BURNS McDONNELL

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS

White Goods Recycling and Disposal

Solid Waste Management Administration and Solicitation Support

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1.0 Introduction

White goods, commonly known as large household appliances such as refrigerators, washing machines, dryers, and air conditioners, play a significant role in modern life. However, when these appliances reach the end of their useful life, they present a unique set of disposal challenges due to their size, weight, and the presence of hazardous materials like refrigerants and oils. Improper disposal can lead to environmental degradation, health risks, and missed opportunities for resource recovery.

According to the Association of Home Appliance Manufacturers (AHAM)[1], white goods are among the most recycled products in the United States. Despite a high recycling rate, communities still face challenges in managing the disposal and recycling processes efficiently and safely.

This white paper aims to provide guidance for city managers and personnel within the North Central Texas Council of Governments (NCTCOG) communities on best practices for disposing of and recycling white goods.

2.0 Current Landscape of White Goods Recycling in the United States

The United States has made significant strides in recycling white goods, with the AHAM reporting that nearly 90% of major household appliances are recycled annually. This success is primarily driven by these appliances' valuable metals and materials, which create strong incentives for scrap metal dealers and recyclers to recover them. Despite this progress, challenges persist. Many communities face limited accessibility to convenient drop-off locations or curbside pickup services for bulky items. At the same time, a lack of public awareness about proper disposal methods hampers participation in recycling programs. Additionally, illegal dumping remains a concern, posing environmental hazards and financial burdens on municipalities. Addressing these challenges presents opportunities to enhance white goods recycling, such as improving hazardous materials handling and expanding infrastructure in under-resourced areas.

2.1 Regulatory Framework

Federal, state, and local laws govern Texas' white goods management regulatory framework. States play a leading role in ensuring that federal regulations are met and that they may set more stringent requirements. Here is an overview of key elements of the framework:

- Federal Regulations
    - Resource Conservation and Recovery Act (RCRA)
        - Under RCRA, the U.S. Environmental Protection Agency (EPA) regulates hazardous and non-hazardous waste management and disposal. Hazardous waste components are found in some white goods.

[1] AHAM Home

        - In the absence of an approved state program, the federal requirements must be met.
- Texas State Regulations
    - Texas Commission on Environmental Quality (TCEQ):
        - TCEQ oversees the transportation and disposal of municipal solid waste (MSW), which includes white goods.
        - The agency provides technical guidance for MSW permits, including recycling and disposal.
    - Texas Administrative Code (TAC):
        - Chapter 330 of the TAC governs MSW collection, transportation, and operational standards for landfills.
        - Rule 330.147 indicates that large, heavy, or bulky items that cannot be incorporated in a landfill's regular spreading, compaction, and covering operations should be recycled. These items include white goods.
- Local Government Regulations
    - Local governments in Texas may have additional rules or ordinances for white goods management, including collection, recycling and disposal.

As listed above, the regulatory framework for white goods management is governed by state and local rules to ensure public health, environmental protection, and efficient waste disposal. The TCEQ sets overarching guidelines for waste classification, handling, and disposal, including regulations on oversized waste. Local governments and municipalities can implement specific collection, recycling and disposal programs. These programs may include curbside collection and drop-off sites. Additionally, regulations emphasize the safe management of hazardous materials, such as chemicals or appliances containing refrigerants.

2.2 Collection Options for White Goods

Effective management of white goods is essential for maintaining clean and sustainable communities. Municipalities and local governments offer various collection options tailored to meet residents' needs while promoting proper disposal and recycling practices. These options include scheduled curbside pickups, on-call or scheduled pickups, designated drop-off centers, seasonal collection events, and combinations of these approaches. Each method addresses unique challenges in waste collection, balancing convenience, environmental sustainability, and resource efficiency.

2.2.1 Scheduled Curbside Collection

Several cities in the NCTCOG offer scheduled curbside collection services to manage white goods. These programs are designed to provide residents with convenient, predictable waste disposal options while reducing illegal dumping. Scheduled collection is also efficient for routing collection services. Typically, these services include specific days, limits on the number of white goods accepted and guidelines. Below are examples of how communities in the NCTCOG manage curbside collection:

- City of Allen: Bulky item collection, including white goods, is collected monthly. Refrigerators, freezers, and air conditioning (AC) units must be refrigerant-free by a professional and the certification tag must be attached. All items must weigh less than 150 pounds.

- City of Dallas: Stoves, washers, dryers and water heaters are included in bulky item collection. This does not include household appliances containing coolant, gasoline or other chemicals, including AC units and refrigerators. The service is offered weekly during regular garbage collection.

2.2.2 On-Call or By-Appointment Collection

Several cities in the NCTCOG offer on-call or scheduled by-appointment curbside collection services to manage white goods. These programs are designed to provide residents with convenient, reliable waste disposal options only when needed. This method reduces unnecessary collections but may require more administrative coordination. Typically, these services include volume limits and guidelines. Below are examples of how communities in the NCTCOG manage on-call curbside collection:

- City of McKinney: Residents can request bulky item collection, including white goods, up to twelve times per year at no additional cost. White goods include residential appliances. Refrigerators, freezers and AC units must have Freon evacuated by a certified Freon removal technician. This must be submitted and verified before the collection date.

- City of Denton: As a resident, up to two bulky items may be scheduled for collection each week for no additional fee. However, any appliance containing polychlorinated biphenyls (PCBs) or refrigerants will be charged an extra fee.

2.2.3 Drop-off Centers

Drop-off centers provide residents with a convenient way to dispose of white goods. These facilities can reduce collection costs but may be inconvenient for some residents. Below is an example of how a community in the NCTCOG manages drop-off centers:

- City of Granbury: White goods containing metal are accepted for free at the Citizen's Collection Station operated by Hood County. This includes washers, dryers, water heaters, and stoves. The facility does not accept appliances containing Freon or chemicals of any kind.

2.2.4 Seasonal Collection Events

Seasonal collection services offer smaller communities a targeted approach to managing white goods. Below are some examples of how communities in the NCTCOG offer seasonal collection events:

- City of Granbury: A bulk trash collection event is held bi-annually. Bulk items include white goods; however, refrigerators, freezers, and AC units must have certification of Freon reclamation.

- City of Ponder: A spring clean-up day is held annually. The event includes appliances (such as washers, dryers, water heaters, stoves, and dishwashers). A licensed agent must tag refrigerators and AC units with a Freon evacuation certificate.

2.2.5 Combination of Services

A combination of services for white goods collection provides residents with flexibility and convenience by integrating multiple disposal options, such as curbside pickup, drop-off centers, and seasonal events. This

approach allows municipalities to address diverse community needs, enhance participation, and promote efficient waste management. Below are some examples of how communities combine services:

- City of Ennis: Bulky items can be scheduled for a 48-hour bulk pick up after being placed at the curb for a fee that depends on how many cubic yards are set out. Ellis County Disposal Landfill offers the City of Ennis residents two free monthly disposal days, including appliances that contain Freon.

- City of Forth Worth: Forth Worth provides monthly curbside collection of bulky items at no extra charge. This does not include appliances that contain coolant, gasoline and other chemicals. White goods, including those that contain coolant, gasoline and other chemicals, are accepted at Drop-off Stations with some limitations on the amount excepted.

- City of Richardson: Bulky collection, including large appliances (washer, dryer, oven, stove, water heater, refrigerator and freezer), is a service provided by request. The city requests residents to limit service requests to eight calls per year for free. Member cities of the North Texas Municipal Water District, including the City of Richardson, may use one of four Citizen Convenience Centers to dispose of metal appliances for free. The service is limited to twice per month.

2.3 Costs Associated with Services

Managing white goods involves various costs that reflect the complexity of collection, processing, recycling and disposal operations. These costs are influenced by collection frequency and methods, the volume and weight of waste handled, and the technologies used for processing, recycling and disposal. Additionally, administrative and overhead expenses and investments in equipment and infrastructure play a significant role in determining overall service costs.

2.3.1 Collection Frequency and Method

As noted above, the frequency and method of white goods collection can range from weekly to monthly pickups to on-demand services based on resident requests. Some municipalities offer seasonal or event-based collections. Methods can include curbside collection and centralized drop-off points for residents to bring their waste. Choosing the right frequency and method involves balancing operational costs, community needs and environmental considerations to ensure effective waste management.

2.3.2 Volume and Weight of Waste

Managing the volume and weight of waste significantly impacts collection strategies, particularly in routing and scheduling. Larger and heavier loads require more sophisticated logistics to optimize collection routes, which can help minimize fuel consumption, labor, and vehicle wear. Additionally, the nature of the waste influences the type of collection equipment needed. Heavier and bulkier items may necessitate more substantial bins and specialized vehicles like grapple trucks equipped to manage large volumes efficiently and safely. Together, these factors play a critical role in the operational planning of waste management services, ensuring both effectiveness and safety in waste collection.

The volume and weight of waste also directly affect transportation costs and operational efficiency. Heavier loads lead to higher fuel costs and can require more trips due to regulatory weight limits on roads, thus increasing the overall cost of waste management. Strategically reducing the volume through compaction or improving waste separation at the source can lead to significant cost savings and operational efficiencies.

2.3.3 Processing and Disposal Methods

White goods collection programs must address proper processing and disposal, with special attention to the hazardous chemicals they may contain. Many appliances, such as refrigerators, freezers, and AC units, rely on refrigerants like Freon, regulated under the Clean Air Act due to their ozone-depleting properties. Certified technicians must safely extract and dispose of these refrigerants before the appliances are recycled or discarded. Additionally, older appliances may contain PCBs, oils, or mercury switches, all requiring specialized disposal to comply with federal and state regulations.

Ensuring that white goods are pre-processed before pick-up or drop-off or processed at certified facilities capable of safely handling and disposing of hazardous substances is crucial for minimizing environmental impact. At the same time, recovering valuable materials such as steel, aluminum, and copper from these appliances can help offset recycling costs and contribute to sustainability goals.

2.3.4 Administration and Overhead Costs

These costs encompass planning, managing, and monitoring waste management operations. They include salaries of administrative personnel, customer service for scheduling and management of on-demand collections, and regulatory compliance, which might require specialized staff or consultant support. Additionally, these administrative costs extend to the management of contracts, which involves negotiating and finalizing terms and overseeing the fulfillment of these contracts to ensure services meet the agreed standards and adapt to changes as required.

2.3.5 Equipment and Infrastructure

Investment in equipment and infrastructure is a significant part of the initial and ongoing costs. This includes:

- *Collection vehicles:* Specialty vehicles adapted to manage bulky items are more expensive than standard waste collection trucks. This includes adding grapple trucks, which are essential for picking up large, bulky waste efficiently, reducing the need for manual labor and enhancing worker safety.
- *Facilities:* Investment in sorting facilities, transfer stations, and recycling centers can be substantial but necessary for efficient operations.

3.0 Strategies for White Goods Management

Communities aiming to enhance the efficiency and cost-effectiveness of their white goods management services can adopt several strategic approaches. These strategies improve service delivery and foster sustainability and community involvement.

3.1 Establish Accessible Collection Programs

Creating convenient collection options is essential for effective white goods management. Curbside pick-up services can make recycling more accessible for residents, reducing the chances of illegal dumping. Municipalities can offer scheduled or on-demand pick-up services, allowing residents to dispose of bulky appliances easily. Smaller communities could require residents to schedule pick-up appointments to maximize efficiency, enabling optimized route planning and better resource allocation.

In addition to curbside collection, centralized drop-off locations, such as transfer stations or recycling centers, provide another convenient disposal method. These locations should be well-equipped to handle white goods and be accessible to urban and rural communities. Clear signage, extended operating hours, and public promotion can further increase participation.

3.2 Collaboration with Certified Recyclers

Partnering with certified recycling facilities ensures that white goods are processed safely and responsibly. Many appliances, such as refrigerators and AC units, contain hazardous substances like Freon, a refrigerant regulated under the Clean Air Act due to its ozone-depleting properties. To minimize environmental risks and comply with regulations, communities can collaborate with certified recyclers to properly handle and dispose of these materials. These facilities have the technology and trained personnel to extract and store refrigerants safely before recycling or disposal.

Some programs may require residents to remove Freon from appliances before pick-up or drop-off. In such cases, municipalities could establish partnerships with licensed HVAC technicians or certified appliance service providers who can remove the refrigerant in compliance with Texas law. Residents should have a list of approved technicians or companies to ensure proper handling. This approach not only safeguards the environment but also streamlines the recycling process, as appliances with Freon already removed can be processed more efficiently.

3.3 Promote Reuse

Encouraging the reuse and refurbishment of white goods can significantly reduce waste and extend the lifespan of appliances. Municipalities can partner with local reuse stores, non-profits, or businesses that refurbish old appliances for resale or donation. Appliances that are still functional or repairable can be diverted from the waste stream, benefiting low-income households and reducing the demand for new products.

3.4 Public Education Programs

Public education is a critical component of successful white goods management programs. Awareness campaigns can highlight the environmental importance of recycling white goods and inform residents about available services. For example, information on hazardous substances and potential risks in appliances can motivate residents to dispose of items correctly.

Communities should also offer clear preparation guidelines, such as removing doors, Freon reclamation, draining fluids, or securing loose parts to make collection safer and more efficient. Outreach through social media, websites, and local events ensures that this information reaches a broad audience, fostering community engagement.

3.5 Regulatory Measures and Incentives

Regulatory measures and incentives can enhance white goods management by ensuring proper disposal, promoting recycling, and reducing illegal dumping. Strong regulations establish clear compliance requirements, while incentives encourage consumer participation in responsible appliance disposal.

Municipalities can create a comprehensive waste management strategy that supports environmental sustainability and reduces landfill waste by implementing local policies, financial incentives, and manufacturer take-back programs.

3.5.1 Local Regulatory Measures

Strong regulatory frameworks can support white goods management by ensuring compliance and accountability. Policies can require residents or businesses to provide proof of proper disposal or recycling through receipts or permits. Regulations should also include penalties for illegal dumping to deter improper disposal and offset cleanup costs.

3.5.2 Incentive Programs

Incentive programs can encourage residents to participate actively in white goods recycling initiatives. Offering rebates or discounts on purchasing new appliances when old ones are recycled is an effective way to motivate consumers. Similarly, providing utility bill credits or vouchers for other community services can make recycling programs more appealing and accessible. These incentives reduce the financial burden on residents while promoting environmentally responsible behavior. Municipalities can partner with local businesses or utility companies to implement these programs, ensuring a broad reach and maximizing their impact.

3.5.3 Take-Back Programs

Engaging manufacturers through product stewardship programs and Extended Producer Responsibility (EPR) initiatives is another important strategy for managing white goods. These programs require or encourage manufacturers to take accountability for the lifecycle of their products, including their eventual disposal. Municipalities can ensure consumers have convenient options for recycling old appliances by mandating or incentivizing manufacturers to establish take-back programs. Take-back programs simplify the recycling process for residents while reducing the burden on local governments. Collaborative efforts between manufacturers, retailers, and municipalities can create streamlined, effective systems for managing white goods in an environmentally sustainable manner.

3.6 Regional Collaboration

Regional collaboration among neighboring communities can significantly enhance the efficiency and cost-effectiveness of managing white goods. This collaborative approach typically involves two key strategies:

3.6.1 Shared Services

Municipalities can share services such as white goods collection, processing, and recycling by partnering with neighboring communities. This reduces the individual costs for each participating community by spreading out expenses and enhances their bargaining power when negotiating with service providers. Shared services might include joint waste processing facilities, shared staffing for specialized roles, or communal educational programs about white goods recycling.

3.6.2 Joint Contracts

Collaborating communities can issue joint Requests for Proposals (RFPs) for white good management services. This approach attracts more competitive bids from service providers who value the larger, consolidated contracts. Municipalities can secure more favorable terms and lower prices by pooling their

needs, benefiting from economies of scale. This reduces costs and leads to improved service quality due to the increased financial incentive for contractors.

4.0 Incorporating White Goods Management into RFPs

When incorporating white goods management into RFPs, it is essential to clearly define the scope of services to ensure proposers fully understand the community's needs. This structured approach facilitates the selection of qualified contractors while enhancing service efficiency and compliance with environmental regulations.

4.1 Defining Service Level Options

RFPs should specify different service levels for white goods collection, including:

- *On-Call Service*: Residents can request pick-up as needed, with defined response times.
- *Scheduled Collection:* Regularly scheduled pick-ups, such as monthly or quarterly, with clearly communicated dates.
- *Drop-Off Programs:* Designated sites where residents can bring white goods for proper disposal.

Additionally, enhanced service options, such as expanded pick-up limits or expedited services, should be detailed with associated costs. Proposals should encourage innovative service models that optimize efficiency and reduce costs.

4.2 Refrigerant Reclamation Requirements

To comply with environmental regulations, the RFP must specify whether refrigerators, freezers, and air conditioning units require Freon reclamation before collection or drop-off. Options include:

- *Pre-Collection Reclamation:* Residents must provide proof of refrigerant removal by a certified technician before pick-up.
- *Contractor-Managed Reclamation:* The selected contractor is responsible for safe refrigerant recovery before disposal, with clear guidelines on compliance and associated costs.
- *Drop-Off Facility Requirements:* Facilities accepting white goods must have proper refrigerant removal protocols, with disposal documentation as required by law.

4.3 Cost Comparison and Evaluation

RFPs should request detailed cost breakdowns, ensuring transparency in pricing, including all capital, operational, and regulatory compliance costs. Cost evaluations should consider service quality, potential long-term savings, and environmental compliance to determine the best value for the community.

4.4 Flexibility in Contracting

To accommodate changing community needs, RFPs should incorporate flexibility by allowing adjustable service levels based on demand trends, ensuring services remain efficient and responsive. Additionally, they should include incentives for contractors who exceed efficiency and compliance targets, encouraging high performance and innovation. At the same time, penalties for non-compliance should be established to maintain accountability and consistent service quality, ensuring that contractual obligations are met effectively.

4.5 Comprehensive RFP Components

A well-structured RFP should clearly define key service components to ensure efficient and transparent white goods management. It should outline scheduling options, including on-call, scheduled, and drop-off service structures, to provide flexibility for residents. Additionally, collection and handling standards must be specified, detailing proper loading, transport, and disposal requirements to ensure safety and regulatory compliance. If community drop-off events are included, establish clear guidelines for organizing periodic disposal opportunities that enhance accessibility. Lastly, the RFP must address additional pick-up costs, providing transparent definitions of any surcharges for extra items to prevent hidden fees and ensure fair pricing.

4.6 Innovative Technologies and Sustainability Practices

Encouraging the integration of technology, such as routing software and mobile apps, for efficient collection scheduling and customer interaction is crucial. Proposals should also emphasize sustainability practices, including minimizing environmental impact and providing metrics for sustainability performance.

4.7 Key Considerations for Effective RFPs

The RFP should clearly outline defined service levels and scheduling options, ensuring flexibility in collection methods to meet community demands. It must specify contractor qualifications and compliance expectations, guaranteeing that only experienced, and responsible providers manage white goods disposal. A transparent cost structure with detailed breakdowns should be included to ensure clarity in pricing and prevent unexpected expenses. Additionally, performance metrics must be established to hold contractors accountable for service quality and efficiency. Lastly, community education and outreach efforts should be emphasized to promote proper disposal practices and encourage public participation. By integrating these elements into white goods management RFPs, municipalities can develop effective, sustainable, and legally compliant disposal programs that address community needs while minimizing environmental impact.

5.0 Case Studies

The following case studies showcase diverse approaches to white goods collection, recycling and disposal, each tailored to meet the unique needs and resources of its respective area.

5.1 Case Study 1: City of Denton, Texas

2023 Population (estimate[2]): 158,349

Residents are permitted to schedule the collection of up to two bulky items, including white goods, per week at no additional charge. Additional items are charged a fee. Bulky item pick-ups can be scheduled by calling a service line or filling out a form online. Appliances containing PCBs or refrigerants, such as refrigerators, freezers, AC units, or water coolers, incur an additional fee due to the specialized handling required for these materials. Residents can also bring white goods to the Home Chemical Collection facility, operated by the city.

Key Strategies Implemented:

- *Establish an Accessible Collection Program:* The city has an on-call pickup and drop-off center for white goods.
- *Promote Reuse:* The city's website features a searchable waste widget. For example, typing "refrigerator" into the widget provides the best option for dropping off appliances at a reuse store. Additional options, such as curbside collection, are also listed.
- *Public Education Programs:* The waste widget featured on the city's website educates the public about the best options available for white goods.

Program Outcomes

- The on-call pickup collection program and drop-off center have provided residents with multiple convenient options for white goods disposal. These accessible services have contributed to higher participation rates in the recycling program, reducing the likelihood of illegal dumping and ensuring that white goods are disposed of properly. By addressing accessibility barriers, the program has made it easier for residents to recycle their appliances responsibly.
- The city's searchable waste widget has significantly promoted the reuse of white goods by guiding residents toward options such as reuse stores. By diverting functional or repairable appliances from the waste stream, the program has extended the lifecycle of these items and reduced the demand for new products.
- The waste widget has proven to be an effective tool for public education, providing residents with clear and actionable information about proper white goods disposal. The user-friendly interface has made it easier for residents to identify the best disposal or recycling options for their appliances, leading to greater compliance and participation in the program.

5.2 Case Study 2: City of McKinney, Texas

2023 Population (estimate[3]): 213,509

Residents of McKinney can schedule an appointment to pick up a bulky item, including white goods. Residential appliances include empty water heaters, washers and dryers. Refrigerators, freezers and AC

[2] U.S. Census Bureau QuickFacts: Denton city, Texas
[3] U.S. Census Bureau QuickFacts: McKinney city, Texas

units are accepted with submitted and approved certification that a technician has removed the Freon. The North Texas Municipal Water District operates four Citizen Convenience Centers where residents of McKinney can take white goods without an evacuation certificate.

Key Strategies Implemented:

- *Establish Accessible Collection Programs:* Residents can request bulky item collection, including white goods, up to twelve times a year at no additional cost.
- *Regional Collaboration:* The city collaborates with the North Texas Municipal Water District to allow residents to use one of four Citizen Convenience Centers twice monthly for free.
- *Regulatory Measures:* The City of McKinney Code of Ordinances describes how bulky waste, including white goods, is collected. The code does not allow for unusual accumulation of bulky waste, including white goods, and allows for twelve pickups per year.

Program Outcomes:

- By allowing residents to schedule up to 12 bulky item collections per year at no additional cost, the city has likely improved accessibility to waste disposal services. This initiative may lead to increased resident satisfaction and a reduction in improper disposal practices.
- The partnership with the North Texas Municipal Water District permits residents to utilize one of four Citizen Convenience Centers twice per month for free. This collaboration enhances residents' disposal options, potentially leading to increased recycling rates and more efficient waste management.
- The City of McKinney Code of Ordinances outlines the procedures for bulky waste collection, prohibiting unusual accumulation and allowing for twelve pickups per year. These regulations help maintain community cleanliness and ensure consistent service delivery.

5.3 Case Study 3: City of Granbury, Texas

2023 Population (estimate[4]): 12,622

Residents of Granbury can take bulky items, including white goods, to the Citizens' Collection Station operated by Hood County. The city also organizes a bi-annual bulk trash event for residents. The event includes accepting refrigerators, freezers, and AC units with certification of Freon reclamation. There is a six-item limit per address for bulky items.

Key Strategies Implemented:

- *Establish Accessible Collection Programs:* Residents can take white goods to the regional facility or during the bi-annual bulk trash event.
- *Promote Reuse:* The city's solid waste web page provides information about donating used and unwanted items instead of discarding them.

[4] U.S. Census Bureau QuickFacts: Granbury city, Texas

- *Regional Collaboration:* Granbury citizens can take their bulky items, including white goods, to the Citizens' Collection Stations, which Hood County manages.

Program Outcomes:

- Small communities like Granbury can maximize their resources by partnering with neighboring cities, counties, or private companies to share resources and services.
- Granbury's organizing bi-annual bulk trash events serves multiple purposes. These events keep the city clean and promote recycling and proper waste disposal. They also foster a sense of community and collective responsibility for environmental stewardship.

5.4 Case Study 4: State of Texas

The Texas ENERGY STAR Sales Tax Holiday is an annual initiative by the Texas Comptroller's Office that promotes energy efficiency and white goods management by offering tax exemptions on qualifying ENERGY STAR®-labeled appliances. This program encourages consumers to replace older, less efficient appliances with energy-efficient alternatives, reducing household energy consumption and promoting sustainability. During the sales tax holiday, Texas residents can purchase, rent or lease select appliances—such as air conditioners (up to $6,000), refrigerators (up to $2,000), ceiling fans, clothes washers, dishwashers, and dehumidifiers—without paying sales tax. Unlike other tax-exempt programs, no exemption certificate is required, and there is no limit on the number of qualifying items a consumer can buy. This initiative supports Texas businesses by stimulating appliance sales. It incentivizes consumers to make environmentally responsible purchasing decisions, aligning with broader white goods management strategies to improve energy efficiency and reduce environmental impact.

Key Strategies Implemented:

- *Regulatory Measures and Incentives:* The Texas ENERGY STAT Sales Tax Holiday is a state-wide incentive program created by the Texas Legislature and is included in the Texas Administrative Code. This initiative supports statewide energy conservation goals and responsible white goods management by reducing upfront costs and encouraging consumers to replace outdated appliances with ENERGY STAR®-certified models.

Program Outcomes:

- In 2024, the Texas ENERGY STAR Sales Tax Holiday saved shoppers an estimated $15 million in state and local sales taxes, reinforcing its impact on promoting the adoption of energy-efficient appliances and reducing household energy consumption.
- Residents are encouraged to consult local waste management services or recycling centers to properly recycle or dispose of old appliances when upgrading to ENERGY STAR-certified models.

5.5 Case Study 5: Retail Store

A major national electronics retailer offers an appliance take-back program that enables consumers to recycle old appliances in an environmentally responsible manner. The units are recycled by licensed third-party partners, who ensure that various materials are sent to end markets to be repurposed into new products. The program provides haul-away services for old units upon delivery of a new appliance and a standalone pickup service for a fee. Consumers can also drop off select appliances at participating store

locations for recycling. This initiative ensures that appliances such as refrigerators, freezers, washers, dryers, and AC units are appropriately dismantled, with hazardous materials like refrigerants safely reclaimed.

Key Strategies Implemented:

- *Collaborate with Certified Recyclers:* The units are responsibly recycled by licensed, third-party recycling partners.
- *Take-Back Program:* A take-back program for white goods ensures that manufacturers, retailers, or third-party partners collect and responsibly recycle old appliances, reducing landfill waste, recovering valuable materials, and promoting sustainable end-of-life management through proper dismantling and hazardous material recovery.

Program Outcomes:

- The program diverts white goods from landfills, ensuring proper recycling and recovery of valuable materials.
- Hazardous substances like refrigerants and PCBs are responsibly reclaimed.

6.0 Action Steps for Communities

Based on the strategies and outcomes reviewed by white goods management programs, communities can take the following steps to improve their systems.

Evaluate and Assess Community Needs:

- *Conduct Surveys*: Gathering data through community surveys, waste audits, and stakeholder consultations provides valuable insights into white goods disposal patterns and service gaps. Cities can determine the volume of discarded appliances by analyzing waste collection reports, landfill records, and consumer behavior trends. Identifying seasonal fluctuations in white goods disposal and evaluating existing recycling and disposal facilities can help municipalities pinpoint areas needing improvement.
- *Engage Stakeholders:* Involving residents, businesses, recyclers, and environmental groups in the planning process ensures that white goods management strategies align with community priorities. Municipalities can gather feedback on disposal challenges and potential solutions through focus groups and online forums. Collaboration with local businesses and certified recyclers can also help identify opportunities for appliance take-back programs, incentive-based recycling, and improved collection services.
- *Identify Service Gaps and Opportunities:* Assessing the capacity and accessibility of current waste management infrastructure can help cities refine white goods disposal programs. By reviewing existing services, policymakers can determine whether regulatory or logistical barriers—such as limited Freon removal services or inadequate transportation options—hinder responsible disposal. Identifying opportunities for incentives, policy enhancements, or expanded municipal services can further encourage residents to recycle old appliances and reduce landfill waste.

Develop a Strategic Plan:

- *Set Clear Objectives:* Define measurable goals such as increasing white goods recycling rates, reducing illegal dumping, and improving accessibility to proper disposal services. Establish key performance indicators to track progress and ensure accountability in program implementation.

- *Allocate Resources:* Budget for program development, implementation, and ongoing operations by securing municipal funding, grants, or partnerships with local businesses and manufacturers. Consider cost-sharing models with retailers or appliance manufacturers to expand take-back programs and incentivize responsible disposal.

- *Establish Policies:* Create or update local ordinances to support white goods recycling, including requiring proper refrigerant removal, mandating proof of disposal for appliance purchases, or implementing penalties for illegal dumping. Ensure all policies comply with state and federal regulations while promoting sustainability and responsible waste management practices.

Implement Collection and Recycling Programs:

- *Launch Pilot Programs:* Begin with small-scale initiatives to test different collection and recycling strategies for white goods. Pilot programs can help assess logistical challenges, resident participation rates, and overall effectiveness before full-scale implementation.

- *Scale Up Successful Models:* Expand programs based on pilot results, data analysis, and community feedback. Use insights from initial trials to refine service offerings, optimize collection routes, and establish partnerships with recyclers or manufacturers to enhance efficiency.

- *Monitor and Adjust:* Track performance metrics such as recycling rates, participation levels, and cost-effectiveness. Regularly analyze data and make necessary adjustments to improve program efficiency, address emerging challenges, and ensure long-term sustainability.

Enhance Community Education:

- *Clear Communication*: Simplify messaging about white goods recycling, including accepted appliances, proper disposal requirements for refrigerants like Freon and hazardous materials such as PCBs, event schedules and drop-off locations. Enhance education with pictures and videos to clearly illustrate the importance of safe disposal. Visuals can effectively demonstrate segregation techniques, environmental benefits, and regulatory compliance, making the information more engaging and easily understood. Ensure accessibility by sharing information in multiple languages and various communication channels to reach diverse community members.

- *Leverage Social Media Platforms:* Use social media to announce upcoming collection days or special recycling events. These posts can include all the logistical details and benefits of participating. Design content that is easily shareable, increasing its reach. This can consist of catchy slogans, compelling images, or fun videos that people are more likely to share with their networks.

- *Share Success Stories:* Highlight positive outcomes from white goods management efforts, such as increased appliance recycling rates and reduced illegal dumping incidents. Showcasing tangible results, like decreased landfill contributions and enhanced environmental protection, informs the community and encourages continued participation by demonstrating the real impact of responsible

disposal practices. Regularly monitoring and reporting on illegal dumping trends and enforcement actions can further reinforce the importance of proper white goods recycling.

Foster Collaboration:

- *Share Resources:* Strengthen partnerships with neighboring communities, certified recyclers, and regional take-back programs to improve white goods collection and recycling. By pooling resources, municipalities can enhance Freon and PCB removal services, expand recycling infrastructure, and streamline bulk appliance transportation, reducing costs and increasing accessibility for residents.

- *Standardize Practices:* Develop regional guidelines to ensure consistent policies for white goods disposal, collection schedules, and environmental compliance across multiple jurisdictions. Standardized procedures for certified refrigerant removal, appliance dismantling, and recycling center operations can improve efficiency and make programs more effective.

- *Advocate for Support*: Collaborate with regional partners to secure state and federal funding for white goods recycling initiatives. Joint advocacy efforts can help expand manufacturer take-back programs, promote incentive-based recycling initiatives, and strengthen compliance with environmental regulations, ensuring sustainable and responsible appliance disposal.

7.0 Conclusion

Effective white goods management is crucial in promoting environmental sustainability, public safety, and resource conservation while meeting residents' disposal needs. Proper collection and recycling of appliances such as refrigerators, washers, dryers, and AC units prevent illegal dumping and landfill overflow and ensure the safe removal of hazardous materials like Freon and PCBs. However, managing these waste streams efficiently requires strategic planning and collaboration to balance service quality, environmental responsibility, and cost-effectiveness.

Several key actions can improve white goods disposal programs for community managers in the NCTCOG region and beyond. Assessing community needs and selecting appropriate collection and recycling methods helps tailor services to local demand while minimizing costs. Implementing regional collaboration with certified recyclers and manufacturer take-back programs enhances resource-sharing and improves program efficiency. Optimizing collection schedules, streamlining regulatory requirements, and ensuring compliance with state and federal disposal laws can further support long-term sustainability. Additionally, engaging residents through education and outreach on proper appliance disposal, Freon removal, and available recycling programs fosters greater participation and reduces contamination in waste streams.

By planning and executing well-structured white goods management programs, communities can protect the environment, reduce operational expenses, and provide accessible disposal options for residents. Through strategic partnerships, policy enhancements, and public engagement, municipalities can ensure the safe, efficient, and sustainable disposal of white goods, contributing to cleaner neighborhoods and a healthier environment.

8.0 Additional Resources

Texas Commission on Environmental Quality (TCEQ):

- Requirements to transport and dispose of municipal solid, industrial, hazardous, and other wastes
- Website: Waste Management: Requirements and Permits - Texas Commission on Environmental Quality - www.tceq.texas.gov
- Managing debris from declared disasters
- Website: Emergency Response - Texas Commission on Environmental Quality - www.tceq.texas.gov

North Central Texas Council of Governments (NCTCOG):

- Regional materials management support, including grants
- Website: NCTCOG - Materials Management

U.S. Environmental Protection Agency (EPA):

- Regulatory and guidance information by solid waste topic
- Website: Regulatory and Guidance Information by Topic: Waste | US EPA
- Responsible Appliance Disposal program (RAD)
- Website: Responsible Appliance Disposal (RAD) | US EPA

Association of Home Appliance Manufacturers (AHAM):

- Industry data and resources on appliance recycling
- Website: AHAM Home


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