

All-in On Recycling:

Reclaiming the Paper Container with Steel Bottom

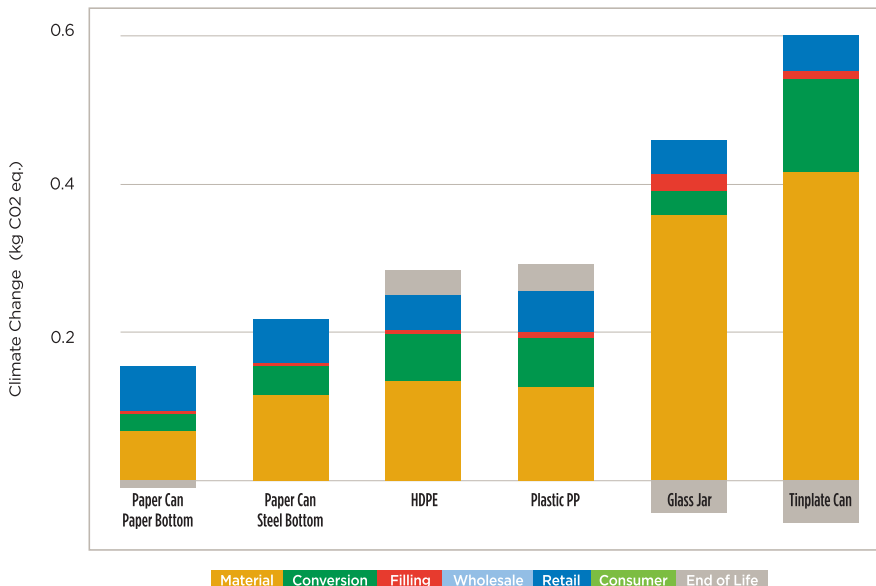


To expand recycling of paper containers with steel bottoms, Sonoco's sustainability team launched a development project in 2020 to prove this packaging can be processed through the steel recycling stream across North America. If successful, up to 135,000 tons of paper containers with steel bottoms could be diverted from landfill. Recycling the paper container with steel bottom in the steel stream has a lower climate change impact compared to landfilling at end of life, and recycling steel contributes to reductions in greenhouse gas emissions across the affected industries.

PAPER CONTAINER WITH STEEL BOTTOM: BEGINNING OF LIFE

The paper container with steel bottom, also known as a spiral wound paper container or canister, is a type of paperboard packaging made with 100% recycled fiber paperboard, of which 90% is post-consumer recycled content. The containers can be manufactured with steel bottoms and have an oxygen and moisture barrier layer thinner than a sheet of paper to provide optimal shelf life. A third-party verified streamlined Life Cycle

Figure 1:



Assessment found that the rigid paper containers have a reduced carbon footprint than comparably sized all steel containers or other rigid packaging types (Figure 1). Paper containers with steel bottoms result in a more environmentally favorable outcome.

PAPER CONTAINER WITH STEEL BOTTOM: RECYCLING CHALLENGES

Merriam-Webster defines the word “recycle” as, “to process in order to regain material for human use or to reuse or make available for reuse...” (*Merriam-Webster, “Recycle”*). To go further, packaging is recyclable if it can be collected, sorted, reprocessed, and ultimately reused in manufacturing or making another item (How2Recycle, “The How2Recycle Guide to Recyclability”). For Americans, this is complicated by the fact that despite the technical ability for an item to be recycled, municipalities and material recovery facilities (MRFs) ultimately dictate what will be accepted.

In the U.S., there are several recycling streams available including paper, plastic, glass, aluminum and steel. There are nuances to each stream with more specific rules and regulations at the municipal level. For a packaging producer to explore recycling a multi-component packaging format such as the paper container, there must be evidence of the targeted recycling stream being compatible with access, collection, sortation, processing and end markets. In addition, selecting an appropriate recycling stream for the product should provide an environmental benefit. Later, this paper will explore options to recycle Sonoco’s paper container with steel bottom in the steel stream and laminated paper container stream.

PAPER CONTAINER WITH STEEL BOTTOM: FIGHTING FOOD WASTE

Food waste has been a growing problem in the U.S. with a USDA estimate of 30-40% of the food supply going to landfill. Not only could this food have helped people in need, but as the USDA points out, we must also consider the, “land, water, labor, energy and other inputs used in producing, processing, transporting, preparing, storing, and disposing of discarded food” (*“Food Waste FAQs”*). World Wildlife reports, “the

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production of lost or wasted food generates the equivalent of 32.6 million cars’ worth of greenhouse gas emissions,” (*“Fight Climate Change by Preventing Food Waste”*) in the U.S. alone.

So, how does packaging help resolve food waste? Packaging serves as a protective solution. Not only does packaging protect food from being crushed during shipment, but it serves as a protective barrier from oxygen and U.V. rays, helping to increase shelf life,

preventing food spoilage and reducing the amount of greenhouse gas emissions caused by food waste. For example, when protected by a Sonoco high-barrier paper container with steel bottom and modified atmosphere packaging, the shelf life of powdered milk increases from approximately 30 days to 2 years, allowing the packaged product to pass through shipping, shelving and eventually consumption without spoiling. In addition, the rigidity of the paper container with steel bottom ensures food product protection throughout the entire supply chain, which in many cases includes distribution across the globe.

ROADMAP TO RECYCLABILITY: STEEL STREAM

Material development, infrastructure development and partnerships make up Sonoco's three-tiered approach to recyclability. Sonoco's sustainability team partnered with internal and external groups to commission three independent, third-party sortation or MRF flow trials in the first and second quarters of 2021. The purpose of the material flow studies was to understand where the paper containers with steel bottoms would flow or sort in a MRF. To assist with these efforts, Circular Matters and Resource Recycling Systems (RRS) were tapped to conduct the studies.

**RECYCLING STEEL ENDS
CONTRIBUTES TO SUSTAINABILITY
IN OTHER INDUSTRIES AS WELL.**

**THE CAN MANUFACTURERS INSTITUTE
(CMI) ESTIMATES THAT NEW STEEL
PRODUCED WITH RECYCLED STEEL
REDUCES GREENHOUSE GAS
EMISSIONS BY 75%. (CMI, 2018)**

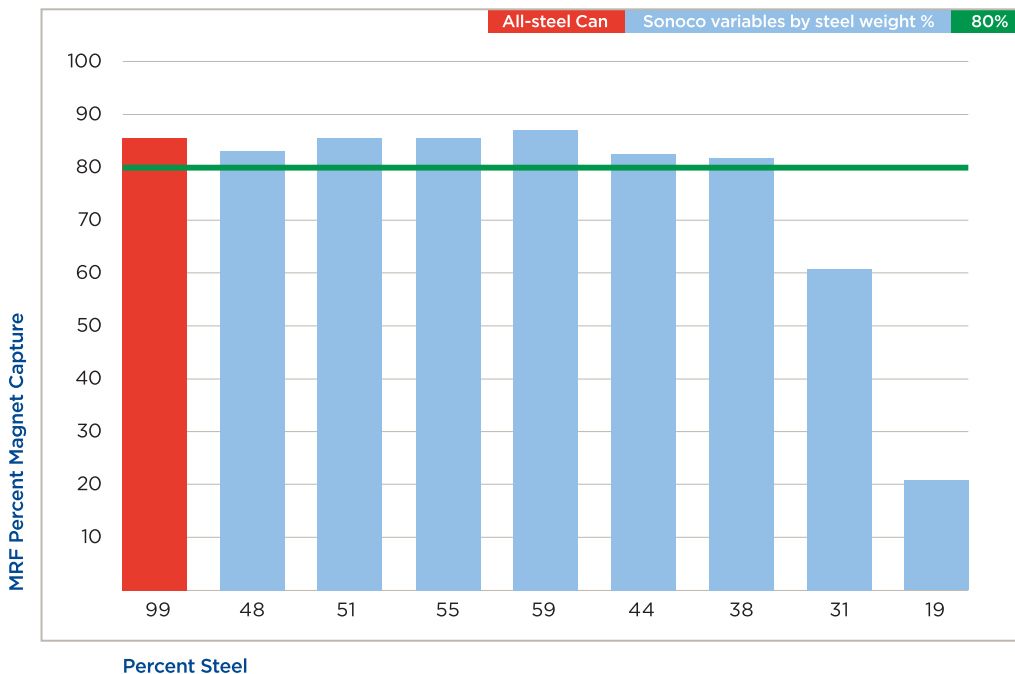
Each MRF in the U.S. has a unique combination of equipment and settings that are specific to its sortation goals and to the incoming material processed daily. In an effort to take a representative sample of the 350+ MRFs in the U.S., three facilities, located in South Carolina, North Carolina and Texas, were chosen for the study. Circular Matters and RRS selected the facilities as the scale and technology represented by these three MRFs provides a good representation of the industry. In the North and South Carolina studies, containers were seeded in curbside collection trucks along normal collection routes, transported to MRFs and observed to analyze each sortation stream. In the Texas trial, RFID tags were used to track material flow, so the containers were pre-conditioned, tagged and then seeded at the beginning of the MRF facility's sortation process. This difference in conditioning and tracking had no impact on sortation results.

MRF SORTATION RESULTS

These trials showed there was no significant difference in the capture rates for the paper container with steel bottom when compared to all-steel cans. The magnet capture rate was approximately 85% capture for both paper containers with steel bottoms and all-steel cans (*Figure 2*). When paper containers with steel bottoms are processed at MRFs, they will be sorted and baled with other steel containers in a highly efficient manner and will add to the existing valuable material stream. Across the three studies, only 9% of paper containers were found in the residue stream, which is on par with the all-steel container residue percentage.

Figure 2:

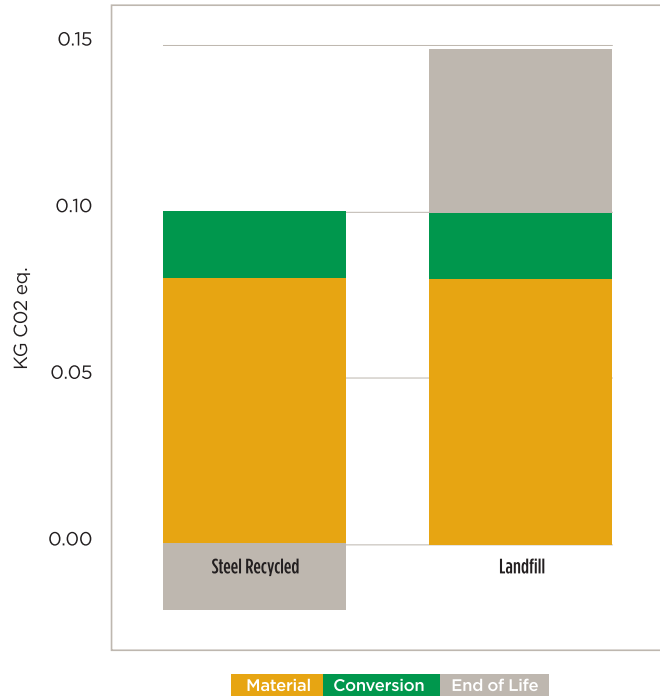
Magnet Recovery vs. Percent Steel in Can



RELEVANCE

Sortation at MRFs is a key element to establish the recyclability of the paper container with steel bottom. With the proof of a high capture rate into the steel stream, that important piece of the puzzle is now solved. Recovering these containers in the steel stream has a lower environmental impact. A streamlined life cycle assessment, conducted with PIQET (*Figure 3*), shows that recycling the paper container with steel bottom in the steel stream has a 45% lower climate change impact compared to landfilling at end of life. Recycling steel ends contributes to sustainability in other industries as well. The Can Manufacturers Institute (CMI) estimates that new steel produced with recycled steel reduces greenhouse gas emissions by 75% (*CMI, 2018*).

Figure 3:



VISION FOR PAPER CONTAINER WITH STEEL BOTTOM RECYCLABILITY: LAMINATED PAPER CONTAINER STREAM

Sonoco has a roadmap to further increase the material recovery of the paper container in the paper recycling process. By focusing on recyclability through the laminated paper container recycling stream, there is an opportunity to recover the fiber from the container body. Additionally, by investing in magnet capabilities at the paper mill, the steel components are able to be recovered; thus, both predominant components of the paper container with steel bottom would be recovered and recycled!

In fact, this recycling system exists in the United Kingdom (U.K.) today. A Sonoco paper mill located in Stainland, U.K., currently accepts mixed bales of paper containers with steel bottoms and laminated paper containers that have been collected through the Bring Bank drop-off system. At the Stainland mill, the baled materials are processed so that the fiber is recovered and recycled. Through a number of trials in the U.S. and Europe, Sonoco has determined that Near Infrared (NIR) technology is a viable means for sorting paper containers with steel bottoms into a laminated paper container or other targeted stream. In addition, in the U.S. we partnered with AMP Robotics, an industry leader in robotic MRF sorting, to create a category within its network that is specific to

our paper containers. Over the course of several trials, AMP Robotics had successfully demonstrated the high-frequency recognition of the paper container with steel bottom. As a result, AMP Robotics updated its software to enable platform-wide recognition of the paper container with steel bottom for sortation into any target stream. Now, any MRF that has an AMP robot can accurately and efficiently sort our paper containers to the desired stream. We believe both the NIR and AMP robotic technology will be key for enabling sortation into non-steel streams as these efforts continue to progress.

CONCLUSION

Recycling paper containers with steel bottoms through the steel recycling stream is possible, viable and beneficial to the environment. Today, fewer than 15% of American households have access to MRFs that will accept the containers for recycling. However, as more municipalities and MRFs learn about the ease of accepting these containers and the positive impact on the environment from recycling these containers with steel, the rate of acceptance will continue to increase.

Ensuring a sustainable end of life for a product is just as important as developing a sustainable beginning of life and is a key component of responsible manufacturing. At Sonoco, a culture of innovation fosters the creation of new pathways, ensuring items reach their full recycling potential. This is easily demonstrated when summarizing the life of the paper container with steel bottom. With a body made of 100% recycled paperboard (90% of which is post-consumer content), ethically sourced fiber and a steel base made with 10% post-consumer recycled product, the beginning of life is sustainable. This packaging protects the filled product, increases shelf life, and decreases food waste and the corresponding emissions that could harm our environment. Finally, this packaging can be recycled into the steel stream with no impact to the stream, allowing for new beginnings with new products. There is also a future pathway to recycle the packaging in the laminated paper container stream. It is no easy feat, but with organizational leadership along with support and collaboration throughout the industry, we can ensure each manufactured product achieves maximum recycling potential.

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