RRS

MATERIALS RECOVERY FOR THE FUTURE RESEARCH PROGRAM: MRF FLEXIBLE PACKAGING PILOT

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Foundation for Chemistry Research & Initiatives
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Goal: Double recycling of PE film by 2020 (2 B lbs.)

www.plasticfilmrecycling.org

MRFF

MATERIALS RECOVERY FOR THE FUTURE

1 Vision

2 Why Recycling Flexible Packaging is Important Today

3 Program Overview

4 What's Next


Nestlé
Good Food, Good Life


DOW


P&G


Nestlé PURINA.


SC Johnson
A Family Company


PEPSICO
Tropicana


FPA
Flexible Packaging
Association


Sealed Air
Re-imagine


amcor


Plum
organics


APR
The Association of
Plastic Recyclers


lyondellbasell


PLASTICS
INDUSTRY ASSOCIATION

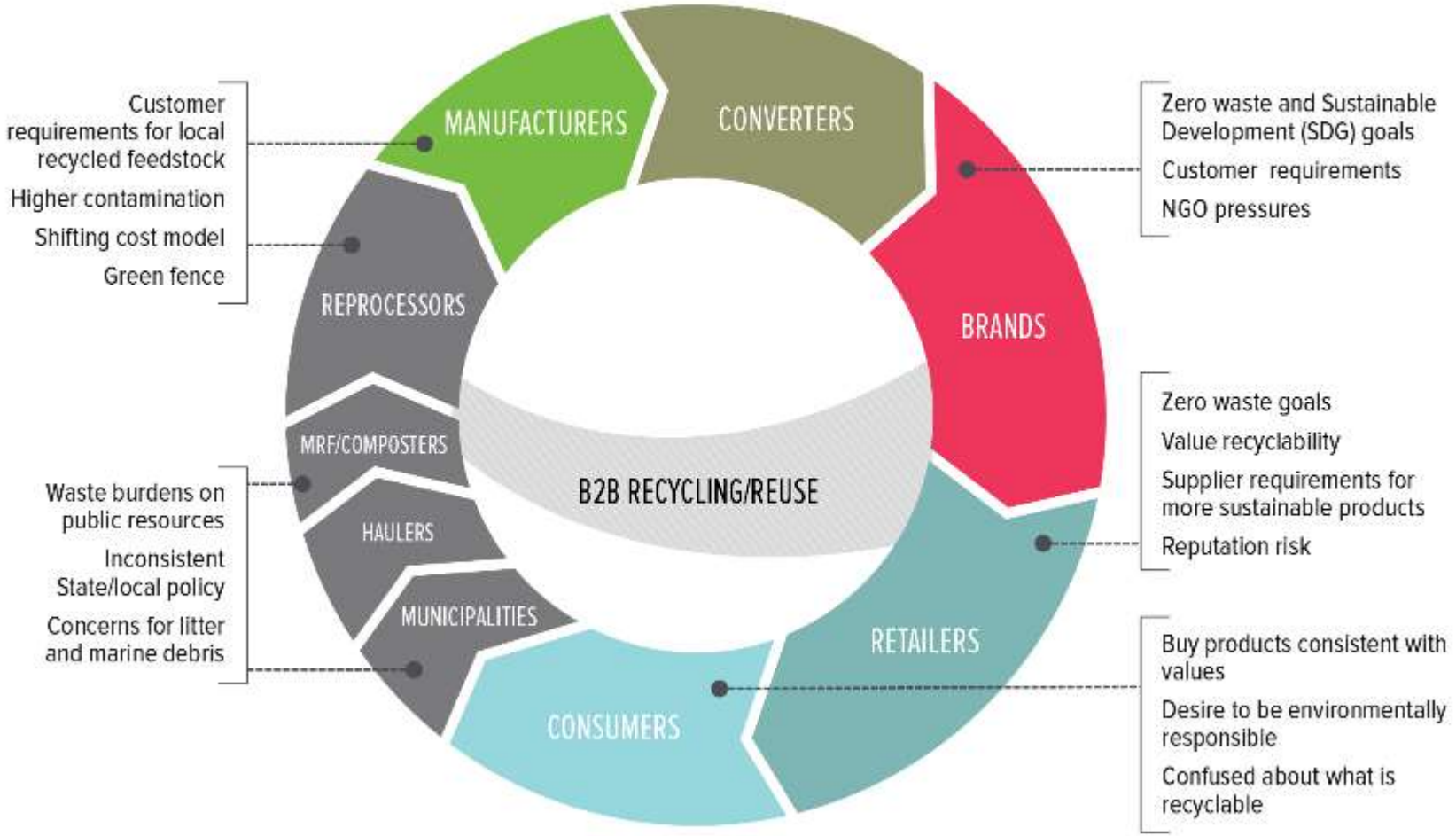

ACIP
CPIA
Association canadienne de
l'industrie des plastiques
since • depuis 1943
Canadian Plastics
Industry Association


RRS
recycle.com

OUR VISION

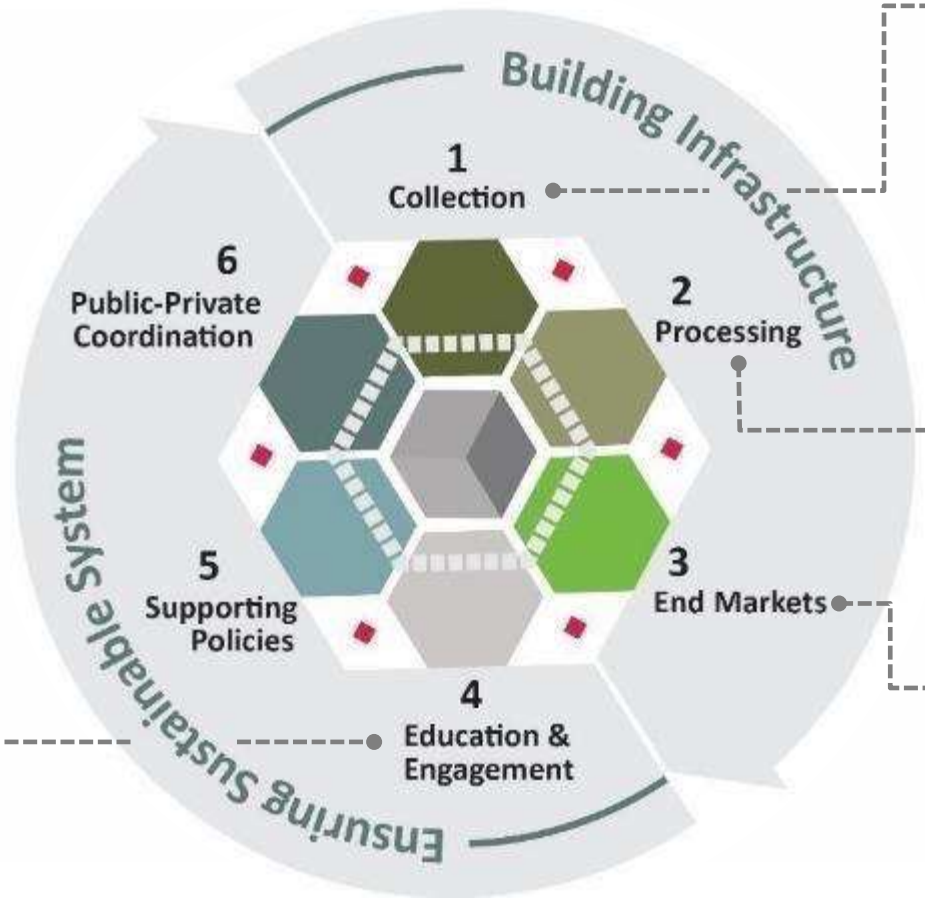
"Flexible packaging is recycled, and the recovery community captures value from it."

OUR APPROACH : COLLABORATE THROUGHOUT THE VALUE CHAIN TO ACCELERATE THE SOLUTION



MRFF IS ONE OF MANY EFFORTS TO RECYCLE FILMS AND FLEXIBLE PACKAGING IN THE U.S.

MAJOR EFFORTS IN THE U.S.



HEFTY Energy Bag

ACC- FFRG

SPI FFBD and Recycling Committee

Materials Recovery for the Future

APR-Film Committee

SPC – ILC

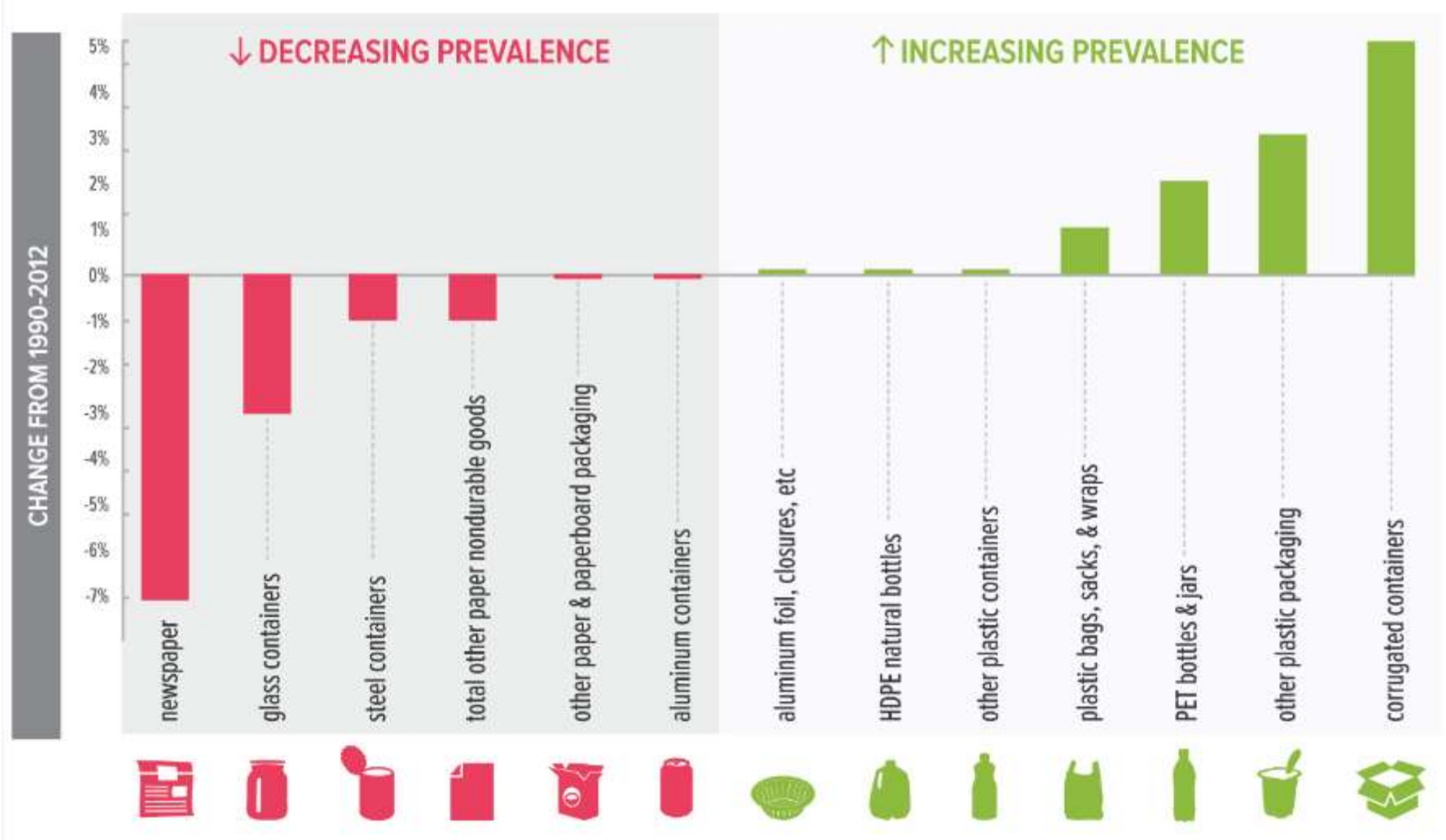
How2Recycle

ACC/SPC/APR - WRAP Recycling Action Program

SPI Recycling Committee and FFBD

THE PACKAGING STREAM HAS EVOLVED

2012 to 1990 Baseline



*% of waste stream | Source: RRS

We don't want **landfills to be excavated** in 50 years and our flexible plastic bags, bearing **our company's name**, show up as "permanent branded litter"… the problem is bigger than one company, so **it makes sense to work in a research collaboration.**

MRFF PARTNER COMPANY REPRESENTATIVE

CONSUMERS WANT PACKAGING THAT CAN BE RECYCLED ACROSS A RANGE OF CATEGORIES

% consumers indicating ***"recyclable packaging"*** is very/somewhat important to their purchase of the following types of products

Household cleaning → 80%

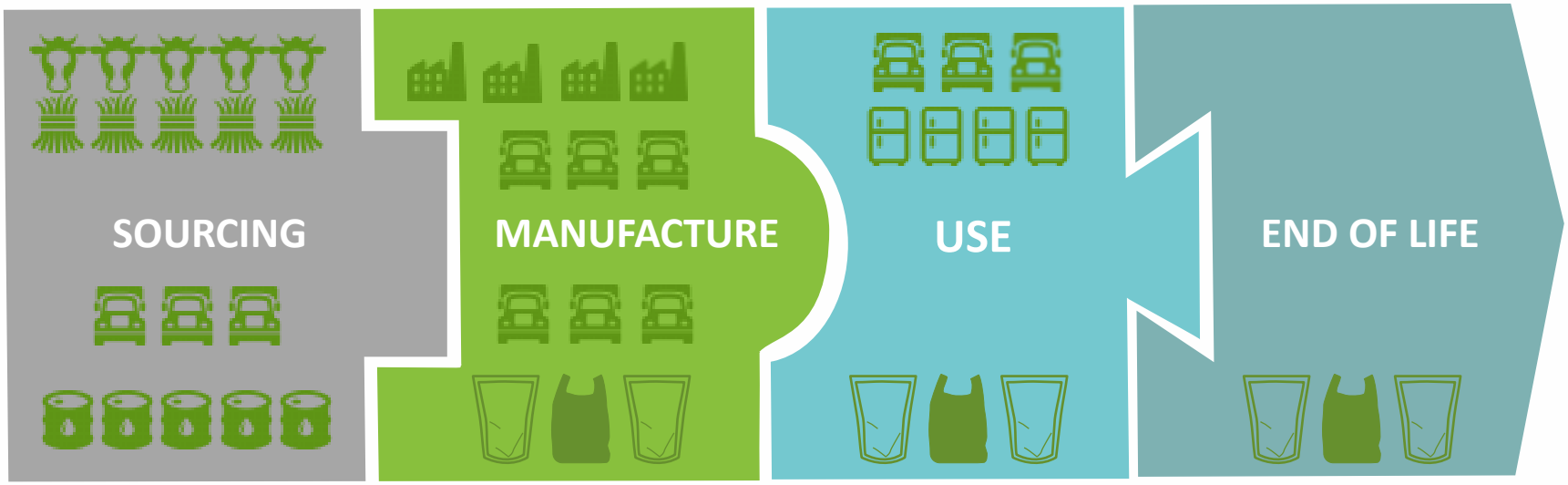
Personal care → 73%

Food and beverage → 73%

* Source: Natural Marketing Institute research

TOTAL LIFE CYCLE MANAGEMENT IS THE EXPECTATION FOR PACKAGING

While flexible packaging performs well from a life cycle perspective, many stakeholders expect end-of-life management options to improve.



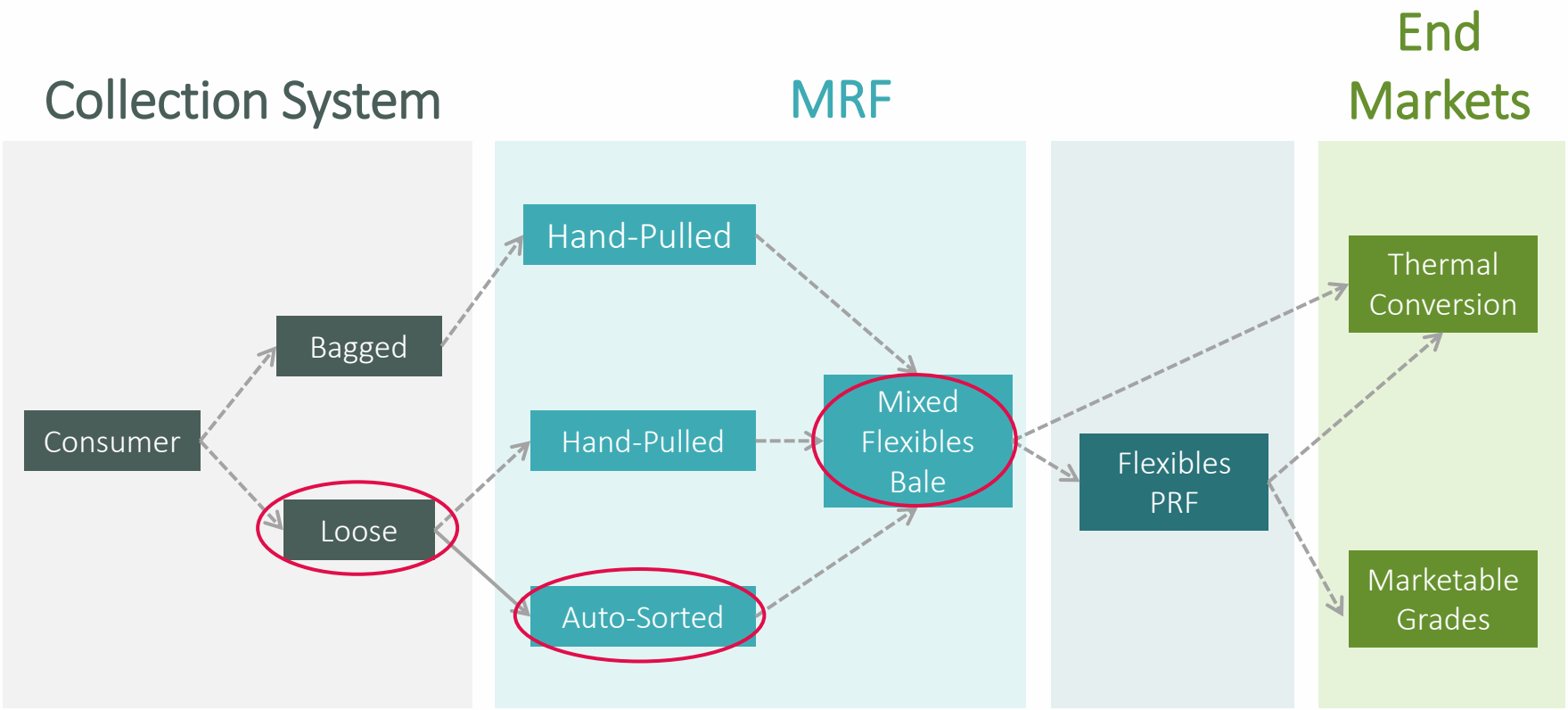
*Flexible Packaging: Less Resources, Energy, Emissions & Waste

THE RECYCLING PROBLEM:

Flexible Packaging Is A Processing Challenge for Today's MRFs

THE KEY PATHWAY FOR MRFF RESEARCH –

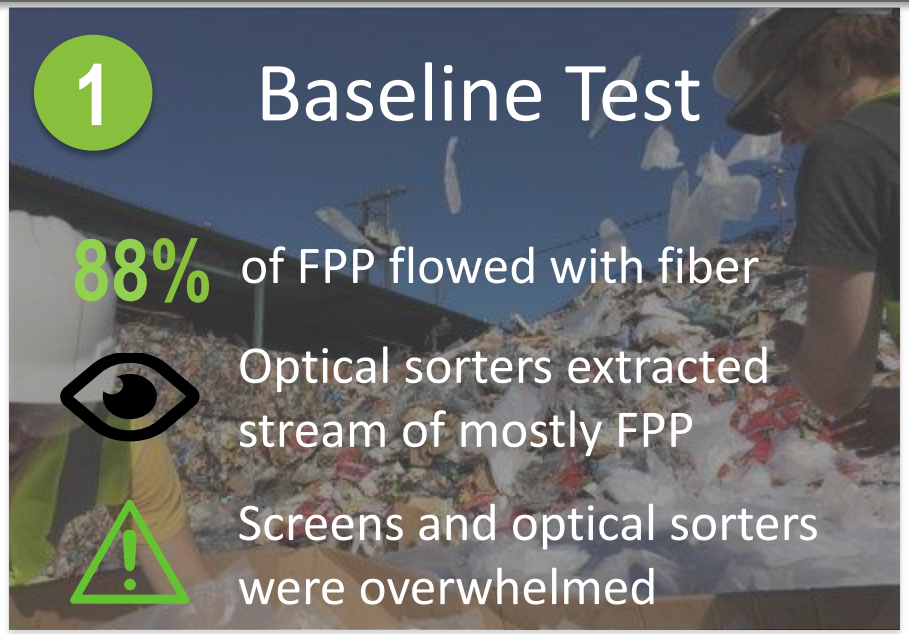
Can loose flexible plastic be separated in a MRF system?



Without affecting the other value streams?

2016 RESEARCH RESULTS

Baseline Test • Equipment Testing
MRF Testing

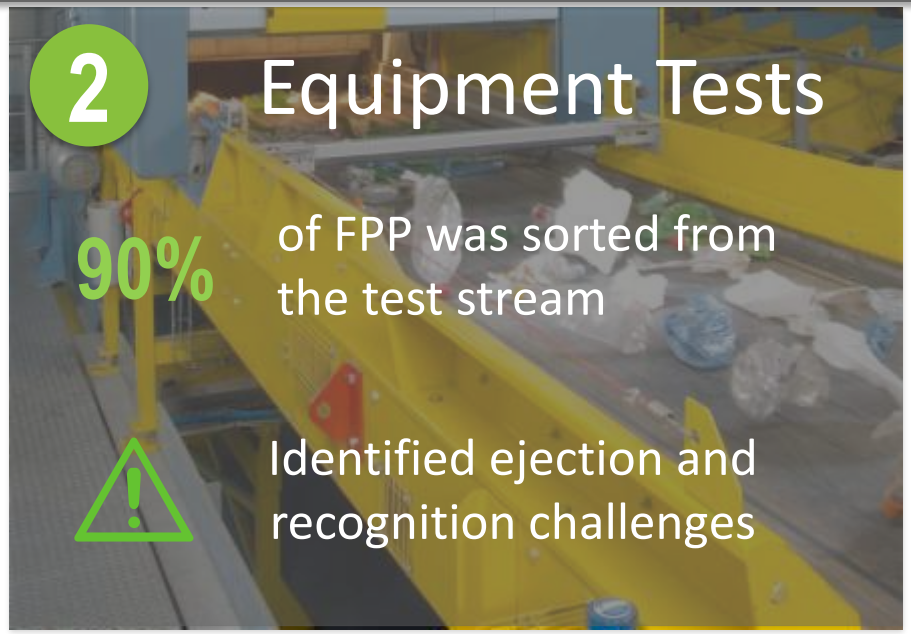


1 Baseline Test

88% of FPP flowed with fiber

Optical sorters extracted stream of mostly FPP

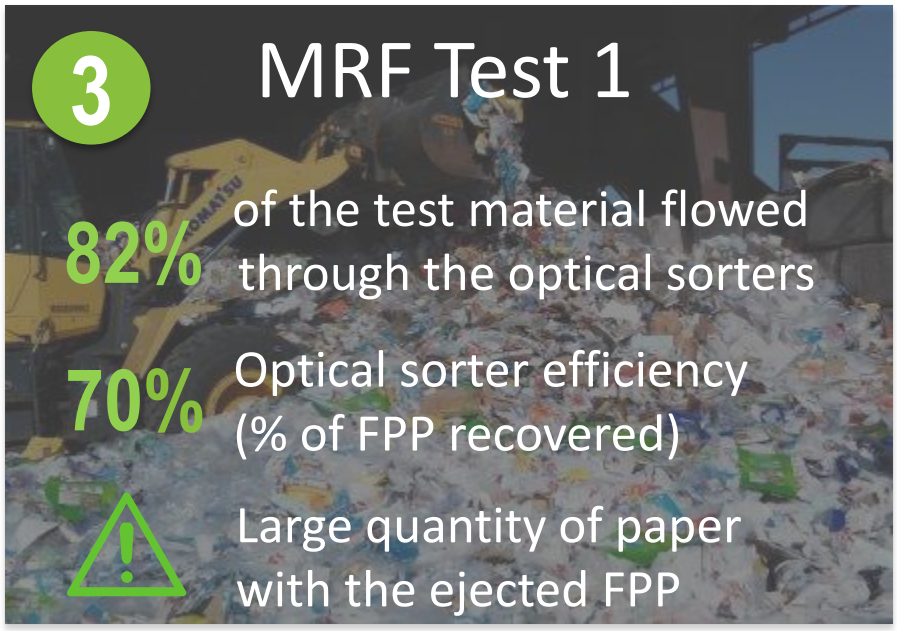
Screens and optical sorters were overwhelmed



2 Equipment Tests

90% of FPP was sorted from the test stream

Identified ejection and recognition challenges

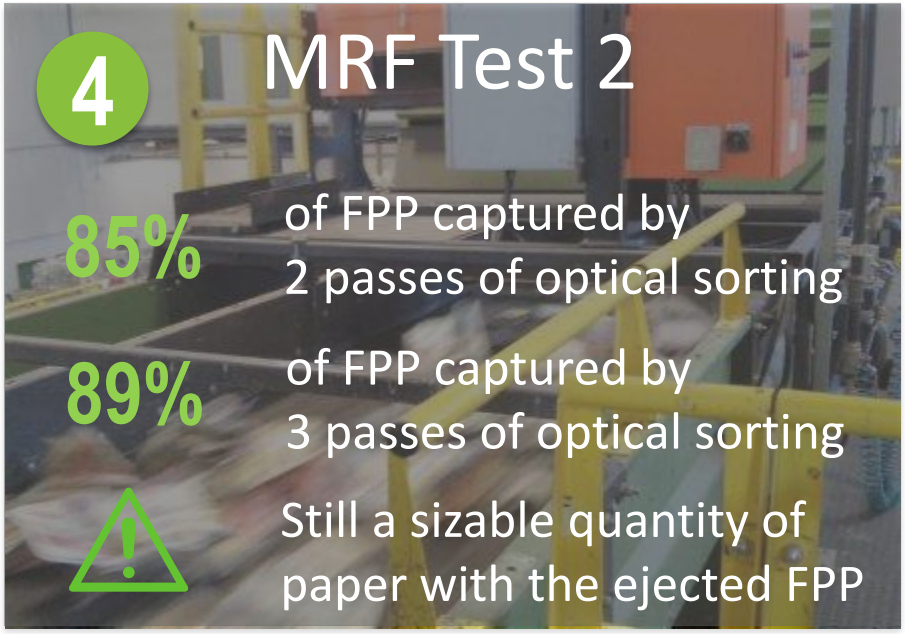


3 MRF Test 1

82% of the test material flowed through the optical sorters

70% Optical sorter efficiency (% of FPP recovered)

Large quantity of paper with the ejected FPP



4 MRF Test 2

85% of FPP captured by 2 passes of optical sorting

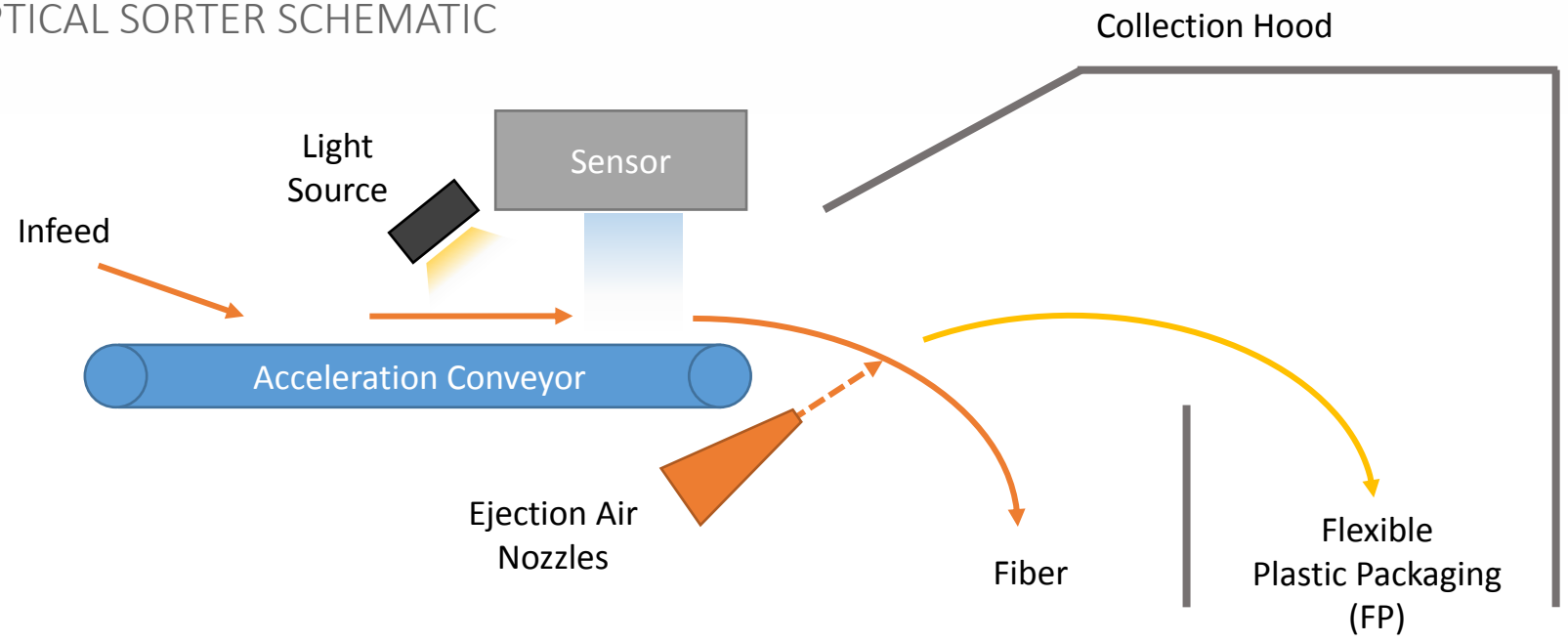
89% of FPP captured by 3 passes of optical sorting

Still a sizable quantity of paper with the ejected FPP

KEY FINDING FOR 2017 PHASE OF TESTING

Airflow control over acceleration conveyor and in collection hood plays a major role in successfully sorting flexible packaging from paper

OPTICAL SORTER SCHEMATIC



FLEXIBLE PACKAGING SORTATION AT MATERIALS RECOVERY FACILITIES

Research Report

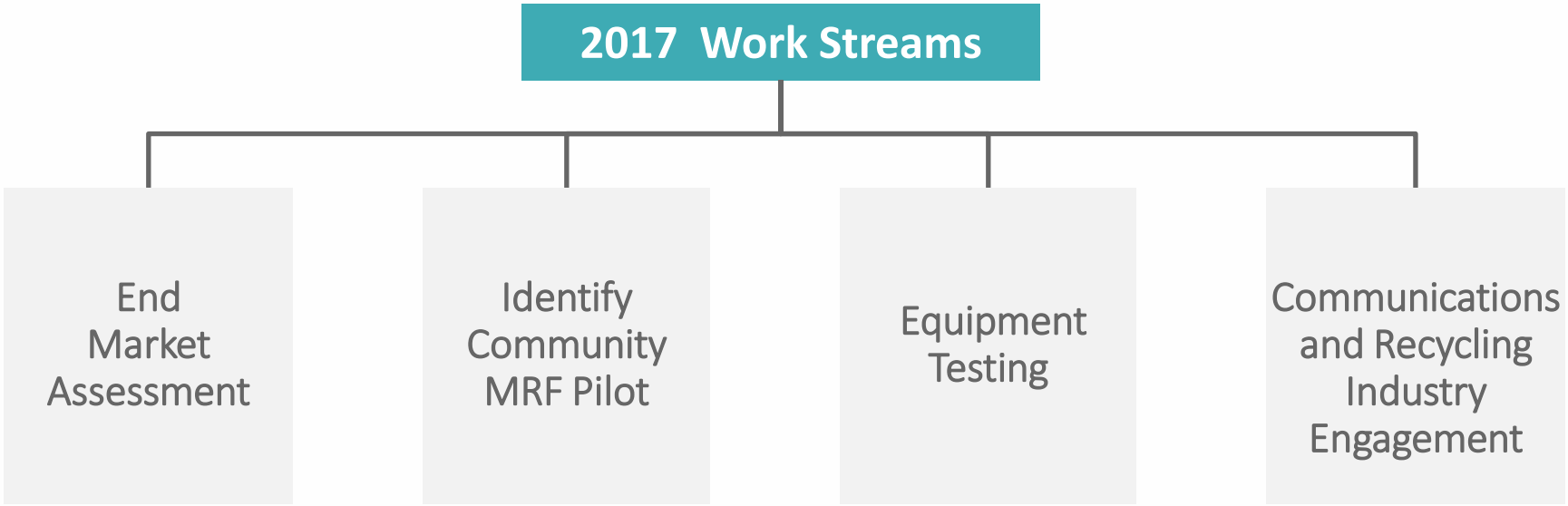
IMPORTANT PARTNERSHIPS FORMED: MRF Test Teams

Larry Baner, Nestle Purina
Michael Timpane, RRS
Emmie Leung, Emterra Environmental
Jeff Wooster, Dow
Steve Sikra, P&G
Kerry Sandford, RRS

Brennan Madden, RRS
Chris King, RRS
Jon Pyper, Dow
Susan Graff, RRS
Sandi Childs, APR
Nevil Davies, Emterra Environmental

OBJECTIVE

Demonstrate flexible packaging recycling with a partner at a community MRF, with a plan to sort both PE and other FPP; and, expecting our MRF partner will require equipment modifications and testing—perform lab testing when necessary in support of the implementation at the MRF.



2017 END MARKET ASSESSMENT

Objective: Answer key MRF questions "What's expected in the bale, and where am I going to sell this material?

Develop a description of the MRF Flexible Packaging Bale

- Describe expected fiber, resin and contaminant content

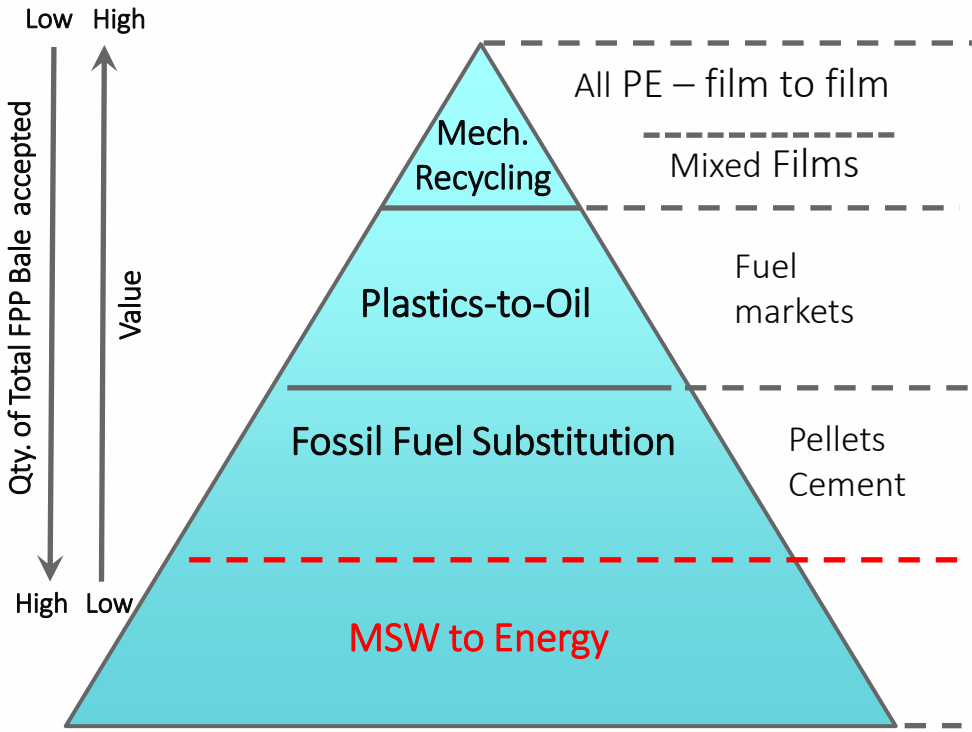
Identify potential end markets

- Mixed resin mechanical recycling
- Sorted resin mechanical recycling
- Chemical recycling
- Energy and fuel

Evaluate pre-processing needed to prepare material for market

- Sorting
- Washing
- Other needs

Flexible Packaging End Markets*



Spec. Type	Use of MRF Mat'l	MRF-to-End Market Cost	Secondary Processors Cost
1 or 2	Rare	Equip. + Freight	QA + Washline + Pelletization
3	Some	Equip. + Freight	QA + Shredding
4	Common	Equip. + Freight + Tip fee	QA + (Shredding)
NA	**Common**	**No need to sort material**	-

***Defined by the current product produced by the process. Size of the end market is not intended to be considered proportional to pyramid.**

Spec. Type	Description
1	Single resin type + limited contamination
2	Mixed resin + limited Contamination
3	PE, PP, PVC<1%, etc. + no fiber
4	PE, PVC<1%, etc. + limited fiber

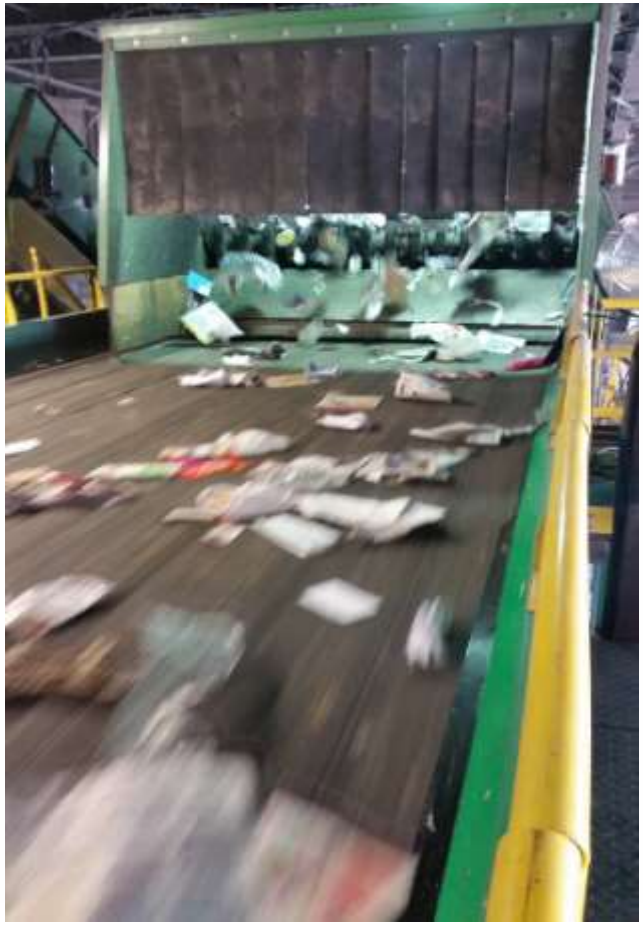
Source: RRS Interviews with 13 end market operators

MIXED RESIN PRODUCT EXAMPLES IN EUROPE

COMMUNITY MRF PILOT PROGRAM BASICS

- **Business Model: Adding flexibles is cost-neutral or better for the MRF**

- **Employ MRF Economic Feasibility Model to determine individual facility's costs and benefits to add flexibles**



Key Considerations for Pilot Selection

- Community support – Local officials interested in adding flexible packaging to recycling collections
- Supportive policy and economic environments
  - Encourages increased diversion, zero waste
  - Large flexibles stream available to MRF
- Single stream MRF processes 20 tons/hr minimum
- Existing end markets in region support value proposition
- High tip fees favorably impact MRF net system cost

How the MRF Pilot Works

- RRS will apply the model for MRFs considering pilot participation
- Output is a customized MRF pro forma for adding flexibles estimating net system costs and benefits based on local conditions
- RRS inputs capital & operating costs MRF provides to build pro forma
- MRFF will provide co-financing, technical support, and stewardship of funding sources for pilot

  (e.g., Closed Loop Fund)

2017 EQUIPMENT PERFORMANCE GOALS

Optical sorting goals

- Maximize extraction of flexible packaging from fiber
- Minimize fiber in flexible packaging product
- Maximize throughput
- If practical, use airflow or other technology to separate flexibles from rigid plastics that might be ejected with them

Specific goals that RRS believes will assure project success are as follows:

- >90% eject of flexibles from fiber (by weight)
- <30% of flexible product is fiber (by weight) [<15% desired]
- 10 tons per hour throughput

Mechanical sorting goals

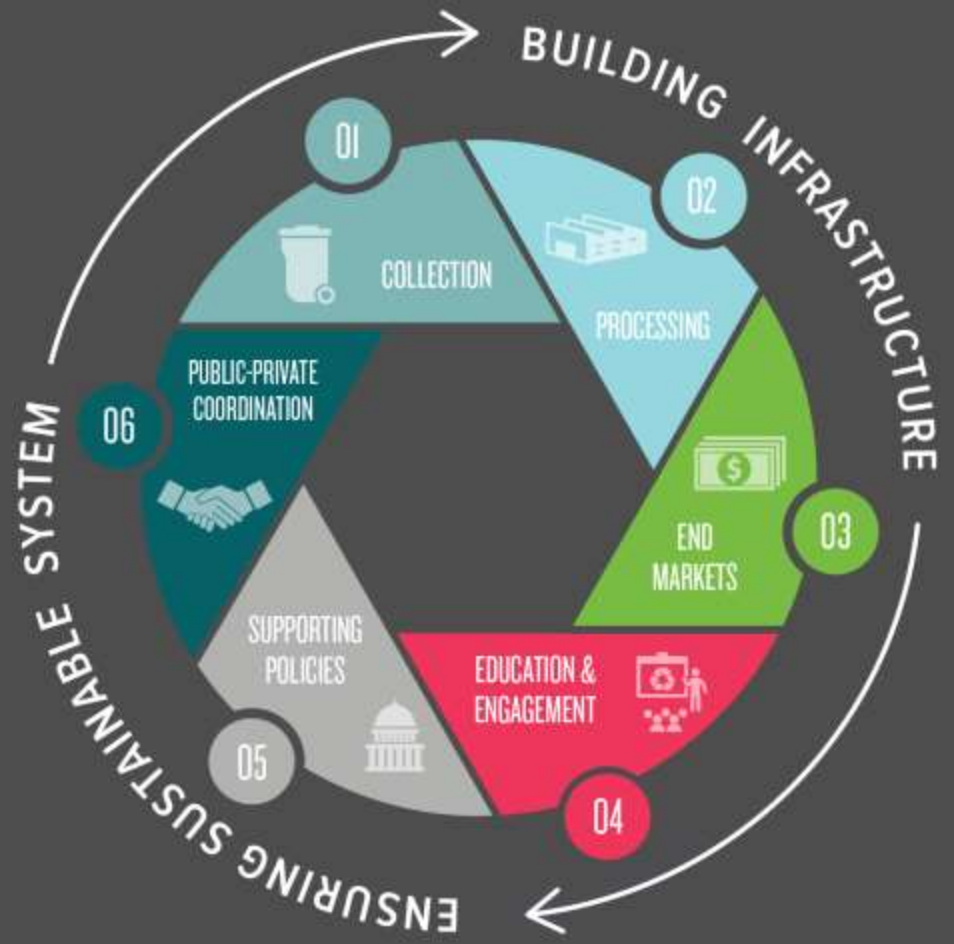
- Capture 30-50% of flexible packaging before optical sorting

2017 COMMUNICATION & INDUSTRY ENGAGEMENT GOALS

Take MRFs, communities and the packaging value chain with us on our journey

- Press releases for specific accomplishments and activities
- Outreach and information exchange with the recycling industry to build community of practice for recycling films and flexibles (e.g., industry association speaking engagements and EPA webinars)
- Continued member recruitment campaigns at major brand owner and retail convenings
- Regularly update materialsrecoveryforthefuture.com website

WHAT'S NEXT

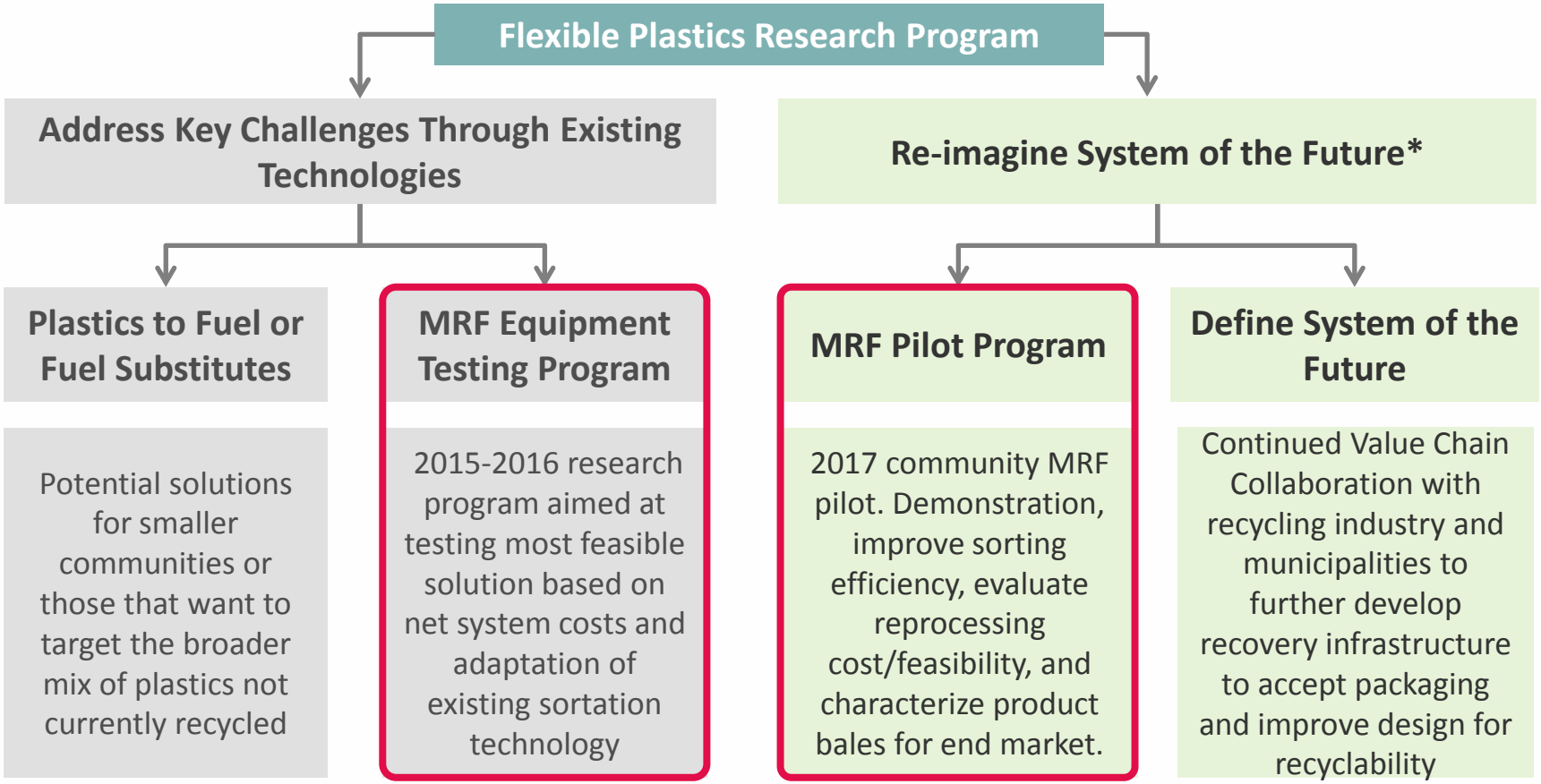

BUILDING INFRASTRUCTURE
01
COLLECTION
02
PROCESSING
03
END MARKETS
04
EDUCATION & ENGAGEMENT
05
SUPPORTING POLICIES
06
PUBLIC-PRIVATE COORDINATION
ENSURING SUSTAINABLE SYSTEM

Current Work Snapshot

- Stakeholder analysis and consultations produced short list of MRFs candidates that are prospective pilot partners
- Talks in process with select MRF operators and interested communities in PA, CT, TX, MN and WA.
- Build broader community to exchange information through various forums (EPA SMM Webinars, press releases, trade associations)
- Exhibit recycled product samples (deck boards, pallets, posts, etc.) at Sustainable Brands Detroit 2017 and other major packaging value chain events

MATERIALS RECOVERY FOR THE FUTURE

Long term Strategy



*Looking for partners to participate in these programs

WE INVITE YOU TO BECOME PART OF THE SOLUTION

Success depends on value chain collaboration to demonstrate and scale the solution. Transparent sharing of data.

Join our mailing list to to receive MRFF news and research findings.

Join Us! Sponsors and MRF partners are needed to support the Pilot Program; plan recycling systems of the future

THANK YOU

For more information on joining the project contact:

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