

Northeast Nebraska Hub & Spoke Recycling Project

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NORTHEAST NEBRASKA HUB & SPOKE RECYCLING PROJECT

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The Nebraska Recycling Council is a statewide, member-based non-profit supporting collaboration between communities, businesses, solid waste and recycling industries to improve recycling collection and infrastructure. Our mission is to maximize the economic and environmental benefits of resource recovery in Nebraska.



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EXECUTIVE SUMMARY

The success of recycling systems relies on an efficient model of collection, processing, and marketing of materials. Many factors influence efficiency from both a capital and operational perspective including access and distance to end markets or processors, collecting marketable volumes of materials, and ensuring material quality for optimal revenue. In many parts of rural Nebraska, it is often more expensive to recycle materials than it is to landfill; relatively low tip fees at the landfill can also be a factor.

The purpose of the Northeast Nebraska Hub and Spoke Project was to address some of the key barriers to recycling, especially in rural areas of the state where access is limited. As noted in the Nebraska Recycling Study (March 2015), recycling availability is often related to population density. Recycling in Nebraska villages (population 100-800) is only 55% as compared to 92% to 100% in larger communities. This unlevel playing field generates real and perceived premiums to the cost of recycling programs in rural communities. Despite these obstacles, most people agree that recycling has many benefits, and that it is worth the time and investment to overcome these economic barriers to the degree that it will allow a sensible and viable recycling infrastructure in rural Nebraska.

The project's objectives included the following:

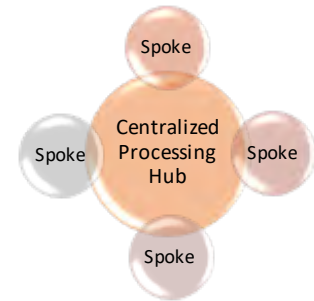
- Map and assess recycling operations, infrastructure, landfills, transportation routes, and markets in the 16-county service area.
- Identify potential partnerships, opportunities, gaps, and barriers for recycling.
- Assess the potential for development of hub and spoke systems.
- Develop funding and logistics recommendations for expanded or new programs.
- Support economical and efficient materials handling to collect more recyclables and move them more efficiently to markets.

The following report considers the options, strategies, and economics of developing a hub and spoke model for recycling with a hub based in Norfolk, and provides recommendations for maximizing potential, for outreach and education to build community support, and for expanding opportunities. Additionally, it can serve as a resource to guide communities throughout Nebraska in making decisions about developing or expanding their recycling programs.

HUB AND SPOKE RECYCLING: AN OVERVIEW

Successful recycling programs depend on efficient collection and processing of materials. Often, especially in rural areas, success is achieved by sharing resources. Hub and spoke recycling as a concept was developed to provide the most efficient means of gathering and processing recyclables from both a capital and operational perspective.

The hub and spoke model works by creating regional recycling processing centers that serve as the “hub” (or processor) and encourages smaller communities, or “spokes”, to deliver their collected material to these hubs. The hubs invest in equipment and infrastructure needed to create and store the high density bales that re-manufacturing markets require, while spokes invest in collection trailers or containers and transportation to the hub. This collaborative approach particularly suits rural communities in which access to recycling is a challenge.



The model provides the most efficient means of gathering and processing recyclables from both a capital and operational cost perspective and provides specific solutions to recycling barriers. Hub and spoke recycling systems allow rural towns to pool their recyclables to reduce the need to store material or sell partial loads to markets. Historic dependence on disposal, along with dispersed populations often results in little or no access to recycling. Access to recycling is defined as the ability to recycle an item within thirty miles of your home. It can range from weekly curbside collection of recyclables to having a single drop-off container with different compartments for source-separated collection. Oftentimes in rural areas, the latter is the best, initial solution. Hub and spoke recycling requires less start up operational costs than conventional recycling programs as costs are shared between communities.

Regional recycling partnerships may not be the best option in areas that are already well-served or over-served. For example, if a public recycling operation is collecting and baling material, and the smaller town 20 miles away is also collecting and baling material and a private enterprise offers recycling hauling services in the next town over, then that area may be saturated. It is not the goal of hub and spoke recycling to create programs that are competing for a limited volume of material, but to create programs that work together to capture the region's recyclables.

The advantages for hub and spoke regional recycling include: job creation, landfill tip fee savings, material sales revenue at hubs, cost avoidance for spokes, transportation efficiencies, and pleased residents as recycling is often seen as a quality-of-life issue.

Hub and spoke partnership can stretch public funds for greater benefit. On a statewide level, funding can be strategically directed to foster regional partnerships as opposed to creating competition for limited materials. Local grants that fund recycling programs such as the Waste Reduction and Recycling Grant from the Nebraska Department of Environmental Quality (NDEQ), Recycling Equipment Grants dispersed by the Nebraska Recycling Council, and grants from the Nebraska Environmental Trust could give priority to projects that include collaboration with other communities or regional partnerships.

RECYCLING PROGRAMS IN NORTHEAST NEBRASKA

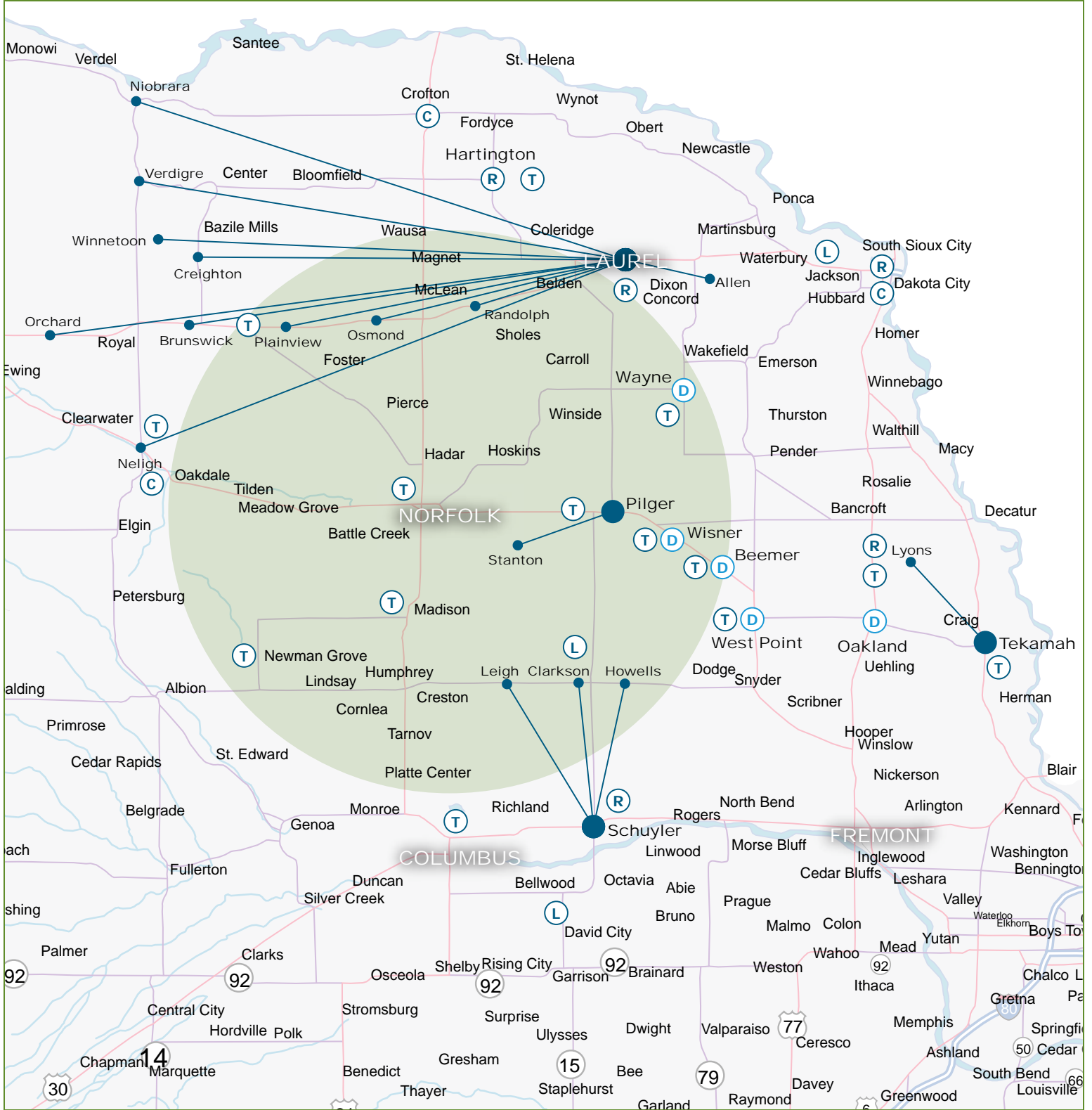
Several counties and communities have access to recycling because of regional recycling centers in Laurel, Schuyler, and Hartington. These facilities accept recyclable materials from residents in surrounding areas and from communities with drop-off recycling trailers. Laurel Regional Recycling Center has employed the hub and spoke model to increase hauling efficiencies, consolidate marketable quantities of material, and to collect high-quality, source-separated materials from spoke and “mini-hub” areas. Processing requires less labor at this facility as materials are fed to the hub source-separated, and are marketed directly to end markets and through brokers.

Drop-off programs in several other communities are co-located with transfer stations at Wisner, Wayne, Pilger, Beemer, West Point, Oakland, and Tekamah. A recycling center in Lyons collects only recyclable materials and co-ops with Tekamah’s program to consolidate materials for better market pricing.


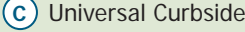
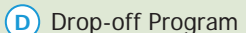
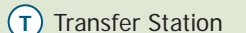
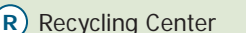
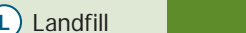
Universal curbside recycling has been implemented in areas where the recycling and solid waste is either operated by the city or contracted to a single hauler for collection. The structure of providing community-wide collection allows for economy of scale and transportation efficiencies to collect and haul curbside material to materials recovery facilities (MRFs) for processing. The one exception to this is Neligh, which provides universal curbside recycling with a pay-as-you-throw program for trash service, and delivers collected materials to their recycling center. Material is further separated and collected by the Laurel Regional Recycling Center.

On the next page is a map with an overview of recycling activities in the area. The green circle represents a 30-mile radius around recycling centers and a proposed hub in Norfolk. Throughout the area, and not indicated on the map, are material-specific collection containers for cardboard and aluminum. Aluminum recycling programs are often collected by community organizations such as the Boy Scouts to generate revenue. Cardboard collection containers are provided and serviced by Greenfiber, and the fiber used in their manufacturing process for cellulose insulation. One private hauler, Bud’s Sanitation, provides fiber collection at curbside and drop-off sites in communities they service, and market the material directly to Greenfiber.

Northeast Nebraska Recycling Programs



MAP KEY

-  Connection from a hub to a spoke
-  Universal Curbside
-  Drop-off Program
-  Transfer Station
-  Recycling Center
-  Landfill

Green circle represents a 30-mile radius

DEVELOPING A REGIONAL RECYCLING STRATEGY: MARKETS COLLECTION, & PROCESSING

Recycling is a process involving a series of steps from the point of generation and collection of materials, to processing and transporting materials as commodities to be manufactured into new products. Successful programs require a sufficient accumulation of material to achieve an economy of scale that allows for efficiencies in each step along the way.

The following steps are a general framework for developing a regional, hub and spoke recycling program and include three, core components: markets, collection, and processing.

UNDERSTANDING YOUR MARKETS

Market selection should be the first concern of any new or expanded recycling effort, as well as the marketability of materials or access to a nearby community with recycling processing capacity. The market selected and their processing demands will then dictate the collection method.

Assessing market options will help to determine what materials can be collected economically and how they will be processed. Local markets for recycled materials include materials recovery facilities (MRFs) such as Firststar Recycling in Omaha and Millennium Recycling in Sioux Falls, SD, end markets such as Greenfiber in Norfolk, and brokers who can be intermediaries between recycling programs and mills. Recycling programs typically utilize a combination of market types. For example, a program may send paper directly to a mill, plastics to a MRF, and sell metals through a broker. Each market has its advantages and disadvantages and will be selected based primarily on the processing capabilities, quality, and quantity of recyclables that a recycling program can produce.

End Markets or Mills

End markets for recyclables, such as paper mills and plastics processors, use materials as feedstock for their manufacturing process. As such, they can provide the highest price paid per ton and often cover freight. However, they also will have the strictest requirements on quality and quantity. Mills generally require a minimum delivery of a truckload, or 40,000 pounds, and prefer a reliable quantity on a regular, consistent basis. Material also will need to be baled and stored. Finished bales are required to be “clean” and meet the specifications for the mill. The “specs” set by a mill are generally stricter on the allowable level of contaminants are allowable. Recycling programs that collect source-separated materials can achieve cleaner loads with minimal sorting, but marketing directly to a mill will require labor, equipment, and storage.

Brokers

Brokers can access end markets or mills and are used by recycling programs that do not have the connections or ability to market materials themselves. They can be useful in negotiating freight and price, can accommodate some off-spec materials, and can allow for infrequent truckloads of a material. Brokers generally charge a percentage of the tonnage value for their services, so preparing clean bales of materials will still be necessary to maximize revenue.

Processors

Sending material to a MRF for processing provides the lowest value per ton, but avoids the capital and operational costs of handling, sorting, and baling materials. Source-separated materials are stored loose until a full truckload can be delivered to the MRF. Likewise, dual stream materials can be marketed without processing them first. The exception may be for cardboard and other fibers, which could be marketed directly to a mill. A MRF will provide more value for dual-stream materials since they are separated and cleaner than single stream, but hauling may not be as efficient if materials are hauled loose, reducing the volume that can be loaded onto a truck. In addition, it is not typical for a MRF to cover freight costs.

A MRF also can be used similar to a broker, and provide higher value for sorted, clean, and baled materials. This would require equipment, labor, and higher operational costs; however, it may provide more financial advantages in the long-term. Unlike end markets, a MRF will accept a load of mixed materials, sorted, and baled by material type. Processing and marketing loads to a MRF can provide moderate value on recyclable commodities.

Table 1: Markets at a Glance			
Market	Quantity	Quality	Value/ton
Mill/End Market	<ul style="list-style-type: none"> • Prefer consistent, large loads of a specific material 	<ul style="list-style-type: none"> • Strictest requirements on contaminants • Typically requires material to be baled 	<ul style="list-style-type: none"> • Best \$/ton • May cover or provide Freight
Processor/ MRF	<ul style="list-style-type: none"> • No minimum quantity • Accepts mixed loads of baled or loose materials (should remain source-separated) 	<ul style="list-style-type: none"> • Can accept loose or baled materials • Moderate allowance for contaminants 	<ul style="list-style-type: none"> • Lowest \$/ton • Will not cover or provide freight
Broker	<ul style="list-style-type: none"> • Larger quantities typically required • Can allow for irregular schedules of loads 	<ul style="list-style-type: none"> • Typically requires material to be baled • May allow off-spec or moderate contamination 	<ul style="list-style-type: none"> • Moderate to Best \$/ton • May arrange freight

Price volatility in recycling markets is a given, and the fluctuations of market prices are impacted by world and economic factors as much, if not more than, any other commodity market. However, recycling programs that focus on quality and quantity, and that are able to utilize domestic end markets, can be economically sustainable for the long-term. Local markets for cardboard, paper, metals, HDPE and PET (plastics #1 and #2), and glass are available to provide fair market value and revenue to recycling programs. Other key recommendations for a successful program include:

- Prioritizing quality as much as quantity. Accepting source-separated materials will provide cleaner loads and require less labor costs to produce high-quality bales for market.
- Investing in education pays off. Effective promotion and ongoing public education is the best way to limit contamination and encourage recycling, ensuring the highest quality and

marketability of recyclables.

- Limit materials to those with strong domestic markets. Plastics #1 and #2 are re-manufactured into products with end markets in Nebraska and Minnesota; Ripple Glass in Kansas City processes recycled glass for local fiberglass manufacturers and beer bottles; Sadoff Iron and Metal and Alter Metal buy, process, and recycle scrap metals including tin and aluminum; and local manufacturer Greenfiber processes cardboard and paper fibers for insulation.
- Build relationships with your end markets. As commodity prices fluctuate, providing high quality and consistent volume to an end market, even when prices are low, will ensure fair prices and a reliable relationship.

COLLECTING YOUR MATERIALS

Collecting materials without identifying a market or processor is a common misstep of small or new recycling programs. Recycling efforts are often developed in response to social and political demands rather than their economic viability. This approach to recycling fails to recognize basic economic principles and typically produces nothing more than a large stockpile of materials which have little hope of being recycled.

Recycling collection systems provide the means of gathering recyclables from a variety of sources within a community. Programs may be designed to target a specific material or a particular source of materials. While there is a wide range of potential collection systems, two formats provide the bulk of recyclable materials: curbside and drop-off (other formats include commercial, event-based, public spaces, in-house, etc.). Curbside and drop-off systems tend to focus on materials generated by households, although they can also support small businesses. As its name implies, curbside collects materials from residents at the “curb” in front of their home. Drop-off, on the other hand, provides centralized collection containers for the use of many homes.

Drop-off collection systems have long been the standard of the recycling industry. Drop-off centers are simple, affordable, and relatively effective at gathering recyclables from the public. While drop-off centers have historically utilized the source-separated method, single stream or dual stream also can be collected in this way. Curbside programs have been developed to provide a more convenient and universally accessible method of gathering recyclables and are either a single stream or dual stream system.

Curbside Dual Stream Recycling

Dual stream recycling requires residents to pre-sort recyclables into two separate streams before putting materials into curbside recycling bins. It involves keeping the fiber component separate from all other materials accepted in a recycling program. Fiber includes cardboard, boxboard, magazines, newspaper, and office paper. The other materials such as aluminum cans, tin cans, and plastic containers are kept separate. This differs from a single stream approach in which all recyclable materials are mixed together in one bin.

While convenience of single stream recycling is one of the most cited benefits, it also comes with challenges for the sorting and separation process at a recycling facility. Contamination rates are higher, producing less quality materials and lower market rates for the material. When plastic or metal containers are mixed with paper and cardboard, liquids and food residue can easily contaminate an entire load

of recyclables. Dual stream recycling addresses this problem by keeping materials separated from the beginning of the recycling process.

Some benefits to dual stream recycling include:

- Lower levels of contamination;
- Higher quality and more valuable recovered material;
- Lower processing costs; and
- Stronger end markets for materials

Dual stream collection has some shortcomings at the collection stage, however. Because materials have to be sorted into separate compartments or further separated at the curb, it requires more handling and time between each stop. Collection routes can be less efficient if one compartment of material fills up and the truck has to be emptied before continuing. Some communities have experimented with bagging one stream and collecting both streams at once. This requires labor at the processing center to separate and de-bag materials.

The trade-off in the time and labor to collect dual stream is in the reduced contamination, lower processing costs, and higher value for recovered materials. The debate in the recycling and waste industry about which system provides the most cost-effective benefits between single stream or dual stream collection is unresolved. While single stream is more convenient for residents, it has more contamination issues, increases the cost of processing the materials, and reduces the overall market value of materials. Dual stream boosts the quality of materials, can have lower processing costs, similar participation and diversion rates among residents, and typically sells higher than single stream materials. Table 2 summarizes some of the strengths and weaknesses of recycling system types.

A community also could opt to have dual stream, drop-off collection. This would fail to take advantage of the “free” labor of residents sorting their materials into source-separated collection containers, though.

Source-separated Drop-off Recycling

Drop-off collection is a cost effective way to collect recyclables, and is often the preferred approach for smaller or rural communities. It can be as simple as a centrally located trailer to collect specific materials such as cardboard or aluminum, or a recycling collection trailer with bins for multiple types of materials. Typically, materials are source-separated and collected by material type. However, dual stream could be collected in this way with separate compartments for fiber (cardboard, mixed paper, newspaper, etc) and containers (aluminum, tin, and plastics).

It is common for drop-off programs located at a recycling center or co-located with a transfer station to have the convenience of a drive through drop-off. This allows customers to drive through the facility and unload recyclables by placing them in the appropriate bins. A drive-through feature will require more space at a facility. However, it provides convenience for both the customer and the facility in reduced collection costs and efficiencies in processing. As a container is filled, it can be replaced and the material baled on-site. Drop-off programs are affordable and relatively effective at gathering recyclables from the public. The collection and storage system should keep recyclables separated, dry, and contamination-free to the extent possible.

Drop-off areas can either be staffed or unstaffed. To mitigate the risk of contamination and illegal dumping at unstaffed drop off sites, communities should carefully consider the location of the collection containers. Containers in the back of a grocery store parking lot are not only hard to find, but also easy to dump into illegally. A good location for unstaffed containers includes visible or high-traffic areas or areas that residents know are well monitored such as city hall, the local post office, or police and fire stations. At both staffed and unstaffed drop off centers, well-placed and clearly understandable signage is imperative.

Single Stream Recycling

Single stream recycling is a system in which all recyclable items are put together in one container or bin. The recyclables are then collected and transported to a large processor or MRF to be sorted and processed. For single stream recycling to work, the processing facility must sort the recyclable materials properly and thoroughly to meet market specifications.

Proponents of single stream recycling say the convenience makes recycling easier for residents, and therefore increases recycling rates and the amount of material diverted from the landfill. For municipalities struggling to divert more waste with less money, the concept of single stream collection may seem like an attractive alternative, but it is important to note that with it comes the possibility of increased contamination. Some contamination such as plastic bags, garden hoses, and wire is detrimental to the processor’s machinery. The process of sorting acceptable items from unacceptable items is an essential activity in single stream programs. Recycling education is important to maintain on a regular basis because the rates of contamination are higher under this method.

System	Source-separated	Dual Stream	Single Stream
Materials collected and received by processing facility	Recyclables separated by the residents	Fiber and containers separate	All recyclables mixed together
Convenience for residents/businesses	Low	Medium-High	High
Sorting equipment expense	Low	Moderate	High
Quality of resulting materials	High	Medium-High	Medium-Low
Markets for resulting materials	Strong	Strong	Medium-Weak
Market value for resulting materials	High	High	Medium-Low
Preferred by waste haulers	No	No	Yes
Preferred by factories which buy recyclables	Yes	Yes	No

DIVERSION POTENTIAL FOR THE HUB & SPOKE AREA OF NORFOLK

In the hub and spoke model, spokes are generally not paid for their material, but they do not have to invest in the infrastructure or operational expenses to process the material. These expenses are the responsibility of the hub. Spokes can measure their savings through cost avoidance; instead of paying a per ton fee to bury material in a landfill, they can recycle that material for little or no out of pocket expense. Hubs also benefit from this avoiding landfill costs and can sell the recyclables to help further offset their processing costs.

The diversion estimation tools in Tables 3 - 4 provide an example of this cost avoidance and revenue potential in the hub and spoke model for the Norfolk region. The tool is designed to help Norfolk answer basic questions regarding estimated avoided costs and combined value to manage a dual stream processing facility or a source-separated recycling program, and the volume of material, or the amount of additional sources of income (tip fees or hauling income) that are needed in order to make a hub economically viable.

Table 3: Recycling Diversion Estimates: Dual Stream Curbside Collection in Norfolk, NE

Population Served: Norfolk, NE	24,350 (US Census)
Predicted MSW Disposed (tons) ²	31,107 (7 lbs/person/day)
Diverted (Recycled) Tons ²	6,346 (17% recycle rate)
Total MSW Generation (tons) ²	37,329 (8.4 lbs/person/day)
Landfill Tipping Fees Per Ton	\$ 24.00
MSW Hauling Fee Per Ton ³	\$ 6.00

	Percent of MSW ²	Tons Generated	Estimated Capture Rate ²	Recovered Tons Annually	Estimated \$/Ton (low market)	Gross Value	Avoided Landfill Tipping Fees	Avoided MSW Hauling Costs	Combined Value & Avoided Costs
Mid Capture Rate									
Cardboard (OCC)	11.50%	4,293	7.5%	322	\$80	\$25,757	\$7,727	\$1,932	\$35,415
Mixed Paper (ONP#7)	15.56%	5,808	15.0%	871	\$5	\$4,356	\$20,910	\$5,227	\$30,494
Aluminum Cans (UBC)	1.03%	384	10.0%	38	\$1,200	\$46,138	\$923	\$231	\$47,292
Tin	1.48%	552	25.0%	138	\$50	\$6,906	\$3,315	\$829	\$11,049
#1 PET Plastic Bottles	2.70%	1,008	10.0%	101	\$320	\$32,252	\$2,419	\$605	\$35,275
#2 HDPE Plastic Bottles	1.10%	411	10.0%	41	\$280	\$11,497	\$985	\$246	\$12,729
Totals:		12,457		1,512		\$126,906	\$36,279	\$9,070	\$172,254

	Percent of MSW ²	Tons Generated	Estimated Capture Rate ²	Recovered Tons Annually	Estimated \$/Ton (low market)	Gross Value	Avoided Landfill Tipping Fees	Avoided MSW Hauling Costs	Combined Value & Avoided Costs
High Capture Rate									
Cardboard (OCC)	11.50%	4,293	15%	644	\$80	\$51,513	\$15,454	\$3,864	\$70,831
Mixed Paper (ONP#7)	15.56%	5,808	25%	1,452	\$5	\$7,260	\$34,850	\$8,712	\$50,823
Aluminum Cans (UBC)	1.03%	384	25%	96	\$1,200	\$115,345	\$2,307	\$577	\$118,229
Tin	1.48%	552	50%	276	\$50	\$13,812	\$6,630	\$1,657	\$22,099
#1 PET Plastic Bottles	2.70%	1,008	25%	252	\$320	\$80,630	\$6,047	\$2,268	\$88,945
#2 HDPE Plastic Bottles	1.10%	411	25%	103	\$280	\$28,743	\$2,464	\$616	\$31,823
Glass Bottles and Jars ⁴	4.00%	1493.14	25%	373					
Totals:		12,457		3,196		\$297,303	\$67,751	\$17,694	\$382,748

¹2009 Nebraska Waste Characterization Study

²Nebraska Recycling Study, 2015; 2009 Waste Study; 2015 local waste characterization studies

³Assuming 50 mph speed for truck, \$3.22 price per gallon of diesel, 68 mile round trip, 20 ton truck, \$1525 in annual truck maintenance costs, \$20/hour driver and employee benefits valued at 35%

⁴Glass collection could be secondary and should be only if the markets exists for the material, may require separation from other rigids

MSW = Municipal Solid Waste, generated from residential and business

Projecting the potential volume of materials collected from a regional recycling program helps to inform decisions on processing, facility size, storage and equipment needs, and markets for the hub. For Norfolk, the material collected and delivered by spokes represents the potential “free” volume of materials needed to more efficiently process and market materials, providing better economies of scale. The spoke communities often benefit from shorter and less expensive hauling costs transporting materials to a hub, in addition to avoided landfill tipping fees.

Table 4: Recycling Diversion Estimates Source Separated Drop Off Collection in Norfolk, NE

Population Served: Norfolk, NE	24,350 (US Census)
Predicted MSW Disposed (tons) ²	31,107 (7 lbs/person/day)
Diverted (Recycled) Tons ²	6,346 (17% recycle rate)
Total MSW Generation (tons) ²	37,329 (8.4 lbs/person/day)

Landfill Tipping Fees Per Ton	\$ 24.00
MSW Hauling Fee Per Ton ³	\$ 6.00

	Percent of MSW ²	Tons Generated	Estimated Capture Rate ²	Recovered Tons Annually	Estimated \$/Ton (low market)	Gross Value	Avoided Landfill Tipping Fees	Avoided MSW Hauling Costs	Combined Value & Avoided Costs
Mid Capture Rate									
Cardboard (OCC)	11.50%	4,293	7.5%	322	\$80	\$25,757	\$7,727	\$1,932	\$35,415
Mixed Paper (ONP#7)	15.56%	5,808	7.5%	436	\$5	\$2,178	\$10,455	\$2,614	\$15,247
Aluminum Cans (UBC)	1.03%	384	10.0%	38	\$1,200	\$46,138	\$923	\$231	\$47,292
Tin	1.48%	552	10.0%	55	\$50	\$2,762	\$1,326	\$331	\$4,420
#1 PET Plastic Bottles	2.70%	1,008	8.0%	81	\$320	\$25,801	\$1,935	\$484	\$28,220
#2 HDPE Plastic Bottles	1.10%	411	8.0%	33	\$280	\$9,198	\$788	\$197	\$10,183
Totals:		12,457		965		\$111,834	\$23,154	\$5,789	\$140,777

	Percent of MSW ²	Tons Generated	Estimated Capture Rate ²	Recovered Tons Annually	Estimated \$/Ton (low market)	Gross Value	Avoided Landfill Tipping Fees	Avoided MSW Hauling Costs	Combined Value & Avoided Costs
High Capture Rate									
Cardboard (OCC)	11.50%	4,293	9%	386	\$80	\$30,908	\$9,272	\$2,318	\$42,499
Mixed Paper (ONP#7)	15.56%	5,808	8%	465	\$5	\$2,323	\$11,152	\$2,788	\$16,263
Aluminum Cans (UBC)	1.03%	384	12%	46	\$1,200	\$55,366	\$1,107	\$277	\$56,750
Tin	1.48%	552	12%	66	\$50	\$3,315	\$1,591	\$398	\$5,304
#1 PET Plastic Bottles	2.70%	1,008	10%	101	\$320	\$32,252	\$2,419	\$907	\$35,578
#2 HDPE Plastic Bottles	1.10%	411	10%	41	\$280	\$11,497	\$985	\$246	\$12,729
Glass Bottles and Jars	4.00%	1493.14	10%	149					
Totals:		12,457		1,255		\$135,661	\$26,527	\$6,934	\$169,122

¹ 2009 Nebraska Waste Characterization Study

² Nebraska Recycling Study, 2015; 2009 Waste Study; 2015 local waste characterization studies

³ Assuming 50 mph speed for truck, \$3.22 price per gallon of diesel, 68 mile round trip, 20 ton truck, \$1525 in annual truck maintenance costs, \$20/hour driver and employee benefits valued at 35% MSW = Municipal Solid Waste, generated from residential and business

Thirteen communities are profiled as potential spokes to collect and deliver materials to a Norfolk-based hub. It is assumed that spokes would use drop-off collection and self-haul this material to the hub. Table 5 shows the potential tonnage that could be recovered by participating spoke communities. A low capture rate estimates 522 tons of recyclables each year at a value of \$45,239 if all thirteen communities served as spokes for Norfolk’s hub. Spoke communities have the potential to increase recycling rates with local policies, rate incentives, or educational programs that promote recycling, and could capture up to 697 tons of recyclables annually at the estimated high capture rate.

Table 5: Potential from Spoke Communities			
Community	Population	Distance (in miles) from a Norfolk Hub	Low-Capture Rate
Battle Creek	1,200	17	61
Creston	203	29	10
Elgin	661	40	33
Hadar	293	7	15
Hoskins	283	9	14
Humphrey	760	26	39
Madison	2,438	16	123
Meadow Grove	301	17	15
Newman Grove	721	38	37
Oakdale	300	30	15
Pierce	1,767	14	90
Tilden	951	22	48
Winside	427	19	22
Total	10,305	22 miles (average)	522 tons

PROCESSING OPTIONS FOR A NORFOLK HUB

Several factors influence the level of processing at a hub including available labor, space, capital, operating costs, markets, existing recycling opportunities, and expected revenue. The revenue generated will depend on the market and how much processing is done at the facility. A program also needs to have sufficient storage to accumulate large enough quantities to maximize hauling and revenue. Once markets have been identified, deciding on a processing strategy is the next step.

Source-separated Processing

Drop-off collection programs handle materials that have been pre-sorted by the customer. These materials require little to no additional sorting and are ready to bale or store in bunkers for shipment with similar commodities/materials.

Dual Stream Processing

Dual stream processing manages fiber (cardboard and mixed paper) separately from rigid materials (metal cans and plastic bottles) and helps to reduce contamination. Processing of dual stream includes utilizing a sorting station and equipment. This could include a two-four person sort line that feeds into one baler, alternating the materials to be sorted between the two dual streams. It also could include two separate sort lines and balers -- one for fiber and one for rigids. In the capital expense examples found later in this report, it is assumed that with initial lower volumes, the processing of dual stream would include one sort line and a baler that alternate depending on which feed material (fiber or rigids) is processed. This reduces capital expense costs and still keeps the two streams separate, thus reducing contamination.

With equipment and labor investments, dual stream material could be sorted, baled, and sold for higher value to a MRF, mills, or through a broker. Sorting equipment and staff time will be the bulk of operating costs to further process materials, but it will increase the gross value and options for markets. It will require basic equipment such as a horizontal baler designed to process at least 2 tons per hour, and a forklift or skid steer. Plastics and metals can be sorted either manually on a sort line, or with automated sorting systems such as eddy current separators that separate non-ferrous metals from other containers in the dual stream.

A storage system will need to be large enough to store both loose and baled material. Loose material is stored in bunkers by type. Once a bunker of material is full, it can be baled and stored until enough bales have accumulated to transport a full load to market. A MRF or brokers will accept a mixed load of baled materials, but mills prefer a full load of one commodity. The facility will need to plan for storage either in the building, in an empty semi-trailer nearby or a separate storage facility.

Minimal Processing

Norfolk could collect materials as source-separated and/or dual stream, and send to a MRF for further processing, but this would generate the lowest revenue for materials. For example, Firststar Fiber in Omaha (110 miles from Norfolk) would provide a higher value for loose, mixed containers (#1 and #2 plastics, tin, and aluminum), however hauling unbaled materials is less economical. The trade-off is less labor, capital, and operating costs because it requires the least amount of handling, and instead passes the processing responsibility and cost onto the MRF.

PROCESSING OPTIONS AND RELATED EXPENSES

General capital expenses are highlighted in Table 6 below. Capital expense assumptions are for a hub with the following features:

- 3,000 square foot uninsulated facility (40' wide x 75' long) with two 10' wide x 12' tall roll up doors and two 30" man doors.
- Five 9' x 15' loose storage bunkers (jersey barriers with chain link risers and gates).
- 300 square foot interior bale storage.
- 7' x 45' baler footprint, +/- 130' steel push walls, 17.5' height at open side, 13.75' at back.

Expenses also assume three sets of commingled collection containers in Norfolk for dual stream drop-off, three divided containers for source-separated drop-off, and three cardboard-only containers. Cardboard is bulky and generated at higher volume, so tends to fill up more quickly than other drop-off containers. This also assumes that the spoke communities will have roll-offs or a trailer and a transportation vehicle that can be used to haul recyclables.

These capital expenses focus on processing expenses and do not include collection equipment or carts for a curbside program. If Norfolk chose to provide curbside collection services, these expenses also would need to be considered.

The hub described above is designed to process approximately 1,500 tons of recyclables per year. The addition of a \$36,000 three-person sort line would increase the per ton capacity to approximately 2,000 per year. If Norfolk were to expand to a dual-stream curbside program and collect more than 1,500 tons of recyclables each year, processing and storage capacity would need to increase accordingly. These options could include building a hub with two sort lines and balers (one for fiber and one for rigids) or investing in a "micro" or "mini" material recovery facility (MRF) that consists of a simple sort line, eddy current magnets to separate the ferrous and non-ferrous metal and conveyor belt. These types of facilities process between 5 to 15 tons of material per hour, range in cost from \$3.4-7.9 million, and require 1.1 to 2.3 acres of space.

Based on diversion estimates between 1,512 tons and 3,196 tons of material annually, Norfolk could accommodate a curbside dual-stream processing program with the capital expenses outlined in Table 6. Estimates include a summary of sub-totals for two scenarios: 1) source-separated program with processing, and 2) a dual stream program processing up to 2,000 tons per year.

Table 6: Sample Budget of Capital Expenses		
Item	Unit Cost	
	Source-separated Program with Processing (~1500 tons/year)	Dual Stream Program with Processing (~2000 tons/year)
General (bonds, mobilization, etc.) Construction	\$0	\$0
Pre-engineering/Site Work Construction Asphalt Baler & Conveyor & Additional Storage	\$23,000 \$60,000 \$20,000	\$23,000 \$60,000 \$20,000
Horizontal Manual Tie Baler (GSA) Pit Conveyor (GSA - 2R CONVEYOR 4829) Baler Freight and Install 3 Phase Power Conversion Sort Line Conveyor (GSA GS-07F-5447P - 3 person station, magnetic head for ferrous & diverter shoot) Collection Equipment	\$60,000 \$24,000 \$8,000 \$9,000 	\$60,000 \$24,000 \$8,000 \$9,000 \$36,000
Cardboard Only or Commingled Collection Roll-Off (3 sets or 6 total at \$6000 each) Source-separated Collection set - container for OCC and divided container for sorted recyclables (3 sets at \$15,000 per set) Miscellaneous	 \$45,000	 \$36,000
Perimeter Fencing (8 ft, High) Fork Lift Loading Ramp	\$3,000 \$30,000 \$11,000	\$3,000 \$30,000 \$11,000
Perimeter Fencing (8 ft, High) Fork Lift Loading Ramp	\$3,000 \$30,000 \$11,000	\$3,000 \$30,000 \$11,000
Sub Total: 15% Contingency Nebraska Sales Tax (7%) Total for Program Interest Rate Annual Debt Service	\$293,000 \$43,950 \$23,587 \$360,537 4.0% \$43,803	\$320,000 \$48,000 \$25,760 \$393,750 4.0% \$47,840

The capital expense difference between the two scenarios above is marginal with the dual stream processing costs requiring \$36,000 for a sort line conveyor. Processing dual stream will require higher operating costs primarily for additional staff time to sort material from the conveyor.

Operating Costs

Table 7 estimates operating expenses for a regional recycling center that processes materials collected both by source-separated drop-off and dual stream collection. The primary difference in operating expenses is the additional need for full time employees (FTEs) to operate a dual stream processing facility. In the estimate, it is assumed the dual stream system would require three additional FTEs to sort the material.

Table 7: Estimated Operating Expenses		
Operating Expenses	Estimated Amount	Estimated Amount
	Source-separated Drop-Off Program	Dual Stream Processing
Labor Rates Not Including Hauling (Annual wages and benefits), assuming \$55,000 per FTE	\$110,000	\$275,000
Gallons of Diesel Fuel used/hour for Onsite Equipment (e.g. fork lift, skid steer, etc)	4	4
Onsite Equipment Use Per Day (Hours)	3	6
Annual Fuel Expenses*	\$9,984	\$19,968
Annual Utilities Cost (electricity, etc)**	\$6,500	\$7,800
Annual Supply Expenses (baling wire, signs, personal safety equipment, etc)	\$3,500	\$5,000
Total Direct Expenses	\$129,984	\$307,768
Indirect/Admin Cost Rate (%)	10%	10%
Annual Indirect/Admin Fees	\$12,998.40	\$30,776.80
TOTAL Annual Expenses	\$142,982.40	\$338,544.80
* Assumes 260 work days per year and \$3.20 per gallon for diesel ** Assumes 260 work days per year and \$25/day utilities fees		

SOURCE-SEPARATED VS DUAL STREAM HUB COMPARISON

Table 7 estimates operating expenses for a regional recycling center that processes materials collected both by source-separated drop-off and dual stream collection. The primary difference in operating expenses is the additional need for full time employees (FTEs) to operate a dual stream processing facility. In the estimate, it is assumed the dual stream system would require three additional FTEs to sort the material.

Table 8 summarizes the capital expenses, avoided landfill costs, revenue, and operating expenses for a source-separated hub compared to a dual stream processing hub. It is interesting to note that the source-separated scenario is nearly break even, comparing avoided landfill costs and recycling revenue to annual operating expenses.

Table 8: Summary Cost Comparison		
	Source-separated Program with Processing	Dual Stream Program with Processing
Initial Capital Expense	\$360,537	\$393,760
Annual avoided landfill costs & recycling material revenue	(\$140,777)	(\$172,254)
Annual Operating Expenses	\$ 142,984	\$338,545

This scenario only covers recycling in the City of Norfolk. However, the potential revenue from the sale of recyclables would increase as spokes start feeding into the hub. A potential of \$45,239 in additional annual revenue could be generated from spokes. These funds could be used to support an additional staff person to help manage the new material. In comparison, dual stream processing would require additional funding, such as solid waste service fees, as the avoided costs and recycling revenue is substantially less than the expected annual operating costs.

HUB AND SPOKE RECYCLING AGREEMENTS

Another key component of launching a successful regional recycling program involves agreements between spoke and hub communities. Oftentimes questions left unanswered can lead to a failed partnership. For this reason, setting clear responsibilities, expectations, and terms for the agreement are imperative. When developing these partnerships, the following questions should be considered.

- Which recyclables will be collected?
- How will the recycling be collected (commingled, source-separated, dual stream)?
- What types of spoke collection containers are needed (roll-offs verses trailers)?
- Who will transport the material from the spoke to the hub, and who will pay for this transportation?
- Are the hub and spoke communities willing to enter into a memorandum of understanding outlining each of the pre-determined responsibilities and roles?
- How will the communities address contamination issues?

See Appendix A for a draft MOU between a hub and spoke community.

CONCLUSIONS & RECOMMENDATIONS

There are several advantages to be gained by having Norfolk operate a recycling processing facility for the region. Benefits include:

- Increased volumes of recyclables to meet efficiencies and access better markets;
- Production of cleaner, high-quality recyclables to market material for higher and better uses;
- Conserved landfill capacity and avoided tip fees;
- Regional economic stimulus from new collection and processing jobs; and
- Increased quality of life sentiment within the community as residents can be proud of their community recycling program.

The revenue from the sale of recyclables collected from the spoke communities is not included in Table 8 as it is important to build the program and set rates to cover costs during low markets and periods of low volume in order to ensure long-term sustainability. Bearing this in mind, a phased approach is recommended to grow the program and evaluate tons collected, barriers, and solutions.

The recyclables collected during both Phase I and Phase II include traditional household recyclables (cardboard, mixed paper, aluminum cans, tin, plastic #1 and plastic #2) and glass if the market exists. Additional materials may be added into the recycling stream as the markets develop.

Additional considerations need to be addressed for both phases, including:

- The plan to manage education and outreach efforts to inform residents of new recycling opportunities;
- The impact on capture rates of fiber from the free drop-off programs provided by the local cellulous insulation manufacturer, Greenfiber; and
- The ability to ensure that recyclables collected within Norfolk come to the recycling center without a franchise agreement or flow control ordinance for municipal solid waste.

Phase I

An option for initial development is a source-separated, drop-off program with infrastructure capable of processing up to 1,500 tons of recyclables per year and three collection locations throughout town, including one at the Norfolk Transfer Station. The recycling drop-off containers at the transfer station should be outside of the scale house to make it easy for residents to drop off their recyclables before they pay any disposal fees. Residents would not pay to drop-off source-separated recyclables in order to encourage participation.

Recyclables would be brought to the transfer station's recycling hub, stored and baled when enough material is collected, and sold to market. It is imperative to track the amount of material recycled by weight and related expenses to plan accordingly for future growth.

Phase II

Curbside collection in Norfolk has a higher recovery potential than drop-off programs and could bring in an estimated 1,512 - 3,196 tons of recyclables for processing by the City. This volume of material could be managed at a facility designed for a source-separated program by adding at least one or two sort lines and conveyors. Additional storage capacity would further increase the capacity of the facility to process material.

RECOMMENDATIONS FOR CURBSIDE COLLECTION

Convenience is hands-down the most important factor to increase recycling participation in every community, and curbside recycling programs offer far greater convenience for residents than a recycling drop-off program.

Conduct community outreach to gauge support for more recycling.

For a new recycling program to be successful, it is critical to have broad support from the community and highlight the benefits of the program to the entire community. This will help counter any push-back on a new program, particularly if a mandatory fee for recycling is needed. It is important to understand what residents want from a recycling program, including:

- Materials collected curbside
- Frequency of service
- Materials collected at drop-off center
- Dual stream or single stream collection
- Container size
- Educational materials

Conduct community outreach with meetings, surveys, and targeted outreach through specific groups such as Keep Norfolk Beautiful, green teams at schools or businesses, the Chamber of Commerce, and other prominent groups to gain support and feedback. Engage stakeholders who would be potentially affected by or involved in the project such as the local haulers, nearby communities, local processors, and end markets.

Change is always hard, and Norfolk should not underestimate how much education and outreach is needed when making changes to the trash and recycling system. There are four key pieces of advice from other communities that have made substantial changes to their trash and recycling system:

1. Do not underestimate people's passion for their trash. Even though people pay to get rid of their trash and it's generally considered something that they do not want, it is amazing how upset residents can get when you try to change the trash system. This is partly because residents interact with the trash and recycling services almost every day, so changes are very visible and can easily cause confusion.

2. Strategically engage citizen and business advocates early and throughout the process. To make change successful, the city would need to build allies early in the process, and to have citizen and business champions who can come to city council meetings and speak in favor of new changes. While most of the community will support and agree with a new program, there will be a small but vocal minority that will resist change, that doesn't support recycling or doesn't want the city to be involved in trash. It's important to keep in mind that this small group does not reflect the opinions of the majority of Norfolk residents, and it's important to have a strong group of voices in favor of a new program to counteract the negative feedback.

3. Invest in education. Because trash and recycling is something that affects everyone in the community on a daily basis, it's important to invest strongly in education programs that reach out to every resident. Mailers and newspaper articles will not reach all citizens, and those out of the loop will be the first to complain. A strong presence at community events and strategic partnerships with local groups can help get the word out to residents and build support for a new system within the community.

Explore contracting with a private hauler for citywide services.

Most communities that provide curbside recycling services also provide curbside trash collection. A city-operated recycling program may provide some opportunity to realize cost efficiencies in utilizing the same equipment and/or personnel. However, there would be substantial capital investment in a new truck and recycling containers. Private haulers currently providing trash and recycling services may be able to offer a competitive price to the city to provide services because of their existing fleet, personnel, and experience. By creating a contract that includes all households, the city increases the efficiencies of providing recycling services and will likely drive down the costs from the current rate per household.

The city could issue a request for proposal (RFP) for citywide recycling collection services to gauge the interest in local haulers in providing services and the cost per household. The city is under no obligation to accept the RFP terms or pricing, should they be unsatisfactory, but would then be better informed to evaluate the costs and benefits of investing in a city-run service.

Consider an opt-out for residents who already subscribe to recycling services.

Ideally, all residents would be serviced under a city program with one hauler. This maximizes efficiency as well as reduces truck traffic and air pollution. There are currently private haulers providing curbside recycling collection in Norfolk and these services may co-exist alongside a citywide program. In some communities, residents can choose between city services or private services.

If the city imposes a recycling fee on all households, residents who are currently recycling and want to stay with their current hauler will feel penalized for doing the right thing. Rather, these residents should be rewarded since they were already "doing the right thing." One option would be to allow these residents to opt-out of the fee if they show proof of existing recycling service. The feasibility of this option would depend on the number of households currently recycling and other factors, but it is important to consider because you do not want to alienate the residents who are already strong supporters of recycling. They are key to helping the program succeed in the community because they can educate others about the benefits of recycling and how to do it right.

Evaluate the feasibility of including small businesses in curbside program.

Almost half of all recyclable material originates from the business community, so developing strategies to collect from local business is a critical component of any growing recycling program. While many large businesses contract for their own recycling services for cardboard and other materials, these costs are often more prohibitive for small to medium sized businesses. Many of these businesses can be included in a residential curbside program if they produce a similar quantity of recyclable materials as a typical household. By including smaller businesses and offices, the city can increase the amount of materials collected and increase the program efficiency, while making recycling a stronger value in the community.

Discuss the feasibility of providing curbside recycling services in nearby communities.

The economic viability and cost-effectiveness of a curbside recycling program may be improved by expanding to more households in surrounding communities. For example, if a recycling truck is picking up materials two days a week in Norfolk, it can be used in other cities on another day. This helps offset the capital investment and brings more materials into the program. Since the coalition landfill is managed by a consortium of cities, there is mutual benefit in diverting recyclable materials as well as a precedent of cooperation in waste and recycling services.

Provide curbside recycling carts to all residents.

Wheeled plastic carts are the most effective container for collecting curbside recyclable materials from households. Compared to other containers, wheeled carts:

- Increase the volume of recyclable materials collected
- Reduce wind-blown litter
- Standardize the program and improve aesthetic appeal
- Provide opportunity to label all carts with recycling guidelines
- Qualify for potential funding assistance, either at the state level through NDEQ grants or nationally through The Recycling Partnership (subject to certain requirements).

Providing carts at the onset of the program ensures a strong foundation for success. A 96-gallon cart is recommended for every other week service.

Consider volume-based trash pricing as part of the system changes.

One of the most effective strategies to increasing recycling is the use of rate. Rate incentives are strategies employed by communities to put a price on the amount of waste each resident or household generates. When trash service is a fixed price, residents have no financial incentive to utilize the recycling program. However, when trash services are billed based on the size of the trash container, with large volume users paying more money, residents have a financial incentive to recycle so they can save money by using a smaller trash cart. This is similar to the pricing model used for electricity and water consumption—the more you use, the more you pay. Using rate incentive programs create a direct economic incentive to recycle more and to generate less waste.

The city can explore moving to a volume-based pricing system for trash, also known as Pay-As-You-Throw (PAYT), as a way to encourage participation in the new recycling program. Some of the most common benefits reported by communities with successful rate incentive programs include:

- **Increased Diversion and Recycling.** Rate incentives have successfully increased diversion and recycling in thousands of communities. More than 7,000 communities in the U.S. have volume-based pricing and these communities typically generate 49% less waste than communities without PAYT. Correspondingly, recycling revenues increase if your community is the processor.
- **Increased Landfill Life.** As rate incentives decrease the rate of waste disposed, landfill cells can stay open and accept waste for longer, as less waste will be landfilled annually. This helps delay or avoid the costs associated with developing new landfill cells, shutting down existing landfills, finding new landfill sites, or sending waste to other landfills.

- **Communities Can Adjust Rates and Cover Costs.** Should communities be unable to completely cover the cost of waste and recyclables collection and processing, waste collection rates can be adjusted to quickly raise revenue.

Community Action Plan

Establishing a community recycling program is a wise investment in the local and regional economy. Even with the best intentions, getting started or making changes can be daunting. Creating a Community Action Plan for recycling and solid waste program planners can assist in assessing the community's priorities and goals for their recycling and solid waste programs. Planning for equipment improvements, collection expansion, new materials, and customer participation via education will ensure that programs meet their goals and have a successful story to share with the community and elected officials. Keep in mind the quality of the action plan is not the number of actions, but the ability of your community to achieve them. See the "Sample Format for a Community Recycling Plan" and "Existing Recycling and Timeline to Expand Materials" in the Appendix for additional resources.

APPENDICES

APPENDIX A: DRAFT TEMPLATE MEMORANDUM OF UNDERSTANDING

This document is a sample MOU to be used by hub communities to establish roles and responsibilities with spokes in regard to the use of equipment provided under this grant program.

This MEMORANDUM OF UNDERSTANDING (MOU) is entered into on this ____ day of _____, 20__, by and between the HUB (INSERT NAME OF COMMUNITY) and the SPOKE (INSERT NAME OF COMMUNITY.)

WITNESSETH:

- A. The HUB has received a grant from the _____ for the purpose of increasing recycling activities.
- B. The _____ grant provides resources for both collecting and processing recyclables from a broad rural area.
- C. In order to serve the greatest population, the HUB will provide collection “trailers” or “roll-off containers” for use in SPOKE communities.
- D. In order to serve the greatest population, the HUB will provide recycling processing services to SPOKE.
- E. This agreement serves as a commitment for the HUB community to provide services as the regional recycling processing center and as a commitment from the SPOKE community to act as an active participant to provide recyclable materials to the HUB program once operational.

NOW, THEREFORE, IT IS MUTUALLY AGREED BETWEEN THE PARTIES:

1. PURPOSE

- A. To provide recycling collection services to residents of rural and under-served communities in Nebraska for the following materials: cardboard (OCC), mixed paper (ONP#7), Aluminum Cans (UBC), Tin Cans, Plastic Bottles #1 & #2. (can add or remove items according to program).

2. SCOPE OF WORK

- A. The HUB shall provide the following equipment and services to the SPOKE:
 - 1. X (no.) of recycling collection trailers. (SPECIFY EQUIPMENT including serial #'s)
 - 2. Processing and marketing of materials collected by SPOKE.
- B. The following conditions of use must be adhered to by the City:
 - 1. The Trailer(s) or Roll-Off Container(s) shall be utilized for the sole purpose of collecting recyclable materials (specified in Paragraph 1, Purpose) from the residents and businesses of SPOKE.
 - 2. The Trailer(s) or Roll-Off Container(s) will be located in a secure area which also provides convenient access to users

3. The Trailer(s) or Roll-Off Container(s) shall be transported solely by SPOKE owned and operated vehicles. OR the Trailer(s) or Roll-Off Container(s) shall be transported by HUB owned or operated vehicles.

4. The SPOKE shall be solely responsible for performing all regularly scheduled maintenance, as defined by manufacturer, including, but not limited to; tire repair, safety maintenance, etc.

5. The SPOKE shall be responsible for any and all damage to the Trailer(s) which occurs during the term of this MOU.

6. Upon the termination of this MOU, the SPOKE shall return the Trailer(s) or Roll-Off Container(s) to the HUB in good working order, with documented records of all maintenance performed on the Trailer(s) or Roll-Off Container(s).

C. The SPOKE shall provide the following;

1. All necessary personnel to support the collection of recyclables as defined by this MOU.

2. All transportation of the Trailer(s) or Roll-Off Container(s) via an appropriately rated and outfitted vehicle to the HUB and within the SPOKE. (Unless HUB provides transportation)

3. Alternative disposal methods for unacceptable materials collected through this program. Ensuring proper signage is maintained on collection container is critical to maintain quality control of material.

4. A location for the Trailer(s) or Roll-Off Container(s) which is both convenient and secure.

5. An education effort informing users of the acceptable materials and rules regarding use of the program.

6. Monitoring of collected materials in order to limit contamination of allowed materials.

7. Education and outreach to SPOKE's citizens regarding recycling program to ensure active participation and proper sorting of materials.

3. TERM

This Memorandum of Understanding shall remain in effect until terminated by either party pursuant to Article 6, below.

4. TERMINATION

This Memorandum of Understanding may be terminated by either of the parties hereto upon written notice delivered to the other party at least 90 days prior to the intended date of termination. By such termination, neither party may nullify obligations already incurred for performance or failure to perform prior to the date of termination.

5. THIRD PARTY BENEFICIARY CLAUSE

This Memorandum of Understanding is not intended by any of the provisions of any part of the Memorandum of Understanding to create in the public or any member thereof, a third party beneficiary or to authorize anyone not a party to the Memorandum of Understanding to maintain a suit for wrongful death, bodily and/or personal injury to person, damage to property, and/or any other claim(s) whatsoever pursuant to this Memorandum of Understanding

6. NEBRASKA TORT CLAIMS ACT –

By entering into this Memorandum of Understanding, neither party shall be responsible for liability incurred as a result of the other party's act or omissions in connection with this Memorandum of

Understanding. Any liability incurred in connection with this Memorandum of Understanding is subject to the immunities and limitations of the _____.

7. AMENDMENT

This Memorandum of Understanding shall not be altered, changed or amended except by instrument in writing.

IN WITNESS WHEREOF, the parties set their hands:

HUB

NAME, TITLE _____ Date _____

APPROVED AS TO LEGAL FORM AND SUFFICIENCY:

NAME: HUB Attorney _____ Date _____

SPOKE

NAME: Mayor _____ Date _____

SPOKE: Clerk _____ Date _____

APPROVED AS TO LEGAL FORM AND SUFFICIENCY:

NAME: SPOKE Attorney _____ Date _____

APPENDIX B: SAMPLE FORMAT FOR A COMMUNITY RECYCLING PLAN

Annual tons or cubic yards of material currently diverted from landfill:

Annual tons or cubic yards of waste landfilled:

Status of Recycling in the Community: Overview of existing programs, activities, services, collection, processing, diversion rates & markets

Vision of the Community Recycling Program: Describe what you want to achieve in 1 – 5 years (e.g. meet recycling rate goals, increase recycling access to community members, save landfill space)

Economic Assessment: What does the current solid waste program cost and how is it funded? What avenues are available to fund improvements? (e.g. internal fund, state grant funds, loans) Don't forget to consider the money saved by avoided landfill tipping fees or transportation costs.

Local & Political Support: Are your community leaders already in support of recycling? If so, can they invest time or funds toward your recycling goals?

Marketing the Materials: Have you identified where the material will go for recycling? Will you have to deliver the material? Will the end-market pick-up the material? What is the distance to market? What materials do they accept and what are the requirements? If the material you are collecting has a fee to process it, can you plan to pass this cost on to your customers?

Collection Methods: It is wise to plan equipment according to the end-market and their requirement. Are they allowing for mixed materials? If there are several collection points, consider the efficiency of each one. Will each collection area be manned? How are you currently collecting trash? Can you co-locate recycling services at every place there is trash service? Do the business in your community have equal space for recycling containers?

Processing and Storage: Most end-markets provides better prices for baled material, but your community must decide the level of investment to make before deciding to bale. Do you have storage capacity for bales and also for loose material waiting to be processed? Consider the number of households, businesses and government offices in your community. Do you have the volume of materials necessary to make an investment in baling equipment?

Regional Partnerships: A nearby community or business may be able to share resources. Are there potential partnering opportunities to maximize the efficiency of recycling equipment and resources? Is there a nearby transfer station that could be the locale for shared recycling equipment? Is there a community that will accept loose material so that your community does not have to invest in baling equipment?

Education & Outreach: Public education about recycling is key to the success of the program. What type of communication will you use to deliver the message about the program goals? Do you have easy to read signage at all of your facilities and drop-off areas, including small containers next to trash cans?

APPENDIX C: EXISTING RECYCLING AND TIMELINE TO EXPAND MATERIALS

Material	Existing Program	Timeline to Expand Collection	Collection Device or Equipment Needed	End-Market
Aluminum Cans				
Animals or Animal Waste				
Batteries - Rechargeable				
Building Materials				
Cardboard, Corrugated				
Concrete				
Drywall (Gypsum Board)				
Electronics (E-Waste)				
Food Waste				
Glass Containers				
Green Waste/Yard Debris				
Household Hazardous Waste				
Lead-Acid Car Batteries				
Lumber, Wood Waste				
Mixed Paper				
Motor Oil/Antifreeze				
Newspaper ONP #7				
Office Paper				
Plastic #1 & #2 Bottles				
Plastic, Mixed (#1 – #7)				
Plastic Bags				
Printer Cartridges				
Rechargeable Batteries				
Reuse Exchange Area				
Scrap Metals				
Textiles/Clothing				
Tires				
White Goods (Appliances)				
Other Opportunities?				