

EXECUTIVE SUMMARY

This research report **Flexible Packaging Recycling in Material Recovery Facilities Pilot** was prepared by RRS on behalf of the Materials Recovery for the Future (MRFF) project. The goal of this research collaboration was to demonstrate in a large, high speed material recovery facility (MRF) whether flexible packaging collected loose in residential single-stream carts could be sorted into a commodity bale for reprocessing into recycled content products. The MRF was upgraded with a flexible plastic packaging (FPP) recovery system using state-of-the-art optical sorters and peripheral equipment that is increasingly utilized for automated MRF sorting.

This is the first such demonstration of MRF flexible packaging recycling in the U.S. The pilot was

performed in partnership with J.P. Mascaro & Sons at the TotalRecycle MRF located in Birdsboro, Pennsylvania. The impetus for MRFF research was the research sponsors' shared vision that flexible packaging be recycled, and that the recovery community capture value from the material. FPP is the fastest growing, most popular category of plastic packaging today, with 12 billion pounds consumed annually in the U.S., including single resin and multi-layer bags, pouches, and wraps.

Within one year of FPP sortation equipment installation, completed February 2019, four of the five sortation performance goals established for this live MRF pilot demonstration were realized, and progress towards the fifth goal continues to proceed.

| PERFORMANCE GOAL | METRIC | RESULT |
|--|---|---|
| 1. Capture at least 90% of flexible plastic packaging (FPP) in feedstock | Capture Rate (% of inbound material captured by weight) | Needs improvement, 74% capture rate in February 2020 testing. Additional equipment tuning and minor upgrade in process. |
| 2. Minimize paper in FPP product (less than 15% by weight) | rFlex Bale Composition (% of bale by weight consisting of each material) | Success, 11-14% over the last few months of monitoring. |
| 3. Even with increased FPP in feedstock, reduce the amount of FPP going into fiber products | Fiber Bale Composition (% of bale by weight consisting of each material) | Success, reduction in newsprint (ONP) from 1.4% to 0.3% FPP, reduction in mixed paper (MP) from 1.6% to 0.5% FPP. |
| 4. Reduce fiber QC staff requirement by a minimum of 25%. | Number of full time equivalent (FTE) staff required to perform quality control (QC) | Success, 38% reduction in QC staff. |
| 5. Controls integrated with existing material recovery facility (MRF) control system | Qualitative (Yes/No) | Success, FPP recovery system integrated into current control system. |

The most immediate benefit of the FPP system upgrade for the MRF was cleaner, higher quality paper bales. The reduction in contamination for two traditional commodity bales, Old Newsprint (ONP) and Mixed Paper (MP), was measured at over 70%. As part of their expansion plan, TotalRecycle has begun operational upgrades and equipment tuning improvements as of April 2020 that are expected to increase the FPP capture rate and improve against Performance Goal #1. Combined with the value created from sustained quality improvements in paper bales, this data is worth evaluating as investments are made to advance MRF sorting.

Once the new mixed bale called rFlex approached performance goals in November 2019, bales were shipped for testing over a 90-day period to highly qualified firms in film plastic reprocessing from the U.S. and Europe. Over one dozen priority end market product opportunities were identified by this expert group in collaboration with RRS, brand owners, and the Pennsylvania Recycling Markets Center. Construction materials were identified as the highest volume, most feasible “quick wins,” with many more opportunities opening up once rFlex is processed into pellet or flake form. Explicit, demonstrated demand pull for these products will be critical to justify the investment needed to sort and create a marketable commodity.

Approximately 56,000 households from municipalities across Berks, Bucks, Delaware, Lehigh and Montgomery counties, Pennsylvania, already using standard lidded roll-out recycling carts were invited to participate in the residential collection phase beginning September 2019. Customer feedback received by the MRF found residents were widely receptive and positive about recycling FPP. While there was no added cost to communities for participation in this pilot, all residential recycling services have net costs. RRS modeled the capital cost of adding the FPP system to the MRF to aid

decisions in other regions where communities may be interested in upgrading their systems to collect FPP. The net cost was estimated at between \$2.25-2.41/ton of recyclables processed and is highly sensitive to local landfill tip fees and bale revenue assumptions. This net cost is on par with the cost of adding other new materials to traditional single stream programs.

Recommendations for the short term and long-term scaling to achieve circular FPP value chain recovery in the U.S. market-driven environment are discussed, and include:

- Support for an Association of Plastic Recyclers Demand Champion category to track purchasing commitments to buy rFlex products.
- An investment strategy in post-MRF processing such as dry wash of the rFlex bale to recycle the plastics-only fraction. This will unlock manufacture of the majority of rFlex products identified through end market manufacturer peer review.
- Development of bale specification(s) that standardize supply while offering MRF operators flexibility to respond to local markets.
- Sustained, focused engagement and co-investment with owners of new MRFs under construction and end markets to simultaneously build demand and supply for rFlex.

In summary, the collective action of MRFF participants has yielded a useful, evidenced-based method to accelerate collection, sorting, and marketing of recycled flexible plastic packaging at scale, keeping the value of plastics in the economy and out of the North American environment. More work will be needed, but the journey and playbook for success have become much better understood during this collaborative research process. MRFF will share results of the 2020 equipment upgrades at www.materialsrecoveryforthefuture.com.

