

2021

Food Waste Recovery with a NTMWD Member City Partnership



City of Plano

Commercial Recycling Division

3/3/2021

Executive Summary

The North Texas Municipal Water District's (NTMWD) solid waste system, made of up the cities of Allen, Frisco, McKinney, Plano, and Richardson, generated approximately 650,000 tons of landfill waste in fiscal year 2019-20. To preserve limited landfill resources, these cities will need to address the growing issue of food waste. With residential and commercial recycling tonnages stabilizing, capturing food waste from the waste stream is the next feasible program to meet ever increasing diversion goals.

In November, 2017, the EPA announced a national goal of 50% recycling by 2030. This goal focuses on three measures:

1. Reduce contamination in recycling – this effort will include a broad approach, but largely focused on public education, minimizing confusion about recyclable material and appropriately measuring the recycled material leaving processing facilities.
2. Make our recycling processing system more efficient – this measure directly outlines the need to invest in infrastructure and equipment in order to capture more material from the current stream.
3. Strengthen the economic markets for recycled materials – this measure supports the use of recycled content in consumer products and will help stabilize commodity prices by continuing to drive consumer demand for recycled products.

This EPA goal has set in motion several actions by municipal governments and private organizations throughout the United States. In Texas, the NTCOG will use this goal and its measures in its upcoming grant opportunities. However, the update to Chapter 328.200, Subchapter K of the Texas Administrative Code in July of 2021, pre-dates the EPA's national goal. This change to Subchapter K requires government entities to have an onsite recycling program, and it establishes a preference for purchasing recycled materials.

These new legislative and regulatory developments on their own will not directly affect food waste recovery efforts, but it does speak to the changing direction of government involvement with municipal solid waste, and how recycling is supported in Texas. These actions are important, and they are more easily attainable with existing partnerships and established relationships.

Texas Pure Products is proof that partnerships work. The compost program diverts approximately 50,000 tons of yard trimmings from the landfill annually. Because of this existing program, food waste captured from the waste stream has an endpoint that is both beneficial to compost production, but also diversion totals for each city. Compost quality has improved from the beginning years, but has limitations. Texas Pure Products currently lacks the ability to process any food waste with even a small percentage of contamination. A food depackaging program would address this limitation and add substantial tonnage to production of compost for resell.

The City of Plano's Commercial Recycling Division has conducted extensive analysis and has determined a food depackaging system would resolve the issues with its former food waste initiatives. Visits to multiple states to observe depackaging equipment have educated our

Public Works Director, Compost Manager, Environmental Waste Services Manager and City leadership. Plano has conducted numerous audits on commercial customers, who have communicated support for a depackaging alternative.

The City of Plano prefers a depackaging operation partnership that would benefit all NTMWD cities. Because of the belief in the benefits of this program, Plano is prepared to pursue this project individually. Conservative estimates reveal some member city percentages associated with disposal costs will increase by at least 10% should Plano proceed with this initiative alone. Plano believes that through collaboration and participation by the NTMWD and all member cities, landfill life can be significantly extended and help stabilize disposal costs in the future.

The NTMWD landfill is serving over a million customers. Population forecasts predict 250,000 more people between the largest member cities alone in the next twenty years. The dense development of North Texas, and its strong retail and corporate presence provide the infrastructure which can support a large-scale food waste depackaging operation. This is the single biggest opportunity to extend landfill capacity and create a diversion opportunity that benefits all stakeholders environmentally and financially.

Program History

The City of Plano operated a cart-based food waste collection program for 21 years. With the assistance of a NTCOG Grant in 1999, Plano purchased an automated truck to collect food waste from commercial establishments utilizing 95-gallon carts. It became clear early in the program which type of generators could easily comply with the strict contamination requirements of the program. Although restaurants have plenty of food waste, few were able to maintain a satisfactory contamination level. Several corporations joined the program, and many chose to roll the carts closer to their kitchens, and then move them to their dock for collection. By 2005, about 45 PISD campuses were on the program. Grocery stores, with their abundant supply of perishables, found value in the program with significant savings on their trash bills.

Unfortunately, as the quality of Texas Pure Products continued to improve, the quality of the incoming food waste contributions continued to decline. In 2007, Commercial Recycling removed about 70 stops from the route due to contamination. This reduced the number of food waste stops from 120 to 50. However, this only resulted in a 10% decline in collected tons. This helped curb the contamination problem, but it exposed a significant flaw in the program: without the ability to process contamination and accept packaging, the program would always be limited.

In February 2020, Plano ceased its food waste program. Not enough customers who can contribute 100% clean food waste are available. The costs to run a truck for just over 40 customers far outweighed any environmental benefit of the program.

Although the program ultimately failed, it heightened the awareness of food waste recovery and the benefits of diverting that material from the landfill to hundreds of commercial

customers. Numerous commercial customers have expressed a desire to have the program return, but they understand the issue of contamination and packaging must first be addressed.

Texas Pure Products benefited greatly from the collected food waste and the rich nutrients it introduced into its products. Texas Pure does receive some food waste from private haulers, but to meet the demand for its premium compost line: more food waste is needed.

The Food Waste Business

Estimates from the USDA and EPA reveal that between 30% to 40% of all food produced ends up in a landfill. Per a 2010 baseline set the by the USDA, household food waste is estimated to be 218 pounds per person per year. A 2018 USDA study published by Forbes, updated this number to a pound a day per person. However, these figures don't include commercial generated food waste from restaurants, schools, corporations, grocery stores and other food waste generators. The commercial sector is full of concentrated streams of food waste. A depackaging operation would allow the NTMWD and its member cities to focus on the largest concentrations of food waste, not on servicing single family homes.

The North Texas Food Bank (NTFB) in Plano is the largest receiver in the North Texas area of food waste donations from grocery stores. This is a mutually beneficial relationship; grocery stores can write off the donation and the NTFB has the resources it needs to address food insecurity. Unfortunately, much of the food received has a short shelf life. In fact, the NTFB at times must landfill up to 50% of the incoming food. It takes time to process the donations and depending on inventory composition; some of the food simply can't be processed in time. The NTFB delivers a compactor of trash to the transfer station almost every day. 90%, (and sometimes 100%) of the contents of those compactor loads is food waste. At times, these loads are taken directly to the landfill due to high liquid content.

Other commercial generators of food waste may not have the volume of food waste as the NTFB, but their waste streams aren't much different. If a depackaging operation were immediately available, Plano conservatively estimates that a minimum of 10,000 annual tons of food waste from over 50 grocery stores would be diverted. As all of Plano's grocery store waste is taken to a NTMWD transfer station that represents well over \$400,000 of disposal costs. As this business plan will illustrate, even with the most conservative volume estimates, the costs associated with implementing a depackaging operation for Plano are not a barrier to move forward.

Source reduction has been the preferred way to reduce landfill tons of food waste. However, and as illustrated by the NTFB problem, all food eventually rots. While there is a justification for food insecurity programs, those programs and efforts have made minimal impacts on food waste to landfill numbers. There is a growing effort to bring as much edible food to market as possible, despite its appearance. Central Market stocks an ugly food section, where patrons can save money on food that isn't pretty but can be eaten just the same. Food Maven is also capitalizing on this movement by partnering with farmers whose crops always yield a percentage of ugly food. Food Maven is a large-scale receiver and distributor of ugly food with

an online marketplace. Their model serves hundreds of restaurants by selling ugly, yet edible food cheaper than traditional distributors. Food Maven opened a distribution center in Dallas in 2020. These are just a few examples of how edible food waste has been monetized, but these solutions don't address food waste disposal.

The goal of a depackaging operation, is to connect all organizations who generate food waste, or are in some capacity involved in food waste initiatives. There are individual partnerships and programs to address food waste in North Texas, but none provide access to all generators of food waste and address food insecurity and food waste diversion.

The partnership between Texas Pure Products and NTMWD cities provides a solid foundation on which to build an innovative food waste program. The NTMWD has significant control on operating costs and program access for all member cities. Member cities have significant control of waste within their cities since all utilize one operator to transport large volumes of commercial waste. Each vary in their enforcement methods of the landfill agreement with the NTMWD, but the majority of the commercial tons end up at the Melissa landfill. This arrangement creates the ideal marketing mix for a diversion program where route density is critical, and operating and processing costs are not solely controlled by for profit enterprises.

The cost businesses pay for disposal provides leverage to pay for the cost of operating a depackaging program. Customers paying per ton disposal at a transfer station, would pay a slightly lower tipping fee for loads diverted to Texas Pure. Most corporations prefer to divert as much material from the landfill as possible. However, the lack of equipment to address inevitably contaminated loads prevents most from participating. This is the same issue for every food waste generator, and for grocery stores and the North Texas Food Bank, it means packaged food is considered contamination.

Plano has estimated that it would divert 65,000 tons of commercial food waste within a few years of program implementation. Estimates for all member cities participating are 175,000 tons of yearly food waste. Since all of Plano commercial customers waste utilizes a transfer station, 65,000 tons represents 2.5 million dollars of disposal costs, add another \$300,000 if you are calculating the actual cost to businesses paying the franchise rate of \$43.35. If all member cities participated and 80% utilize the transfer stations, 140,000 tons in disposal is 5.3 million in disposal costs. Another 20% of 175,000 tons directly to landfill at \$28 per ton is almost another 1 million in disposal costs. 6 million in disposal costs is well beyond any concerns of initial investment costs and long-term operating costs. As mentioned before, that's only accounting for NTMWD disposal costs, not the actual cost to businesses which is notably higher.

The opportunity to diversify operations by reallocating funds to process waste differently, rather than lose revenue altogether is the issue at hand. In North Texas, there is no other waste stream that provides a business case as strong as the steady stream of food waste entering the landfill.

Market Demand and Competition

The density of the NTMWD cities provides a robust market of food waste, and the only reason there hasn't been more competition for food waste are the barriers to entry it presents to *for profit* companies. Very few states have regulation that require food waste diversion from large generators, but the few that do have them aren't turning back. In addition, in states where regulation for food waste exists, each of them rely on food waste depackaging processors to address the incoming loads. Regulation isn't something that is necessary in North Texas, but it has provided a proving ground for research into food waste in general.

Estimates for food waste in the US are consistently between 60 and 80 million tons each year. This gives us an easy way to compare our volume forecasts for a NTMWD depackaging program. In the previous section, a yearly number of 175,000 tons of food waste was used to forecast yearly volume from all member cities. Using the lower number of 60 million annual US food waste tons, we can easily calculate that to be about 180,000 tons per million people. Given the member cities population and future population growth, there is high confidence the tonnage estimate of 175,000 tons is accurate. This type of volume can only come from a population density that can support a depackaging operation.

Looking at 5 states that have food waste bans, the DFW population alone exceeds the total state population of all but 1 of those states, California. Massachusetts' food waste regulation has spawned numerous depackaging operations throughout the state. In 2018, a member of Plano's Commercial Recycling Team visited with two organizations in Massachusetts with a depackaging operation. The first was E.L. Harvey in Westborough, Massachusetts, which serves customers in the Boston metropolitan area. E.L. Harvey has been in the waste business since 1911. Ben Harvey, President of E.L. Harvey, provided a demonstration of the Scott T42, a depackaging machine with over 350 installations worldwide, over 200 of those in the US. Ben's only regret was that E.L. Harvey did not design the site for multiple machines. E.L. Harvey couldn't keep up with the incoming volume and were forced to send some material to other processors. One of those processors is Troiano Trucking, about 20 minutes away from E.L. Harvey. A visit with Troiano Trucking led to another demonstration of another Scott T42, and the comments were the same: more depackagers were planned due to the volume of incoming material.

Two other sites with the Scott T42 were visited, and there are no food waste bans in these states. In 2018, five members of Plano's Public Works Department visited American Composting in Little Rock, Arkansas. American Composting is very similar to Texas Pure Products, in terms of producing a superior soil amendment suitable for organic gardening. The owner of American Composting demonstrated his feedstock and allowed the Plano group to observe material being fed into the depackaging machine. The group was allowed to see the cleanliness of the compost piles where material from the depackager was being introduced. The compost material was clean and no odor or vector issues from the outdoor windrows were observed. The other site visited was just Outside of Atlanta, and this location was also using a Scott T42, but only processing expired milk and other expired juice to capture PET containers. While this visit wasn't processing the stream Plano intends to pursue, it is another example of the value of depackaging when the right markets connect.

The Atlanta visit was the only visit set up by Scott equipment, the others were coordinated independently and without knowledge from the Scott Equipment company. This was to get an unbiased assessment of equipment operation and capability and allow for any negative feedback. Some owners/operators did voice regret on their own system design, but none regretted their decision to depackage food, and all were utilized to capacity.

While there are very different market forces driving the success at the depackaging locations visited, none have as strong of a business case as the NTMWD member cities. The competition is trash, and with a depackaging option, food waste can be managed at a lesser price than trash. With the nature of landfill and solid waste contracts within the NTMWD, it will be very difficult for any private company to compete if the member cities and the NTMWD act first.

Resources

Plano is home to over 210,000 jobs, and when combined with other NTMWD cities, the employment opportunities within the district rival any region in the US. This provides the right ingredients for successful waste initiatives, and the number of fortune 500 companies with headquarters located at one of the 5 member cities continues to grow. With Plano's recent Legacy Development, Plano surpassed Ft. Worth in available office space square footage. This is a trend in several other NTMWD cities, and this is reflected in annual population forecasts.

The dense number of corporations has provided Plano with opportunities for strong collaboration on several waste diversion programs. For a depackaging operation to be designed, built and operated efficiently, it is imperative that input from valuable corporate partners be considered. The metrics used to gather, and report information is more sophisticated, and more technology is needed create uniform access to data. Several corporations in Plano have expressed interest in providing assistance and expertise that will help the NTMWD design a system that is dynamic and easily adjusts to the needs of its operators.

Risk

The risk of doing nothing could result in no changes. There is much to gain from pursuing a depackaging operation, and the financial impact will help preserve valuable landfill space.

It is possible that with time a private entity will construct its own facility to depackage food. This would help individual organizations more that it helps the NTMWD and its member cities. This would result in participation by large corporations within the NTMWD and likely food processors and distributors from other parts of North Texas. This could affect the overall tons to the system, and the risk to which city or to the district is not certain. With NTMWD and member cities out of the depackager program, the cost per ton for waste would significantly increase over time to support the fixed costs of the system.

Strategy

Plano is prepared to assist the NTMWD with any information needed to gain support for a depackaging program from other member cities. This includes statistical data, volume projections and estimations by industry. Plano's strategy is to roll out a depackaging program to the largest customers first. Industrial, then frontload and lastly cart based customers.

Collaboration

Plano has involved the business community throughout the process of terminating the cart-based food waste program formerly operated. Many businesses voiced displeasure over losing the program but understood the collection and operational challenges of a program that couldn't address contamination. In October of 2019, Plano hosted its first ever Food Waste Symposium, titled, *"Feed the Need, Plant the Seed"*. The support for the event was overwhelming with over 60 people from over 28 different Plano businesses in attendance. This invitation only event was held to communicate the need for a depackaging operation. Speakers represented a cross section from different aspects of food recovery. Corporate sustainability, restaurants grocery stores, the North Texas Food Bank, the EPA and the City of Plano covering the benefit and impact a depackager would have on all facets of food recovery. The Business community in Plano is prepared to assist with sponsorships, some monetary and some in the form of physical assistance to help the project get started.

Industrial Customers

Plano will assist other member cities by including them in communications with national/regional decision makers for the largest sources of food waste. This will help recruit the largest number of high-volume customers in the shortest amount of time. Many of the same stores have locations throughout member cities, and Plano has established relationships and contacts at most of these chains. Plano can generate 10,000 tons from grocery stores alone in year one, and likely up to 30,000 tons if all 5 member cities grocery stores participate. Numerous corporations and other large generators, such as the North Texas Food Bank would also choose this collection method as they have adequate dock space.

Front Load Customers

Plano is consistently in the top three of all cities in the nation in the nation in restaurant density, and many of these customers would need front load service. In early 2019, a restaurant food waste route was developed to evaluate the weight of trash at restaurants strictly along Plano's I-75 corridor. Out of 70 restaurants along I-75, 40 were selected to be part of the audit. Fast food restaurants were not part of the study, and their volume is not included as part of Plano's weight diversion estimates. Republic Services installed scales on the collection truck to help with the audit. Commercial Recycling coordinators met a Republic Services driver at 4:00AM, and recorded the weight of each container, and to record the fullness and contents of each container. The average weight per cubic yard of commercial trash that Republic uses to set front load rates about 78 pounds per yard. The average weight for the restaurant audit was close to 300 pounds per cubic yard. Some containers weighed more than 500 pounds per cubic yard. This would require food waste customers to utilize no more than a

4-yard container for service, since a front load truck could not lift 8 yard containers full of food waste. This audit was of customers trash containers, not source separated food waste as the weights might suggest. Several of these front load containers would have been acceptable for recycling as they were, if transported to a depackaging operation.

In Plano, adding additional containers for food waste presents a challenge. Containers would need to be screened from view, and many food waste customers who would utilize a front load container don't have screening. The City of Plano is working in a solution to help bring construction costs down for those businesses whose volume would justify the expense of enclosure construction.

The University of Texas at Dallas has an engineering program called EPICS, or Engineering Projects In Community Service. This program is comprised of engineering students who select projects that benefit the community. Once a depackaging system is in place, restaurant participation will be critical to maximize diversion. EPICS students are actively working on a design that is modular, prefabricated and costs substantially less than the current construction methods and materials used for enclosures. This is an ongoing project, and a final design is expected within the next year. However, Plano did update its Planning and Zoning ordinance two years ago which requires all new developments to construct double enclosures. As redevelopment happens, Plano will slowly resolve the enclosure issue, which presents capacity and recycling challenges for some businesses.

Early concept enclosure and construction plans submitted by EPICS students have shown costs lowered by as much as 67% when comparing their initial enclosure plans to current construction standards.

Cart Collection

Due to the nature of development, and to capture the maximum amount of available food waste: a cart program must return to the program. A depackaging program resolves several issues our former cart program presented:

1. Our carts were not secure – there are carts on the market that are lockable.
2. Our carts were not sanitary – there are carts available made specifically for food waste.
3. Our carts were often smelly – since there was no way to address contamination, business could only use compostable bags which are expensive, so few used them. With a depackaging machine, business would be required to use plastic bags and tie them off to reduce leakage and smell. These could be regular plastic bags that every business already uses.

Although there are subtle differences in infrastructure and development between member cities, all member cities have a significant amount of businesses who would not be able to participate without a cart program. Many restaurants are situated in a strip center where a front load enclosure is not a viable option. There are well over 1,000 organizations with a full-service kitchen in Plano, and many of those share waste access with others. Carts also provide an option for other businesses who have a screened dock area but prefer to use carts for efficiency. Many corporations preferred to keep our former carts near their kitchens and then

transport them to a staging area at their dock. By including carts as part of a food waste diversion strategy, the program is diversified in scope, allowing any customer with reasonable amounts of food waste to participate.

Texas Pure Products

All food waste received by Texas Pure Products is mixed with woody material to speed the production of high quality soil amendments for resell. Introducing food waste increases the microbial activity needed to break down these piles/windrows and brings them to maturity faster. Introducing more food waste directly results in more available product for sale, and instead of 6 months, compost could be ready for market in as little as 3 months.

The availability of more of this product will make it easier to create a partnership between generators of food waste and the landscape companies they employ to maintain their grounds. Numerous Plano corporations have voiced a desire to partner with Texas Pure on a full circle food waste and composting solution, returning nutrients to the properties from which some of the feedstock was generated.

Food Recovery

A food waste depackaging program provides an attractive outlet for all organizations involved with food insecurity and/or food recovery programs. The North Texas Food Bank and all food pantries it partners with would participate. Additionally, numerous community gardeners and 48 farms are customers of Texas Pure Products. Food Maven and other large organizations who are already partnering with farmers, and The North Texas Food Bank would have a preferred disposal option for food not suitable for consumption.

Food waste depackaging would create the strongest collaboration for cities, communities and businesses to achieve a common goal: feed people first and limit the amount of food ultimately landfilled.

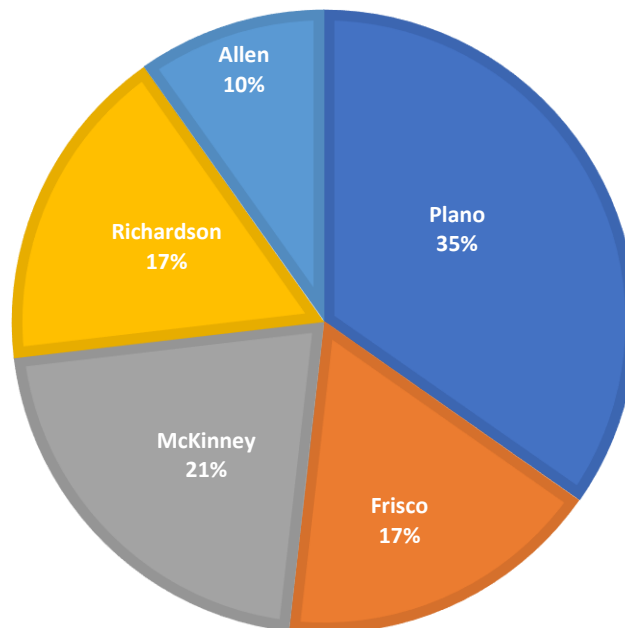
Sustainability

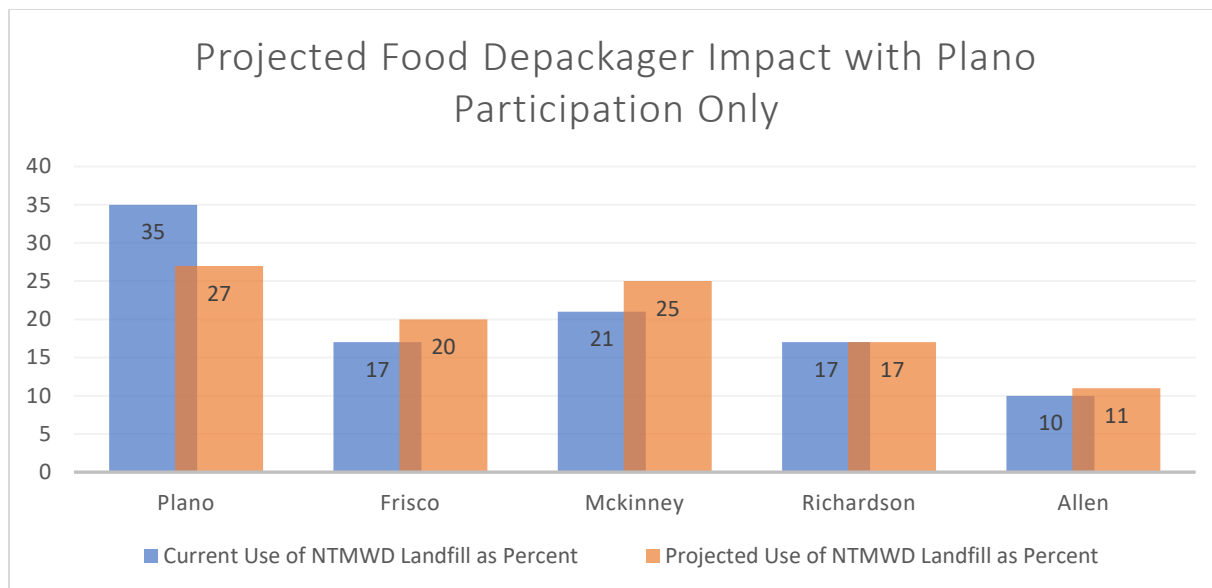
Creating a food waste program which offers an innovative food waste program supports the goals of many North Texas organizations. The supply of food waste is abundant, and there has not been a technological or science-based advancement that has demonstrated a financially viable alternative to how food is currently produced, distributed and consumed. This means the future of any depackaging operation is financially sustainable, as much as it is environmentally sustainable. Food waste depackaging is a simple operation, unlike most all other recycling programs targeted to the masses. This provides a simple and manageable stream of only two products; one introduced in compost and the remainder to landfill. No other diversion program in North Texas has the logistical and processing advantages that are available to the NTMWD and its member cities in the foreseeable future.

Financials and Forecasts

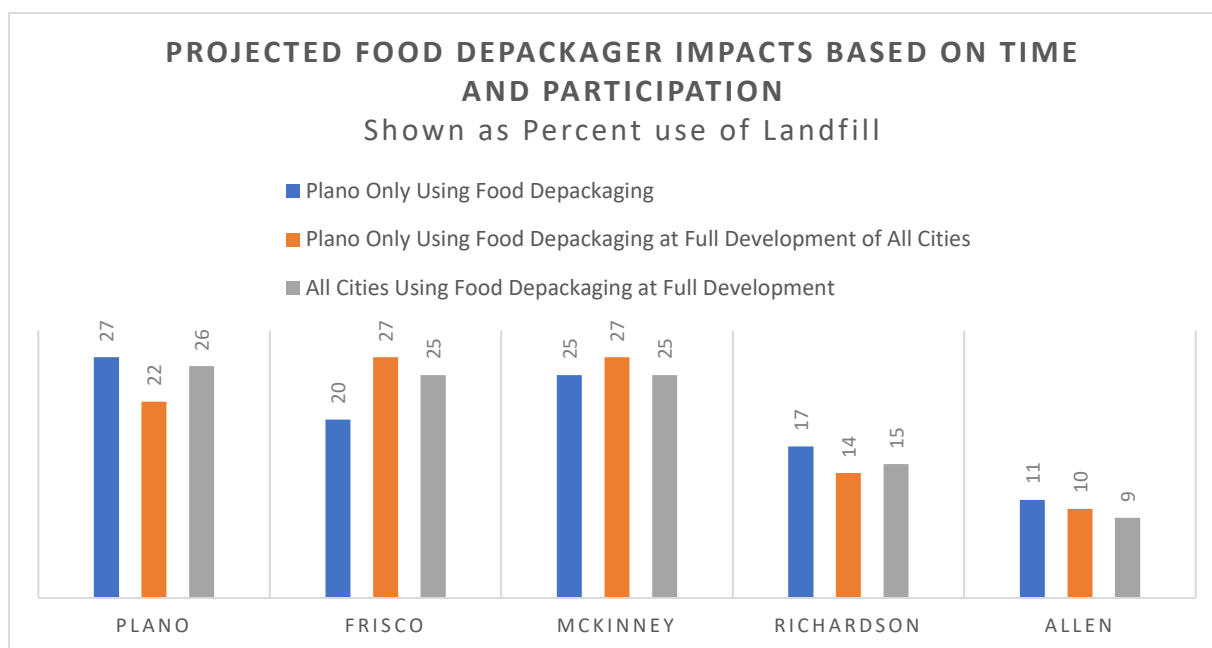
The growing population of the NTMWD will result in more volume to the Melissa Landfill. Raising tipping fees as the NTMWD district has done help curb the use of this landfill by private haulers or material coming from outside NTMWD cities. However, it would benefit the district and its member cities if landfill operations diversified. Instead of efforts to restrict incoming loads due to landfill capacity, the NTMWD would have the flexibility to choose its income stream. Instead of an income stream primarily generated from landfill tons, a separate stream of income can be generated from depackaging food waste. As the City of Plano has observed in other States, it isn't a matter of finding enough food waste, the bigger problem will be to control the incoming volume. This would give the District the discretion to supplement incoming food waste volumes from member cities by accepting additional volumes by private processors outside the district and charge a premium rate for those tons.

**PERCENT LANDFILL USE
OF NTMWD MEMBER CITIES**
(2018-19 DATA)





Plano is determined to reduce its percentage of yearly landfill costs. Plano can significantly lower its percentage by diverting large amounts of food waste, and a depackager would allow more business opportunities for Texas Pure Products. However, several other member cities would see their percentage increase.



The initial impact wouldn't be as significant for all cities. Plano would benefit immediately by reducing its current percentage of 35% significantly. The real disparity will happen once some of the member cities get closer to build out. They would be left out of the food waste depackaging program, and Frisco's percentage would increase by at least 10%, McKinney goes up by 6% and the remaining cities stay relatively flat. For Plano, there is more to gain by going alone than going in altogether. Still, it is better for the entire system, and for the region if everyone is included in the opportunity. The estimates and financial impacts provided have

been conservatively calculated, any error would likely be in *underestimating* the increase to any member city.

Appendices



This is one of several loads from the North Texas Food Bank which, due to liquid content, must go directly to landfill.



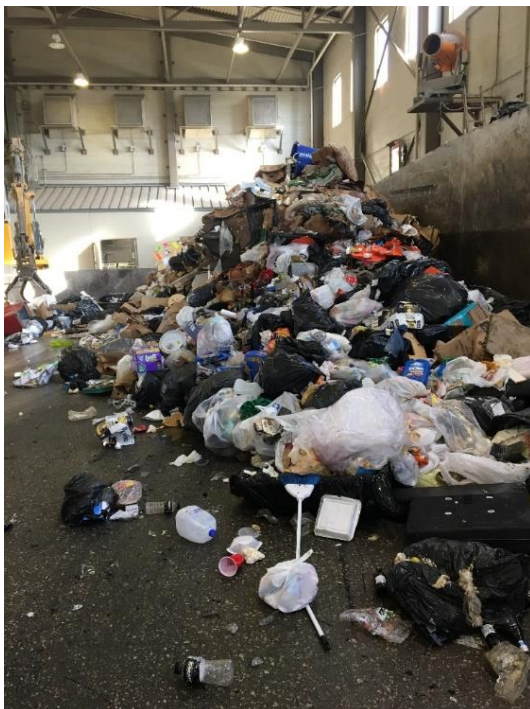
This grocery store produce looks great but was rejected due to packaging. Texas Pure does not have the capability of addressing plastics and other contamination once introduced into its compost piles.



This is typical for restaurants. Corporate cafeterias suffer from the same problem: inevitable contamination due to staff misuse, or where customers are directly involved with separation.



Picture from Plano's 2019 dedicated restaurant **trash** audit. The results speak for themselves, tons of food waste in this load.



This is what a typical commercial load looks like. This picture is simply to illustrate the obvious difference in appearance of a mixed commercial waste route.



A depackaging machine can easily maintain a 15tph processing capability and has the flexibility to run wet or dry product. The system is dynamic, and can be customized to divert liquid to AD or other.