  - ☐ How often does the hauler pick up waste?
  - ☐ Do you have a recycling hauler?
  - ☐ What are your typical monthly hauling costs? May we refer to a past bill to check the exact amount?
    - Are you charged by number of pick-ups or weight of discards?
    - Do you have a contract with the hauler? If so, what are its terms?
    - Are there fees for additional/unscheduled pickups or for items outside the dumpster?
- Do you currently have any donation/bartering practices in which you give away or trade any of your byproducts or discards with other manufacturers, organizations, or individuals?

MANUFACTURER INTEREST AND FEEDBACK

- What are your three biggest challenges as a firm? What, if any, are your biggest waste disposal challenges?
- What would make you most interested in participating in a reuse program?
- What are your biggest concerns about participating in a reuse program?
- Do you have space to temporarily store some of your byproducts for reuse?
- Would you be willing for the City (or another user) to pick up some of your byproducts for reuse?
  - ☐ How frequently would you need these byproducts to be picked up?
  - ☐ What are the best days/times for byproducts to be picked up?
  - ☐ Would you be willing to pay an additional small fee to have these items picked up?
- Would it be feasible for you to keep an updated list of your discards on an online platform, so that interested users could come and pick them up?
- Do you have any additional suggestions as to how a reuse program might work best for your manufacturing business?

MANUFACTURING MATERIALS REUSE

Newark, NJ

Help Newark create an inventory of manufacturing discards to:

1. **Support Newark's manufacturing sector**
2. **Divert discards from landfills and incineration**
3. **Create businesses and jobs for Newark residents**

We are visiting manufacturers in Newark from February - April and would love to learn about your business

Diverting discards from the waste stream offers environmental benefits to local communities

Industrial discards may serve as inputs for other local manufacturers

For more information, contact us at:
848.932.2835 or renewark@ejb.rutgers.edu

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CITY of NEWARK Office of Sustainability

WASTE INFRASTRUCTURE

BID STRUCTURE AND FLOW CONTROLS

Because of the importance of bid structure and flow controls to how waste flows through Newark, we review how these systems work here. The New Jersey Solid Waste Management Act of 1978 (NJSWMA) designates each NJ county as a solid waste management district which provides them with the authority to develop and implement comprehensive Solid Waste Management Plans and later employed the "State Self-Sufficiency Program," that mandates counties to construct sufficient in-state capacity to dispose of solid waste. Flow control under the NJSWMA provided NJ counties the authority to direct in-county generated solid waste to designated facilities within their respective counties. The counties, which built, own, and operate waste management facilities, received state subsidies to pay down bond debts.

The Essex County Executive and the Essex Board of Chosen Freeholders created the Essex County Utilities Authority (ECUA) in 1992 which is responsible for planning, developing, and implementing cost effective solid waste methods with an emphasis on material reuse, recovery, and waste to energy practices with a minimal impact on the environment. The ECUA is the sole agency responsible for implementation of the Essex Plan which was most recently amended in 2006. The ECUA recommended a revision to the County Plan that created a Waste Disposal Agreement with the Port Authority of New York and New Jersey for the delivery and processing of processible (meaning suitable for incineration) municipal solid waste at the ECRRF (Essex County Solid Waste Management Plan). For the Port Authority, this created an obligation to accept and dispose of all MSW originating in Essex County in an amount equal to 360,000 tons per year (guaranteed tonnage). To satisfy these commitments to transport MSW to the ECRRF, to meet its guaranteed tonnage requirements, the ECUA entered into voluntary contracts with each of the county's twenty-one municipalities. Flow control was reestablished over waste not delivered to the ECRRF through non-discriminatory bidding processes which establishes contracts not to exceed five years (Essex County Solid Waste Management Plan).

MATERIAL	2011 TONNAGE
Corrugated	24,548.83
Mixed Office Paper	4,663.39
Newspaper	729.19
Other Paper	531.09
Glass Containers	3,407.87
Aluminum Containers	1,510.13
Steel Containers	201.66
Plastic Containers	1,064.92
Heavy Iron	64,870.23
NonFerrous /Aluminum Scrap	20,124.38
White Goods & Light Iron	164.61
Antifreeze	97.47
Batteries (Automobile)	144.27
Automobile Scrap	9,457.46
Tires	1,055.84
Used Motor Oil	2,215.66
Brush/Tree Parts	451.70
Grass Clippings	0.00
Leaves	17.50
Stumps	33.35
Consumer Electronics	198.63
Concrete / Asphalt / Brick / Block	193,304.14
Food Waste	113,851.70
Other Material Not Listed	7.24
Other Glass	0.00
Other Plastic	531.88
Oil Contaminated Soil	54,668.92
Process Residue	0.00
Textiles	0.01
Wood Scraps	4,122.94
TOTAL	**501,975.00**

TONNAGE REPORTING

To ensure accurate records of the waste that moves through New Jersey waste facilities, all solid waste and recycling facilities report monthly tonnage to county and state officials (Clean Communities and Recycling Grant Act). Solid waste tonnage reports show waste type, volume, and origination and destination. Recycling tonnage reports determine the amount of grant money individual municipalities receive for their collected recyclables because the recycling grant program awards funds to municipalities based on the amount of recycling material collected. In 2011, Newark received $228,379.64 (NJ DEP 2011 Recycling Tonnage Grant Payout Schedule).

Each municipal recycling coordinator is required to collect tonnage reports from all facilities that recycle materials and report it to the DEP. This determines the amount of grant money which municipalities used to improve their recycling programs. These reports vary depending how thorough the recycling coordinator collects the data and less than thorough data collection and reporting means lost grant funds. Accurate reports of scrap metal are often not captured because scrap metal dealers often operate profitable businesses collecting and re-distributing scrap metals outside of regulated recycling facilities. Below is a list detailing the tonnage reported for recycling materials in Newark in 2011.

2012 TONNAGE RECEIVED BY TYPE AND FACILITY

FACILITY	WASTE TYPE										
	10	13	13C	23	25	27	27A	27I	Other	TOTAL	% Total
Evergreen	1802.32	10153.47	82624.6	0	0	1630.37	0	0	0	96210.76	6.35%
DART	459616.1	2447.84	4416.11	0	0	7109.41	0	0	0	473589.46	31.25%
Covanta	824588	0	0	0	0	366	0	0	0	824954	54.44%
Lemcor	65000.1	0	55501.22	0	0	0	0	0	0	120501.32	7.95%
TOTAL	1351006.52	12601.31	142541.93	0	0	9105.78	0	0	0	1515255.54	100.00%
% Total	89.16%	0.83%	9.41%	0.00%	0.00%	0.60%	0.00%	0.00%	0.00%	100.00%	

The table highlighting Tonage Recieved by Type and County in 2011 is on the top of page 87.

TONNAGE RECEIVED BY TYPE AND COUNTY IN 2011*

COUNTY	BULKY WASTE	CONSTRUCTION & DEMOLITION	DRY IDUSTRIAL	HOUSEHOLD & MUNICIPAL	TOTAL CONTRIBUTION	PERCENT OF WASTE FLOW
Atlantic				1.11	1.11	< .001%
Bergen	1,045.54	14,855.84	60.23	85,361.20	101,322.81	6.920%
Burlington		0.67			0.67	< .001%
Camden	3.33	20.18	111.85		135.36	0.009%
Essex			5,257.11	351,141.86	356,398.97	24.342%
Gloucester		1.61			1.61	< .001%
Hudson			11.36	346,238.36	346,249.72	23.649%
Hunterdon		198.50		2.76	201.26	0.014%
Mercer		10.56			10.56	0.001%
Middlesex	31.86	1,683.59	15.78	1,103.21	2,834.44	0.194%
Monmouth		904.03	95.85	2.76	1,002.64	0.068%
Morris		136.40	18.03		154.43	0.011%
Ocean	3.16	59.16			62.32	0.004%
Passaic	1,579.00	20,329.57		79,741.41	101,649.98	6.943%
Salem		1.51			1.51	< .001%
Somerset	342.40	7,844.96		18,895.20	27,082.56	1.850%
Sussex		403.80		42.75	446.55	0.030%
Union			2.83		2.83	< .001%
Warren		595.64	23.48	18.62	637.74	0.044%
OUTSIDE OF NJ						
New York	119.19	12,237.28	109.99	512,276.73	524,743.19	35.839%
Pennsylvania		58.53	6.85	122.84	188.22	0.013%
International			1020.75		1020.75	0.070%
TOTAL	**3,124.48**	**59,341.83**	**6,734.11**	**1,394,948.81**	**1,464,149.23**	**100.000%**

***Data from January - November 2011; Evergreen did not begin operation until 2012**

REFERENCES

Clean Communities and Recycling Grant Act, New Jersey Senate and General Assembly P.L. C.13:1E-213 (2002), Chapter 128.

REUSE AND RECYCLING OPPORTUNITIES IN NEWARK

COMMUNITY DEVELOPMENT STUDIO 2014

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