

Resource Recovery: Automatic Recycling of Steel Cans and Other Ferrous

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It is truly a pleasure to speak with the assembled management of the resource recovery industry. It is no surprise to you that this last year, 142 operating resource recovery facilities combusted about 18 percent of the solid waste for communities across the United States. Perhaps less on the tip of your tongue would be the fact that about 75 percent of these facilities magnetically separated steel cans and other discarded steel items either pre- or post-combustion. This magnetic separation of ferrous scrap by the resource recovery industry not only reduces the amount of post-combustion material that must be landfilled but also lays claim to heightened environmental performance through very credible recycling achievement.

Indeed, you may be surprised to hear that one out of every six steel cans made and used in this country is recovered automatically through resource recovery. Think about it -- automatic recycling of steel cans through resource recovery. How many people know that their local resource recovery plant is helping to insure that virtually all of their food, beverage and general purpose cans -- including paint and aerosol -- are being recycled so easily and efficiently? Both the resource recovery and steel industries would do well to promote the benefits of this automatic steel can recycling vigorously so as to heighten public awareness. Clearly, magnetic separation at resource recovery facilities is a profoundly simple and desirable method of diverting what would otherwise be relegated as solid waste to the landfill. It should be touted as an increasingly important part of the resource recovery and steel industries' overall recycling efforts. It is a great story to tell and should be told often. Let's review why this is so.

THE STEEL INDUSTRY: THE ORIGINAL RECYCLER

As we know, most resource recovery facilities, recognizing the inherent recyclability of steel, magnetically separate scrap iron and steel rather than landfill it. When properly beneficiated, this recovered ferrous scrap is readily marketable. In addition to melting steel cans and other ferrous derived through resource recovery, the steel industry is also a major consumer of source separated steel cans from curbside and drop-off programs. Iron and steel foundries and detinners also consume source separated steel cans in significant quantities, thus providing additional incentive for steel cans to be included in curbside and drop-off programs. We need to look at why steel cans are desirable as well as other municipal solid waste derived ferrous, when this has not always been the case.

Steel Mills and Foundries Recycle Steel Cans and Other Ferrous Scrap

Steel scrap has been traditionally obtained from three sources: "home" scrap, derived from the production of steel; "prompt" scrap, derived from the manufacture of steel products; and "obsolete" scrap, steel products that have come to the end of their useful life. The reuse of steel scrap has always been an integral part of the steelmaking process. In fact, for the past 50 years, more than 50 percent of the steel produced in the United States has been recycled into a multitude of new steel products. These new steel products will eventually be remelted again by mills to make new steel. Due to technological advances in the art of steelmaking, the two types of furnaces used in today's steel mills require more steel scrap than ever. The basic oxygen furnace (BOF) blends molten iron with approximately 25 percent steel scrap. The electric arc furnace (EAF) uses virtually 100 percent steel scrap. With these new efficiencies in steelmaking and all phases of manufacturing, less traditional scrap is being generated, thus creating a need for more externally sourced scrap. Through these sources, 66 percent of the domestic steel produced in recent years has been recycled.

Helping to fill the shortfall, steel food, beverage, paint and aerosol cans contain at least 25 percent recycled steel and are recyclable as scrap themselves for new steel production. Manufactured from the

highest grade of steel, they are now recognized as an excellent source of steel scrap and have gained great acceptance as a desired commodity. Steel cans no longer have the restrictive amounts of tin that melters once feared. Thus, the steel industry is fully prepared to consume the majority of steel cans collected, remelting them to produce new steel.

Source separated steel cans are also being recycled into ductile and grey iron products. A study performed by the University of Wisconsin-Madison confirmed how steel cans will now serve as a scrap resource for foundries across the United States. Taking part in the study for the past two years, Waupaca Foundry in Wisconsin has recycled more than 15,000 tons of steel cans into ductile iron products. Several other foundries have also begun to recycle steel cans and are using or considering using municipal solid waste derived ferrous from resource recovery. There are more than 2,500 iron and steel foundries, which will potentially provide end markets for many communities across the United States.

METHODS OF COLLECTION FOR RECYCLING

In the last four years, steel cans have advanced in their availability and desirability to the point that competition now exists between local "traditional" recycling programs and the automatic recycling provided by the servicing resource recovery plants. Is it better to capture steel cans through source separated recycling and then let automatic recycling with resource recovery catch the "strays?" Is it better to exclude steel cans from the curbside and drop-off programs altogether in favor of resource recovery? There is no single, best answer, as reflected by the different approaches seen across the nation. Let's look at both avenues.

Source Separation Recycling Programs

Residents in both urban and suburban areas are increasingly serviced by curbside recycling, or a combination of curbside and drop-off programs. In a curbside program, residents are responsible for commingling recyclables together into a storage bin and placing the bin at the curbside for collection. Recyclables are collected by truck and delivered to a secondary processor for sorting, preparation and shipment to end markets.

Drop-off programs may operate as the sole recycling program in rural areas where curbside recycling is not feasible. To participate in this recycling program, residents bring their steel cans and other recyclable materials to a drop-off site. These sites may also supplement curbside collection, giving residents additional opportunities to recycle steel cans. Multi-commodity buyback centers operate somewhat similarly.

Steel cans and other recyclables generated by schools, businesses, hotels, restaurants and other commercial/institutional establishments are collected through their own recycling programs. Employees separate empty steel cans and store them in a large container or roll-off for recycling. Haulers collect and deliver recyclables to secondary processors for handling and shipment to end market.

Automatic Recycling of Steel Cans from Resource Recovery Facilities

Whether source separation recycling is available or not, resource recovery facilities offer unique advantages. Ferrous scrap, including steel cans, cannot be burned or melted at the facility -- it takes the steel mill temperatures in excess of 3000 degrees to do that. But, by magnetically separating steel scrap before or after combustion, resource recovery facilities avoid landfilling this recyclable steel scrap. The incremental costs of the beneficiation and processing of steel scrap for reuse by steel can end markets is largely offset by the incremental revenue and cost avoidance. The intangible value of recyclability itself is even higher and is suggested as a benefit for all concerned.

When seeking to maximize the diversion of recyclable material from the solid waste stream, curbside and drop-off collectors and processors are largely dependent upon the participation of area residents in a

traditional recycling program. Magnetic separation of steel cans at resource recovery facilities automatically recovers more than 90 percent of the steel can scrap generated from a community. Residents participate in recycling steel cans just by disposing of them normally. For instance, it was recently determined in Florida that steel cans are being recycled at a rate exceeding 50 percent. This higher than national average recycling rate for steel cans is rightfully credited to magnetic separation by resource recovery facilities across the state.

Just as importantly, steel cans are automatically recycled from the entire community. This means that in addition to all households being covered, area businesses, schools, and other commercial and institutional establishments automatically recycle their used steel cans. Therefore, magnetic separation of steel cans at resource recovery facilities achieves tremendous economies of scale by fulfilling the functions of both residential and commercial/institutional recycling programs.

Finally, resource recovery facilities magnetically separate all types of steel cans, including steel food, beverage, paint and aerosol containers, from a community's solid waste stream. Steel paint and aerosol cans, in addition to steel food and beverage cans, are part of the steel industry's overall recycling efforts. Minor or even major product contamination of these containers is handled in a very forgiving nature by the combustion process.

PROCESSORS OF STEEL CANS AND MUNICIPAL SOLID WASTE-DERIVED FERROUS SCRAP

All steel cans, whether collected from communities through source separation recycling programs or through magnetic separation with other ferrous scrap at resource recovery facilities, require processing for shipment to steel industry end markets.

Source Separation Recycling Programs

When collected through community recycling programs, steel food and beverage cans should initially be rinsed clean. Steel aerosol cans must be empty of their contents, and steel paint cans should only have a thin skin of dry paint left on the inside of the can. All steel cans may be processed and baled together, regardless of type.

Ferrous scrap dealers have long supplied the steel industry with processed scrap. More recently, many of these businesses have added steel cans to their collections as the demand for steel cans has risen. Scrap processors are effective processors of source separated steel can scrap because much of the necessary equipment to process steel cans is already in place, and the links to end markets for steel cans are well developed.

Material recovery facilities also process steel cans recovered from communities through community recycling programs. These facilities magnetically sort steel cans from commingled recyclables for baling and shipment to end market.

Beneficiation of Steel Cans and Other Ferrous at Resource Recovery Facilities

Before they are recycled, steel cans and other ferrous scrap generated from resource recovery facilities must first be upgraded through additional processing. This beneficiation is necessary because ferrous recovered before combustion has residue from solid waste; ferrous recovered after combustion is coated with ash.

Specialty vendors typically perform the needed beneficiation. Methods vary from vendor to vendor, but ordinary proven mechanical processes are used, such as shredding, air classification, screening, trommeling and additional magnetic separation. Beneficiation produces ferrous scrap that is an attractive, marketable material with predictable chemical characteristics.

Most operators would agree that beneficiation should be performed on the site of the resource recovery facility. When performed on-site, no additional arrangements or negotiations need to be made regarding leftover residue. It can just go back into the resource recovery plant -- or, if ash -- be appropriately managed. Off-site beneficiation does occur, however, when there is limited space at the site of the facility, or when existing equipment for beneficiation already exists off-site. The disposition of residue is, as noted, a matter that must be coordinated to the satisfaction of all affected parties.

CONCLUSION

Steel cans and other ferrous scrap are easily recovered through magnetic separation at resource recovery facilities. Performing magnetic separation decreases a resource recovery facility's costs associated with the disposal of post-combustion material and generates incremental scrap revenue. Whether recovered before or after combustion, properly beneficiated municipal solid waste derived ferrous is a readily marketable material. These facilities, through automatic recycling, recover virtually all steel cans from the community -- independent of active participation by residents. The increased diversion of steel cans from the solid waste stream accordingly improves the measured statistical rate of steel can recycling.

Resource recovery facilities should heighten public awareness of automatic steel can recycling. The overall environmental image of these facilities should be bolstered as the public realizes that approximately one out of every six steel cans recycled in the United States is recovered through magnetic separation at resource recovery facilities.

By mutually working towards increased public awareness of automatic recycling of steel cans and other ferrous at resource recovery facilities, both the resource recovery and steel industries can accomplish their respective goals. The Steel Can Recycling Institute is prepared to heighten accomplishment and awareness by working with the Integrated Waste Services Association and its member companies.