



The Current and Potential Economic Impacts of Austin Recycling- and Reuse-Related Activity

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austintexas.gov



TXP, Inc.  
 1310 South 1st Street, #105  
 Austin, Texas 78704  
 (512) 328-8300 phone  
 www.txp.com

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## Summary

In July 2014 City of Austin officials were awarded \$1 million in grant funding from the U.S. Economic Development Administration (EDA) to fund infrastructure improvements for the new Austin [re]Manufacturing Hub (the Hub), the City of Austin's first eco-industrial park and the center for jobs in the recycling, reuse, and repair industries. Among the goals for the Hub is to help create a local economy of scale in the transformation of recyclables into new products.

As a part of this effort, the City of Austin commissioned TXP, Inc. to evaluate the recycling and reuse sectors' economic impact. This will provide a better understanding the current impact of recycling and the magnitude of the opportunity to increase its role in the local economy, as well as provide a benchmark against which future economic development in this sector could be measured. The report that follows is based on evaluation of data, industry and overall economic trends, input from local stakeholders, and literature and best practices review. The following table shows the current total economic impact and the additional impact of bringing local recycling-related manufacturing up to the national average.

**Table 1: Total Current & Potential Impact of Austin MSA Recycling Activity (\$2014)**

NAICS Codes	Output/Receipts	Earnings/Payroll	Employment
Manufacturing (3261, 327215, 3314)	\$105,075,647	\$21,080,902	464
Wholesale (423140, 423930)	\$534,424,333	\$45,817,140	1,036
Solid Waste Recovery (562111, 562920)	\$80,291,063	\$42,995,720	1,173
<b>Current Total</b>	<b>\$719,791,043</b>	<b>\$109,893,762</b>	<b>2,673</b>
<i>Additional Manufacturing-Related</i>	<i>\$363,860,498</i>	<i>\$72,999,862</i>	<i>1,606</i>
<b>Potential Total</b>	<b>\$1,083,651,541</b>	<b>\$182,893,624</b>	<b>4,278</b>

Source: TXP

In terms of structure, the first section provides an overview of the industry, including a short discussion of metal, glass, paper, and plastic, and the role of recycled materials in the manufacturing process. Key industry trends that point toward economic development opportunities are then outlined, followed by measurement of the current and potential impact of recycling on the local economy. The report then concludes with recommendations that hopefully translate into action on bridging the gap between the present and the possible. The growing role of recycled materials as a cost-effective factor of production for many industries, along with consumer awareness of how a product was made (and by who), increasingly render a product's "green" quality a factor in the overall value proposition. This points to a range of economic development opportunities in Austin that can build on the investments and program commitments already made by the City.

## Overview

The connection between recycling and economic development is becoming increasingly clear. For example, the Texas Recycling Data Initiative (TRDI) is a collaboration among stakeholders that seeks “to examine environmental, economic and policy issues of interest to businesses, citizens and governmental agencies.” TRDI recently released a biennial report on the state of recycling in Texas, which found that more than 6.1 million tons of material were recycled from municipal solid waste sources Texas in 2013, supporting more than 12,678 jobs. Similarly, City of Austin officials were awarded \$1 million in grant funding last year from the U.S. Economic Development Administration (EDA) to fund infrastructure improvements for the new Austin [re]Manufacturing Hub (the Hub), the City of Austin’s first eco-industrial park and the center for jobs in the recycling, reuse, and repair industries. Among the goals for the Hub is to help create a local economy of scale in the transformation of recyclables into new products. In order to support this effort, the City of Austin commissioned TXP, Inc. to evaluate the recycling sectors’ current local economic impact and estimate the potential impact of expanded activity in this sector. The report that follows will provide a context for continued discussion of the economic impact of the recycling, reuse, and recycling-related manufacturing sectors as well as the best way to support the growth of these industries.

## How Recycling Touches the Economy

### Overall Context

While the history of reuse is almost as old as the history of humankind, recycling only became possible after humans learned to make, control and use fire for melting and re-melting metals.<sup>1</sup> Today, there are approximately 1.6 million people globally who are active in the recycling industry, handling more than 800 million tons of recyclables every year. The recycling industry worldwide generates about \$200 billion in revenue. The use of recycled materials in the manufacturing sector decreases the amount of energy consumed, in addition to a reduction of the use of natural resources, when compared to production processes using virgin materials. This reduction in the cost of production is a primary reason for the fact that recycled materials now supply 40 percent of the global raw material needs.<sup>2</sup>

In addition to the obvious environmental benefits, recycling plays an important role in the world economy. Of the \$200 billion generated by the recycling industry worldwide, 10 percent is spent on new technologies and research and development.<sup>3</sup> The industrial demand for recycled commodities is global, and include such materials as automotive and industrial scrap metal, nonferrous scrap metal, paper, plastics, and textiles. Steel is the

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<sup>1</sup> Recycling throughout the ages (n.d.). Bureau of International Recycling. [www.bir.org](http://www.bir.org)

<sup>2</sup> The Industry (n.d.). Bureau of International Recycling, [www.bir.org](http://www.bir.org)

<sup>3</sup> The Industry (n.d.). Bureau of International Recycling, [www.bir.org](http://www.bir.org)

world's most recycled material, with about 500 million tons of steel scrap produced annually. The United States is the largest scrap exporter of steel, and Turkey is currently the largest scrap importer, using the material to supply the building boom domestically and in neighboring countries. However, Asia is expected to be the fastest growing market over the next decade, particularly China and India. Export restrictions on scrap have artificially inflated prices, as 20 countries have some sort of scrap export restraints. As a result, exports from countries with no restrictions such as the U.S., Canada, and the EU are on the rise.<sup>4</sup>

Domestically, there are about 6,200 recyclable materials wholesalers with combined annual revenue of about \$87 billion. Major sources of revenue are ferrous metal scrap (iron and steel representing 45 percent of sales) and nonferrous metal scrap (accounting for 35 percent). Other sources of revenue include recyclable paper, plastics, and textiles. The industry processes about 135 million tons of material annually, including 75 million tons of ferrous metals, 50 million tons of paper, 8 million tons of nonferrous metals, 3.5 million tons of electronics, 1 million tons of plastics, and 100 million tires. Almost all old cars are recycled, along with 90 percent of appliances, 70 percent of newspaper, and 30 percent of glass containers.<sup>5</sup>

### Recent Trends

The popularity of and need for recycling has increased significantly in recent years. Numerous organizations and municipalities across the country have spent thousands of hours and millions of dollars on efforts to increase recycling rates, and, in fact, rates have steadily risen since 1960. In 2010, Americans generated about 250 million tons of trash and recycled and composted over 85 million tons of this material, equivalent to a 34.1 percent recycling rate. According to the U.S. Environmental Protection Agency, this provided an annual benefit of more than 186 million metric tons of carbon dioxide equivalent emissions reduced, comparable to the annual emissions from over 36 million passenger vehicles.<sup>6</sup> The figure below shows recycling rates of certain products as of 2010.

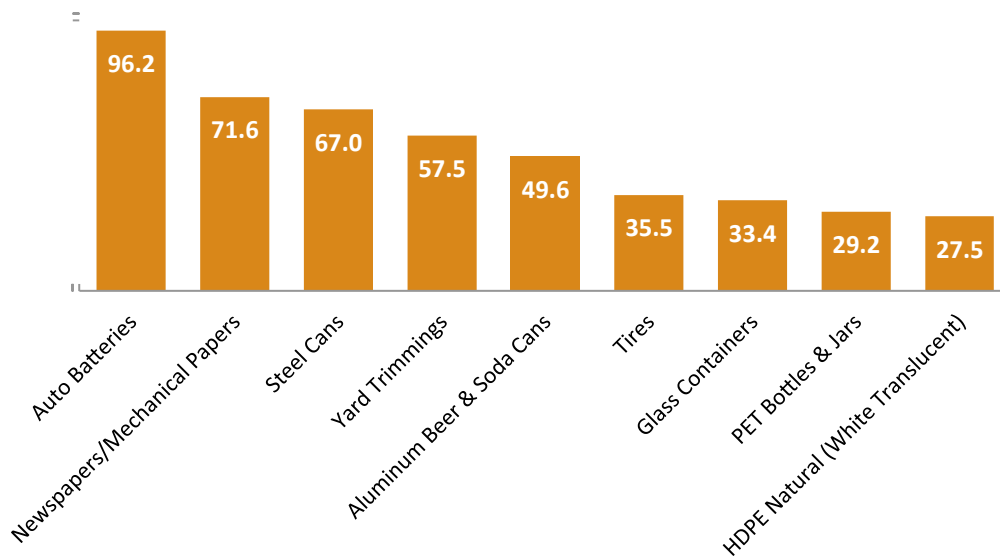
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<sup>4</sup> Recyclable Material Wholesalers (June 23, 2014). First Research Industry Profile. [www.firstresearch.com](http://www.firstresearch.com).

<sup>5</sup> Recyclable Material Wholesalers (June 23, 2014). First Research Industry Profile. [www.firstresearch.com](http://www.firstresearch.com).

<sup>6</sup> United States Environmental Protection Agency (2010). *Facts and Figures for 2010*. Accessed from [http://www.epa.gov/epawaste/nonhaz/municipal/pubs/msw\\_2010\\_rev\\_factsheet.pdf](http://www.epa.gov/epawaste/nonhaz/municipal/pubs/msw_2010_rev_factsheet.pdf)

**Figure 1: Recycling Percentage Rates of Selected Products, 2010**



Source: U.S. Environmental Protection Agency

In addition to the environmental implications, recycling is also an important element of domestic production. United States manufacturers—particularly manufacturers of energy-intensive and trade-exposed products such as glass, plastic, paper, aluminum and steel—need access to recycled materials in order to retain competitive advantages, particularly energy savings, that result from a lesser reliance on virgin raw materials.

### Major Recycled Materials

#### ***Metal & Scrap***

Recognized as one of the world’s first green industries, scrap recycling is a major industry designed to transform end-of-life products and industrial scrap into new commodity grade materials. Iron and steel, referred to as ferrous scrap, are recovered from automobiles, steel structures, food cans, household appliances, railroad tracks, and office buildings. Steel makes up the largest category of metals in the municipal solid waste (MSW) and industrial waste streams. In 2012, the U.S. generated about 16.8 million tons of ferrous metals in the MSW stream, representing 6.7 percent of the total MSW generation that year.<sup>7</sup>

Ferrous scrap is sorted and processed by the scrapyards that use a variety of processes including sorting, shearing, shredding, torching, and bailing to prepare ferrous scrap to commodity-grade specifications. In 2013, more than 350 shredders were in operation in North America, up from just 120 shredders in the early 1970’s.<sup>8</sup>

<sup>7</sup> United States Environmental Protection Agency (n.d.) Steel. [www.epa.gov/osw/conservation/materials/steel.htm](http://www.epa.gov/osw/conservation/materials/steel.htm).

<sup>8</sup> The Scrap Recycling Industry (n.d.). Iron and Steel Scrap. <http://www.isri.org/recycling-industry/commodities-specifications/ferrous-scrap>.

Nonferrous scrap, including aluminum, copper, lead, nickel, tin, and zinc, are among the few materials that can be recycled an infinite number of times because they do not degrade during the recycling process. More than 9 million metric tons of nonferrous scrap was processed in the U.S. in 2013 from a wide array of consumer, commercial and industrial sources. Examples of this type of recycling include copper and precious metal circuitry in electronic devices, aluminum cans, automobile batteries and radiators, aluminum siding, and airplane parts. Nonferrous scrap makes up less than 10% of the total quantity of material recycled in the U.S. in terms of volume, but by value, it accounted for more than half of the total U.S. scrap recycling earnings in 2012.<sup>9</sup>

A 2013 study found that the U.S. scrap recycling industry was responsible for 462,940 jobs and generated more than \$87 billion annually in economic activity. The industry accounts for 0.55 percent of the nation's total economic activity, making it similar in size to the cosmetics industry, the milk industry, and the aircraft engine industry. The scrap recycling industry generates \$6.3 billion in federal taxes and \$4.0 billion in state and local taxes annually. Exports account for 39 percent of this activity, and generate \$33.9 billion in economic benefits for the U.S. and contribute \$1.9 billion in tax revenues for federal government and \$1.6 billion in state and local taxes.<sup>10</sup>

### ***Glass & Glass Products***

Unlike other food and beverage containers, glass is 100 percent recyclable and can be recycled endlessly without loss in quality or purity. Glass recycling increased from 750,000 tons in 1980 to more than 3 million tons in 2012. Americans generated 11.6 million tons of glass in the municipal solid waste stream in 2012, which mostly consisted of food and beverage containers.<sup>11</sup> According to the Glass Packaging Institute, in 2012, 41 percent of beer and soft drink bottles were recovered for recycling, along with 34 percent of wine and liquor bottles, and 15 percent of food and other glass jars. In total, just over 34 percent of glass containers were recycled.<sup>12</sup>

Glass is made from readily available domestic materials such as sand, soda ash, limestone and "cullet," an industry term for scrap glass. 90 percent of recycled glass is used to make new containers, but it can also be used in kitchen tiles, counter tops, wall insulation, and parking lots, and for filtration and sand blasting.

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<sup>9</sup> The Scrap Recycling Industry (n.d.). Nonferrous Scrap. <http://www.isri.org/recycling-industry/commodities-specifications/nonferrous-scrap>.

<sup>10</sup> John Dunham and Associates (2013). Economic Impact Study U.S.-based Scrap Recycling Industry. [www.isri.org/news-publications/economic-impact#.VBsn-y5dXKk](http://www.isri.org/news-publications/economic-impact#.VBsn-y5dXKk).

<sup>11</sup> United States Environmental Protection Agency (n.d.). Glass. <http://www.epa.gov/osw/conserves/materials/glass.htm>.

<sup>12</sup> Glass Packaging Institute (n.d.). Glass Recycling Statistics. <http://www.gpi.org/recycling/glass-recycling-facts>.

Color sorting is an important part of the glass recycling process, as different colors can represent different melting points and chemical compounds. Glass separated by color yields glass cullet of higher economic value, and demand for quality cullet is higher than the supply.<sup>13</sup>

### ***Paper & Fiber***

Recovered fiber, which includes paper and board, is one of the most recycled materials in the world. In fact, paper accounts for more than half of all recyclables by weight. According to the Scrap Recycling Industry, Americans have recycled approximately one billion tons of recovered fiber since 1990, and the recovery rate nearly doubled during that time to reach 65.1 percent in 2012.<sup>14</sup> In the U.S., approximately 76 percent of paper mills rely on recovered fiber to make some or all of their products.

Recovered paper can be grouped into several main categories including OCC (old corrugated containers), ONP (old newspaper), mixed paper (discarded mail, telephone books, etc.), and high-grade deinked paper (office paper). The various grades of recovered fiber processed in the U.S. were valued at \$8.4 billion in 2012. These products were sold and transported to paper mills at home and abroad for production into new packaging, office paper, tissue, newsprint, and many other paper products. In 2011, 42 percent of recovered paper was exported to overseas markets, 53 percent stayed in the U.S., and the remaining 5% was used to make other non-paper products.<sup>15</sup> Dramatic economic growth in China has fueled strong export demand for America's recycled paper, making it more expensive to produce recycled paper at home. Recovered fiber was exported to 85 different countries in 2013 at a value of approximately \$3.5 billion.<sup>16</sup>

### ***Plastic Materials***

Plastics make up almost 13 percent of the municipal solid waste stream, a dramatic increase since 1960 when it represented less than 1 percent of the waste stream. Plastics are most commonly found in containers and packaging, but they are also found in durable (appliances, furniture) and nondurable (trash bags, cups, medical devices) goods. The overall recycling rate for all plastics is only 9 percent, but some plastics products have a much higher rate such

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<sup>13</sup> United States Environmental Protection Agency (n.d.). Glass. <http://www.epa.gov.osw/conserves/materials/glass.htm>.

<sup>14</sup> The Scrap Recycling Industry (n.d.). Recovered Paper and Fiber. <http://www.isri.org/recycling-industry/commodities-specifications/recovered-paper-and-fiber>.

<sup>15</sup> United States Environmental Protection Agency (n.d.). Paper Recycling Markets. <http://www.epa.gov.osw/conserves/materials/paper/basics/market.htm>.

<sup>16</sup> The Scrap Recycling Industry (n.d.). Recovered Paper and Fiber. <http://www.isri.org/recycling-industry/commodities-specifications/recovered-paper-and-fiber>.

as HDPE bottles (28 percent) and PET bottles (31 percent). The primary market for recycled PET bottles is fiber for carpet and textiles, while the primary market for HDPE is bottles.<sup>17</sup>

Plastics can be divided into two major categories: thermosets and thermoplastics. Thermosets solidify or set irreversibly when heated, and are therefore used primarily in automobiles and construction applications. Thermoplastics soften when exposed to heat and return to their original condition at room temperature and therefore can be easily shaped and molded into products such as milk jugs, floor coverings, credit cards, and carpet fibers. The resin identification coding (RIC) system classifies plastics 1 through 7 based on the resin content and aids in the recycling process.

### Recycling in Manufacturing

Recycled materials supply 40 percent of global raw materials needs. The recycling industry has become an integral part of modern society not only due to its social and economic impact but also because it plays a vital role for the future of our planet. The use of recycled materials in manufacturing directly translates into fewer natural resources being used and considerably less energy being consumed when compared to production processes using virgin materials.

In addition to the environmental benefits, using recycled materials in manufacturing has a strong appeal to consumers. Market research shows that consumers want what sustainability helps provide: greener products and services. According to recent research,<sup>18</sup> twice as many Americans recycle on a regular basis (58 percent) and more buy green products (29 percent) compared to twenty years ago. Findings from the global 2011 ImagePower® Green Brands Survey<sup>19</sup> echo this growing interest in green living. Respondents indicated they are most likely to purchase green products in the household, grocery, personal care, and packaged food and beverage categories. The survey also indicated that consumers in all markets intend to buy more environmentally sustainable big-ticket items during the next year, with U.S. consumers exhibiting the most interest in green technology brands.

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<sup>17</sup> United States Environmental Protection Agency (n.d.). Plastics.  
<http://www.epa.gov.osw/conserves/materials/plastics.htm>.

<sup>18</sup> GfK Roper Consulting (2011). The Environment: Public Attitudes and Individual Behavior -A Twenty-Year Evolution.  
[http://www.scjohnson.com/Libraries/Download\\_Documents/SCJ\\_and\\_GfK\\_Roper\\_Green\\_Gauge.sflb.ashx](http://www.scjohnson.com/Libraries/Download_Documents/SCJ_and_GfK_Roper_Green_Gauge.sflb.ashx)

<sup>19</sup> Cohn & Wolf, et al. (2011). Green Brands, Global Insights 2011.  
[http://landor.com/pdfs/k9/GB2011\\_Pamphlet\\_8June2011.pdf?utm\\_campaign=PDFDownloads&utm\\_medium=web&utm\\_source=web](http://landor.com/pdfs/k9/GB2011_Pamphlet_8June2011.pdf?utm_campaign=PDFDownloads&utm_medium=web&utm_source=web).

**Figure 2. How Recycled Material Becomes New Products**



The activities of recycled product manufacturers can be divided into four basic categories. Some manufacturers may perform more than one function:<sup>20</sup>

1. Manufacture a new product for sale directly to consumers or other manufacturers (i.e., compost or other garden supplies, paper, compost metal parts, artwork);
2. Remanufacture or recondition products for resale (i.e., toner cartridges, computers);
3. Transform material into feedstock for a specific market (i.e., plastic pellets, paper pulp); and/or
4. Fabricate products from recycled materials (i.e., fleece outerwear, plastic benches).

As an example of how companies can incorporate recycling into their production processes, it is instructive to examine a company like U.K. based Recycling Lives. One of the company’s goals is to develop manufacturing processes for a number of products made using recycled materials. A few examples of the products that they have developed include:

- Interlocking Concrete Blocks System is billed as a “fast and flexible storage solution” that uses crushed glass as aggregate in place of sand to create stacking concrete storage blocks.

<sup>20</sup> Chelsea Center for Recycling and Economic Development (February 2003). Massachusetts Directory of Recycled Products Manufacturers. <http://www.chelseacenter.org/Publications1.htm>

- Plastic I-Beams are created for use in the construction industry using any recycled plastic polymer. This product provides an eco-friendly, sustainable alternative to wood, and will not rot or decay as wood does.
- Glass tiles are produced from crushed waste glass and provide a sustainable alternative to products made from marble, granite, ceramics, and synthetic material.

Other companies have developed creative and innovative methods for using recyclables in their manufacturing processes; see the footnote below for a link to examples of other products made using recycled materials.<sup>21</sup>

### **Key Industry Trends**

The following analysis is drawn from a range of secondary sources, including industry publications, public sector data, and popular media. These findings represent the overall market environment and context for evaluating both the existing status and future opportunities related to recycling and recycling-related manufacturing in the Austin area.

#### ***Recycled material prices fluctuate.***

The recycling materials industry is vulnerable to fluctuations in both foreign and domestic markets. Excess world supply of steel and scrap has caused market disruptions in the US. In recent years, overcapacity in China has led to excessive imports into the US, putting downward pressure on domestic prices. On the other hand, trade barriers can inflate the cost of US materials, which then raises domestic manufacturing costs. Many countries, such as China, India, and Russia, enact quota restrictions and put additional taxes on scrap exports. As a result, exports from the US, which does not restrict trade, increase.

#### ***The need for scale has prompted industry consolidation.***

Some recycling firms have made acquisitions in a bid to become large enough to produce a steady supply of raw material to large producers. Supply contracts with large customers can bring higher prices over longer periods than can the volatile spot market. A diversified customer base can also help to insulate the company during a difficult economy.

#### ***Demand for recycled materials is highly dependent on end-use markets, and therefore the economic cycle.***

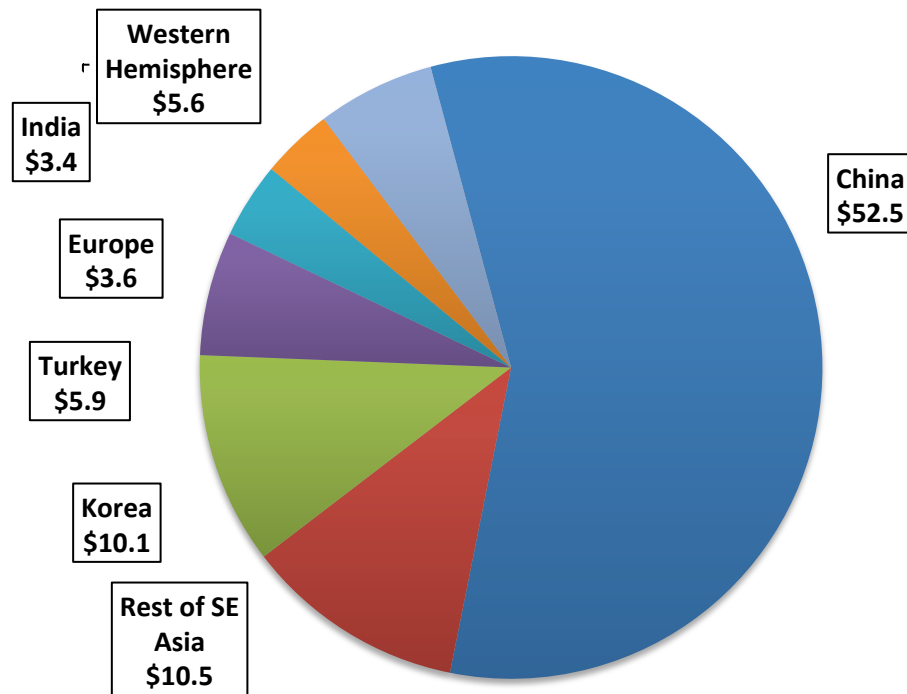
Demand for scrap steel comes mainly from the US steel industry, for example, which in turn depends heavily on the auto, machinery, and construction industries. The shift of more auto production to foreign plants will negatively affect scrap metal demand long-term. Demand from China, Taiwan, South Korea, and Turkey has boosted US exports.

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<sup>21</sup> <http://mentalfloss.com/article/50227/13-products-made-using-recycled-materials>

These patterns are also evident in Austin, as domestic markets account for about two-thirds of local trade in waste and scrap. Of the remainder, the majority is with China and elsewhere in Asia.

**Figure 3. 2013 Austin MSA Waste & Scrap Foreign Market Trading Partners (\$millions)**



Source: Brookings Institute, TXP

***Changes in technology and business practices increase flexibility and efficiency.***

For example, mini-mills make steel by melting scrap in electric arc furnaces (EAF), whereas traditional steel making, using the basic oxygen process, uses no more than 20 percent scrap as raw material. EAFs have lower carbon dioxide emissions and greater energy efficiency. A steep reduction in the price for scrap that mini-mills use in relation to iron ore needed for traditional steel manufacturing also gives mini-mills an advantage. In general, processors need a constant flow of low-cost raw material, making improvements in sourcing and collecting materials important.

***Bans on plastic increase demand for product substitutes that contain recycled materials.***

Between prohibitions on Styrofoam, plastic shopping bag bans, and even bans on plastic bottles in some communities, the push to phase-out plastics like these will continue. In the future, look to bioplastics and hybrids (e.g., the convergence of plastic and paperboard in food containers). The declining use of traditional plastics will lead to a more complex recycling process and marketplace.

***E-commerce and digital communication continue to impact demand for paper and paperboard materials.***

In 2012, President Obama signed legislation requiring the EPA to move to a completely digital system of records by 2015. This legislation is the tip of a much larger iceberg, as the efficiency and environmental benefits associated with digital record systems are pervasive. By contrast, e-commerce has dramatically increased the use of cardboard boxes and other shipping containers. Online retail giant Amazon sold on average approximately 26 million items per day in 2012. Even with efforts to decrease the amount of shipping packaging used, last year more than 100 billion cardboard boxes were manufactured in the US.

### **Modeling the Economic Impact of Austin Recycling**

From a macroeconomic perspective, recycling primarily influences the economy through the lowering of costs to the production of certain goods and the mitigation of certain social/environmental costs associated with waste. When viewed from a regional point of view, the picture broadens to include both the activity associated with recycling itself, and the downstream production sector that can use recycled materials as inputs. In 2001, the EPA commissioned R.W. Beck (EPA Study) to conduct an analysis of the economic impact of recycling and reuse in the United States.<sup>22</sup> The EPA Study follows the taxonomy outlined by the National Energy Regulatory Commission (NERC), as follows:

- Includes all “supply side” activities involved in recovering and preparing materials and used products for resale;
- Includes all “demand side” activities up to the first point at which the recovered materials or used products have successfully competed directly against their respective primary, or virgin, equivalents;
- Excludes the activities of non-business entities such as individuals, and of advocacy, education and other organizations which do not directly add value to recovered materials and used products, or directly support such activities; and,
- Excludes activities involving incineration or use of materials as fuel.

“Recycling” as defined in the EPA study includes the following “covered activities”:

- Collecting materials or used products for the purposes of intermediate processing, manufacturing, and/or distribution by reuse sales establishments;
- Intermediate processing of recovered materials or used products including sorting, cleaning, consolidating, treating, disassembling, densifying, and/or transferring ownership for use in processing, product manufacturing, and/or for distribution by reuse sales establishments;

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<sup>22</sup> [http://www.epa.gov/epawaste/consERVE/tools/rmd/rei-rw/pdf/n\\_report.pdf](http://www.epa.gov/epawaste/consERVE/tools/rmd/rei-rw/pdf/n_report.pdf)

- Reclaiming of recovered materials or used products to produce refined raw materials and/or reusable products meeting the specifications of manufacturers, reuse sales establishments or other end-users;
- Manufacturing “first-stage” products containing recycled materials or used products; Operating wholesale or retail sales establishments that offer, largely or exclusively, used products prepared for reuse; and
- Intimately supporting the above activities through research, equipment development and sales, consulting, engineering, brokering, and exchange services.

The end-point of recycling is considered to be the “first-stage” manufactured product or the first product produced from recycled materials, such as a roll of paper, sheet of plastic, glass bottle, or metal billet. First-stage products are often converted into finished products (e.g., envelopes, plastic bottles, or metal parts), sometimes at the same facility. The EPA study includes only first-stage products in its definition of the output of recycling.<sup>23</sup>

The above translates into the following business activities:

- Government Staffed Collection
- Private Staffed Collection
- Compost/Miscellaneous Organic Producers
- Materials Recovery Facilities
- Recyclable Material Wholesalers
- Glass Container Manufacturing
- Glass Product Producers
- Nonferrous Secondary Smelting
- Nonferrous Product Producers
- Nonferrous Foundries
- Paper, Paperboard, and Deinked Mills
- Paper-based Product Manufacturing
- Pavement Mix
- Plastics Reclaimers
- Plastics Convertors
- Rubber Product Manufacturing
- Steel Mills
- Iron and Steel Foundries
- Other Recycling Manufacturing

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<sup>23</sup> Note: Reuse is also sometimes included in the calculations of recycling-related impact, meaning that outlets such as thrift stores become part of the equation. The economic development focus of this report, i.e., creating primary jobs, means that this activity has not been included.

As previously mentioned, the EPA Study was released during 2001. At that point, the total estimated direct recycling and re-use related activity for the United States as a whole were reported as follows:

**Table 2: Estimates of Direct National Recycling Economic Activity (2001)**

	Receipts (\$Millions)	Payroll (\$Millions)	Employment
<b>Recycling: Collection</b>	\$1,974.5	\$956.9	32,010
<b>Recycling: Processing</b>	\$41,753.9	\$3,826.3	160,865
<b>Recycling: Manufacturing</b>	\$178,390.4	\$29,181.7	759,746
<b>Total</b>	<b>\$222,118.8</b>	<b>\$33,964.9</b>	<b>952,621</b>

Sources: R.W. Beck, EPA, TXP

When the ripple effects were included, the total impact reached \$557.3 million in output (receipts), total payroll of \$137.6 million, and almost 4 million total jobs. Since this report was produced, the volume of municipal solid waste materials in products (excluding things such as yard trimmings, food waste, and other organic material) has grown from approximately 53 million tons during 2000 to 65.3 million tons in 2012, a gain of just over 23 percent.<sup>24</sup> This is a reasonable proxy for estimating the growth of the economic impact of recycling and reuse since the EPA Study, suggesting that current national figures would be about one-quarter larger than those reported above.

### Estimates of Direct Presence in Austin

#### Recycling Activity

Recycling activity in Austin is found in the following NAICS (North American Industrial Code Classification System) Codes. The capsule descriptions that follow are summaries of some of the larger local firms engaged in recycling-related activity.

- 3261:** Plastic Products Manufacturing
- 327215:** Glass Product Manufacturing Made of Purchased Glass
- 3314:** Nonferrous Metal Production
- 423140:** Motor Vehicle Parts (Used) Merchant Wholesalers
- 423930:** Recyclable Material Merchant Wholesalers
- 562111:** Solid Waste Collection
- 562920:** Materials Recovery Facilities (MRFs)

Specific recycling-related activities important in the Austin economy (such as the collection and processing of organic material into compost or electronics recycling and reuse) are

<sup>24</sup> [http://www.epa.gov/epawaste/nonhaz/municipal/pubs/2012\\_msw\\_dat\\_tbls.pdf](http://www.epa.gov/epawaste/nonhaz/municipal/pubs/2012_msw_dat_tbls.pdf)

contained within these NAICS (562111 and 423930, for collection and processing/resale respectively). The recycling industry in Austin, in terms of both the quantity of materials processed and the number of workers employed, is concentrated in a few firms. The major participants in the reuse and recycling industries in the Austin area are profiled below. This list illustrates the breadth of local companies involved in recycling- and reuse-related activities, but is by no means meant as an exhaustive catalog of all such enterprises or organizations in the Austin area.

#### *973 Pit Materials*

Established in 1999, 973 Materials provides recycling solutions for construction-related materials such as concrete, asphalt, and brick. It operates a materials dump and resale location in southeast Austin. 973 Materials employs approximately 5 full time workers.

#### *Austin Wood Recycling*

For more than 25 years, Austin Wood Recycling has provided land clearing and recycling yard services as well as creating best-selling mulch and compost products. Austin Wood Recycling serves Texas and other customers across the Southwest. They maintain the resources and machinery to manage wood recycling projects from start to finish and can clear, grind, haul, and recycle most wood and other organic materials from brush to shingles. Austin Wood Recycling owns and operates two major recycling yards and accepts materials in any volume from large contractors to major highway projects to neighborhood homeowners. Austin Wood Recycling employs approximately 100 employees.

#### *Balcones Resources*

Specializing in recovering resources through traditional recycling, document destruction, and alternative energy approaches, Balcones Resources is a comprehensive environment services company. For more than two decades, Balcones Resources has created customized recycling programs for businesses in the Austin, Dallas-Fort Worth and Little Rock metropolitan areas. In the Austin market, Balcones Resources recycles paper, plastics, ferrous and non-ferrous metals, and glass from both commercial and residential customers. Balcones processes approximately 60 percent of the City of Austin's recycled materials. Its 100,000 square foot Austin facility has the capacity to process 25 tons per hour of residential single-stream recycled materials. Balcones Resources employs approximately 100 employees.

#### *Ecology Action*

A non-profit organization founded in 1969, Ecology Action has worked to promote environmentally sustainable policies and community education initiatives. The organization's main activities have evolved to focus on recycling and landfill diversion. They run resource recovery operations, brownfield remediation, and zero waste initiatives

throughout Central Texas. Ecology Action employs 5 full-time staff members and dozens of volunteers.

#### *Global Environmental Services*

Specializing in electronic recycling, asset and parts recovery, secure data destruction, managed print services and IT support, Global Environmental Services, is the seventh largest electronics recycler in North America. GES has facilities in both Georgetown, KY and Austin, TX where it provides full-service asset disposition and asset management solutions for IT products. At its 56,000 square foot facility in Austin GES employs approximately 50 workers.

#### *Goodwill*

Goodwill Central Texas is part of an international network of 165 community-based agencies in the United States and Canada with a presence in 14 other countries. The Goodwill Resource Center, a 124,000 square foot facility in Southeast Austin, is a hub of recycling activity that handles large scale recycling and repurposing projects. In 2013, Goodwill Central Texas was able to divert 86 percent items donated to its locations, totaling 27.9 million pounds of potential waste, from landfills. Certified by the State of Texas as an authorized collector of electronic waste, Goodwill partners with Dell to recycle any brand of personal computer equipment. Systems in working condition are refurbished and resold through Goodwill stores, while parts that cannot be reused or refurbished are recycled. Over the past decade, the electronic recycling program has grown such that it now diverts more than 285 tons of electronic waste from landfills each month. Goodwill Central Texas employs several thousand workers throughout the region, with 30 employees dedicated to non-retail recycling activities.

#### *HDi Plastics*

Located in Taylor, Texas HDi Plastics is a plastics recycling company that processes postconsumer and postindustrial thermoplastic waste materials into clean, reusable resin sold to manufacturers of plastic products. HDi Plastics maintains the entire processing stream on-site, with the capability to sort, shred, wash, grind and pelletize plastic materials. As a part of their service, HDi Plastics works with companies to determine the best recycling program as well as ways in which they can reclaim and reuse their own waste products.

#### *IESI/Progressive Waste Solutions*

Texas-based IESI Corp was acquired in 2005 and the overall parent corporation changed its name in 2011. Progressive Waste Solutions Ltd. is one of North America's largest full-service, vertically integrated environmental solutions companies in the solid waste industry. It provides solid waste collection and recycling services to residential, commercial, and public sector customers. Progressive Waste Solutions employs 129 workers in its Austin metro

service area, 27 of which are dedicated full-time to recycling, composting, and other Zero Waste activities.

#### *Image Microsystems*

Founded in 1992, Image Microsystems maintains more than 400,000 square feet of facilities in California, Texas, Ohio dedicated to securely refurbishing, reusing, and recycling electronic equipment. Image Microsystems is the only certified zero-landfill reverse logistics provider that also manufactures quality products from e-waste plastics components. They partner with Texas Tech University for research and design of sustainable end-of-life management for IT products and with the Texas School for the Deaf in an internship and workforce-training program. Image Microsystems employs approximately 50 full-time employees in its Central Texas facility.

#### *JOSCO Products*

For more than 30 years, JOSCO Products has served the Austin area as its only dedicated textile recycling facility. They partner with local companies and organizations – including the City of Austin – to reduce landfill waste by recycling uniforms, as well as providing other textile recycling services. Their finished products range from sterile wipes to consumable apparel to fiberglass-reinforced products. In 2013, JOSCO Products was awarded the Intel Environmental Responsible Award for Small Companies by the Austin Chamber of Commerce. JOSCO Products employs approximately 30 people in its Austin facility.

#### *Kinser Ranch*

Established in 1972 as a cattle ranch, Kinser Ranch has expanded into a brush recycling and wood product operation. It provides brush recycling, composted mulch, firewood, and stovewood to Central and South Austin, including drop off and delivery services. Kinser Ranch employs approximately 4 full-time employees.

#### *Organics by Gosh*

Beginning in 1936, the Gosh family business collected and resold horse manure as a natural fertilizer in Texas. Now a leader in the organic recycling and composting services industry in Central Texas, Organics by Gosh both collects and receives organic materials which are then recycled into award winning mulch and compost mixtures. Organics by Gosh employs approximately 15 workers in the Austin area.

#### *Resale Resource Corporation (R2 Corp)*

Focusing on asset recovery and recycling for consumer electronics and components, Resale Resource Corporation/Recycling Resource Corporation (R2 Corp) has provided its services throughout Texas, with both national and international partnerships, since 2000. They provide reverse logistics services for both public and private inventory stock. They also

maintain security measures for processing. data-bearing materials. R2 Corp employs 17 workers in Texas.

### *ROUND2*

With strategic centers and e-Cycling facilities in five states and corporate HQ in Austin, Texas, ROUND2 offers the only vertically integrated, closed-loop, 100% green compliant e-recycling and computer de-manufacturing solution in the Central United States. ROUND2 processes more than 60,500 tons of materials annually in its four electronic recycling centers. They have the capacity to process a variety of materials for reuse including metals, plastics, glass, etc. ROUND2 employs several hundred employees at its Austin headquarters.

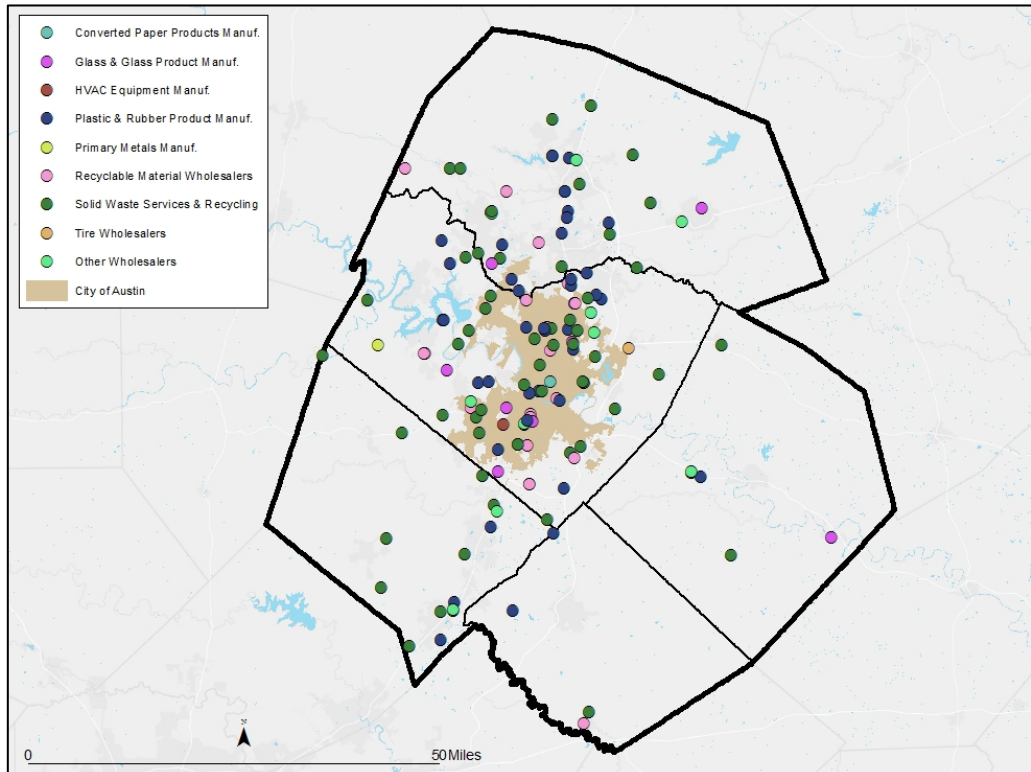
### *Texas Disposal Systems*

Since 1977, Texas Disposal Systems has grown to offer a full range of waste removal, transportation, and disposal services to businesses, construction projects, governmental entities, educational institutions, and residential property owners in more than 35 counties across central Texas. Its 2,000-acre Landfill, Recycling, Composting, and Ranch facility currently processes a wide variety of waste materials. They are also developing a 210-acre Eco-Industrial Park to serve as a centralized cluster of sorting, processing, and remanufacturing for recyclable materials as well as an eventual network of local end-markets for processed recyclables. Texas Disposal Systems employs 520 employees at its facilities.

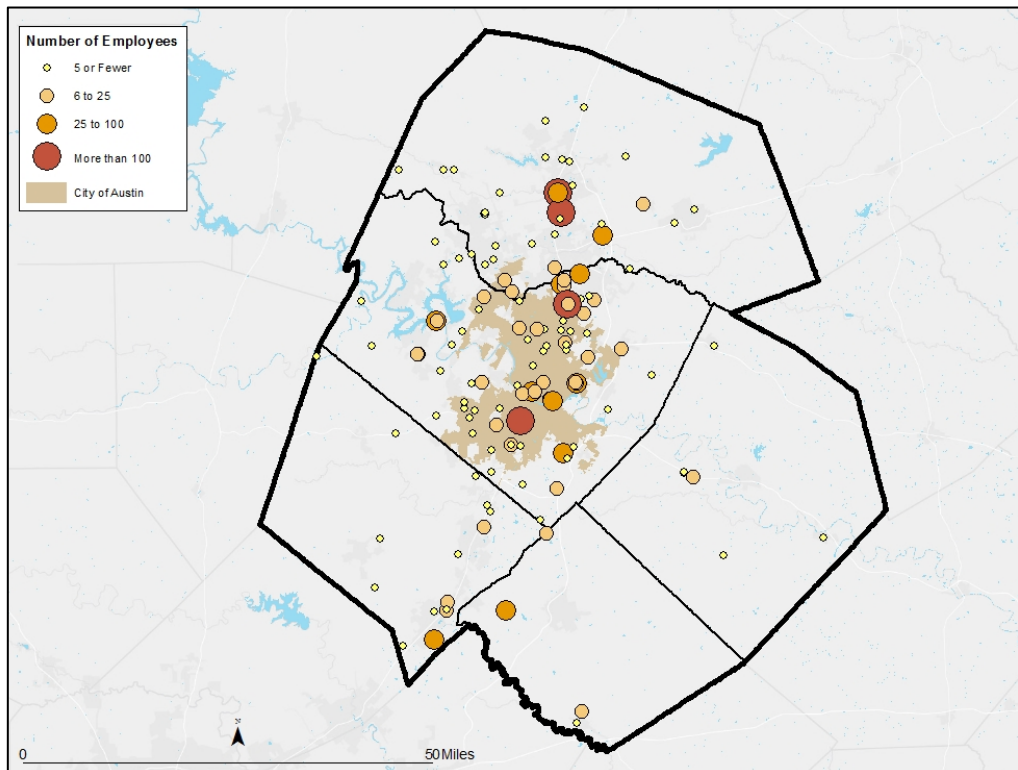
### *Wilco Recycling*

A full service waste company serving Central Texas since 1981, Wilco Recycling operates a 40,000 square foot facility which can process up to 6,000 tons of single-stream recyclable materials per month. The facility was not designed and built primarily for one major city, rather it was created to provide recycling services to the smaller communities in Central Texas in a cost-effective manner. Wilco Recycling employs 25 full time workers.

**Figure 4: Recycling and Recycling-Related Firms in the Austin MSA by Industry**



**Figure 5: Recycling and Recycling-Related Employment in the Austin MSA**



### Direct Recycling Activity Data

The best source of data that describes the current footprint of direct recycling activity in Austin is the Quarterly Census of Employment and Wages (QCEW), maintained by the Texas Workforce Commission (TWC).<sup>25</sup> Data was selected by NAICS (a classification system which allocates establishments based on their primary economic activity) codes associated with recycling and recycling-related manufacturing. Only those NAICS that are present in the local Austin economy were included (for example, pulp and paper mills that make recycled paper were not include as no such business is located in Austin). Additionally, not all activity in each of these included industries is recycling-related. Using information from the EPA Study, adjustments were made in NAICS 3261 (Plastic Product Manufacturing), where only 13 percent is related to recycling, NAICS 3314 (Nonferrous Metals) at 45 percent, NAICS 423930 (Recyclable Material Merchant Wholesalers), at 90 percent, and NAICS 562111 (Solid Waste Collection), where 26 percent is related to recycling.<sup>26</sup> The adjusted figures for employment and payroll, along with estimates on annual receipts, are presented below.

**Table 3: Austin MSA Direct Recycling & Reuse Activity (2014)**

NAICS	Industry	Related to Recycling	Recycling Related Receipts	Recycling Related Payroll	Recycling Related Employment
<b>Total</b>			<b>\$402,636,275</b>	<b>\$56,800,401</b>	<b>1,292</b>

Source: TWC, EPA Study, TXP

<sup>25</sup> The TWC’s QCEW dataset is the best publically available data for these purposes, but still has some limitations. This dataset allocates all each employer to a single NAICS code. This means, for example, a company that conducts both solid waste collection and MRF activity may be allocated entirely to the Solid Waste Collection industry. As such, this company would be underrepresented in our calculations.

<sup>26</sup> The original EPA Study calculated 20 percent of total Solid Waste Collection industry activity was recycling-related at the national level. After discussions with city staff and local stakeholders, we have adjusted this figure to 26 percent for the Austin market.

## Economic Impact Methodology

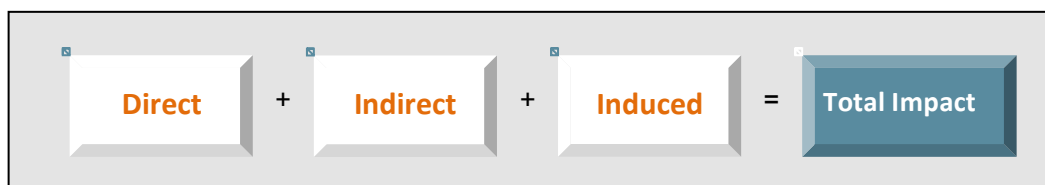
In an input-output analysis of new economic activity, it is useful to distinguish three types of expenditure effects: direct, indirect, and induced. Direct effects are production changes associated with the immediate effects or final demand changes. The purchase of collected and processed recycled materials from a materials recovery facility (MRF) is an example of a direct effect.

Indirect effects are production changes in backward-linked industries caused by the changing input needs of directly affected industries – typically, additional purchases to produce additional output. In order to collect the recycled materials which they will in turn process and sell, a MRF would need to purchase and maintain vehicles, equipment, and other supplies. These downstream purchases affect the economic status of other local merchants and workers.

Induced effects are the changes in regional household spending patterns caused by changes in household income generated from the direct and indirect effects. The MRF and its owners see increased revenue from increased collection and resale of recycled materials, for example, as do the establishments that provide the necessary supplies or maintain and repair the MRF's equipment. Induced effects capture the way in which this increased income is in turn spent in the local economy.

Once the ripple effects have been calculated, the results can be expressed in a number of ways. Three of the most common are “Output,” equivalent to sales or receipts; “Earnings,” which represents the compensation to employees and proprietors; and “Employment,” which refers to permanent, full-time jobs that have been created in the local economy. The interdependence between different sectors of the economy is reflected in the concept of a “multiplier.” An output multiplier, for example, divides the total (direct, indirect and induced) effects of an initial spending injection by the value of that injection – i.e., the direct effect.

**Figure 6: The Flow of Economic Impacts**





**Table 5: Total Economic Impact of Austin Recycling Activity by Industry (2014)**

	Output/Receipts	Earnings/Payroll	Employment
Agriculture, etc.	\$233,591	\$22,931	1
Mining	\$1,744,772	\$219,428	4
Utilities	\$9,191,088	\$1,074,164	11
Construction	\$3,032,404	\$630,961	14
Manufacturing	\$82,477,652	\$12,806,903	274
Wholesale Trade	\$320,728,487	\$29,982,324	482
Retail Trade	\$23,063,558	\$4,212,246	177
Transportation/Warehousing	\$11,608,184	\$2,240,012	57
Information	\$23,581,092	\$2,873,770	54
Finance & Insurance	\$36,976,482	\$6,064,277	157
Real estate	\$51,552,925	\$2,246,537	139
Prof./Technical Services	\$27,320,274	\$6,891,469	122
Management of Companies	\$5,278,100	\$1,195,923	19
Admin./Waste services	\$64,644,538	\$27,000,399	684
Educational Services	\$3,479,600	\$741,923	31
Healthcare & Social Services	\$23,114,465	\$5,752,638	160
Arts, Entertainment, etc.	\$2,583,573	\$508,497	31
Accommodation	\$3,301,898	\$644,162	28
Food services, etc.	\$10,578,125	\$1,949,509	125
Other services	\$15,300,237	\$2,695,232	79
Households	N/A	\$140,459	22
<b>Total Annual</b>	<b>\$719,791,043</b>	<b>\$109,893,762</b>	<b>2,673</b>

Source: TXP

## Austin Recycling-Related Manufacturing Growth Potential

### Stakeholder Input

As part of this effort, a meeting was convened with local organizations currently engaged in recycling and providing recycled materials. Their input underscored much of what was found elsewhere, with discussion concerning the international nature of markets, the challenges of unpredictable supply, and the evolving role of technology and changing business practices. In addition, several key points specific to potential opportunities and challenges to the growth of recycling-related manufacturing in Austin emerged, including:

- The Universal Recycling Ordinance has created an increased demand for the recycling of packaging materials from warehouses and small businesses.
- The widening of the Panama Canal will lead to increased shipping activity in Houston and Corpus Christi to and from China. Long Beach is currently at capacity and labor issues are a concern. Additional Mexican port capacity (specifically, at Mazatlan and Manzanillo) is being developed.
- U.S. is a net importer of goods. Recyclable materials are one of the nation's largest exports (partially since they can fill return shipping containers that have brought imported consumer goods).
- The lack of a railhead in Austin is a limiting factor.
- Half of the recovered material in Austin is paper but recycling paper needs a very large amount of water to be re-processed.
- Austin produces twice the national average of glass flow (alcohol and consumer preferences). Glass is inert and damages processing equipment over time.
- Glass and plastic represent significant opportunities (there are enough materials to support growth and development in the near term and there is a certainty of in-bound flow and volume).
- Should focus on products that offer vertical integration possibilities. For example, the wine industry in California has stimulated the growth of local bottling, which in turn employs recycled glass as a feedstock.

### Opportunities for Growth in Local Manufacturing based on Recycled Materials

There are a number of variables that influence Austin's ability to build a concentration of manufacturing activity that relies on recycled materials as key inputs. On the positive side, there currently is a strong local presence of manufacturers in the food and beverage sector, who presently largely rely on packaging done elsewhere. These firms in theory could become customers of locally-made packaging materials made from recycled materials. Most of the traditional factors of production (land, labor, energy, etc.) are fairly cost-competitive in Austin, especially when compared to markets in the Northeast and on the West Coast. Moreover, "Made in Austin" is beginning to mean something from a brand perspective,

suggesting that products produced here may enjoy an additional market advantage. Finally, the local policy environment is highly receptive and proactive, both in terms of promoting recycling generally and specifically creating programs and dedicating resources designed to stimulate manufacturing activity using recycled materials.

Perhaps the largest constraints to growth in this area have to do with distance to both end-use markets and inter-modal shipping capacity, the absence of existing local clusters in this space, and the resource requirements associated with re-processing certain materials (paper, for example, requires a substantial amount of water). Landfill pricing is an issue; since it costs relatively little (in comparison to other areas) to access local landfills, the incentives to recycle are reduced.

**Table 6: Total Additional Economic Impact of New Recycling Activity (\$2014)**

	Output/Receipts	Earnings/Payroll	Employment
Agriculture, etc.	\$87,883	\$12,085	N/A
Mining	\$1,894,017	\$1,046,857	8
Utilities	\$7,656,337	\$2,095,463	29
Construction	\$2,033,710	\$437,917	15
Manufacturing	\$236,207,868	\$38,475,447	856
Wholesale Trade	\$16,566,055	\$3,765,270	100
Retail Trade	\$9,097,309	\$2,624,907	62
Transportation/Warehousing	\$4,050,556	\$1,080,402	26
Information	\$8,224,165	\$2,002,375	38
Finance & Insurance	\$13,934,900	\$3,493,854	79
Real estate	\$19,545,002	\$6,351,675	32
Prof./Technical Services	\$11,683,054	\$3,295,188	107
Management of Companies	\$2,872,560	\$806,673	24
Admin./Waste services	\$6,505,546	\$1,640,428	53
Educational Services	\$1,320,180	\$328,172	11
Healthcare & Social Services	\$8,972,921	\$2,433,011	84
Arts, Entertainment, etc.	\$1,003,736	\$271,135	7
Accommodation	\$1,485,763	\$419,023	9
Food services, etc.	\$4,393,563	\$980,148	28
Other services	\$6,325,373	\$1,392,951	38
Households	N/A	\$46,882	2
<b>Total Annual</b>	<b>\$363,860,498</b>	<b>\$72,999,862</b>	<b>1,606</b>

Source: TXP

While recycling is clearly embraced by the community in Austin, manufacturing based on recycled materials represents a smaller share of the local economy than the national average. In spite of the constraints, there are sufficient opportunities that replicating the national average is a reasonable benchmark of what could be achieved. The translation would be an additional 910 direct manufacturing jobs, representing \$35.2 million in direct annual earnings and \$217.8 million in receipts each year. When these inputs are run through the model, the total potential gains are \$363 million in total economic activity, \$72 million in labor compensation, and approximately 1,600 more permanent jobs. See above for detailed results.

## Recommendations

Austin is creating a comprehensive program to help build and sustain markets for recyclable materials being collected through the Zero Waste Master Plan. The attraction and incubation/development of manufacturing firms in these industries is an economic development focus for the City of Austin, with the Hub a key tool in the effort. The hope is that issues such as the volatility of global materials markets and the substantial transportation costs associated with overseas demand can be mitigated by growing firms that take advantage of an improved range and quality of locally-sourced materials to serve local and regional markets, as well as niche products with demand that extends beyond Central Texas. According to the City, target industries include:

- Construction & demolition debris recycling
- Plastics processor (grinding, washing, pelletizing, molding)
- Paper conversion plant
- Wood salvage and re-milling
- Glass processing/manufacturing
- Appliance repair and resell
- Scrap tire recycling/baling
- Electronics repair, de-manufacturing, recycling
- Non-profit/small industry incubator

Each of these industries likely would benefit from the overall economic development environment in Austin, which includes a community that both values and mandates recycling for both residents and commercial customers.

In addition, firms that locate at the Hub will receive:

- Long term ground leases at competitive rates;
- Expedited permitting from the Economic Development Department through the planning and development review process, including a pre-development meeting;
- No common area maintenance fees;
- Free commercial recycling services;
- Free participation in the Austin Materials Marketplace; and
- Triple freeport exemption from the City, Travis County, and Del Valle ISD.

More broadly, the use of recycled materials is clearly an economic development focus and goal for the City. Therefore, TXP further recommends:

**Recommendation #1**

**Work on developing end-use markets locally for products made from recycled materials, with particular focus on the sectors that require upstream packaging.** A clear example is in the food and beverage sector, as Austin is home to a broad and growing range of packaged food and drinks, and glass and plastic (which are typically used in food/beverage packaging) are relatively available locally. Given the volume of local food and beverage production that uses packaging materials made elsewhere and larger than normal “raw material,” this is an area of opportunity.

**Recommendation #2**

**Identify meaningful incentives to encourage the use of recycled materials in the production process.** Just as factors such as location in the Desired Development Zone and employing traditionally hard to serve populations are included in the economic incentive evaluation done by the City, the use of recycled materials (by any type of production firm) could also be part of the equation, either as a core consideration or as a means to receive bonus points.

Beyond the near-term efforts to leverage available material supply and possible local demand in the packaging sector, Austin should continue to facilitate the growth of the local materials sector overall. The online marketplace is a good start, and further improvements could come via the following recommendations.

**Recommendation #3**

**Leverage the City’s buying power to promote end-markets for recycled products by including a preference for locally-made recycled-content products in the City of Austin’s purchasing process.** Just as the City helped jump-start the market for renewable energy, Austin itself is a large enough customer to make a difference with its purchasing decisions.

**Recommendation #4**

**Solicit stronger relationships with the Gulf Coast ports.** In addition to attracting and developing firms that can use recycled materials as feedstock, there could be enhanced export markets for Austin-derived materials if the transportation infrastructure were improved. While multi-modal development may be some time away, it is possible that stronger relationships with Gulf Coast ports (as well as ports of entry along the Mexican border) could open up broader trade opportunities, either through filling excess capacity on a given shipment or better understanding market demand via a relationship with those who manage the flow of goods.



### Recommendation #5

**Focus on business and consumer education efforts connecting recycling and economic development.** Austin’s commitment to zero landfill waste by 2040 and its new Universal Recycling Ordinance provide an excellent opportunity to raise local business and community awareness of the economic development opportunities associated with recycling and recycling-related manufacturing.

### Conclusion

Consciousness on recycling has risen steadily over the past several decades, with common terms such as “carbon footprint” and “sustainability” indicating an awareness of and focus on the environmental implications of reducing waste. In recent years, the lens has begun to broaden to include the economic impacts as well, as the use of recycled materials has become a cost-effective factor of production for many industries. At the same time, consumers are increasingly evaluating not only the product itself, but how it was made (and by who) in making their purchasing decisions, making a product’s “green” quality a factor in the overall value proposition. The combination of environmental and economic benefits is powerful, and points to a range of economic development opportunities in Austin that can build on the investments and program commitments already made by the City.

## Appendix 1: Detailed Economic Impacts by Recycling-Related Sector

This Appendix includes a detailed breakdown of the total economic impact of each recycling-related sector by industry. It is important to note that specific recycling activities important to the Austin economy are found within each of these NAICS. The NAICS 562111, for example, includes the collection of all recyclable materials including organics, electronics, construction waste, packaging materials, paper, etc.

### A1.1: NAICS 3261: Plastic Products Manufacturing (\$2014)

	Output/Receipts	Earnings/Payroll	Employment
Agriculture, etc.	\$15,369	\$3,842	N/A
Mining	\$188,275	\$38,424	1
Utilities	\$1,102,756	\$219,014	2
Construction	\$311,231	\$115,271	2
Manufacturing	\$41,466,709	\$8,080,475	173
Wholesale Trade	\$2,547,482	\$795,368	11
Retail Trade	\$1,629,159	\$553,299	20
Transportation/Warehousing	\$614,777	\$207,487	5
Information	\$1,494,677	\$345,812	6
Finance & Insurance	\$2,478,320	\$695,466	16
Real estate	\$3,600,288	\$292,019	16
Prof./Technical Services	\$2,090,242	\$964,431	15
Management of Companies	\$514,876	\$211,330	3
Admin./Waste services	\$964,431	\$411,132	16
Educational Services	\$238,226	\$96,059	4
Healthcare & Social Services	\$1,621,474	\$760,787	18
Arts, Entertainment, etc.	\$184,433	\$65,320	3
Accommodation	\$280,492	\$80,689	3
Food services, etc.	\$799,210	\$253,596	14
Other services	\$1,079,702	\$326,600	8
Households	N/A	\$19,212	3
<b>Total Annual</b>	<b>\$63,222,130</b>	<b>\$14,535,634</b>	<b>338</b>

### A1.2: NAICS 327215: Glass Product Manufacturing (Purchased Glass) (\$2014)

	Output/Receipts	Earnings/Payroll	Employment
Agriculture, etc.	\$1,093	\$219	N/A
Mining	\$113,490	\$23,179	N/A
Utilities	\$127,485	\$25,366	N/A
Construction	\$28,646	\$10,496	N/A
Manufacturing	\$2,491,746	\$509,501	11
Wholesale Trade	\$132,295	\$41,329	1
Retail Trade	\$113,052	\$38,486	1
Transportation/Warehousing	\$84,625	\$26,896	1
Information	\$100,151	\$22,960	N/A
Finance & Insurance	\$161,597	\$45,483	1
Real estate	\$233,977	\$19,243	1
Prof./Technical Services	\$131,202	\$60,572	1
Management of Companies	\$38,267	\$15,744	N/A
Admin./Waste services	\$73,910	\$31,926	1
Educational Services	\$15,963	\$6,560	N/A
Healthcare & Social Services	\$109,335	\$51,169	1
Arts, Entertainment, etc.	\$11,808	\$4,155	N/A
Accommodation	\$17,056	\$5,029	N/A
Food services, etc.	\$50,513	\$15,963	1
Other services	\$80,471	\$24,491	1
Households	N/A	\$1,312	N/A
<b>Total Annual</b>	<b>\$4,116,684</b>	<b>\$980,079</b>	<b>23</b>

### A1.3: NAICS 3314: Nonferrous Metal Production (\$2014)

	Output/Receipts	Earnings/Payroll	Employment
Agriculture, etc.	\$8,916	\$1,608	N/A
Mining	\$245,189	\$36,994	N/A
Utilities	\$980,756	\$139,934	1
Construction	\$247,418	\$65,946	1
Manufacturing	\$24,253,661	\$2,644,269	53
Wholesale Trade	\$2,104,168	\$474,489	4
Retail Trade	\$884,910	\$217,139	5
Transportation/Warehousing	\$470,317	\$107,765	2
Information	\$780,147	\$130,283	1
Finance & Insurance	\$1,384,204	\$294,344	5
Real estate	\$1,809,941	\$106,157	4
Prof./Technical Services	\$1,152,389	\$382,808	4
Management of Companies	\$276,395	\$82,030	1
Admin./Waste services	\$840,330	\$250,916	6
Educational Services	\$127,053	\$36,994	1
Healthcare & Social Services	\$860,391	\$291,127	5
Arts, Entertainment, etc.	\$93,618	\$24,127	1
Accommodation	\$131,511	\$27,343	1
Food services, etc.	\$419,050	\$96,506	4
Other services	\$666,469	\$146,368	2
Households	N/A	\$8,042	1
<b>Total Annual</b>	<b>\$37,736,833</b>	<b>\$5,565,189</b>	<b>102</b>

#### A1.4: NAICS 423140: Motor Vehicle Parts (Used) Wholesalers (\$2014)

	Output/Receipts	Earnings/Payroll	Employment
Agriculture, etc.	\$4,354	\$726	N/A
Mining	\$25,400	\$5,080	N/A
Utilities	\$150,221	\$29,754	N/A
Construction	\$52,976	\$19,594	N/A
Manufacturing	\$304,071	\$63,862	1
Wholesale Trade	\$7,704,088	\$2,406,439	34
Retail Trade	\$441,955	\$150,221	5
Transportation/Warehousing	\$229,323	\$91,439	2
Information	\$460,823	\$108,856	2
Finance & Insurance	\$689,420	\$193,763	4
Real estate	\$992,039	\$77,650	4
Prof./Technical Services	\$515,251	\$237,306	4
Management of Companies	\$96,519	\$39,914	1
Admin./Waste services	\$338,904	\$148,044	6
Educational Services	\$67,491	\$27,577	1
Healthcare & Social Services	\$445,583	\$209,003	5
Arts, Entertainment, etc.	\$48,622	\$16,691	1
Accommodation	\$56,605	\$16,691	1
Food services, etc.	\$195,215	\$61,685	3
Other services	\$282,299	\$85,633	2
Households	N/A	\$5,080	1
<b>Total Annual</b>	<b>\$13,101,159</b>	<b>\$3,995,008</b>	<b>78</b>

### A1.5: NAICS 423930: Recyclable Material Merchant Wholesalers (\$2014)

	Output/Receipts	Earnings/Payroll	Employment
Agriculture, etc.	\$173,264	\$7,597	N/A
Mining	\$1,010,708	\$53,180	1
Utilities	\$5,977,616	\$311,482	3
Construction	\$2,108,048	\$205,122	5
Manufacturing	\$12,099,618	\$668,546	16
Wholesale Trade	\$306,562,168	\$25,192,042	414
Retail Trade	\$17,586,319	\$1,572,603	68
Transportation/Warehousing	\$9,125,249	\$957,237	25
Information	\$18,337,130	\$1,139,568	22
Finance & Insurance	\$27,433,502	\$2,028,430	54
Real estate	\$39,475,366	\$812,892	54
Prof./Technical Services	\$20,502,933	\$2,484,257	45
Management of Companies	\$3,840,690	\$417,841	7
Admin./Waste services	\$13,485,732	\$1,549,812	72
Educational Services	\$2,685,595	\$288,690	12
Healthcare & Social Services	\$17,730,706	\$2,187,970	63
Arts, Entertainment, etc.	\$1,934,784	\$174,734	11
Accommodation	\$2,252,435	\$174,734	8
Food services, etc.	\$7,768,013	\$645,755	42
Other services	\$11,233,297	\$896,460	27
Households	N/A	\$53,180	9
<b>Total Annual</b>	<b>\$521,323,174</b>	<b>\$41,822,133</b>	<b>958</b>

### A1.6: NAICS 562111: Solid Waste Collection (\$2014)

	Output/Receipts	Earnings/Payroll	Employment
Agriculture, etc.	\$27,533	\$8,044	N/A
Mining	\$145,531	\$56,311	1
Utilities	\$766,986	\$313,735	4
Construction	\$255,662	\$193,068	5
Manufacturing	\$1,675,569	\$756,182	16
Wholesale Trade	\$1,510,372	\$965,339	16
Retail Trade	\$2,167,226	\$1,512,364	66
Transportation/Warehousing	\$975,449	\$764,226	20
Information	\$2,167,226	\$1,013,606	20
Finance & Insurance	\$4,346,253	\$2,525,969	66
Real estate	\$4,896,909	\$844,671	52
Prof./Technical Services	\$2,635,284	\$2,485,747	46
Management of Companies	\$460,191	\$386,135	7
Admin./Waste services	\$44,044,650	\$22,146,477	502
Educational Services	\$310,728	\$257,424	11
Healthcare & Social Services	\$2,112,161	\$2,027,211	59
Arts, Entertainment, etc.	\$279,261	\$201,112	12
Accommodation	\$507,391	\$305,691	14
Food services, etc.	\$1,211,444	\$788,360	52
Other services	\$1,762,101	\$1,094,050	33
Households	N/A	\$48,267	8
<b>Total Annual</b>	<b>\$72,257,926</b>	<b>\$38,693,989</b>	<b>1,012</b>

### A1.7: NAICS 562920: Materials Recovery Facilities (MRFs) (\$2014)

	Output/Receipts	Earnings/Payroll	Employment
Agriculture, etc.	\$3,061	\$894	N/A
Mining	\$16,179	\$6,260	N/A
Utilities	\$85,268	\$34,879	1
Construction	\$28,423	\$21,464	1
Manufacturing	\$186,278	\$84,067	3
Wholesale Trade	\$167,913	\$107,320	3
Retail Trade	\$240,937	\$168,134	11
Transportation/Warehousing	\$108,444	\$84,961	3
Information	\$240,937	\$112,686	3
Finance & Insurance	\$483,186	\$280,820	11
Real estate	\$544,405	\$93,905	8
Prof./Technical Services	\$292,973	\$276,348	7
Management of Companies	\$51,161	\$42,928	1
Admin./Waste services	\$4,896,580	\$2,462,092	80
Educational Services	\$34,545	\$28,619	2
Healthcare & Social Services	\$234,815	\$225,371	9
Arts, Entertainment, etc.	\$31,046	\$22,358	2
Accommodation	\$56,408	\$33,985	2
Food services, etc.	\$134,680	\$87,644	8
Other services	\$195,898	\$121,629	5
Households	N/A	\$5,366	1
<b>Total Annual</b>	<b>\$8,033,137</b>	<b>\$4,301,730</b>	<b>161</b>



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