

ISSUE PAPERS

Prepared for



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INTRODUCTION

Legislative Bill 1101 directed the Nebraska Department of Environmental Quality (NDEQ) to study the status of solid waste management programs operated by the department and make recommendations to modernize and revise such programs. Five priority issues – recycling and composting, materials management, information, grant programs, and landfill bans – were identified as key components of this study. To further define these issues and identify potential options and opportunities for improvement, papers addressing these five priority issues were prepared.

Recycling and composting operations in the State of Nebraska focus on specific service areas, defined by geographic or political boundaries. Each of these operations have developed programs that focus on their specific service area. This issue paper examines recycling and composting in Nebraska through the best management practices of successful programs, from data required to establish a statewide strategy for waste reduction, identifying the economic advantages and disadvantages of selected waste management strategies, successful partnership strategies, and regulatory and statutory obstacles.

Materials management as it relates to solid waste in Nebraska, involves the collection, processing, and shipment of recyclables and solid waste. To identify and address materials management issues, this paper assesses Best Management Practices (BMPs) utilized in adjoining states, potential strategies to move from waste management to waste prevention, and methods for manufacturers to move toward zero waste landfilling.

The lack of comprehensive information regarding recycling, waste reduction, and waste disposal is of significant concern. Without a centralized program to collect information pertaining to these activities it is impossible to clearly understand the success or failure of any recycling, reuse, or disposal operation in the state. This issue paper identifies the value of thorough information and comprehensive, statewide data.

Grants provide significant support to a variety of solid waste programs throughout the state. This issue paper addresses Nebraska's present recycling and waste reduction grant programs and considers expanding those activities eligible for grant award, awarding grants more frequently, and utilizing zero-percent-interest loans or a state revolving loan program.

Landfill bans are utilized for a variety of reasons and purposes. The State of Nebraska's waste hierarchy emphatically emphasizes volume reduction at the source to divert wastes from landfills. An emphasis on removing more materials from the solid waste stream has resulted in more recycling and waste recovery programs. This issue paper considers the need for increasing or decreasing the number of bans at municipal solid waste landfills in Nebraska and methods to enforce these bans.

RECYCLING AND COMPOSTING

Recycling and composting operations in the State of Nebraska are owned and/or operated by both public and private entities. These operations focus on specific service areas, defined by geographic or political boundaries. The level of effectiveness and efficiency of these recycling and composting programs is relatively unknown. This issue paper examines the following five components of recycling and composting in Nebraska in an effort to better understand these programs.

- Best Management Practices of Successful Recycling and Composting Programs
- Data Required to Establish a Statewide Strategy for Recycling and Composting
- The Economic Advantages and Disadvantages of Selected Waste Management Strategies
- Successful Partnership Strategies
- Regulatory and Statutory Obstacles to Increasing Recycling and Composting

BEST MANAGEMENT PRACTICES

Information regarding recycling and composting programs from seven states was evaluated to determine how operations in these states compared to Nebraska. The seven states are Iowa, Missouri, South Dakota, Wyoming, Colorado, Kansas, and Minnesota. Recycling and composting operations in these states were relatively equivalent to operations throughout Nebraska. Operations in or near the largest communities in each state were typically more sophisticated than in rural areas and provided more options for collecting recyclables. As is the case in Nebraska, recycling and composting operations in nearby states varied depending upon a community's or county's commitment to recycling and/or composting and whether a facility was publicly or privately operated.

Best Management Practices (BMP) from the seven nearby states were examined. Some of these BMPs are delineated below:

- Using hub-and-spoke systems for recycling and composting programs. A variation in this concept incorporated direct hauling from one outlier community to the hub community along with the standard practice of collecting from several communities before returning to the hub.
- Instituting mandatory recycling to establish a program or revitalize a program.
- Establishing pay-as-you-throw programs for commercial accounts to stimulate recycling and target specific recyclables.

- Requiring recycling data be submitted online and accessible from the website.
- Creating a system that is integrated with the waste hierarchy and waste minimization concept and provides information for educating the public, improving recycling, handling yard waste, addressing other activities.
- Providing environmental education tools for teachers to use with students from first grade through high school.
- Employing a standardized recycling and composting message to eliminate confusion.
- Identifying and modifying city, county, and state codes that inhibit recycling and composting (i.e., littering codes that only focus on waste receptacles or codes that limit where recycling bins can be placed).
- Expanding and improving materials exchange programs.
- Establishing a sustainable purchasing program for local and state agencies.
- Developing programs for businesses and/or residents to reduce food waste.
- Setting targets to establish recycling collection in at least two communities annually.
- Collecting waste on a bi-weekly rather than weekly basis.
- Collecting recyclables and waste on the same day.

This list of BMPs is not exhaustive; however, it does provide a spectrum of ideas and tools other communities and states have utilized to further increase composting and recycling. Implementing some of these BMPs could be relatively straightforward and data from nearby states indicate they result in exceptional outcomes.

DATA REQUIREMENTS

Presently the State of Nebraska does not directly collect data relating to recycling and composting. The information that is collected is generated and provided by recycling and composting facilities. Information is provided voluntarily and is not consistent from facility to facility. During recent interviews conducted with many of the state's recycling program operators, it was found that each recycling facility collects information differently and facilities do not necessarily collect the same information. Most facilities collect information on the:

- types of materials they collect and/or process;
- quantity of materials collected and/or processed;
- number of bales or gaylords that were filled; and
- where the materials were sent for either additional sorting or final processing.

To establish a useful database, it is imperative that each facility or operation collect and submit data in formats provided by NDEQ and that the most essential information is identified for inclusion. The information that needs to be incorporated into this database includes the four items listed above as well as, but is not limited to, the following:

- quantities and types of materials accepted and processed;
- facility size and its capacity quantified as either the number of bales or tons per day the facility can handle;
- staff members' level of experience;
- facility's service area; and
- age of the material.

It is also important to understand the needs of these recycling and composting facilities. These needs may encompass not only financial support, but also knowledge, logistics, and training. At a minimum, data collected for inclusion in the database encompasses a facility's:

- level of funding and sources;
- access to reliable transportation;
- available equipment and methods to acquire additional equipment;
- staff training and public education endeavors; and
- activities related to upkeep and enhancement.

Using this information, opportunities to improve existing recycling and composting facilities could be better identified and implemented. Improved or expanded facilities could enable capturing more recyclable materials and augmenting composting activities within the state.

ECONOMIC ADVANTAGES AND DISADVANTAGES

Recycling operations have employed numerous waste management strategies in their efforts to boost the quantity of recyclables they can capture. Four strategies have been identified as potentially useful in Nebraska; a discussion of each strategy follows.

Strategy 1: Pay-As-You-Throw

The pay-as-you-throw (PAYT) strategy has been utilized throughout the United States and has produced varied results. The concept is relatively simple. Each household or business is given the option of using varying container sizes for their waste. The cause-and-effect of this strategy is direct. Lower collection or service charges result from electing to use smaller-sized containers.

A three-phase process is usually encountered when the PAYT strategy is implemented. The first phase encompasses customers choosing an adequately-sized container for their waste. Many containers are exchanged throughout the first few months of the program as users determine which container is "right sized" for them.

The second phase begins after the first few months of implementation and extends for one to three years. During this period, residential and business users experience changes that affect their waste generation. Residential users face changes in the size of their families, the range of ages in their household, and increased or decreased income levels. Increasing or decreasing business size and revenue are the most impactful changes commercial users confront. During this period, users are more likely to react to alterations in their waste generation and exchange their container for a more-appropriately sized for their circumstance.

After the program's first three years, users become more complacent and changes affecting their waste generation do not as often result in exchanging containers. In addition, because the container is attached to the dwelling or building and does not belong to or move with the resident or business owner, new residents or business owners will typically keep the container already in place unless there is a significant difference in family or business size.

One key problem of pay-as-you-throw programs is complacency on the part of both service providers and system users. Service providers become less committed to educating users about container sizes and related savings. They can make more money if the users select larger containers which can breed negative motivation and reduced education efforts.

Service users' complacency lies in their decreased desire to change containers as circumstances change. As household members age and families decrease in size, service users' urge to exchange their containers for ones smaller in size is limited. Instead, they often use the larger waste container to dispose of clothing and other items that could be recycled or reused as they begin "downsizing" in anticipation of relocating to a smaller dwelling.

Strategy 2: Bottle Bill

Bottle bills have been in place for many years. Most bottle bills concentrate on keeping glass out of the waste stream. Instead of placing their glass bottles in the trash, users return the bottles for redemption and the bottles are cleaned and reused or the glass is crushed for use as a construction material or finely crushed and used in the production of new bottles.

Data from Nebraska's statewide waste characterization study (conducted in 2007 and 2008) indicates that glass comprises only 4.91% of the state's municipal waste stream. Additionally, glass is an inorganic material that does not contain any hazardous elements. Because glass is inert and does not comprise a large portion of the waste stream, it exerts limited negative impacts to the environment when properly disposed.

The multi-faceted costs associated with handling and processing glass bottles via a redemption program (bottle bill) often outweigh any benefits. This, together with its limited presence in the waste stream and impact to the environment, overshadows the advantages of diverting glass via a bottle bill.

Strategy 3: Hub-and-Spoke Systems

The aim of a hub-and-spoke system is to facilitate recycling among a group of communities and efficiently collect and process recyclables. The system includes a recycling process center – the hub – that receives recyclables and prepares them for shipping, and a series of recycling drop-off centers – the spokes – where users deposit their recyclables which are then collected and delivered to the hub.

Implementing a hub-and-spoke system reduces transportation costs for collecting recyclables and eliminates the need for balers and forklift trucks at the recycling drop-off centers. This system also allows for cost and income sharing among the communities. Hub-and-spoke systems have been effectively implemented in rural areas similar in nature to portions of central and western Nebraska. Successful hub-and-spoke systems identify optimal routing to and from the drop-off centers and the recycling process center.

There are two primary disadvantages to the hub-and-spoke system, logistics and relationships. From a logistics standpoint, it can be difficult, and sometimes impossible, to develop an efficient routing scheme and schedule for the collection of recyclables. For the system to successfully function, it is imperative that collection routes among the drop-off centers are direct and accommodate the shortest distance possible. Additionally, it is essential that collection frequency maximizes the amount of recyclables available for collection in order to defray costs.

Maintaining a positive relationship between drop-off centers and the recycling process center is another issue of the hub-and-spoke system. These relationships can become complicated because of the number of people involved, the specific needs of each community served, and the support each community must provide to encourage recycling.

Strategy 4: Target Programs

Targeting programs are a relatively new concept and results from increased scrutiny of the municipal solid waste stream. Data from waste characterization studies conducted during the past two decades is facilitating a better understanding of materials present in the waste stream and is being used to target materials for removal. Targeting cardboard for diversion is a case in point. Roll-off containers are now being placed in strategic locations, at shopping centers for example, to capture just cardboard.

Congestion around drop-off locations is one of the disadvantages of this strategy. Another is that organizations and entities other than the local recycling center “cherry pick” high-value recyclables, sell these recyclables, and pocket the funds. This process circumvents the local recycling center and affects the revenue it can generate. Taking a high-value material out of the waste stream before it reaches the recycling center can be devastating as it can cause the center’s operation margins to precipitously decrease. Many times, recycling centers rely on the income generated through the sale of high-value recyclables to fund its processing of less valuable recyclables. Diverting high-value recyclables away from the recycling center can result in the center’s ultimate failure and the loss of recycling services for a community.

SUCCESSFUL PARTNERSHIP STRATEGIES

Successful recycling partnerships require mutual respect and collaboration among all partners. Participants must rely on each other and commit to opportunities presented through the partnership. Implementing the strategies outlined below can boost a partnership’s success. These strategies provide a disciplined avenue to partnering, assist in maintaining trust among participants, and encourage the partnership’s ultimate success.

Strategy 1: Select Mutually-Beneficial Partners

In recycling, the most important considerations for identifying partners include:

- understanding partners’ access to the materials and each partner’s integration with the markets;
- finding partners who can bring the elements of the materials and markets together;
- cultivating an appreciation of partnerships that foster loyalty and longevity in a volatile market; and
- vetting partners to ensure long-term compatibility and commitment.

Strategy 2: Share Information that Fits the Circumstance

A successful partnership relies on sharing information. This sharing is based on:

- identifying the type of information needed;
- determining how information will be shared among partners;
- recognizing the specific uses of the information; and
- insuring the focus of the partnership and utilization of information are in sync.

Strategy 3: Evaluate the Risk/Reward of the Partnership

In any partnership, a clear understanding of the level of risk at stake and the size of the possible risk must be considered. For many recycling operations in Nebraska the risks or rewards include:

- financial and staffing risks of partnering;
- each partner's commitment to the community and region;
- partners' obligations to utilize existing infrastructure; and
- the level of education, experience, and commitment each partner brings to the relationship.

Strategy 4: Understand and Agree on a Market Approach

In a partnership, all parties must understand what is expected relative to the markets and material movement. To this end, they need to:

- agree on changes to the existing situation of each organization or participant to advance the partnership;
- clearly voice their expectations;
- agree on how to approach the recycling market;
- maintain a clear understanding of their obligations;
- understand the anticipated risk; and
- understand the expected reward.

Strategy 5: Develop a Mutual and Flexible Approach

With recycling partnerships, it is important that all partners:

- agree and commit to providing the information needed to successfully operate;
- specify what information is needed and agree that this information will be shared among the participants;
- determine how success and failures will be measured;
- stipulate how profits or losses will be distributed; and
- identify how any partnership plans, programs, or adjustments will be handled and approved.

Partners' willingness to share information, adjust as situations evolve, and facilitate positive outcomes are essential for successful recycling partnerships.

REGULATORY AND STATUTORY OBSTACLES

The State of Nebraska has prepared a guidance document, *Permitting and Operating Compost Sites (In Accordance with Title 132 Regulations)*. This guidance document is designed to present information on the regulatory aspects of composting and the procedures and responsibilities that accompany the operation and ownership of a composting operation.

Although there are limited rules or regulations specifically designed for recycling, the systems for collecting and processing recyclables are quite active in the state and encouraged by the Nebraska Department of Environmental Quality. Because the rules and regulations related to recycling are not extensive, obstacles to increasing recycling, from a state regulatory perspective, are slight. In turn, local codes/ordinances/regulations can potentially impede certain recycling efforts by limiting where these operations can operate or place drop-off bins. Further, impacts to increasing recycling in Nebraska are driven by the state's characteristics. For example, the distances between communities and processing facilities, the cost to transport recyclables, and the markets for the recyclables can be formidable obstacles.

The impact of regulations on composting is more significant, but not excessive. The guidance document, *Permitting and Operating Compost Sites (In Accordance with Title 132 Regulations)*, clearly describes the regulations and procedures to undertake to meet these regulations. As with recycling, the proximity to markets, or end users, does impact the quantity of compost generated and its availability within the state.

Important in the establishment and successful operation of a composting facility is the education and training of compost operators. Vital to the success of composting is access to both educational tools such as seminars and training videos as well as outreach from NDEQ staff or others. The success of the compost programs is providing a strong educational base that is supported by continuing training and on-site support.

CONCLUSIONS AND POINTS OF DISCUSSION

While the industries are intimately related, the contrasts between recycling and composting warrant examination. The logistical challenges of transportation, market management and siting are magnitudes less in composting than recycling. A composting facility, once sited and built, often operates under inertial force. These concerns, transportation, siting, and market management, are ever present in recycling.

Recycling and composting both present many issues which require consideration and resolution. For example:

- How are costs to be controlled or reduced to make recycling a break-even proposition?
- With the potential increase in food waste entering composting operations, how will odors be controlled?
- Are there methods where local governments can be more involved in transporting or marketing recyclables without negatively impacting private enterprise?
- Although not available throughout the entire state, can wood chipping and the sale of wood chips be a part of composting operations?
- How can the state be more aggressive in motivating commercial and industrial business to recycle more cardboard and metals?
- Should a determination be made as to the impact of having grass clippings included or excluded from compost operations?
- Should the state conduct a survey to determine the level of interest in placing recycling facilities in all parts of Nebraska?
- Should compost from public composting operations be offered for sale at garden shops, grocery stores, and home improvement stores?
- Should the state establish goals for recycling and provide incentives to meet those goals?
- If a compost operation has excess compost, can it provide the compost to area farmers?

In recycling and composting, resolution of today's issues historically results in producing a new group of issues. With a concerted effort by all parties and a commitment to the recycling and composting processes, these programs can thrive and provide improved services and options in the areas they serve.

MATERIALS MANAGEMENT

Materials management, as it relates to the recycling system established in Nebraska, involves the collection, processing, and shipment of recyclables. This same system can also be tied to the collection, transport, and disposal of solid waste. In both instances, the material is collected or received from a generator, transported by truck, wagon, cart, or similar method, and delivered to a processing or disposal facility. Both systems attempt to complete the process as efficiently as possible.

Recycling materials management begins where recyclables are accumulated for collection. This point can be a: (1) trailer with compartments where a variety of recyclables are sorted and placed; (2) building with a series of chutes where various recyclables are inserted; or (3) cart where users place a variety of recyclables and then place it at the curb. In each case, recyclables are captured and the process of returning the recyclable to a raw material state is begun.

Once captured, collected, and delivered to a recycling facility, management of the recyclable material begins. Here, the materials are processed before they are shipped out for final processing or further sorting. Depending on the layout of the recycling facility, the material may be processed through as many as ten steps. The materials are:

- pre-sorted where they are separated into major components such as plastics, paper, and metals;
- sorted again to further segregate them into categories such as newsprint or white paper, HDPE or PET plastics, aluminum or tin;
- screened to remove contamination, which may consist of food, soils, or different materials fused together;
- sent through a trommel or similar device to remove any other non-desirable contaminants;
- placed in a bin with other like materials;
- accumulated in the appropriate bins until a sufficient quantity is assembled;
- moved from the bins to a packaging location once the quantity of material has reached a predetermined volume or weight;
- placed in gaylords, plastic tubs, or possibly baled;
- packaged and moved to storage; and finally
- moved to a loading location where they are placed on a truck, boxcar, or container for final shipment.

The ten-step process described above can vary dramatically from recycling center to recycling center. Several factors can affect the process and include the:

- size of the facility;
- age of the facility;
- geographic size of the facility's service area;
- population within the facility's service area;
- level of commitment to recycling in the facility's service area;
- availability of funds;
- availability of staff; and
- distance to the nearest material recovery facility or mill.

Subsequent sections of this paper present: (1) an assessment of the Best Management Practices (BMPs) utilized in adjoining states and their applicability in Nebraska; (2) potential strategies to move from waste management to waste prevention; and (3) possible methods for manufacturers to move toward zero waste landfilling.

BEST MANAGEMENT PRACTICES FOR MATERIALS MANAGEMENT

Best management practices (BMPs) from seven states was evaluated to determine how operations in these states compared to Nebraska. The seven states are Iowa, Missouri, South Dakota, Wyoming, Colorado, Kansas, and Minnesota. Ten BMPs were identified for possible implementation in Nebraska. These BMPs, along with their potential value and disadvantages, are presented in Table 1.

**TABLE 1. ADVANTAGES AND DISADVANTAGES OF IDENTIFIED
POTENTIAL BEST MANAGEMENT PRACTICES FOR MATERIALS MANAGEMENT**

Best Management Practice (BMP)	Value of the BMP	Disadvantage of the BMP
Establish a sustainable purchasing program for businesses and public offices in the community.	Good stewardship Potential increases in recycling	Keeping the program active The potential level of effort required to maintain high sustainability levels
Locate green-painted dumpsters, with "Recyclables Only" printed on each side, in alleys in the commercial sections of the community.	Commercial businesses have easy access to a dumpster for recyclables Recycling centers have access to more recyclables	The cost of dumpster maintenance Potential for Contamination
Modify recycling collection trailers to allow more flexibility in the size of each bin.	Accommodates the collection of varying types and sizes of recyclables	Greater potential for cross contamination resulting from confusion with a bin's size
Monitor the trailer drop-off locations to identify traffic flow and adjust as needed.	The ability quickly adjust to the flow of materials being delivered to the drop-off trailer An early indication of the potential success of drop-off system	The potential cost of monitoring Developing the criteria to determine when a trailer should be moved
Work with large retailers to setup single-stream collection points at the front and rear of the store.	The opportunity to capture a greater volume of selected recyclables Monetary value of materials such as cardboard, white paper, certain plastics, and selected metals	The length of time the container may need to be placed at the store Increased risk of contamination and need to clearly mark which container is "trash" and which container is "recyclables"

TABLE 1. (continued)

Best Management Practice (BMP)	Value of the BMP	Disadvantage of the BMP
<p>Arrange collection trailers so smaller recyclables can be collected in removeable bags or boxes</p>	<p>Easier unloading from the trailers</p> <p>Safe and efficient speed in which the recyclable can be removed from the trailer</p>	<p>Additional manhours due to time required to remove the box or bag from its container</p>
<p>Take a census of the materials received during each quarter and determine which materials should be targeted for greater marketing and which materials do not need as much emphasis.</p>	<p>Recognizing the ebb and flow of the quantity of materials throughout the year</p> <p>Recognizing the need to direct attention to collecting more materials that may be lagging in volume or weight</p>	<p>Identifying a balanced method to encourage, rather than dissuade, increasing the volume of recyclables collected</p>
<p>Establish a traffic pattern at recycling facilities and use maps and floor markings to demarcate traffic directions and control points.</p>	<p>Increased safety</p> <p>Reduction in the number of accidents</p> <p>More efficient movement of materials</p>	<p>Applicability at certain recycling centers, some of which are small enough that an established traffic pattern is not needed</p>
<p>Store fiber using the first in first out (FIFO) inventory plan to maintain the material's quality.</p>	<p>Increased monetary value of fiber materials being sold (cleaner and fresher fiber materials command higher prices)</p>	<p>Attempting to time market swings and the inflow of fiber materials</p> <p>Risk of holding material too long or selling too soon</p>
<p>Take quarterly photographs of the recycling facility to note changes and to identify problem areas.</p>	<p>Photographs could be utilized to: track the changes in the facility; document issues with the facility's operation and record how these issues were addressed; recognize workers; and record visitors to the facility.</p>	<p>Failure to document the photographs and to share photographs with staff, visitors, and regulators</p>

STRATEGIES TO SWITCH FROM WASTE MANAGEMENT TO WASTE PREVENTION

Waste prevention activities have been undertaken in the United States and Nebraska for many years. The Keep Nebraska Beautiful Material Exchange Program, reuse of bottles, donating clothing to charity organizations for sale or re-distribution to others, sending food waste to compost facilities, and recycling a variety metals, paper, and plastics are all examples of waste prevention. Interest in expanding waste prevention activities and techniques is growing as recycling and reuse programs continue to be successful at diverting materials from disposal. In Nebraska, waste prevention activities encompass recycling metals, paper, and plastics, as well as construction and demolition materials, appliances, automobiles, and other manufacturing and transportation equipment.

Some strategies can be employed to foster a stronger commitment to preventing waste rather than managing waste. The first of these strategies is to emphasize using the term "waste prevention", which will re-focus attention away from "waste management" and toward a more positive outcome – environmental improvement.

This effort to alter attitudes relative to waste could be coupled with establishing new and expanded educational programs. Using previous education programs as a basis, these new programs could focus on keeping waste out of solid waste collection vehicles, which results in preventing it from being disposed in landfills. Education could emphasize diversion techniques that can be implemented at the household level and the positive outcomes of waste prevention.

Expanding education programs to include all waste generators is critical. Along with programs directed toward individuals, it is imperative that commercial waste generators are likewise educated. These generators should be supplied with information that provides actionable techniques to prevent waste generation.

Employing education programs at the individual and business level that emphasize waste prevention rather than management can re-direct attitudes about waste. Attitudinal shifts about waste should open opportunities for the introduction of more aggressive waste prevention techniques specifically tailored to circumstances Nebraskans face.

METHODS FOR MANUFACTURERS TO MOVE TOWARD ZERO WASTE LANDFILLING

Over the past 20 years, many U.S. manufacturers have adopted methods to send minimal or zero waste to landfills. Molson Coors Brewing Company, Proctor & Gamble Company, Nestle USA, Unilever North America, and Cargill, Inc. have all embraced the zero-waste-to-landfill approach. Techniques these companies employ are tailored to their unique manufacturing processes coupled with methods that are common among many manufacturers in a range of industries. Some examples of these techniques include:

- Molson Coors Brewing Company connected all floor drains to a common drain that then connects to a treatment pond system that filters the water and removes the solids. The water is then recirculated to the plant while the solids are screened and segregated for use as road base, soil enhancement, and fines for use in concrete mixes.
- Unilever North America places bins at each press to collect metal scraps. Bins are labeled to allow for segregating the metals. All metals are either reused through an on-site reconditioning plant or shipped to other plants for reuse.
- Cargill Inc., captured the fats and tailings from meat processing activities and renders them for use in gelatins and soaps.
- Nestle USA eliminated plastic wrap for shipping purposes and utilizes cardboard and paperboard for containers.
- Proctor & Gamble Company established collection bins for white paper, colored paper, packaging, and miscellaneous wastes on each floor of district offices. Miscellaneous papers are shredded and utilized for packaging.
- At a Nestle USA plant all floors are covered with a mix of paper and wood that is ground to a coarse consistency. This mixture is swept up at the end of each production day and sent to an on-site compost operation.
- A subsidiary of Proctor and Gamble Company collects the mixed paper cut from documents generated each day and sends this material to a recovery facility located adjacent to the printing plant.

CONCLUSIONS AND POINTS OF DISCUSSION

The management of materials involves controlling and diverting materials from being disposed and identifying options to repurpose or recycle these materials. The extent of the options depends on the value and availability of a diverted material along with its flexibility for reuse.

Recycling and waste recovery programs rely on their ability to manage and control materials. The collection, storage, and packaging of recycled materials are integral to successful materials management. Controlling inventory and addressing aging materials impact the success of any recycling or waste reduction operation. Proper control and materials management are critical for a successful operation.

Issues relating to materials management vary with the type of material and the goals of a recycling or waste reduction program. Important issues to consider for successful materials management include:

- balancing storage space and aging inventory;
- finding reliable and consistent buyers;
- recognizing fluctuating markets for materials;
- meeting the interests of the public and the agencies supporting and/or directing the recycling facility;
- developing a sound business plan;
- pinpointing opportunities to team or establish a joint venture with other recyclers to handle and market certain materials;
- identifying methods to utilize or repurpose materials with low market value; and
- utilizing public education programs to control material flow and promote material reuse.

INFORMATION

Present recycling programs in the State of Nebraska have evolved into sophisticated programs. Recovered materials are viewed as commodities, bought and sold throughout the nation and rest of the world.

A key component of this industry is the financial support the Nebraska Department of Environmental Quality (NDEQ) and the Nebraska Environmental Trust (NET) have provided for various recycling programs in Nebraska. This financial support has helped fund the state's recycling infrastructure and aided in its growth. Similarly, the amount of material removed from the waste stream and collected via these recycling programs has grown dramatically.

One of the concerns about the present recycling efforts conducted throughout the state is the lack of comprehensive data regarding these endeavors. There is no centralized program to collect information pertaining to the amount of recyclable materials collected through drop-off centers and/or curbside collection. This issue paper identifies the value of thorough information and comprehensive, statewide data relative to recycling.

STATEWIDE ISSUES

The State of Nebraska, through NDEQ, has assisted with funding for recycling programs since 1979 (Nebraska Revised Statute 28-523). These funds are generated through three sources: (1) a business fee; (2) a tire fee; and (3) 50% of the \$1.25 per ton disposal fee. In addition to funding available through NDEQ, the Nebraska Environmental Trust, which was established in 1992 and is funded through the Nebraska Lottery, provides grants for recycling programs. Neither organization collects thorough information relative to the types and quantity of materials recovered and recycled throughout Nebraska.

Without more robust data, it is not feasible to identify what impacts the grant programs have had on recycling in the state. Further, there is no opportunity to assess how recycling has improved year over year, or what materials are being collected.

NEED FOR INFORMATION

Comprehensive state recycling data would facilitate an annual review of the various recycling programs, assist in identifying successful and unsuccessful strategies and programs, and provide the opportunity to focus funding to improve the success rate of recycling operations and programs.

In addition, more information is needed regarding the marketing of the recyclables. With limited information, it is difficult to recognize problems or issues with the marketing of recyclables. Reliable, accurate, and comprehensive data would aid in more easily addressing issues, responding to fluctuating markets, and adjusting programs to meet the changing materials and markets.

The state currently collects tonnage data from all solid waste facilities. This data is a robust resource for the same tracking and projections desired in state recycling. While the recycling industry may be more complex, by means of material tracking and reporting, the precedent and basic infrastructure is already in place and utilized in a related arena.

TYPES OF INFORMATION

Recycling is a sophisticated industry, and appropriate analysis of the industry requires a likewise sophisticated database. Some potential datasets for this database include:

- types of material;
- monthly, quarterly, and yearly quantities of material (weights and volumes);
- age of the material;
- method of collection;
- method of transport;
- material buyers; and
- material values.

Information identified in this list is needed to determine trends, identify fluctuations in material collection, anticipate future recycling program needs, and ascertain the frequency specific materials are found in the waste stream. This information could also be used to evaluate: (1) variations in waste disposal options in different areas of the state; (2) differences between urban and rural recycling and disposal operations; and (3) unique materials generated by specialty manufacturers or agricultural endeavors.

PROTECTION OF INFORMATION

As information is collected, it will be imperative to recognize what information recycling facility owners, managers, and operators consider proprietary. It will be essential to establish database controls that maintain confidentiality and that the data collection team and facility operators respect this confidentiality. There are a variety of methods to control the security and confidentiality of information. Some examples of these methods include:

- eliminating the use of any specific facility names;
- assigning random, unique numbers to each facility;
- protecting the portal to allow for discreet data submittal;
- utilizing protected spreadsheets; and
- using protected files to segregate data.

As important as it is to protect the data, it is also important that the information provided is as complete and accurate as possible. To this end, establishing a data format that allows for consistent and comparable data to be collected should be considered.

CONCLUSIONS AND POINTS OF DISCUSSION

The ability to access information relative to recycling programs operating within Nebraska would allow NDEQ and NET the opportunity to develop a clearer picture of the impact of their investments in the state's recycling efforts. More importantly, with more comprehensive data available, detailed analyses can be conducted that provide a more thorough understanding of the industry for all stakeholders.

The ability to have a reliable and steady flow of information regarding recycling efforts in Nebraska would also provide insight into potential waste reduction efforts as well as the possibility to quickly address changes in recycling generation and recycling markets. Access to recycling information should also facilitate the development of long-term plans and strategies that can further aid in increasing waste reduction, recycling, and reuse efforts in the state.

There are several issues that will need to be addressed in order to reach a point of collecting consistent and reliable information. Some of these issues include:

- establishing a secure method of collecting information;
- requiring recycling programs to regularly report specified data regarding their programs;
- creating formats to present useable and understandable information and data;
- presenting data in a manner that does not identify any program as a winner or loser;
- making electronic equipment available to securely submit data;
- establishing a system to share information on markets and transportation opportunities;
- developing a system to share techniques to optimize the collection, sorting, storing, and transporting of materials;
- providing on-site training; and
- establishing an annual gathering of recyclers to disseminate information and conduct training.

An issue that was consistently echoed during recent site visits conducted as a part of NDEQ's Solid Waste Management Programs Study was the volatility of the recycled materials markets and fluctuating transportation costs. Some recycling operations are wholly dependent upon receiving funding through the state's annual grant programs. This limits their ability to conduct future planning; and retaining staff is a continual problem. These issues are paramount for many of the state's recycling operations and programs.

GRANT PROGRAMS

The Nebraska Department of Environmental Quality (NDEQ), and the Nebraska Environmental Trust (NET) have provided grants for recycling and waste reduction throughout the state. During this time, many recycling facilities have received financial support to purchase equipment, hire and retain staff, acquire working space, and educate the public on recycling and waste reduction issues.

Grant programs garnered much discussion during the recent interviews conducted with recycling operators located throughout Nebraska. Interviewees largely agreed that the grant programs provided by NDEQ and NET were essential for the establishment and growth of their programs. Some of the organizations noted that without these grant programs, their operation would likely not survive.

This issue paper addresses Nebraska's present recycling and waste reduction grant programs and considers:

- expanding those activities eligible for grant award;
- awarding grants more frequently; and
- utilizing loans with zero percent interest or a state revolving loan program.

EXPANSION OF EXISTING GRANT PROGRAMS

As noted previously, the State of Nebraska has provided grants for recycling since 1979. This financial support increased dramatically in the early 1990's with the advent of a grant program funded from the \$1.25-per-ton fee placed on all solid waste disposed in Nebraska municipal landfills. The Nebraska Environmental Trust Fund, which provides grants for recycling program support, was also established in the early 1990's.

Recyclers greatly appreciate the funds available via grants programs; however, they also voiced their opinion that the amount of funding should be expanded to allow for acquiring more equipment, training, and staff. In addition, several recyclers voiced their desire for assistance from NDEQ regarding the sale of recyclables and identifying more-favorable transportation options.

There is a lack of consensus among the interviewed recyclers about expanding activities eligible for grant award. However, there is agreement that if materials to be accepted for recycling are increased or the mandatory recycling of certain materials is implemented, then an expansion of the grant program will be needed.

The landfill tipping fee of \$1.25 per ton is currently split equally (50% each) between grants and NDEQ waste programs. It has been considered that more of the funds should go to the latter programs and less to grants, or raise the tipping fee to better accommodate both the programs and grants.

Consideration should be given to increasing the landfill tipping fee. The tipping fee was established in the early 1990's and it has not been increased since its inception. The impact of inflation has decreased the value of the tipping fee to less than \$0.75. In addition, a case could be made that an increased tipping fee is justified as the number of solid waste facilities has significantly increased, and the dramatic increase in recycling and waste reduction programs is straining present fund levels. Further, an increased tipping fee could facilitate expanded recycling collection and processing in the state which, in turn, could increase waste diversion.

FREQUENCY OF GRANT AWARDS

Presently, grants are awarded once a year; however, the various grant programs do not award funds at the same time during the year. NDEQ has considered combining programs and then awarding grants more often or even continuously, which raises the issue of the availability of funds throughout the year.

Increased frequency in awarding grants would allow NDEQ to react more quickly to the need of grantees and other issues that may occur. The grant application award and review process may need to be shortened if grants are distributed more frequently. The recently-implemented online process should aid in shortening the application and review processes. However, it is important to note that this online process is a statewide system designed to do a variety of things and it may need to be modified to more specifically address the grant application and award process.

An alternative to more grant award dates would be making all grant award dates the same. This approach may simplify the grant process and allow for consolidation of grant programs. The major difficulty with this approach is that the various programs were created at different times, with different legislation and different funding sources.

Treating common similar requests the same and awarding them on a less onerous basis should be considered. For example, all litter cleanup, or all household hazardous waste (HHW) collection events might be handled on an almost automatic basis. This approach would allow for a more rapid grant response and addresses similar programs at once.

ESTABLISHMENT OF A LOAN PROGRAM

There has been discussion over the years regarding the use of loans to support recycling and waste reduction programs. Discussion has ranged from deleting the matching funds requirement, to increasing matching fund requirements. In addition, there was consideration to providing loans with or without interest. Past experience with loans included awarding funds to the Nebraska Energy Office, who in turn loaned out the funds for various waste reduction activities. These loans were usually for projects tied to energy savings.

One of the biggest issues with loans is the perceived increase in the work load required for administration. The loan process could create more work for NDEQ personnel who would have to obtain new skills along with an increased commitment of time. This concern is driven by the likelihood that the loans would require repayment over several years and thus increase the prospect for either renewal or default. If a loan program is considered it would be prudent that the program be administered by the private sector and overseen by a government agency such as NDEQ.

Zero-interest loans would provide organizations access to larger sums of money with less limitations than grant funds. In addition, there is the possibility that these loans could be bought or sold which in turn could reduce the risk for NDEQ. Finally, if the organization receiving the loan is exceptionally responsible regarding loan management and facility operation, consideration could be made for loan forgiveness. Loan forgiveness would be based upon meeting certain criteria, benchmarks, and other parameters.

CONCLUSIONS AND POINTS OF DISCUSSION

The grant programs for recycling and waste reduction in the State of Nebraska have been successful and allowed for the addition of several recycling facilities located throughout the state. The grant programs have facilitated improvements to the environment, established new businesses in every part of the state, and added jobs to the state's economy. These efforts have afforded the State of Nebraska the opportunity to establish a recycling and waste reduction industry that has flourished.

Adjustments to the grant programs described in this issue paper are considered enhancements and not wholesale changes. Each of the potential enhancements has certain aspects that could enable improvements and further expansion of recycling and waste reduction programs in the state. Any changes to the present grant program process should be carefully thought out and gradually introduced.

Some issues facing grant programs relative to the programs' operations include:

- developing a single application for grants from any of the granters;
- attaining long-term commitments to the waste hierarchy through more consistent public education;
- implementing procedures that result in site visits to each facility, community or county that has received grant funding within 12 months of grant award;
- identifying long-term funding for grant programs and protecting this funding from uses not consistent with the purposes of the grant programs;
- linking the submittal of data to NDEQ with access to grant funding;
- expanding grant support for household hazardous waste programs;
- clearly identifying the needs and not wants of a particular program; and
- establishing a format that highlights the grantees.

LANDFILL BANS

Banning specific wastes from disposal in municipal solid waste (MSW) landfills is typically considered for two reasons. The first reason is that the banned material is either potentially dangerous or may adversely impact the operation of the landfill. For example, acid-lead batteries are a potentially dangerous material and are banned from disposal in MSW landfills. Similarly, tires are statutorily banned from disposal in MSW landfills. The disposal of these materials, and other similarly dangerous materials, in MSW landfills can adversely affect the environment as well as the facility's operations. The second reason for banning a material from a MSW landfill is that it may have potential for beneficial reuse or recovery, yard waste, for example.

The State of Nebraska waste hierarchy emphatically emphasizes banning or diverting as many wastes as possible from landfills. A stronger emphasis on removing more materials from the solid waste stream has resulted as recycling and waste recovery programs throughout Nebraska have flourished. This has put pressure on state and local entities to implement bans on certain materials entering the municipal solid waste landfills. This issue paper considers the need for increasing or decreasing the number of bans at municipal solid waste landfills in Nebraska and identifies possible methods to enforce these bans.

PRESENT MATERIAL BANS

The following materials are banned from being disposed in municipal solid waste landfills in Nebraska:

- Yard Waste (April 1 to November 30)
- Waste Oil
- Lead Acid Batteries
- Household Appliances
- Unregulated Hazardous Waste
- Waste Tires

Most of these banned materials either contain hazardous materials or are problematic for the proper operation of the landfill. Although a definitive study of the success of these bans at Nebraska landfills has not been conducted, anecdotally it does appear that the bans have had an impact on landfills and reduced the amount of these banned materials from entering landfills.

IMPACT OF PRESENT MATERIAL BANS

As noted previously, the impact of banning certain materials from municipal solid waste landfills in Nebraska has not been thoroughly evaluated. However, it does appear that waste generators and landfill operators have been successful in keeping banned materials out of the waste stream. A major force in the success of these bans is their longevity. For example, yard waste, household appliance, and tire bans have been in effect for around two decades. The yard waste ban was implemented in 1994; the ban on household appliances began in 1995. A tire ban was established in 1995 with an exception for properly processed tires; in 1998 all tires were banned from landfills. During this time, a generation of Nebraskans have grown up knowing only these bans.

POTENTIAL MATERIAL BANS

Banning a material from municipal solid waste landfills should not be undertaken without thorough evaluation. It is important to consider the impact the ban may have on both residential and commercial waste generators and avenues for safely collecting and disposing of the material.

There are two types of materials banned from disposal in MSW landfills: (1) materials that pose a hazard to the community, landfill, or environment; and (2) materials that have the potential to be beneficially reused or recovered. The first type of materials pose public health and/or operational issues for facilities. As noted previously, most of the bans implemented in Nebraska encompass these materials.

The second type of ban identifies materials that can be taken out of the landfill and either recycled or reused, for example the state's present yard waste ban or the forthcoming ban of the disposal of cardboard at the City of Lincoln's landfill. In both cases the banned material can be recycled (e.g. cardboard) or beneficially utilized (e.g. yard waste).

Implementing new landfill bans should be driven by safety or opportunity issues. Safety issues are currently an integral part of the regulatory framework. Environmental regulations allow certain materials, liquid or solid, to be banned from entering landfills in the state. Constituents usually accept these types of bans as a matter of course as the danger of the materials is easily recognized.

Landfill bans driven by opportunity issues are more involved. Implementation of these bans requires informing and educating the public and businesses as to the value of the ban as well how the banned material will be handled. In addition, alternatives to disposing the banned material must be provided. These alternatives can encompass a variety of options – providing drop-off locations, separate collection at the curb, or separate collection bins for large generators.

As noted previously, an example of an opportunity-issue type of ban is the cardboard ban that was recently approved for implementation by the City of Lincoln. This material will not be banned from the City of Lincoln's landfill until 2018. It is anticipated that between now and the implementation date in 2018, the City of Lincoln will prepare an aggressive public education campaign as well as establish locations to drop-off cardboard.

Potential landfill bans may include many materials, each of which possess certain value or disposal problems. In either case the need to establish an infrastructure to accommodate each ban should be in place and properly functioning before the ban is in full force.

POTENTIAL OF BANNED MATERIALS

Experience gained from more than 20 years of recycling and recovering a variety of materials along with the growth of the recyclables and reuse market makes it possible to determine a banned material's potential value. In addition to the material's possible value, it is important to recognize the level of effort needed to collect the material. Table 1 presents an evaluation of a material's potential value if it is removed from the solid waste stream together with an assessment of the volatility of the market for the material. Two elements comprise the rating of a material's potential value, the material's consistency and its availability; market volatility is based on the stability of the material's value and fluctuations in the value of the material.

TABLE 1. POSSIBLE BANNED MATERIALS AND POTENTIALS

Material	Potential Value	Market Volatility
Cardboard	Excellent	Limited
Aluminum	Excellent	Limited
Newsprint	Very Good	Potential
Plastics	Good	High
Food	Good	Limited
Construction and Demolition Debris	Good	Limited
Glass	Fair	High
Other Metals	Fair	Potential
Other Paper	Fair	Potential
CRT	Limited	High
Televisions	Fair	Fair

Of the materials presented in the table, those that are most reliably found in the municipal waste stream and have the most stable marketability are aluminum and cardboard. These two materials are most in demand in the commodity market and the market for these materials has been the most stable from year to year. Further, these two materials are consistently found on the list of materials collected by recycling operations.

Other than these two materials, the remaining materials presented in the table vary in both availability and potential value. Newsprint, for example, has been diminishing in availability as the interest in newspapers as a primary source of information has declined. In addition, given the potential options for uses of newsprint the value of the material is in flux.

Plastics provide another example of a material that can be recycled but its accessibility and value varies significantly. From an accessibility perspective plastic can be very easy to recycle. The complication with plastics is the ease of segregating plastics into specific types. Even the most common plastic containers, PET and HDPE, can be challenging to successfully segregate as they often contain plastic materials that are not PET or HDPE.

Shipping and storing plastic materials presents another challenge. Although some plastics can be baled using a standard baler, there are other plastics that are either too rigid or too flexible to easily bale. Other methods such as the use of gaylords or heavy-duty bags are often utilized for these types of plastics. When gaylords or bags are used, the amount of space these plastics consume increases which, in turn, increases shipping costs.

When the commodity market demand for plastics is down, the issue of storage and material degradation become more prevalent. Some plastics, including PET and HDPE, have limited life and are susceptible to degradation from deformation, temperature, and light.

The success or failure of banning a specific material from MSW landfill's is ultimately dependent upon the material's long-term value or long-term risk. In either case the decision to ban a material from MSW landfill's must be clearly thought out and evaluated to ensure there are alternatives in place for the material's final disposal or reuse. If alternative options for disposal or reuse are not available, the banned material may become a burden on both the economy and environment.

ENFORCING MATERIAL BANS

Successfully banning certain materials in MSW landfills relies on effectively communicating the reasons for banning a specific material and the ban's value to the public, and providing alternative options for disposing or reusing the banned material. Education campaigns through the schools, radio, television and social media, public hearings, and signage at landfills are the most prominent methods for educating the public. In addition, working directly with waste generators to develop alternative methods to dispose of or reuse the material affect a ban's success or failure. Further, emphasizing the health and safety reasons for banning a material from being disposed at MSW landfills together with the consistent reinforcement of this message are crucial in the success of any ban.

The best example of the enforcement of bans is the success the Nebraska Department of Environmental Quality (NDEQ) has had with present landfill bans. The measures NDEQ has taken to make these landfill bans successful should be followed if new bans are considered for implementation.

CONCLUSIONS AND POINTS OF DISCUSSION

The potential to utilize landfill bans to remove selected materials from landfills is a relatively new concept. Historically, landfill bans have been utilized to control the disposal of hazardous or dangerous materials in municipal solid waste landfills.

Utilizing landfill bans to remove recoverable materials from the waste stream will require a similar infrastructure as has been established for hazardous materials banned from disposal in MSW landfills. Alternatives for accepting a banned material must be in place; a regular public awareness and education program needs to be undertaken; changes in the operation of landfills and the collection of wastes to ensure the banned materials are being captured must be implemented; and a conduit to recycling facilities to process and market the material must be established.

Along with identifying specific materials that would be beneficial to ban from MSW landfills, the following issues need to be addressed.

- What new public education programs are needed?
- What alterations to the present recycling system will be required?
- What level of funding will be needed to assist recycling facilities to prepare for the influx of the banned material?
- What preparations for the ban will be needed and/or required at the municipal solid waste landfills?
- What role should the Nebraska Department of Environmental Quality play in assuring the ban is effective?
- What adjustments to the recycling and waste reduction grant programs will be needed?

Although the issues listed above are not the only aspects of a material ban to be considered, these issues do identify the breadth of the elements and concerns that need to be addressed. When considering the implementation of a landfill ban it is important to recognize that impacts of such a ban will create a series of winners and losers across the state. These groups must be carefully handled and respected to ensure the endeavor's long-term success.