



DALLAS-FORT WORTH



STATE OF THE REGION



RECYCLING REPORT



MARCH 2017

TEXAS CAMPAIGN FOR THE ENVIRONMENT FUND

Dallas-Fort Worth State of the Region Recycling Report

March 2017

Prepared by



Acknowledgements

The Dallas-Fort Worth State of the Region Recycling Report is an ongoing project of Texas Campaign for the Environment Fund. This report was made possible by generous funding and support from the following:

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Executive Summary

Since the early 1900s, managing streams of discards—especially from single-family homes in cities and towns—has been an essential responsibility of government. North Texans discard more than nine million tons of materials into landfills every year, and according to NCTCOG in 2010, recycle a mere 22%. The economic loss from this landfilling is tremendous; our region is literally burying tens of millions of dollars in easily recoverable materials each year. Additionally, landfilling organic waste creates significant levels of greenhouse gas emissions that contribute to climate change. Landfill methane pollution in the U.S. is second only to the oil and gas industry among human-made sources.

By reducing the volume of discards going into landfills in North Texas, we will not only save valuable resources and dollars, but can also reimagine a more circular and efficient economy whose resources will be available for future generations.

This report weaves together the most recent data on discard streams in the North Texas region with case studies and original public opinion research from local governments and individual businesses tackling the challenge of reducing and redefining waste. It serves as a snapshot of our region's efforts and lays out a roadmap to creating a regional Zero Waste economy.

What is Zero Waste?

An excerpt from *Zero Waste International Alliance* defines the term as:

"...designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them."

Zero waste goals involve not only changing consumption and disposal habits, but also product redesign and innovation to create a more circular economy. Often, local governments and businesses have created quantifiable goals and programs that reduce landfilling and incineration by 90-95%. Some cities have come very close to achieving this goal including San Francisco (80% recycling), Los Angeles (76%), San Jose (75%), Portland (70%), and San Diego (68%), all recycling at twice the national average rate.¹

Expanding Recycling in North Texas

Although diversion rates are increasing in the North Texas region, they are significantly lower than the national average of 34%. While the vast majority of single-family residents in DFW now have access to curbside recycling, most apartments and businesses are doing little to prevent the landfilling of their discards.

Dallas implemented the first comprehensive zero waste plan in DFW in 2013, with plans for universal composting and recycling participation from businesses and multi-family homes. City officials expect to reduce waste by 85% by 2040, but progress toward that goal has been exceedingly slow since this long-term plan was adopted. For instance, according to a 2015 survey commissioned by the city, apartment managers reported that only 7% of their on-site discards were being diverted for recycling. The recycling rate at single-family homes is approximately 20%.²

In contrast, several other North Texas cities have implemented new policies to divert discards. Some highlights include:

- Fort Worth passed a local ordinance that requires multi-family buildings to offer recycling programs for their residents.



- Allen, Euless, Cedar Hill, Lewisville, and Little Elm signed sole franchise agreements with their respective haulers that include recycling services for multi-family residents.
- Frisco passed a construction and demolition (C&D) ordinance requiring all new commercial buildings to recycle C&D materials. Frisco also requires new multi-family buildings and businesses to provide recycling to tenants and residents.
- Plano has a yard trimmings compost program that offers mulches and soil blends to residents, as well as a program offering financial incentives to increase recycling participation.
- Denton has a yard trimmings program, offers voluntary recycling to multi-family buildings and businesses, and maintains a ReUse store to foster material reuse and landfill reduction.

Monthly Multi-family Recycling Cost in DFW Cities					
City	Euless	Little Elm	Allen	Lewisville	Cedar Hill
Multi-family recycling cost (per unit cost)	\$1.00	\$0.78	\$0.65	\$1.18	\$1.10
Franchise began	2007	2013	2004	2015	2013

Public Opinion Research

As part of our Zero Waste DFW Project, Texas Campaign for the Environment Fund (TCE Fund) commissioned two public opinion research projects to better understand public and private opinions on recycling in multi-family buildings in the City of Dallas. Results of these studies suggest that an overwhelming number of Dallas multi-family residents think that recycling is important and beneficial to the environment.

Overall, our public opinion research indicates that in order for Dallas to meet its diversion goals in the coming years and decades, good recycling policies will need to be enacted to push multi-family buildings and other commercial properties to participate. Ideally these policies and programs should:

- Include a concerted, multi-lingual, and on-going education program for residents;
- Provide support for property owners and managers to achieve compliance;
- Collect the same materials as Dallas' single-stream residential recycling program;
- Be as consistent as possible across the city and the region to minimize confusion as residents relocate.

Recommendations

Zero waste policies and diversion programs hold real promise for North Texas. In addition to conserving natural resources and preventing pollution, recycling industries also create jobs and economic activity. Data from the Tellus Institute suggests that effective diversion programs could add 23,000 jobs in DFW.

It is important for cities to move toward universal recycling and diversion programs rather than simply improving their existing services in single-family neighborhoods. Cities in Texas are significantly increasing their diversion rates by launching programs that expand recycling and composting into multi-family buildings and businesses. DFW communities should learn from these policies and adopt the best programs to replicate these successes.

Municipalities in Texas have significant power in the arena of diversion, and so they have the ability to implement policies and programs that fit each region or locality. Ultimately, effective participation in changing the culture of wasting must involve education, good policy, and proper enforcement. It is essential that policy makers and advocates focus on addressing discards with a holistic approach.

I. Current Wasting & Recycling Trends in DFW

A. Defining waste and the evolving ton

The types of materials that we discard have changed significantly over the past several decades. Our discarded materials used to be more biodegradable in nature, and now contain much more non-degradable products and packaging. Lighter and more diverse types of plastics, foils, and composite materials have become popular in consumer products. Today's ton of recycled discards is made up of less paper, and much more and diverse plastic. It is necessary for cities to consider product design and consumer habits when planning for future solid waste management.

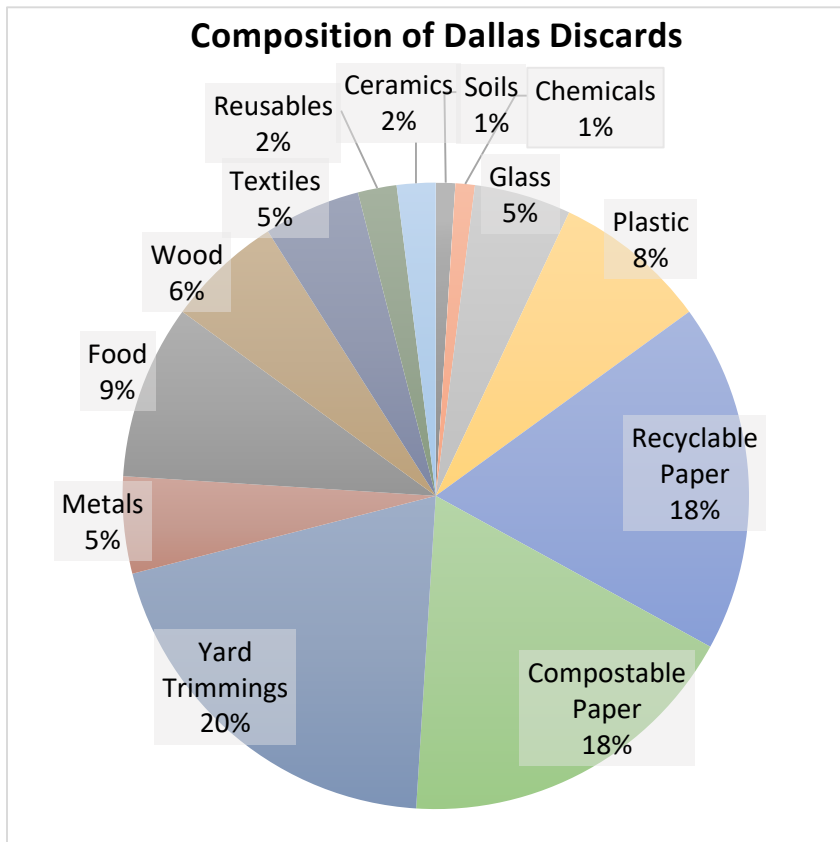


Figure 1 Composition of materials discarded by residents in the City of Dallas

The vast majority of materials that North Texans currently discard into landfills could be recovered, reused, recycled, and composted (**Figure 1**). The value of keeping these materials from being wasted benefits both the long-term sustainability of our environment and economy.

For many decades, the term “waste” has been used in resource management, industry and public policy to define materials that are disposed in landfills and incinerators. Phrases like “toss out” and “throw away” are used often to refer to disposal. We find that these terms inaccurately contribute to the view that these materials have little value or impact after disposal. In order to challenge the old paradigm of thinking about our relationship to our environment and resources, we use a different set of terms throughout this report that more appropriately credit our discards with value and purpose.

B. Useful terminology

- Municipal solid waste (MSW)** – discarded materials generated by residents. Some governments include multi-family residents with MSW, while others do not. Furthermore, TCEQ combines residential and commercial discards (not including Construction & Demolition) as MSW. For the purposes of this report, MSW will refer only to residential discards and will be broken into two-subcategories. **Primary MSW** includes metals, plastics, paper, glass, organics, and wood. **Other MSW** refers to hard to recycle items including all Household Hazardous Waste (HHW), consumer electronics, tires, and similar products that are often taken to special transfer stations and public drop-offs.
- Industrial-Commercial-Institutional Waste (ICI)** –discards generated by commercial businesses, hospitals, schools, and city government. Sometimes discards from multi-family buildings are included in this category. In this report, ICI waste will be referred to as **commercial materials** and will include industrial and institutional materials.
- Construction and Demolition Waste (C&D)** –materials generated by construction and demolition sites from housing, commercial, and public infrastructure projects. Sometimes, more careful deconstruction techniques can be used before demolitions to salvage the reusable and more valuable materials.

- **Discards generated** – the total weight (or volume) of solid discards that are recycled, composted, landfilled, or otherwise disposed.
- **Discards recovered** – the total weight (or volume) of solid discards that are collected for recycling, composting, and not landfilled or incinerated.
- **Diversion rate** – the rate of materials diverted from landfills and incineration, typically represented by a percent. Diversion rate is calculated by dividing the weights or volumes of collected recyclables and compostables by the total discards generated by a region.
- **Single-stream recycling** – also known as comingled recycling, refers to a collection program in which recyclable materials—often paper, cardboard, plastics, aluminum, tin and steel cans, cardboard, and glass—are disposed of in one bin to be later processed and sorted at a materials recovery facility.
- **Yard trimmings** – compostable materials, including grass clippings, leaves and branches, collected from residents and businesses by some municipalities.
- **Organic materials** – include yard trimmings, food scraps and food-soiled paper. These materials can be collected separate from recyclable materials to be composted at certain composting facilities.
- **Materials Recovery Facility (MRF)** – a recycling facility in which collected recyclables are sorted, cleaned, processed, and baled. Sorted materials are shipped from a MRF to the commodity market to be remanufactured into new recycled products.

C. Regional resource and recycling data sources

Upon collecting data for this report, we found that most cities in the DFW area do not accurately track discard tonnage data. Many cities track data only for residential sources, and often, it is incomplete or unreliable. For instance, the City of Dallas collects all recyclables and landfill materials from residents. The tonnages for these two collection streams are tracked at the landfill and recycling facility. Commercial materials, however, are collected by dozens of private haulers who are less meticulous about tracking and reporting where the waste is coming from and where it is going.

The most reliable data for discard and recycling trends in Texas comes from Texas Recycling Data Initiative (TRDI), the North Central Texas Council of Governments (NCTCOG), and the Texas Commission on Environmental Quality (TCEQ). The most recent NCTCOG report collected data from 2010. This report contains the most specific and granular data on discards in individual DFW cities to date. More recent trends are documented by some city governments and are cited in the following sections. In addition, the TRDI report covers waste and recycling trends across the State of Texas.

NCTCOG spans a 16-county area, centered on Dallas and Tarrant counties.^α For purposes of this report, references to the DFW area include all counties in the NCTCOG jurisdiction.

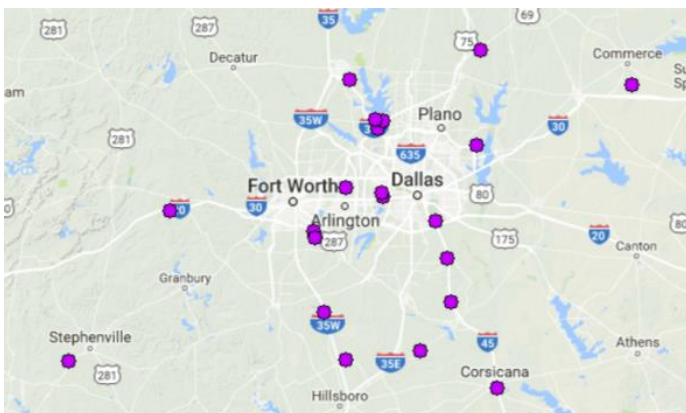


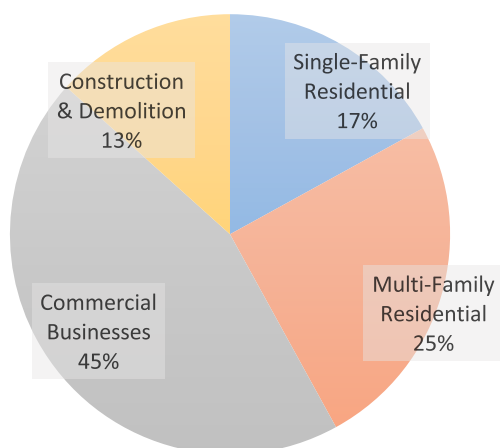
Figure 2 Active landfills in the DFW area

D. Landfill discards in DFW

According to state data, DFW area landfills received 9,238,905 tons of discards to in 2014.³ There are 18 Type I (MSW) landfills and 3 Type IV (commercial, C&D, and yard trimmings) landfills in the DFW area (**Figure 2**). Based on estimated disposal and compaction rates in 2013, these landfills had a total remaining capacity of about 435,551,694 tons, or about 50 years altogether. Some of these landfills will retire in several years, while some have potential to last centuries. The remaining years of capacity are based on current disposal rates and do not account for population growth or changes in discard patterns, such as increased diversion.⁴

^α NCTCOG counties include: Collin, Dallas, Denton, Ellis, Erath, Hood, Hunt, Johnson, Kaufman, Navarro, Palo Pinto, Parker, Rockwall, Somervell, Tarrant and Wise

E. Primary sources of discards going to landfills



City of Dallas discards by source

Figure 3 illustrates the share of discards generated by source in Dallas.

The TCEQ annual report does not track proportions of discards generated by residential and commercial sources. However, according to NCTCOG, in 2010 the residential sector of DFW generated 3,100,673 tons of material. During this same period, the commercial sector generated 5,921,722 tons, nearly twice as much as the residential sector.

Individual cities have differing proportions of discards being generated from these sectors. For instance, the City of Dallas residential material only accounts for 17% of the total waste generated, while the remaining 83% comes from the commercial sources, including multi-family buildings (**Figure 3**). These differences are due to city design, proportions and type of industry and housing, new construction, and so on.

F. Current reduction & diversion programs

The most common diversion program utilized in the DFW area is curbside recycling collection. The vast majority of DFW cities have single-stream curbside collection services for most, if not all, of single-family homes. Single-stream recycling programs allow residents to put many recyclables—often aluminum and steel cans, paper and cardboard, plastics, and glass—into a single bin or rolling cart that is collected by a hauler. Some cities haul their own residential landfill discards and recyclables, such as Dallas and Denton, while others contract private haulers to do so.

Many DFW cities offer infrequent bulk trash and yard trimmings waste collection. The main purpose of these programs is to give residents the option of disposing items that are too large for their bins or carts, thus alleviating a trip by residents to local landfills. Some cities, such as Dallas and Fort Worth, comingle the collection of bulky items and yard trimmings. This practice often results in most or all of the material being discarded into landfills. Other cities, such as Plano and Denton, have separate collection days for bulky items and yard trimmings. This source-separation program has allowed these cities to divert yard trimmings away from landfills and sell compostable materials as mulch, soil blends, and compost.

Food diversion in DFW is mostly limited to donations, although some food is collected for composting. Many grocery stores, entertainment venues, and universities donate usable food to local shelters in DFW. Only a few businesses, like hotels and universities, are utilizing composting, which can include undesirable and inedible food and organic material.

Residential food diversion is limited almost entirely to backyard composting programs. Some cities provide classes for residents to learn about how to compost their own food, but no DFW cities have initiated city-wide collection programs for residents. Only a few small, private businesses offer residential food scrap collection with a monthly subscription.

Another common diversion program in DFW is Household Hazardous Waste (HHW) collection. Often, cities have one or more HHW collection facilities that function as drop-offs for residents to dispose of products like used paint, electronics, tires, batteries, and other recyclable materials that are not generally accepted in single-stream programs. Many HHW



Figure 4 Curbside recycling is nearly ubiquitous in DFW

collection facilities accept materials year-round, while others are more restrictive. Some cities don't have HHW collection facilities, but offer once or twice a year collection events for these materials.

Some of these city programs work with county-funded collection drop-offs that manage the ultimate diversion of these materials (**Figure 5**).⁵ For instance, a Dallas resident can drop off batteries at a city collection point (e.g. City Hall). Those batteries would be sent to the Dallas County HHW transfer station, and then to the sorting facility in McKinney, TX before hauled to a specialized recycling facility.

Some DFW cities are beginning to address diversion in commercial sectors, the largest generators of waste, with limited success. Since commercial materials, including those from construction and demolition, are typically hauled by private companies, data reporting is extremely limited.⁶ While recycling collection in the commercial sector is available throughout DFW, the vast majority of cities have done little to assure universal collection services. Therefore, commercial businesses choose which materials they wish to divert if any. The majority of waste diverted from commercial sources come from paper products (693,500 tons) and metals (530,756 tons), accounting for 87.5% of reportedly recycled material.⁷

Several DFW cities have begun addressing discarded commercial materials with city-wide diversion programs that have brought recycling to apartments and businesses. These examples are discussed in detail in [Section III: Case Studies](#).

G. Recycling data & trends

According to NCTCOG, the total residential recycling weight between September 2009 and August 2010 was 587,967 tons (**Figure 6**).⁸ This equates to an estimated residential diversion rate of 19%. Out of 71 cities surveyed, ten cities reported residential diversion rates over 30%. Nineteen of these cities reported recycling over 400 pounds of material per household.⁹ The cities with the highest diversion rates had one or more of these factors: (1) variable garbage rates (or a pay-as-you-throw system, which allows residents to pay lower trash fees if they opt for smaller trash containers), (2) large recycling roll carts, as opposed to bins or blue bags, (3) a yard trimmings diversion program.

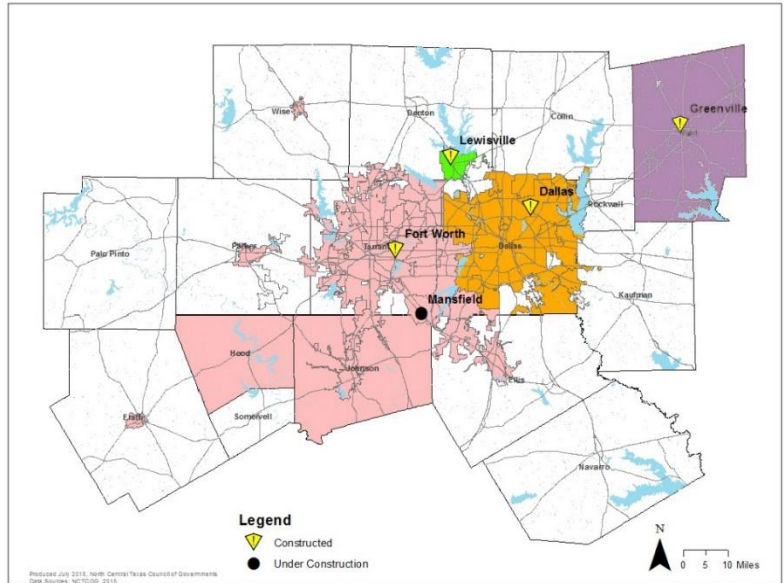


Figure 5 Permanent Household Hazardous Waste Facilities in the DFW area.

North Central Texas Regional Recycling Rates September 2009 – August 2010

Generation	September 2004 to August 2005			September 2009 to August 2010		
	Residential	Commercial	Overall	Residential	Commercial	Overall
Recycling	344,839	1,290,462	1,635,301	587,967	1,398,674	1,986,641
Disposal	2,477,839	6,245,278	8,722,936	2,512,707	4,523,048	7,035,755
Total Generation	2,822,498	7,535,740	10,358,237	3,100,673	5,921,722	9,022,396
Recycling Rate	12.20%	17.10%	15.80%	19.00%	23.60%	22.00%

Figure 6 NCTCOG regional recycling rate studies in 2005 and 2010 show growth in recycling

The total commercial recycling tonnage between September 2009 and August 2010 was 1,398,674 tons. This equates to an estimated diversion rate of 23.6%. As mentioned before, 87.5% of these materials are paper products and metals. The third largest category of materials recycled from commercial sources is construction and demolition (C&D), accounting for

5% or 70,390 tons.¹⁰ Most collected C&D materials are categorized by NCTCOG as natural disaster debris or other, so it is difficult to determine which materials are recycled from this source.

Furthermore, NCTCOG only collected commercial recycling data from 11 of the 71 cities surveyed. This is largely due private haulers' lack of tracking or reporting data for this study. Commercial disposal data was only extrapolated for cities that reported commercial recycling data, so the numbers are low, but methodology is sound.¹¹ If cities with C&D requirements like Fort Worth and Dallas had reported commercial data, is it possible that the diversion rate would be higher.

Figure 7 shows diversion rates and programs from five DFW cities. Some data collected for this comparison were independently reported by local governments. These more recent data suggest that recycling rates have steadily increased in the past five years. Recycling rates for Denton and Frisco only reflect data from residential sources.






DFW Cities: Diversion Programs and Recycling Rates					
City					
Recycling Rate	20% (2015) ¹²	24% (2016) ¹³	38% (2016 residential only) ¹⁴	38.5% (2015) ¹⁵	43% (2015 residential only) ¹⁶
Specific Diversion Programs					
Curbside Recycling	✓	✓	✓	✓	✓
Commercial & Multi-family recycling	Voluntary commercial and multi-family recycling	Voluntary commercial recycling, mandatory multi-family recycling	Voluntary multi-family and commercial recycling (15% participation)	Voluntary commercial recycling and composting, voluntary multi-family recycling	Mandatory commercial and multi-family recycling (built after 2001)
Pay-as-you-throw		✓	✓	✓	
Residential yard trimmings		✓	✓	✓	✓
C&D programs				C&D recycling rebate program	Mandatory C&D recycling for concrete and metal

Figure 7 Comparison of recycling rates and diversion programs in five DFW cities

II. Environmental & Economic Impacts

A. Waste & landfill impacts

Landfills are by definition a waste of valuable natural resources. Beyond the materials themselves (which are taken from finite sources, often at the expense of destroying natural habitat and ecosystems), extraction, manufacturing and transporting consumer products is also responsible for a significant portion of our global energy use, which is then wasted when these products end up in landfills.¹⁷ **Figure 7** illustrates total emissions from various systems in the U.S., rather than point sources, to show the large impact of consumption and disposal.¹⁸ Our practice of sending discards to landfills literally wastes economic activity and capital, human labor and productivity, and the natural world itself.

Residents unfortunate enough to live near landfills are often exposed to hazardous air emissions that can threaten their quality of life, and in some cases their long-term health. Dominant concerns from those living near landfills include environmental degradation, fumes and noxious odor emissions, heavy traffic, noise, unsightliness, and litter. Like other industrial polluting facilities, landfills are often permitted in more deprived communities of color and low-income areas, contributing to a disproportionate burden of pollution experienced by these residents.¹⁹ A long term epidemiological study conducted in Italy found that elevated hydrogen sulfide and other air pollutant levels near landfills contributed to significant respiratory issues and cancer.²⁰

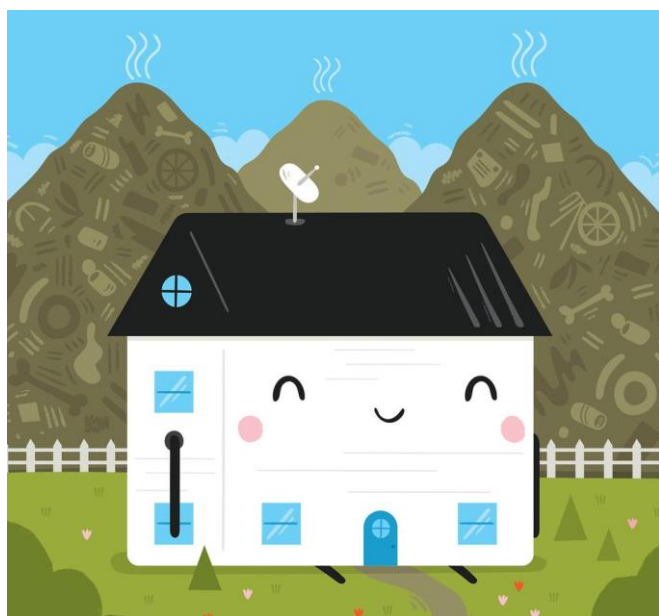


Figure 9 Illustration by Shaw Nielsen for the Wall Street Journal. Proximity to large landfills affect home values negatively.

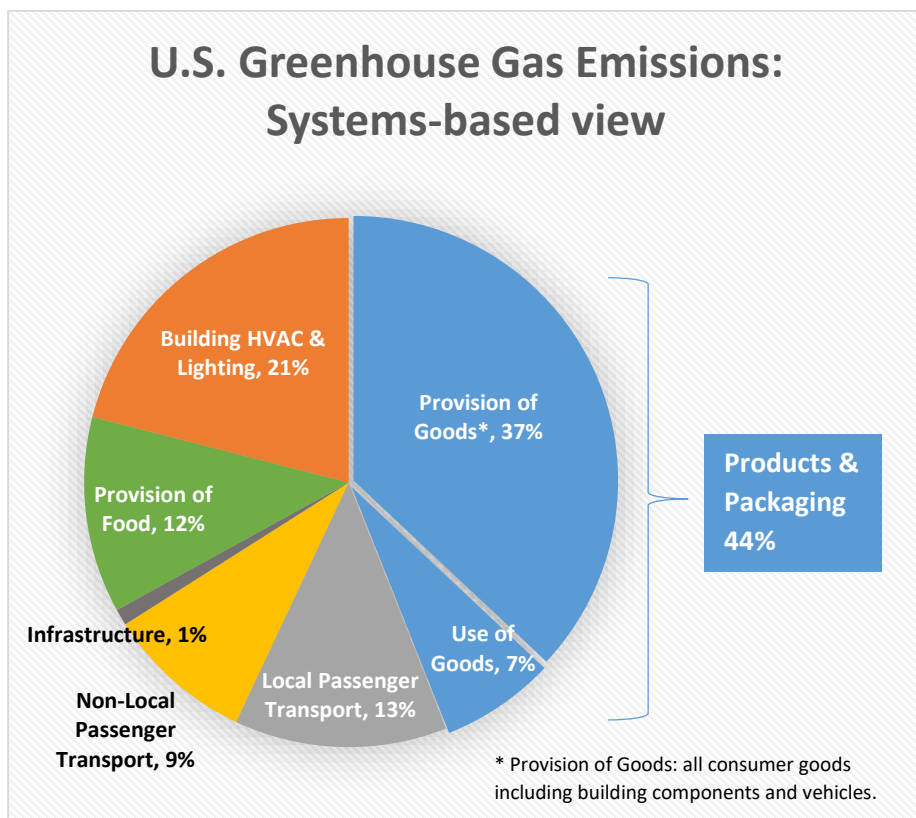


Figure 8 EPA data showing large share of U.S. carbon emissions are associated with products

Another impact of landfills is the negative impact on adjacent and nearby property values. A literature review study from 2010, which compiled data from 9 different studies, found that single-family home properties were negatively affected by small and large volume landfills. Approximately 75% of landfills that accept less than 500 tons of waste per day had negative effects on adjacent and nearby housing values. Virtually all large landfills (>500 tons/day) had an impact on adjacent properties, reducing their value by 13.7% on average.²¹

Landfills can pollute the soil and groundwater as well. Their clay and plastic liners often leak, potentially allowing multiple toxins to contaminate underground water sources. According to data collected by the Texas Commission on Environmental Quality, 35% of monitored active MSW landfills have detected hazardous leaks in Texas, including 8 active and 7 inactive landfills in DFW. **Figure 10** illustrates leaking landfills across the state.

A 2015 survey of landfill leachate across the U.S. found 129 chemicals of concern present in many landfills including 62 pharmaceuticals, 23 industrial chemicals, 18 non-prescription pharmaceuticals, 16 household chemicals, 6 hormones, and 4 plant/animal sterols. Landfill fluids, or leachate, in wetter climates proved more toxic than arid areas. This may also suggest that landfills that boost methane production with injected water have higher concentrations of leached chemicals.²²

Texas Landfills Leaking Toxins into Groundwater Monitors (2015)

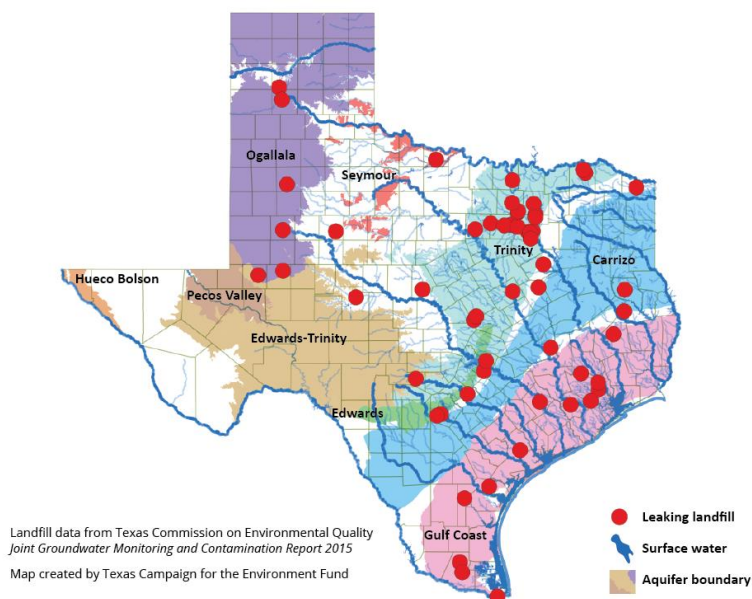


Figure 10 Map of leaking landfills in Texas according to the TCEQ

Figure 11 and **Figure 12** cite landfills that have raised concerns over health, quality of life, and property in DFW cities.

“We Are Not Trash” Protests



Highland Hills are predominantly low-income people of color who are disproportionately impacted by local pollution. Highland Hills residents are still located less than two miles from the landfill that accepts roughly two million tons of discards annually.

The Highland Hills neighborhood also fought the illegal “Deepwood” landfill in the 1980s that caught fire and burned for several months. This story is chronicled the film “Out of Deepwood,” by *buildingcommunityWorkshop*.

Students from Paul Quinn College led residents in the Highland Hills neighborhood of Dallas in an historic protest to repeal a mandate that increased loads of trash going to the landfill in their community.²³

In 2011, the City of Dallas passed a “flow control” ordinance that required all commercial trash collected within the City to be disposed in the McCommas Bluff Landfill in Highland Hills.

After protests from community members concerned with the health impacts of increased trash and pollution, and waste haulers who also found the ordinance unfair, U.S. District Judge Reed O’Connor struck down the measure.

This decision was viewed as a victory for environmental justice as community members in

Figure 11 Story from the Highland Hills neighborhood of Dallas

A Tale of Two Cities' Trash

The Cities of Lewisville and Farmers Branch have been embroiled in a fight over a shared landfill. The so-called Camelot Landfill, which is used by both cities, is located in Lewisville, but owned by Farmers Branch.²⁴

In 2012, Farmers Branch proposed an expansion of the Camelot Landfill. This concerned many Lewisville residents who were concerned about additional environmental damages. For instance, the Camelot Landfill was found to be polluting local groundwater sources by the state environmental agency.

Lewisville finally agreed to the expansion in 2015, after Farmers Branch accepted responsibility to stop the leaking. In a complicated agreement, Farmers Branch also decided to pay a \$60,000 monthly hosting fee for the landfill. Many Lewisville community members are still concerned about the environmental and economic impacts of the expansion on their health and property values.



Figure 12 Story from Lewisville and Farmers Branch over a landfill battle

B. Economic contribution of reuse & recycling

It should come as no surprise that reuse and recycling industries create more jobs and economic activity than simply trashing used materials. The Texas Recycling Data Initiative (TRDI) has some of the best data in the state regarding the economic impact of diversion. According to their 2015 report, at least 12,678 jobs are supported by recycling activities in Texas.²⁵ This number is intentionally conservative as it only includes processing activities, or jobs supported by material recovery facilities (MRFs), and not collection and remanufacturing jobs.

The Institute for Scrap Recycling Industries (ISRI) completed a recycling economic impact study on the U.S. and some individual states in 2014. Accounting for indirect and induced impacts, this study found that,

“Texas recycling firms are responsible for a total of 43,710 jobs paying over \$2.6 billion in wages and contributing over \$8.8 billion to the Texas economy, while generating \$342.8 million in tax revenues for Texas and its local governments.”²⁶

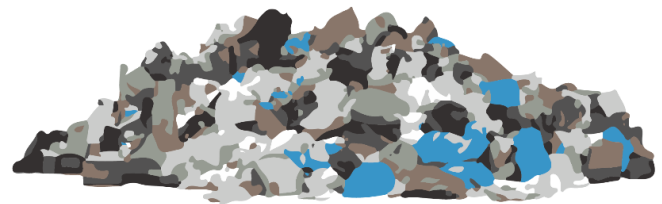
Another study, conducted by the Tellus Institute in 2011, compared job creation figures by waste industry in the U.S.

This report found that landfilling creates considerably fewer jobs than diverting materials, which is largely due to the fact that “capital intensive equipment used at disposal facilities can handle large tonnages with few employees.” **Figure 13** illustrates estimated job growth by disposal industry for 10,000 tons of materials.

As a result of the passage of House Bill 2763 in 2015, the state environmental agency is conducting a study of the economic impacts of recycling in Texas. This study, to be included in TCEQ’s 2016 Municipal Solid Waste report, will assess the current and potential statewide recycling rate, the current and potential economic and jobs impact of recycling, and potential markets and infrastructure needs for recycled materials.

Resource management jobs created per 10,000 tons of materials

Recycling Composting Landfill



Source: 2011 Tellus Institute. More Jobs, Less Pollution.

Figure 13 Recycling and composting discards has the greatest job impact

C. Zero Waste DFW projections

Recycling diversion growth in recent years has slowed nationwide to about 1% increase annually.²⁷ In areas with strong waste diversion policies and programs, these numbers are increasing more rapidly.

According to a jobs and economic growth forecast conducted by the Tellus Institute, setting strong standards and goals for waste diversion would result in significant economic growth. The Tellus Institute predicted U.S. job growth and economic impacts of diversion based on two scenarios. The study predicts that increasing residential and commercial diversion to 75% nationwide would create 1.1 million more jobs compared with a “business as usual” scenario in which diversion numbers only increase to 41% (**Figure 14**).²⁸

Extrapolating data for Texas, based on proportion of U.S. population, the 75% diversion scenario would produce an additional 91,305 jobs in Texas, with approximately 23,639 jobs in the DFW area, compared with the baseline scenario. These are likely conservative numbers as they are derived from a baseline diversion percent of 33% for the U.S., compared with an estimated Texas baseline at 18.9%.²⁹

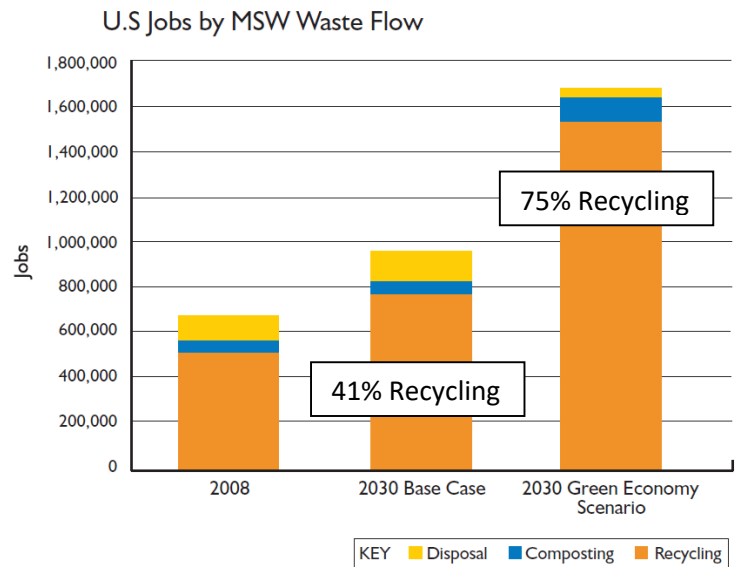


Figure 14 Jobs forecast shows positive correlation with increased recycling

III. Case Studies

A. Fort Worth – Multi-family recycling and pay-as-you-throw

i. Policy research on multi-family recycling ordinance

In 2004, the City of Fort Worth had two drop-off locations for multi-family residents to haul their recyclables for collection. These containers collected 175 tons in 2004, although the city estimated only about 5% came from multi-family residents.³⁰ In effort to explore options for increasing waste diversion from this sector, Fort Worth contracted a study with the consulting group R. W. Beck (now part of Leidos Engineering LLC). The study included interviews with multi-family residents, property managers, and recycling haulers. The report also included the investigation of four scenarios for multi-family recycling in the city (**Figure 15**).³¹

Scenario A	Scenario B	Scenario C	Scenario D
Status Quo	Off-site Collection	On-site collection via Exclusive Contracts	On-site collection via Open Competition
Two unstaffed recycling containers could be used by multi-family residents. No additional measures taken to expand services.	Nine staffed and 10 un-staffed recycling containers would be located near multi-family clusters for use by residents.	City would contract a private hauler to service recycling containers in every multi-family complex.	Ordinance requiring multi-family complexes to sign contracts with private waste haulers to provide recycling services.

Figure 15 Scenarios recommended by R.W. Beck consultants to expand multi-family recycling in Fort Worth

While the R. W. Beck report recommended and outlined a 10-year strategy to implement an off-site collection program (Scenario B), they also provided a strategy for implementing Scenarios C and D. The city used the public opinion research and analysis provided by R. W. Beck and ultimately decided to implement Scenario D.³²

ii. Policy implementation

In December 2011, the City Council of Fort Worth passed an ordinance mandating that all multi-family complexes 8 units or larger sign a contract with a recycling hauler and submit a recycling plan to the city.³³ According to the City of Fort Worth in January 2015, 545 multi-family complexes were compliant with the new ordinance. Of those, 440 complexes submitted recycling plans, while 105 complexes signed waivers to opt out of the program.

iii. Challenges & shortcomings

While the vast majority of multi-family complexes have submitted recycling plans and signed recycling contracts with independent haulers, the city ordinance does not require a list of recyclable materials that must be collected. Furthermore, diversion reporting is not required of independent recycling haulers, so the success of the program remains somewhat unclear. Fort Worth has plans to continue and expand recycling education for apartment managers and tenants, reduce recycling contamination, require diversion reporting, and reduce the number of exemptions allowed for complexes to opt-out of recycling outlined in their Comprehensive Solid Waste Management Plan draft.³⁴

iv. Residential organics composting program

Fort Worth offers weekly curbside collection of yard trimmings for single-family home residents through Waste Management. Yard trimmings are hauled to a local landfill where they are ground into mulch by Living Earth Technologies. In the fiscal year 2014-2015, 29,000 tons of yard trimmings were processed into mulch and made available to residents for purchase.³⁵

In addition yard trimmings pickup, Fort Worth also collects bulky items from single-family homes on a monthly basis. A 2011 city survey found that bulky items account for only 12.3% of discards collected, but represents 33% of the cost of hauling for residents.³⁶ Furthermore, up to 70% of bulky items were identified as yard trimmings, but was not properly diverted through source separation. Therefore, if residents practiced better separation of yard trimmings from bulky items, they could potentially reduce their bill while greatly increasing diversion. **Figure 16** compares annual discard stream proportions with cost.

FT. WORTH - RESIDENTIAL COLLECTION COST

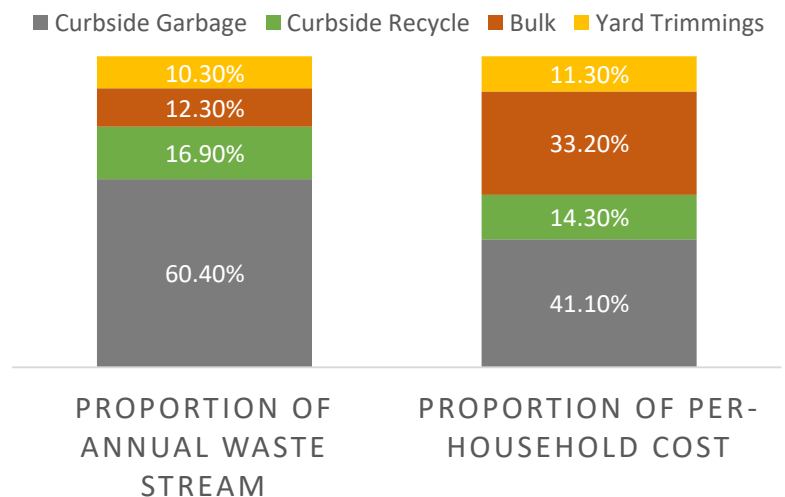


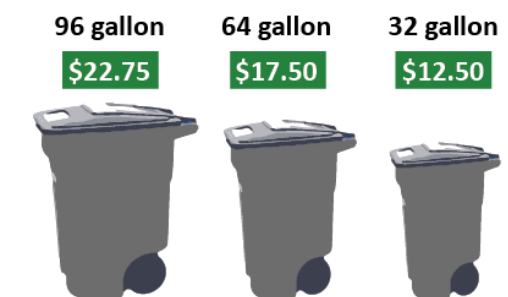
Figure 16 Shows the high relative cost of collecting bulk waste from residents

v. Residential incentive program - Pay-as-you-throw

The City of Fort Worth has implemented two incentive programs that promote waste diversion from single-family homes. The pay-as-you-throw (PAYT), sometimes called SMART (Save Money and Reduce Trash) program allows residents to choose the size of their landfill trash rolling cart and pay based on size.

The following prices and sizes are shown in **Figure 17**.³⁷ In principle, this program encourages residents to reduce their landfill trash generation while increasing recycling and organics diversion. The city does not currently track diversion rates based on size of trash rolling cart selected.

Pay-As-You-Throw



Based on monthly prices in Fort Worth, Texas

Figure 17 Ft. Worth's pay-as-you-throw system prices are based on the size of residential garbage cart

vi. Comprehensive Solid Waste Management Plan 2016-2036

As of August 2016, Fort Worth opened its Comprehensive Solid Waste Management Plan draft to public comment. The 2016-2036 plan outlines the city's strategy to manage waste through the next two decades. While the current draft does not mention Zero Waste or set an ambitious goal as in Dallas' 2013 plan, it does aim to increase diversion rates to 50% over the long term.³⁸

B. Cedar Hill, Little Elm, Lewisville, Allen, and Euless – Exclusive franchise agreements

Four cities—Cedar Hill, Little Elm, Allen, and Euless—have addressed multi-family recycling using exclusive franchise agreements with private haulers. Typically, as in the case for these cities, exclusive franchise agreements are contracts between a hauler and city government that require landfill and recycling services to cover residential housing and certain types of commercial buildings at a fixed rate. These cities contracted haulers at relatively inexpensive rates to provide recycling for all multi-family tenants, see **Figure 18** below for details.

Monthly Multi-family Recycling Cost in DFW Cities					
City	Euless	Little Elm ³⁹⁴⁰	Allen	Lewisville	Cedar Hill
Hauler	Community Waste Disposal	Republic Services	Community Waste Disposal	Community Waste Disposal	Waste Management
Multi-family recycling cost (per unit price)	\$1.00	\$0.78	\$0.65	\$1.18	\$1.10
Franchise began	2007	2013	2004	2015	2013

Figure 18 The average monthly cost for recycling in multi-family complexes in these five cities is about \$1.00 per housing unit

Exclusive franchise agreements have many advantages to competitive contract ordinances. Using a single hauler for all commercial buildings allows easier tracking of landfill trash, recycling, and compost rates. Many cities have set recycling diversion goals, as in Dallas, but struggle to track their progress as there are so many haulers with different tracking and reporting habits. Residents and property managers also benefit from exclusive contract agreements since cities have more collective bargaining power to get the lowest prices for hauling services. Finally, cities with exclusive franchise agreements benefit from having more efficient discard management traffic throughout their communities. Hauling discards in cities with non-exclusive franchise agreements inevitably results in trucks repeatedly crossing paths to reach their clients. This results in unnecessary traffic congestion, air pollution, and street wear-and-tear.⁴¹

A 2013 study conducted by the Los Angeles Alliance for a New Economy (LAANE), found that exclusive franchise agreements can markedly reduce overall waste management traffic. In the case of large cities, exclusive franchise agreements can be signed with multiple haulers based on jurisdictions or districts and can be offered through an RFP process. A 2016 study commissioned by the City of New York Department of Sanitation found that establishing exclusive commercial waste collection zones could reduce truck traffic from waste collection by 49 to 68%.⁴² The study found that zoned franchise agreements in New York

Route Inefficiency in a Non-Exclusive Franchise



Figure 19 Illustrates the inefficiency of multiple haulers collecting from the same area

City could reduce air pollutants most closely associated with asthma and other respiratory illnesses by 32 to 62 percent.⁴³

C. Denton – Residential services and voluntary commercial recycling

i. Residential program and incentives – Pay-as-you-throw and ReUse store

The City of Denton offers a wide variety of solid waste management services as well as incentives for residents to divert and reduce landfill waste. All single-family home residents have access to curbside collection of landfill trash, single-stream recycling, bulky items, yard trimmings, and household chemicals collection. Similar to Fort Worth, Denton uses a pay-as-you-throw system for single-family curbside collection. All curbside collection services are bundled and billed together, and the only pay-as-you-throw variable is size of landfill trash rolling cart.

Certain used household chemical products collected by the city are transported to a ReUse Store operated by the city. If these used products are in relatively good condition and more than half full, they are placed on shelves where residents can select up to four products per day, free of charge.



Figure 20 Denton residents can obtain free, used household chemical supplies at the ReUse store

ii. City owned and operated landfill, MRF, compost facility advantages

The City of Denton benefits from owning and operating their own landfill, materials recovery facility, and composting facility. Owning these assets allows Denton to set their own service rates, keep accurate reporting data, reduce traffic flow and road damage through exclusive hauling (see **Figure 19**), and generate revenue from the sale of recycled and composted products.

iii. Commercial and multi-family recycling

The City of Denton also offers single-stream collection services for commercial and multi-family buildings. The voluntary program allows businesses to sign up for monthly services with the city. Businesses and multi-family complexes can select a variety of container types including rolling carts, front and side load containers. According to a 2016 quarterly recycling report, approximately 15% of businesses in Denton use recycling services through the city.⁴⁴

The City of Denton bills commercial and multi-family customers based on the volume of container. We used the following scenario and calculation to find the approximate price per multi-family unit to compare with other cities. An 8-yard front load container leased from the City of Denton would cost \$191.60, and could easily service 150 multi-family units. This would cost an average of \$1.27 for each apartment unit, which is comparable with other DFW cities that use exclusive contracts for apartment recycling.

The City of Denton also maintains four recycling drop-off locations throughout the city for multi-family dwellers whose complex does not offer an on-site recycling service. Use of these containers is free.

D. Plano – Exclusive, non-mandatory franchise and residential services

i. Residential programs and incentives

In many respects, the City of Plano offers similar programs and incentives as Denton for their single-family residents to reduce and divert discards but in addition Plano has a program to highlight "Recycle Right All-Stars." All single-family home residents have access to curbside collection of landfill trash, single-stream recycling, bulk items, yard trimmings, and household chemicals collection via the city's hauling service. Plano also uses a pay-as-you-throw system for single family homes. Like Denton, solid waste services are bundled and billed together and the only variable that affects cost is the size of the trash cart.

Plano also offers a household chemicals reuse center, in which acceptable collected chemicals can be obtained by residents free of charge.⁴⁵

A unique incentive offered to residential customers in Plano is called Recycle Right All-Stars. Households can opt into the program and place a sticker on their recycling rolling cart, which would subject them to waste auditing by the city. Customers with no contamination in their recycling bins are entered into drawing for free waste hauling services for one year or a set of stainless steel recycling cans. In October 2014, over 800 households were Recycle Right All-Stars.⁴⁶

ii. Commercial and multi-family recycling

Plano signed an exclusive franchise agreement with Republic Services to haul waste and recycling for commercial and multi-family buildings, but recycling service is not mandatory. This exclusive contract secured low costs for commercial buildings and complexes, but has not resulted in comprehensive recycling for all buildings throughout the city.

Plano is the only city in North Texas that offers commercial food waste composting for businesses. The voluntary program allows restaurants and other businesses that generate food waste to sign up for a composting container to be hauled to a city-managed facility in Melissa, Texas. Since this is a voluntary program, participation and food scrap diversion is limited.

iii. Construction and demolition recycling

The City of Plano also incentivizes commercial businesses to divert C&D materials by offering refunds on C&D deposits based on diversion rates. Commercial businesses must pay a deposit to the City to remodel, construct or demolish any structure. Based on the diversion rate of C&D materials, businesses can submit a refund request form to be reimbursed for their deposit. Projects with diversion rates as little as 20% are rewarded a 20% refund, and projects with diversion rates of 60% or higher receive a full refund on their C&D deposit.⁴⁷

E. Frisco – Universal recycling access for businesses and residents, C&D material diversion

Frisco has some of the most comprehensive recycling requirements in North Texas, including widespread access to recycling in apartments, businesses, and neighborhoods, as well as requirements to address C&D materials.

i. Commercial and multi-family recycling

Frisco took a unique approach to implementing comprehensive recycling for commercial businesses and multi-family complexes. The ordinance requires that all new commercial building projects include enclosures for both recycling and trash containers. Similar to the Fort Worth ordinance, the Frisco ordinance allows businesses to contract with any hauling company and provides assistance and approval of submitted recycling plans. While Frisco's commercial recycling ordinance affects all types of commercial businesses, it is limited to buildings constructed after its passage in 2001, after which significant development has taken place in the booming suburb.⁴⁸

ii. Construction and demolition recycling

Frisco also requires the recycling of certain construction and demolition materials, concrete and metal, by city ordinance. Since most C&D recycling haulers allow comingling of these materials with others, like concrete and steel, businesses can choose to recycle more than they are required.

The Star in Frisco complex, a public private partnership between the Dallas Cowboys, Frisco and the local school district, touted a diversion rate of 95% of construction materials in 2016. This \$1.5 billion project highlights the potential and scalability of zero waste construction in the DFW area.⁴⁹



Figure 21 The Star in Frisco touted its Zero Waste construction project in 2016

iii. Public event recycling incentives

The City of Frisco also incentivizes the diversion of materials from large public events through a deposit and refund system similar to Plano's program for construction and demolition materials. Event organizers in Frisco pay a vendor's deposit before hosting, and up to 30% of this deposit is refundable if the vendor follows the city's green guidelines for recycling.⁵⁰

F. Dallas – Long-term solid waste management plan

i. Long Term Solid Waste Management Plan

The City of Dallas is the only municipality in the DFW area that sets ambitious Zero Waste goals. Dallas officials began considering a Long Term Solid Waste Management Plan in 2010. The original draft of the plan did not include many of the ambitious goals outlined in the final 2013 version. With the help of recycling advocates, including Texas Campaign for the Environment, the plan became the first municipal Zero Waste plan in North Texas.

While the Long Term Solid Waste Management Plan 2013-2063 (hereon referred as the Zero Waste Plan) contains a strategic policy framework to attain 85% diversion, current trends indicate a stagnation in collection growth, which could be addressed by more immediate policy and city program implementation.



Figure 22 The Dallas Zero Waste Plan outlines a strategy to achieve 85% diversion by 2040.

ii. Resident Programs and Incentives

In 1997, Dallas became one of the first cities in Texas to provide curbside single-stream recycling collection to residents. The program initially only accepted a few materials—glass, aluminum and tin cans, and paper products—in small recycling bins provided by the city. Dallas now collects comparable materials to other DFW cities and uses 96-gallon rolling carts for collection. Now that Dallas' new recycling facility is open, the city's single-stream recycling service might begin to accept new types of materials.

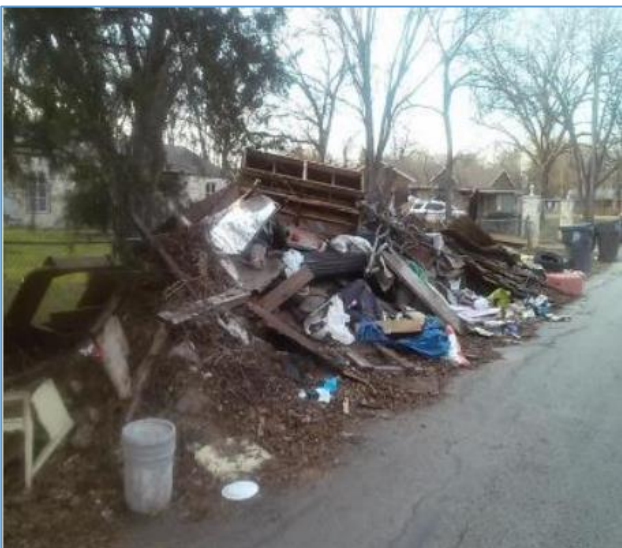


Figure 23 City-wide diversion is expected to rise considerably when Dallas requires the separation of bulk and brush

In lieu of curbside household chemical collection, the City of Dallas collects batteries, motor oil and filters, latex paints, and antifreeze at special collection events a few times a year. All Dallas County residents can take used household chemicals and hazardous waste to the Dallas County Home Chemical Collection Center located in northeast Dallas, bordering the City of Garland.

Dallas does monthly collection of bulky items and yard trimmings from residents, but currently comingles these discard streams and diverts very little. City sanitation officials are working on a plan to pilot collection of these materials separately at the source so yard trimmings can be diverted for composting, thereby increasing residential diversion rates and potentially reducing bulky item hauling costs. The City of San Antonio increased their residential diversion rates by ten percentage points by collecting these waste streams separately.⁵¹

iii. Commercial and Multi-family recycling

Residents in larger multi-family buildings are not guaranteed recycling service within the Dallas city limits. Instead, the city has encouraged voluntary recycling collection by private haulers in multi-family and commercial buildings. Dallas included a strategy to address limited commercial recycling participation in its Zero Waste Plan.

The city contracted Decision Analyst to survey building managers about the availability of voluntary recycling programs and to conduct waste characterization audits with commercial and multi-family businesses over three years. During the first year of this study, Dallas found that multi-family complexes were diverting a mere 6% of their discards, and relatively few apartments, businesses, and hotels were participating in recycling. Since the surveys were voluntary, respondent participation was low. The city redesigned the survey in 2015 and 2016 to eliminate questions and the waste audits, but participation did not increase.

Commercial Recycling: Overall

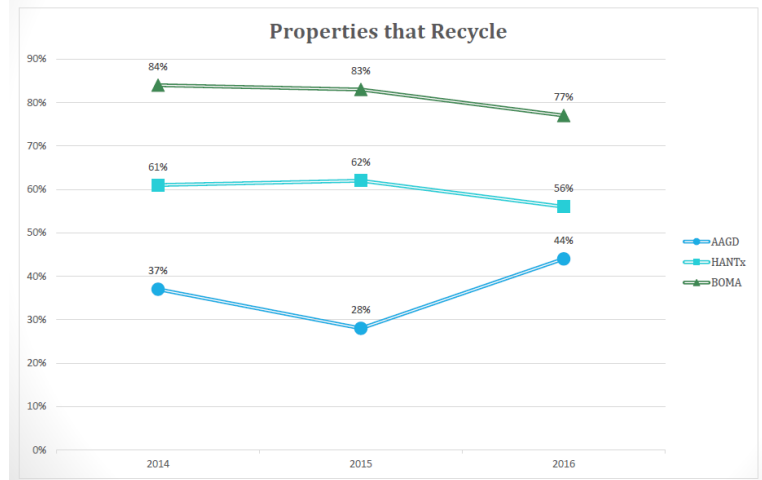


Figure 24 Shows recycling participation data from City of Dallas surveys to apartment, business, and hotel managers

Regardless, the city has not found significant growth in commercial recycling participation over the past three study years, particularly for apartments. Figure 24 illustrates recycling participation in hotels, businesses, and apartments in Dallas according to data collected by Decision Analyst and the City of Dallas. It is important to note that some city officials, including one councilmember, have called into question the methodology of these surveys. Since the emailed surveys are voluntary and indicate the topic of recycling in the subject line, participants in the survey may be skewed toward those who recycle while those who do not might ignore the survey altogether.

The City of Dallas does not have an ordinance that requires diversion of C&D materials. Approximately 23% of commercial sector discards accepted at the McCommas Bluff Landfill in Dallas are from C&D.⁵² The Green Building Ordinance in Dallas gives certification to buildings based on requirements that include on-site recycling and diversion of C&D materials, but these are strictly voluntary.

iv. Challenges and areas for improvement

According to city data, single-family residents in Dallas generate only 13% of total discards in the city. The remaining 83% of materials are generated by multi-family complexes, commercial industries, and construction and demolition. Therefore, the largest area of impact for diversion is the commercial sector.

The Zero Waste Plan includes the consideration of a Universal Recycling Ordinance (URO), a commercial recycling policy that could manifest as an exclusive or non-exclusive franchise agreements with private and/or public haulers. However, the plan does not recommend the adoption of a URO or any mandated recycling policies until 2019-2020.

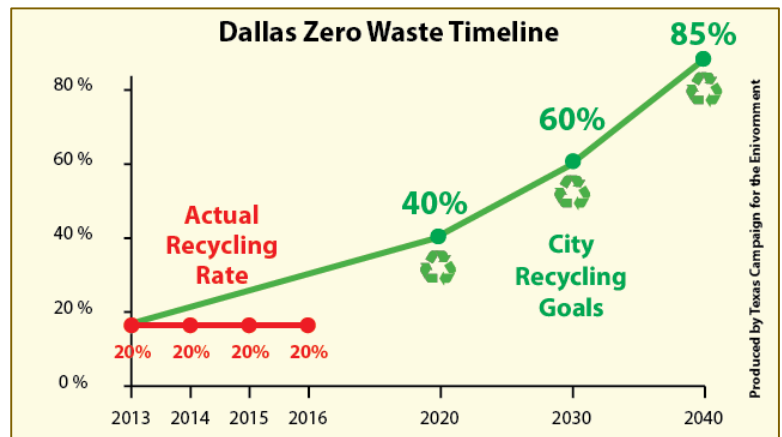


Figure 25 Dallas set ambitious diversion goals for 2020, 2030, and 2040. The city will likely need a URO to attain even the first of three.

It is unlikely that the City of Dallas will reach its proposed goal of 40% diversion by 2020, or 60% diversion by 2030, without implementing commercial recycling policies similar to a number of other Texas cities.

G. Beyond DFW – Other leaders in materials diversion

The cities of San Antonio and Austin have implemented commercial recycling ordinances with positive results for meeting diversion goals outlined in their respective Zero Waste Plans.

i. San Antonio

The City of San Antonio passed a ten-year solid waste management plan in 2010 that included a “path to Zero Waste,” and a goal to reach 60% waste diversion by 2020.⁵³ By December 2010, the City Council passed a multi-family recycling ordinance that requires multi-family complexes to provide a recycling service. The multi-family ordinance is non-exclusive, like Fort Worth’s “open competitive” recycling contracts between complexes and haulers.

The ordinance set detailed guidelines for multi-family complexes, including placement of recycling containers next to landfill waste containers (**Figure 26**) and recycling education for residents. Separate deadlines for program implementation were given to multi-family complexes depending on number of units through 2011 and 2012. The city began enforcement the following year with 1,399 complexes in compliance.⁵⁴

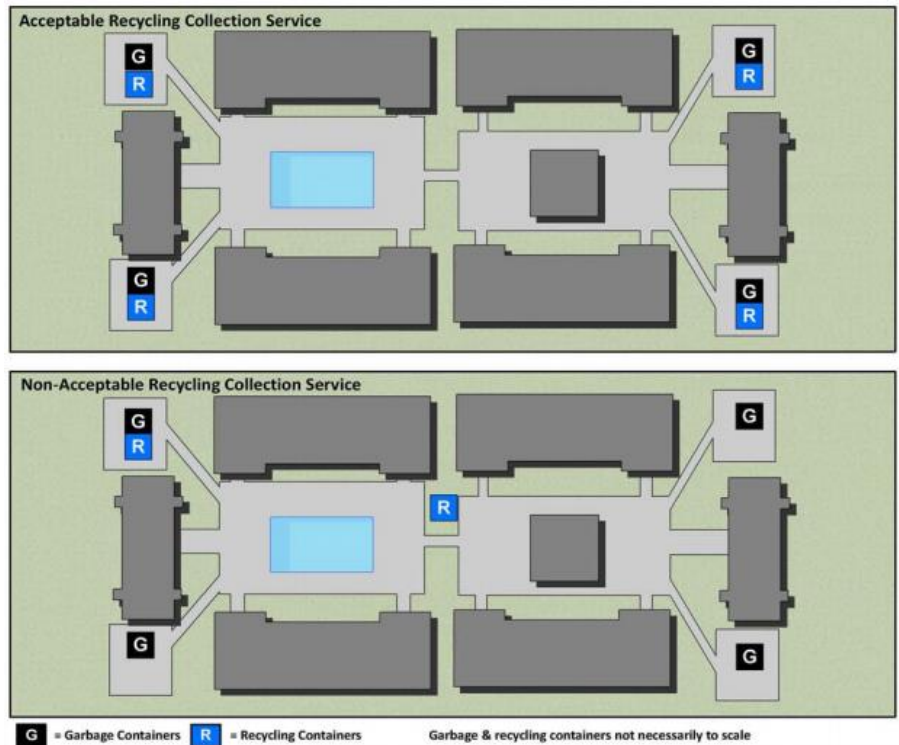


Figure 26 The examples above show acceptable and non-acceptable recycling plans for an apartment complex in San Antonio, based on siting of recycling containers.

Commercial recycling haulers are required to submit annual reports to the city including number of units served and weight of recyclables diverted. This requirement, unique among non-exclusive commercial recycling ordinances in Texas, was intended to help more easily track diversion data. However, due to haulers collecting from commercial and multi-family sources simultaneously, San Antonio still has trouble keeping track of multi-family recycling data.

Residential recycling rates in San Antonio are some of the highest in the state, in 2013, single-family homes diverted 31% of discards.⁵⁵ San Antonio implemented a PAYT system that offers variable subscription fees to different curbside services. In 2015 they became the first city in Texas to start rolling out free curbside organics collection to all single-family residents they service. Concurrently, San Antonio started its PAYT program. The city introduced 64-gallon landfill trash bins as well as 48- and 96-gallon organics carts. Residents will pay more for a 96-gallon landfill cart, which was the standard size previously.

ii. Austin

In 2009, Austin City Council adopted a “zero waste” resolution, formalizing the city’s commitment to diverting waste. In December of 2011, Austin City Council unanimously approved the Austin Resource Recovery Master Plan, which outlined the city’s specific path to Zero Waste. Austin’s Resource Recovery Plan contains the most comprehensive diversion strategy in the state; it aims to meet a 90% diversion rate by 2030, and 95+% by 2040.

The plan included specific policy recommendations for years 2012-2016 (**Figure 27**), and outlined more general policies and initiatives through 2040. The plan recommends public input and annual review of timelines, and proposes contracting 5-year diversion assessments to measure progress toward 5-year benchmarks outline by Austin City Council.⁵⁶

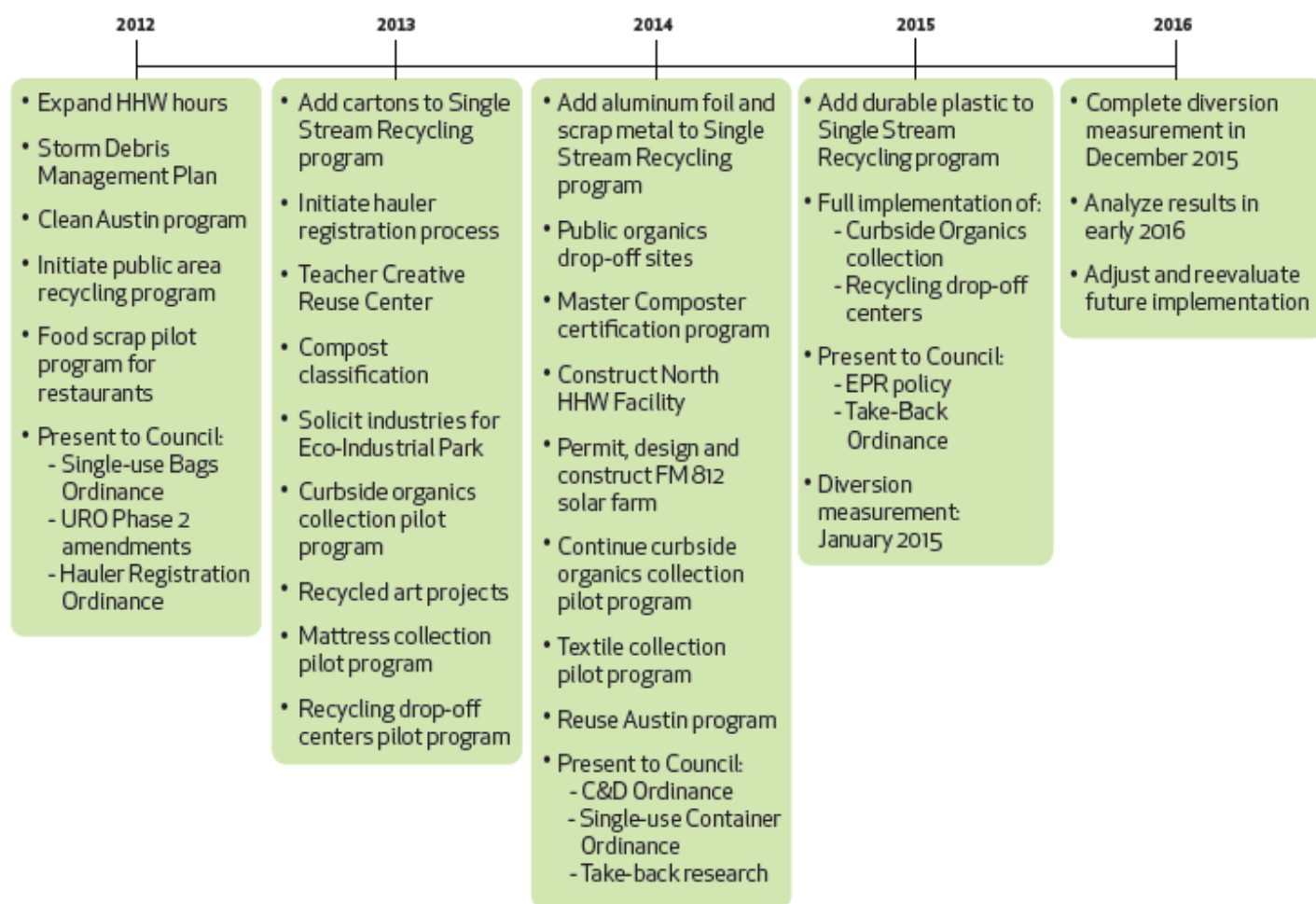


Figure 27 City of Austin resource management policy recommendations from 2012-2016

The City of Austin has the highest recorded waste diversion rate of any large city in the state, at 42% in 2015.⁵⁷⁵⁸ The effectiveness of Austin's resource recovery efforts are a result of mandatory policies and education programs that embed waste diversion throughout the city.

For single-family residents, Austin provides comprehensive waste diversion programs. Austin uses a pay-as-you-throw system, with monthly costs ranging from \$16.90 for a 24-gallon waste container to \$41.85 for a 96-gallon waste container. Residential yard trimmings are collected for composting.

In December 2012, the City of Austin started a pilot program for curbside compost carts which residents can use for yard trimmings, food scraps and food-soiled paper and cardboard, in addition to other items⁵⁹. Approximately 14,000 households were in the pilot program. In September 2016, the Austin City Council passed a city budget to roll out this service city-wide before 2020.

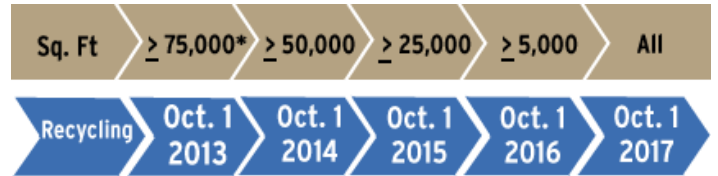
Austin passed a Universal Recycling Ordinance in 2010⁶⁰ with a timeline for implementation from 2013-2017. Beginning with large multi-family complexes and commercial businesses, the ordinance requires buildings and complexes to provide recycling services to tenants and employees. **Figure 28** shows how the ordinance first affects large properties (e.g. apartments with more than 50 dwelling units and commercial buildings with more than 75,000 sqft), and gradually covers smaller properties. Grocers, farmers' markets, restaurants and bars and businesses with food permits are also required to offer food composting starting with the largest generators in 2016 to smallest generators such as food trucks in 2018.⁶¹ Austin's URO is the only one in the state that covers all commercial buildings in addition to multi-family dwellings.

The Austin URO requires non-exclusive contracts between waste haulers and businesses throughout most of the city. This policy is similar to Fort Worth and San Antonio's respective multi-family recycling ordinances. Part of the downtown area of Austin is covered by an exclusive contract agreement with the City and one hauler to limit traffic congestion especially in alleys while providing comprehensive services.⁶²

Multi-Family Recycling Timeline



Commercial (Non-Residential) Recycling Timeline



Organics Diversion Timeline

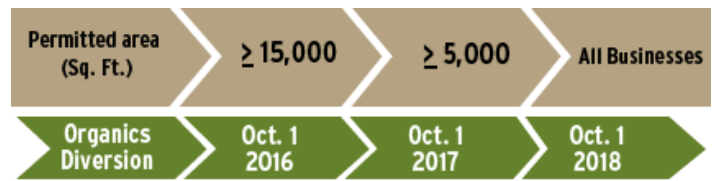


Figure 28 Illustrates the timeline for implementation of Austin's URO for recycling and organics collection.

In November 2015, Austin passed an ordinance to address C&D discards. The ordinance went into effect in October 2016 and affects all construction and demolition projects larger than 5,000 square feet. Unless a project is given a waiver, it must divert at least 50% of all C&D discards, and may not landfill more than 2.5 pounds of materials per square foot.⁶³

The vast majority of diverted materials—an estimated 85%—are collected from commercial and multi-family sources in Austin (**Figure 29**).⁶⁴

Recycling Diversion Initiatives	FY 2010	FY 2015	FY 2020	FY 2025	FY 2030
Single Stream Recycling - residential	52,479	75,000	80,000	85,000	90,000
Clean Austin - expanded bulk collection and recycling	194	1,000	4,000	10,000	15,000
Public area recycling containers	0	400	1,000	2,000	4,000
Event Recycling Ordinance	0	250	500	1,000	1,500
C&D Debris Ordinance	0	50,000	100,000	150,000	180,000
Commercial & multi-family recycling (plus URCO impacts)	350,000	450,000	700,000	850,000	1,000,000
Public drop-off recycling facilities	0	5,000	10,000	20,000	30,000
Expanded public drop-off recycling facilities	0	30,000	100,000	140,000	150,000
Total estimated diversion volume	402,673	611,650	995,500	1,258,000	1,470,500

Figure 29 Shows the sectors and programs from which materials are diverted in the City of Austin.

iii. Product bans and restrictions

Some cities choose to ban or restrict certain products, particularly single-use products or products that are difficult to manage at their end-of-use from commerce to prevent environmental harm and waste. Single-use product bans are most common for disposable products that create environmental or property harms, are not easily diverted and for which reasonable alternatives exist. Single-use checkout bags and Styrofoam (a brand name for expanded polystyrene, or EPS) are two of the most common products banned or restricted at the municipal level across the country.

There are at least ten communities in Texas with ordinances that discourage or restrict the use of single-use check-out bags. The City of Brownsville was plagued by single-use bag pollution, in part because of cross-border commerce, and was the first to pass an ordinance in 2009. The next ordinance in Fort Stockton was spurred by cattle deaths and bags despoiling the landscape as they were caught on cactus and barbed wire by strong West Texas winds. South Padre Island passed an ordinance over concerns about tourism and the danger single-use bags pose to marine wildlife.

The only DFW area city to pass an ordinance on single-use bags was Dallas in 2014. Starting on January 15, 2015, Dallas residents began paying 5 cents for each single-use carry-out bag. However, the bag maker Hilex Poly (now Novolvex) took legal action and the Dallas City Council repealed the ordinance. A survey conducted by the *Dallas Morning News* indicated that while some residents were unhappy with the ordinance, most shoppers were changing habits by bringing their own reusable bags.⁶⁵

Single-use bags also pose harms to recycling machinery. One Sacramento area facility reported being forced to shut down operations six times a day to clear bags from recycling equipment.⁶⁶ Under normal circumstances most communities do not want these bags included in with recycling, making diversion significantly more difficult. Styrofoam has few markets for remanufacture, is costly to transport, and contaminates the recycling stream when it breaks down.

There are many sustainable alternatives to these products, so local restrictions are unlikely to cause significant negative impacts to commerce. Bans can not only contribute to increased diversion by switching to more recyclable products, they can also reduce the overall amount of waste by eliminating disposable products and replacing them with reusable products. With a few exceptions, any product which cannot be diverted through municipal programs or producer takeback could be considered for a product ban.

Although bills to pre-empt local options on bag ordinances have been defeated in every legislative session since 2009, the legal standing of single-use bag ordinances in Texas is uncertain. On August 7, 2016, the 4th Court of Appeal based in San Antonio overturned a state district court ruling and invalidated Laredo's single-use bag ordinance on a 2 to 1 vote. Currently, that ruling only applies to the counties under the jurisdiction of the Fourth Circuit Court of Appeals. Laredo is appealing this decision to the Texas Supreme Court.⁶⁷ On October 12, 2016, Texas Attorney General Ken Paxton filed suit against the Brownsville largely over the option that a handful of large retailers are utilizing to charge \$1 per transaction for an unlimited number of single-use bags.⁶⁸ Brownsville has since removed the \$1 per transaction option.

iv. Extended Producer Responsibility

Some state and local governments have passed laws to make producers responsible for recycling and diverting products when consumers are finished using them. Extended Producer Responsibility (EPR), or producer takeback, laws encourage better and more sustainable product design by placing the responsibility of the product and its materials on the manufacturers.

Producer takeback legislation has been adopted most widely with electronic waste. Almost half the states in the U.S., including Texas, now have laws requiring electronics manufacturers to take back their products for recycling, or those manufacturers are not allowed to market their products in that state.⁶⁹ This has reduced the amount of electronic waste in landfills by more than half a billion pounds nationwide, including 214 million pounds in Texas alone.⁷⁰

Other states have passed EPR laws for batteries, paint, mattresses, fluorescent lighting and other products. A number of U.S. counties have passed local ordinances requiring EPR for pharmaceuticals, and stakeholders have begun discussing the possibility of national EPR policies for packaging.

In 2015, Texas House Representative Rodney Anderson (R-Grand Prairie) filed an EPR law for household batteries, which would have established convenient recycling containers for single-use and rechargeable batteries throughout the state. Texas Campaign for the Environment led the advocacy work to get support on the legislation, but the bill ultimately did not pass.⁷¹ Representative Anderson filed House Bill 1874 also on battery recycling.⁷²

Extended Producer Responsibility laws entail big product manufacturers paying local governments to collect materials, or setting up their own drop-offs for customers. Adopted as a principle for all products, EPR could recover most of the materials remaining after curbside recycling and composting. By requiring manufacturers to responsibly handle these materials at the end-of-life—physically and/or fiscally—it also encourages them to design simpler, more recyclable, less wasteful products in the future.

IV. Public Opinion Research

In order to understand the perceptions of recycling programs and policies in Dallas, Texas Campaign for the Environment Fund conducted public opinion studies with multi-family tenants and property managers in 2016. The results of the qualitative and quantitative studies found widespread interest in recycling programs and majority support for a multi-family recycling ordinance that would require multi-family complexes to offer recycling programs to residents.

A. Quantitative study with multi-family tenants

The quantitative study utilized phone polling of 400 multi-family residents in Dallas by a third-party research group. The study ensured accurate representation by age, race, household income, and geography by ZIP code.

Data from this study suggest an overwhelming number of Dallas multi-family residents think that recycling is important and beneficial to the environment. Polling data indicate that almost all multi-family residents who have recycling at their complex do participate in the program to some extent. Furthermore, most surveyed residents—across almost all demographic groups—agreed that Dallas should require all multi-family buildings to offer a recycling program (**Figure 30**).

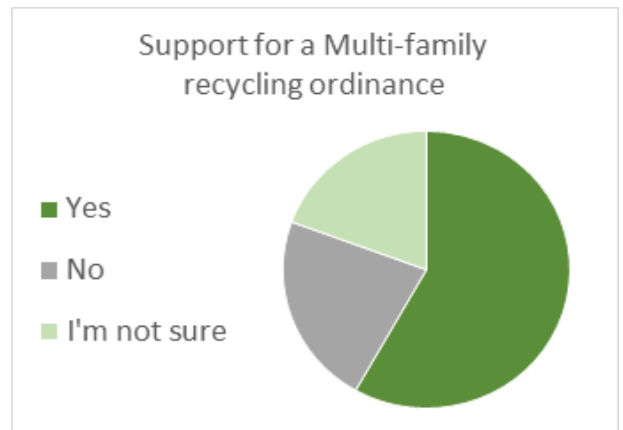


Figure 30 Phone respondents support for a recycling ordinance

B. Qualitative study with multi-family tenants and property managers

The qualitative study was led by a third-party moderator and respondents were selected and compensated by a recruiting firm. The study utilized three focus groups with residents (two in English, and one in Spanish). In addition, 25 in-depth interviews were conducted with English- and Spanish-speaking tenants and property managers in Dallas.

Property managers who participated in the study were, by and large, already aware that the city is considering implementing a recycling ordinance, and many said they are simply waiting until they are required by the city to start a program. Managers unanimously agreed, for various reasons, that a city ordinance would be necessary for them to adopt universal recycling programs in their buildings. One property manager summed up the general attitude when he said, “We are not required to, so why do it?”

TCEF Qualitative Study Respondent Excerpts

“We are not required to, so why do it?”

– Dallas apartment property manager

“If they tell us what they do with the [recyclables]... maybe they built a park with it, all the rubber pieces built a track or something... maybe the money went to a school or maybe they can show where this recycling is helping our community.”

– Anne, apartment resident

The study also confirms that education plays a pivotal role in increasing recycling participation and collection rates. Many participants in the study—even those who are already recycling regularly—indicated that they were unclear which items are recyclable, they did not know specific environmental or economic benefits of recycling, and they suggested that better education would lead to increased participation.

Residents also expressed frustration that the materials accepted in their multi-family recycling programs were not always consistent with curbside

recycling programs they had previously participated in, leading to further confusion about what is acceptable to put in their recycling bins. Because multi-family residents tend to move more often than homeowners, this problem will only be worsened if Dallas’ multi-family buildings are allowed to implement significantly different recycling programs that accept different types of materials.

One clear theme among property managers and tenants alike is interest in providing incentives to provide for and participate in recycling. Some managers were very focused on cost, and said they would be more inclined to offer a program if reduced trash fees or other incentives could make up for the added costs of recycling services.

Overall, our public opinion research suggests that in order for Dallas, and other DFW cities, to meet ambitious diversion goals in the coming years and decades, good recycling policies will need to be enacted to push multi-family buildings and other commercial properties to participate. Ideally, these policies and programs should:

- Include a concerted, multi-lingual, on-going education program for residents;
- Provide support for property owners and managers to achieve compliance;
- Collect the same materials as Dallas’ single-stream residential recycling program;
- Be as consistent as possible in various multi-family buildings to minimize confusion as residents relocate over time.

V. Recommendations

A. Beyond curbside recycling: Zero Waste programs

While almost all DFW cities have curbside recycling services for single-family homes, many lack adequate programs and policies to address other waste streams from commercial sectors. According to NCTCOG data and various assessments by Texas cities, commercial sources generate about twice the discards compared with single-family and small building residential sources. The largest area for improvement on diversion is the commercial sector, including multi-family residences and businesses.

As one important component of a long-term “Zero Waste” goal, several cities in Texas have adopted commercial recycling policies aimed at significantly increasing their diversion rates by launching programs that expand recycling and composting into multi-family buildings and businesses. DFW communities could learn from these policies and adopt the best programs to set and accomplish similar Zero Waste goals.

Municipalities in Texas have significant power in the arena of diversion, and so they have the ability to implement policies and programs that fit each region or locality. Ultimately, broad participation in changing the culture of wasting must involve education, good policy, and proper enforcement. There are several effective programs that cities have used to improve residential recycling rates, and those should certainly be implemented in more DFW communities. But it is essential that policy makers and advocates focus on addressing *all* discards with a holistic, long-term approach.

B. Potential policy measures

i. Establishing a Zero Waste goal

Adopting an ambitious, long-term waste diversion goal aimed at nearly eliminating the need for landfills and incinerators—90% diversion or higher—is often called “Zero Waste”. The *Zero Waste International Alliance* has developed the only peer-reviewed definition:

Zero Waste is a goal that is ethical, economical, efficient and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use.

Zero Waste means designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them.

Implementing Zero Waste will eliminate all discharges to land, water or air that are a threat to planetary, human, animal or plant health.

In practice, local and commercial Zero Waste standards vary. Dallas adopted a long-range solid waste management plan with an 85% diversion goal, Austin has established a 95% diversion goal, and San Antonio has a short-term goal to divert 60% of its waste by 2020 as part of its “path to Zero Waste.” While the numbers and the complexity of the issue can seem daunting, a simple Zero Waste policy statement for cities could be articulated as:

- Comprehensive and consistent recycling
- Comprehensive and consistent organics collection
- Policies which incentivize recycling and composting
- Full-scale public education efforts
- Producer responsibility and single-use product bans

The most typical path that cities have taken is to work with residents, businesses and stakeholders to develop a long-range materials management plan that includes a Zero Waste goal and outlines the specific programs and policies that will be implemented on a set timetable to accomplish the stated diversion goal. Any city in North Texas can take this first step, as Dallas has already done.

The following sections detail the various policies and programs that cities can implement to meet Zero Waste goals.

ii. Addressing commercial diversion

a. Franchise agreements

Cities that wish to offer comprehensive recycling for commercial businesses typically adopt either an open competitive policy or some type of franchise agreement.

Franchise agreements, or contracts between cities and haulers, exist in many cities in Texas. A simple franchise agreement could be a renegotiated contract with an existing hauler to include more recycling services. Many DFW cities, including Allen, Lewisville, Cedar Hill, Little Elm, and Euless, simply updated their contracts with existing haulers to include certain commercial buildings. While franchise agreements might disrupt private contracts that already use a different hauler, they offer many advantages. These agreements often include inexpensive service rates since the cities have more bargaining power than individual companies, royalties from the commodity price of recyclables, and reduced traffic and air pollution from collection trucks.

For larger cities, a contract with a single hauler may not be feasible, due to logistical limitations of available haulers. A zoned franchise agreement, which requires a city to be divided into zones that are contracted with different haulers, could work best for these scenarios. This approach distributes the burden of collection, which may be impossible for just one hauler, while maintaining the economic and environmental advantages of other franchise agreements. Los Angeles uses zoned franchise agreements, and New York City recently published a report recommending a similar policy.

Commercial franchise agreements and open competitive ordinances can cover some or all commercial businesses. In DFW, these are limited to multi-family complexes, while Austin covers all commercial buildings, including retail stores and office buildings.

b. Universal recycling for multi-family and businesses

Cities may choose to create an open market for commercial and multi-family recycling. For these cities, a Universal Recycling Ordinance could be an effective alternative to provide comprehensive recycling services to businesses.

Open competitive policies, often passed as an independent ordinance or amendment to a previous ordinance, require businesses to contract with private haulers to provide recycling services. This approach allows businesses the option to choose their preferred hauler and contract. In this way, businesses can renegotiate an existing trash hauling service to also include recycling. Open competitive policies have this advantage over franchise agreements, since they do not disrupt existing contracts.

Both Frisco and Fort Worth have open competitive ordinances that require commercial businesses to provide recycling to varying degrees. Fort Worth's ordinance applies to all multi-family complexes with more than four housing units. Frisco's ordinance applies to both multi-family complexes and businesses, but only applies to structures built after the passage of the ordinance in 2001.

c. Commercial organics collection

Commercial organics collection policies can be structured similarly to commercial recycling policies, either by franchise or open competition. Commercial businesses, like restaurants, grocery stores, and food manufacturers generate significant feedstocks for industrial composting facilities.

In DFW, there are no cities that currently require commercial businesses to participate in composting food scraps or yard trimmings. The City of Plano has a voluntary program for food scraps collection from commercial businesses. Plano manages a composting facility in Melissa, TX that mixes commercial food scraps with residential yard trimmings from other cities to produce soil amendment products that are resold.

The City of Austin passed a city-wide residential composting program in September 2016, following a successful three-year pilot program. After much deliberation, the city decided against a "subscription based" program, in which residents could opt for or against the third collection bin, and instead will offer the program to all residents by 2019.

Organics composting in DFW has ample room for growth, including large unused feedstocks and opportunities for new and expanded facilities. A composting facility in Fort Worth is authorized to collect food scraps, but currently only collects from large commercial clients. Another facility has been proposed in Mansfield, TX.

iii. Addressing construction & demolition materials

a. Deposit/refund system

Cities can use economic incentives to help divert construction and demolition materials. The City of Plano uses a deposit and refund system that encourages diversion of remodeling and C&D materials. The program requires companies that plan to do remodeling of buildings larger than 10,000 square feet, or demolition of buildings larger than 5,000 square feet, to pay a deposit ranging from \$1,000 to \$11,250. Up to 100% of this deposit is refunded by the city, based on percentage of diverted materials.

Economic incentive programs can help promote diversion of materials, but as they are voluntary by nature, these programs often lack participation compared with stricter requirements.

b. Recycling requirements

Cities can also require diversion of specific C&D materials. The City of Frisco required by ordinance that all construction and demolition projects recycle metal and concrete. The recent Dallas Cowboys practice facility, a public private partnership between the Dallas Cowboys, Frisco and the local school district, touted a diversion rate of 95% of construction materials. This achievement highlights the potential for Zero Waste construction projects in the DFW area.

iv. Addressing residential diversion

a. Curbside organics collection (San Antonio and Austin)

More than 40% of the total materials discarded in the U.S. are organic or compostable materials, comprising almost three-quarters of the materials left after recycling is removed.⁷³ A growing number of communities are offering curbside collection for composting as well as for recycling. Organics break down in landfills to produce methane and other greenhouse gases (GHGs), meaning that diverting organics from landfills is crucial for reducing the climate impacts of landfills. Compost can also be used to facilitate and improve local agriculture by reducing the distance between farm and table, thereby reducing the energy and carbon footprint in food production. While recycling is the most basic element of Zero Waste, organics collection has some of the largest potential for increased diversion as well as local processing and end-use.

One significant obstacle to organics collection is participation, and what is known as the “yuck” factor. Food scraps can begin to produce undesirable odors, draw insects and other vermin and can generally deter participation. A variety of solutions have been developed, however, from lining compost containers with paper bags, using smaller bins, redesigning bins keep out insects or putting compost in the freezer until collection day.

Unlike recycling, composting does not necessarily need to be collected at the curb. Residents can also compost on their own property and reduce the need to purchase fertilizers for yard and indoor plants alike. The City of Austin has developed a backyard composting program where residents can receive training in composting, request a smaller trash can and receive a rebate voucher for a 75% discount on a home composting system.

b. Diversion incentives

Even among cities that have comprehensive recycling and composting programs, the next challenge becomes encouraging participation—if residents don’t actually source-separate their discards, they will still end up at a landfill. One effective means of ensuring participation is to provide financial incentives to separate discards and reduce waste.

One such incentive is called pay-as-you-throw (PAYT). Residents are charged for the collection of municipal solid waste—ordinary household trash—based on the amount they put in their trash cart. This creates a direct economic incentive to recycle more and to generate less waste.”

While some communities may determine this through metering, where each load of trash set out at the curb is weighed, this is unnecessary and often unpopular. Pay-as-you-throw programs are usually accomplished by offering different sized trash roll carts—such as 24 gallon, 36 gallon, 64 gallon and 96 gallon—with a tiered pricing formula. Another solution is to require that trash be disposed in designated bags (sometimes marked with a city’s logo); these bags are offered at convenient locations, such as grocery stores. Some PAYT programs tout as much as a 44% average decrease in wasted materials.⁷⁴ EPA estimates that the PAYT policies in place as of 2006—which covered only 25% of the U.S. population—diverted about 6.5 million tons of recyclables which would have otherwise been thrown away, and reduced disposal by an average of 17%.⁷⁵

Fort Worth and Denton currently use a PAYT pricing system for residential waste and recycling. These cities have a relatively higher diversion rate compared with other North Texas cities.

c. Yard trimmings & bulk collection

Many DFW cities offer “bulk and brush” programs to single-family home residents. Typically, these programs require residents to separate landfill materials from compostable yard trimmings. Programs designed this way can increase diversion of organic matter considerably.

The City of San Antonio found their residential diversion rate increased by 10 percentage points following the separate collection of these materials. Fort Worth can attribute about 38% of its total residential diversion to yard trimming collection.⁷⁶ The City of Dallas currently combines the collection of bulk landfill materials and yard trimmings, therefore, diverting most of these materials is infeasible. City of Dallas Zero Waste and Sanitation staff are working on a proposal to separate the collection of these materials to aid in residential diversion.

v. Public places

Providing diversion programs in public places presents a unique challenge to cities for a number of reasons. Since these bins are accessible to anyone, including visitors who may not know or understand how to properly sort their materials, contamination of diversion streams can become an issue. Recycling and composting containers are often specially designed for public use with clear labels and sometimes variable slot sizes to prevent improper sorting.

The City of Frisco incentivizes the diversion of materials from large public events through a deposit and refund system. Event organizers in Frisco pay a vendor’s deposit before hosting, and up to 30% of this deposit is refundable if the vendor follows the city’s green guidelines for recycling.

vi. Single-use product bans

Some products and materials, such as single-use plastic bags and Styrofoam, pose hazards to recycling facility equipment, wildlife, and public health. Many Texas cities have placed restrictions on single-use plastic bags to better manage the recycling stream and protect the local environment. These local ordinances have considerably reduced the consumption and improper disposal of single-use bags.

vii. Producer responsibility

Other products and materials, such as electronics and prescription medication, also pose hazards to public health and wildlife if improperly disposed, but cannot be restricted from commerce. Instead, these products can be managed through “extended producer responsibility,” or producer takeback, programs.

Almost half the states in the U.S., including Texas, now have laws requiring electronics manufacturers to take back their products for recycling. A number of U.S. counties also require pharmaceutical collection by producers. When these programs are designed to be convenient for consumers (e.g. drug takeback in pharmacies, and electronics drop-offs in retail stores), they can be effective in diverting substantial shares of these materials.

viii. Education

Participation rates are highest when people understand the recycling, composting and the Zero Waste goals set by their community. Full-scale education means providing information for residents through multiple methods—from mass media campaigns reaching as wide an audience as possible, to targeted media tailored to specific populations, to grassroots community education with small groups and civic organizations to individual communication door-to-door. Some billboards or a few radio ads will likely not suffice.

Door-to-door efforts in particular can be very valuable at increasing participation and reducing contamination in recognized “hot spots” where diversion is not being done well or at all. City employees, community partners or volunteers can take time to explain to residents what works and what does not, express the importance of recycling and composting and make sure that residents understand the incentives in place.

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