

Material Cost Differentiation (MCD) Project

Thursday, June 25, 2020

Welcome from Neil Antymis



A thank you to the Steward Consultation Committee (SCC)



Background – Modernizing fee methodologies and cost methodologies

- All Boards approved the replacement of the three-factor formula fee methodology with the Four-Step Fee Methodology in June 2016
- This included approval of its Guiding Principles, one of which instructs us to consider how a material's characteristics impacts the cost of recycling system activities
- The current method for determining how materials impact the cost of the system is the Activity Based Costing (ABC) methodology which requires replacement
- The project charter initiating the Material Cost Differentiation to 'find a better way' to calculate these impacts was presented and approved by all four Boards of Directors in the summer of 2017

MCD Methodology developed by experts

- RRS chosen via a competitive RFP process because of their excellent combination of engineering and operating experience in recycling system and facility design as well as deep technical expertise on packaging formats, life cycle analysis, and costing both in Canada and the U.S.
- Guy Perry & Associates brings extensive experience in analyzing and optimizing recycling systems and strategies for attributing costs and fees
- CSSA team with core competencies in program management, analytics, material knowledge, procurement and the mechanics of designing and operating EPR programs
- Program leaders from Recycle BC, MMSW, MMSM and Stewardship Ontario with intimate knowledge of their local supply chains

MCD Methodology reflects steward priorities

- ✓ Principle Based – Reflects guiding principles designed by stewards
- ✓ Fair – Establishes a level playing field
- ✓ Repeatable – Supported by replicable procedures
- ✓ Defensible – Generates sound results that are comparable over the long term
- ✓ Comprehensive – Applicable to all materials and CSSA-supported programs
- ✓ Nimble – Reflects emerging trends in packaging formats, recycling technologies and end-markets

Steward-developed MCD Project Principles

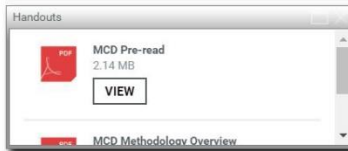
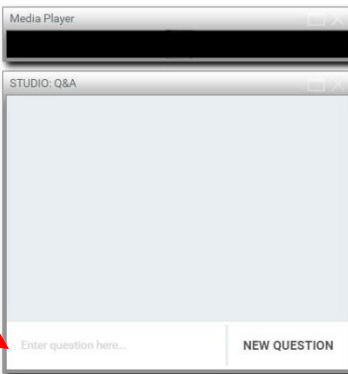
1. Relativity counts
2. All designated materials count
3. All material characteristics count
4. All activities count
5. Value counts
6. System design and operations count
7. Emerging trends count
8. The material mix counts

CSSA wants your feedback

- Do you agree that the MCD Methodology is sufficiently principle-based, fair, defensible and comprehensive? If not, why not?
- Is it clear how the MCD methodology will be applied and how it will contribute to fee setting?
- Did you find the pre-read and other project materials helpful and will you be able to use them to brief your colleagues? If not, what additional materials would be helpful?
- What else do you want to tell us about the proposed Material Cost Differentiation Methodology?

mcd@cssalliance.ca

Webinar details



**Submit your
questions**

**Main screen
displays slides**

**Download
the pre-read**

Technical issues? Send a note in the Q&A box

Today's agenda

1. Introduction: Material Cost Differentiation (MCD) Methodology
2. MCD Methodology overview & outcomes
3. How the project outcomes impact fees, fee rates and stewards
4. Next steps & action items
 - Consultation timeline
 - Q&A process
 - Upcoming harmonization project



Introduction

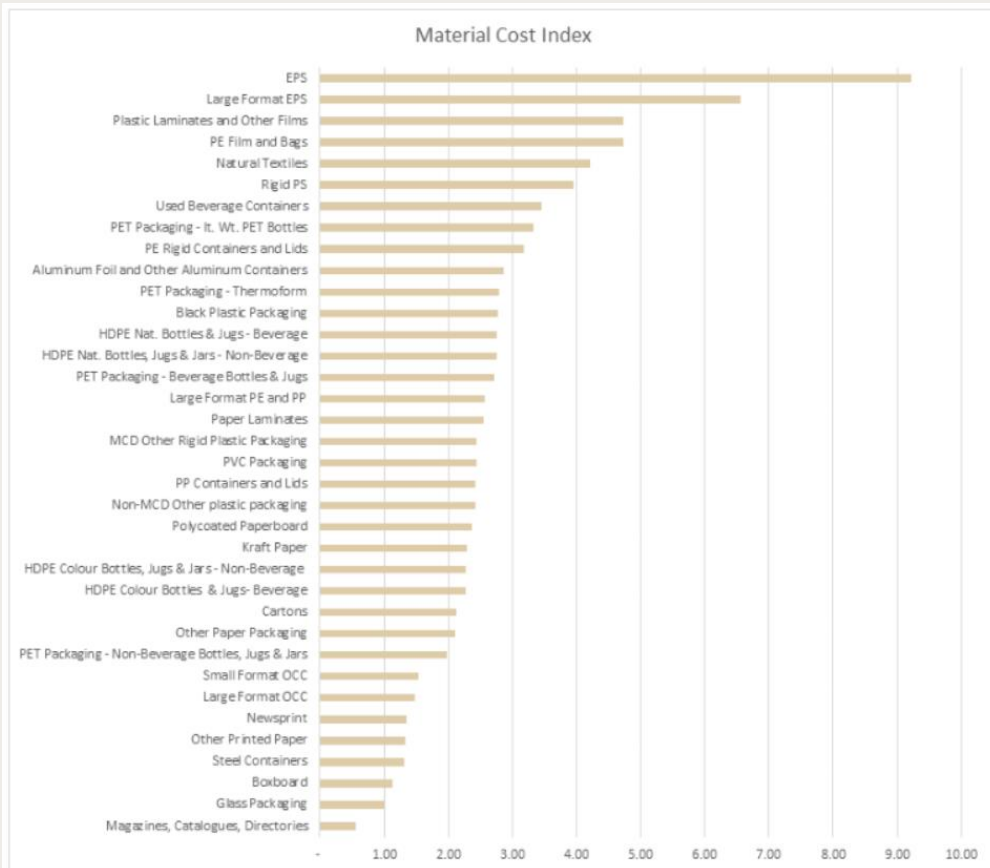
In this section

- We will introduce the Material Cost Index (MCI)
- We will illustrate how the MCI is used to allocate the budgeted Gross Cost of the recycling system in Step 1 of the Four-Step Fee Methodology
- We will discuss the use of the MCI as a metric that can be used when comparing the cost impacts of one material to another
- We will explain that the MCI does not impact a program's cost budget
- And, that the MCI does not send a signal about the fee rate because it is only one of a number of inputs to the allocation of Gross Costs

Introducing the Material Cost Differentiation (MCD) Methodology

- It is a comprehensive methodology providing us with instructions, impact metrics, measurement protocols and a computational model that allows for the calculation of each material's impact on the activities of the recycling system
- The activities that are measured are those that satisfy the guiding principles established by stewards to reflect their priorities of fairness and comprehensiveness
- The methodology allows us to produce defensible and explainable results
- These results are used as an important input to fee setting

The MCD Methodology produces a Material Cost Index (MCI)

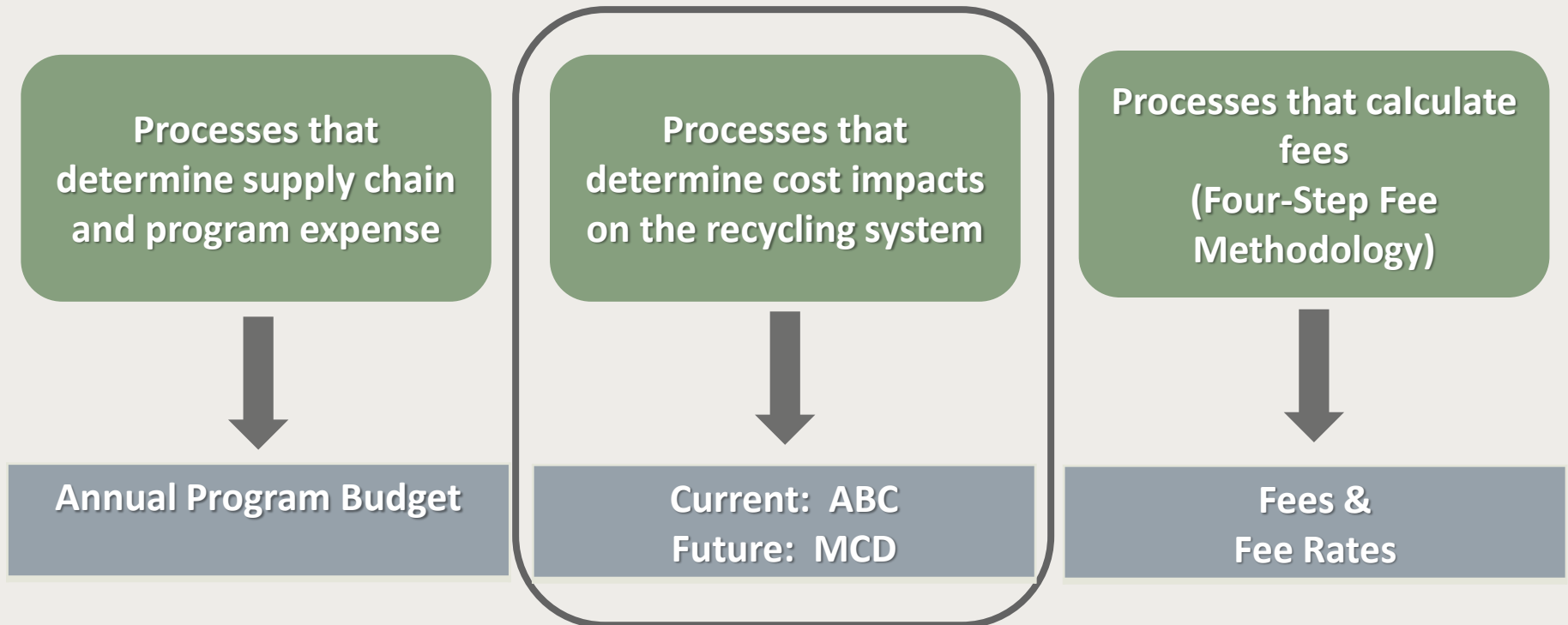


- Each material has a value on the MCI.
- The MCI provides a means of easily comparing the impact one material has on the cost of recycling system activities as compared to all others.

Each material category has a value on the Material Cost Index

- The material's MCI value expresses its impact on the cost of recycling system activities relative to other materials
- Comparing the MCI values of materials is easy and meaningful as it is a unitless number with no further qualification such as 'per tonne'
- The lower the MCI, the lower the cost impact on the cost of the recycling system activities and vice versa

The MCD Methodology will measure cost impacts - one of the three processes common to all PPP programs



The Four-Step Fee Methodology applies rules to the allocation of the four program budget items

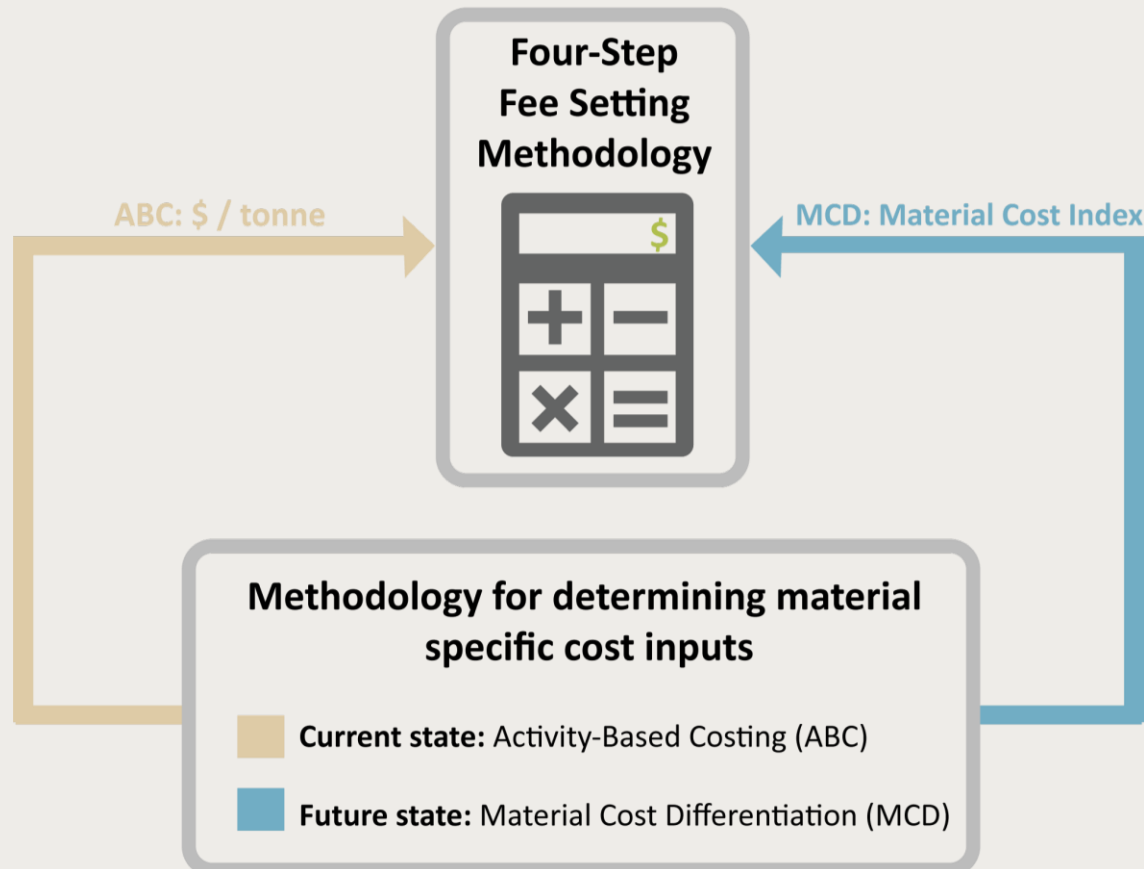
Processes that
determine supply chain
and program expense



Inputs to the Four-Step Fee
Methodology

Budget Item	Step of Four-Step Fee Methodology responsible for allocating budget item
Gross Cost	Step 1
Commodity Revenue	Step 2
Program Management Costs	Step 3
Material Specific Investments	Step 4

Step 1 of the Four-Step Fee methodology allocates the gross cost of the system to each material. To do so fairly, a critical input is needed to reflect each material's unique cost impacts.



This input allows for the calculation of each material's relative share of the Gross System Costs in Step 1 of the Four Step Methodology

Material	Quantity (kg) A	MCI B	A X B = C	Relative Share C ÷ D
Material 1	1,000 (50%)	1	1,000	33.3%
Material 2	1,000 (50%)	2	2,000	66.7%
Total	2,000		3,000 D	

Introducing a material specific representation of its cost impacts allows for a more fair allocation of costs because weight alone does not reflect the effort to manage material of differing characteristics.



Recap

- The MCD methodology produces a Material Cost Index (MCI)
- The MCI is used to allocate the budgeted Gross Cost of the recycling system in Step 1 of the Four-Step Fee Methodology
- The MCI provides us with a cost impact value that can be used when comparing the cost impacts of one material to another
- The MCI does not impact a program's cost budget
- The MCI does not send a signal about the fee rate because it is only one of a number of inputs to the allocation of Gross Costs



MCD Methodology Overview

In this section

- We will introduce the MCD Methodology as described in Sections 7 - 9 of the pre-read
- We will highlight a few of the new measurement techniques that have been developed to measure the impacts that materials have on the recycling system
- We will illustrate how these measurements are used to calculate the final Material Cost Index (MCI)
- We will provide some examples of why certain materials have different impacts than others

The MCD Methodology has four components and enables the measurement of cost impacts based on material characteristics

Material Cost Differentiation Methodology

1 Guiding Principles



1. Guiding Principles

2 The MCD Context



2. The MCD Context

3 The MCD Model



3. The MCD Model

4 MCD Methodology Maintenance



4. The Maintenance Processes

8 Guiding Principles included two key concepts that had significant influence on the MCD Methodology design

1 Guiding Principles



4

Readiness to Repurpose

“To transform a material for a specified use as a value-added input.”

7

Emerging Trends

“Technologies that are expected to be commercially proven in the next few years.”

The second component of the MCD Methodology establishes the 'context' for the MCD Model

2 The MCD Context



2 The MCD Context

- 1) **Material Characteristics:** Determine what impacts to measure.
- 2) **Material Categories:** Categories used for impact measurement tests.
- 3) **System Boundaries:** Where materials enter the system and extent of sorting activities needed.
- 4) **The MCD System:** Comprised of 18 distinct modules that collectively represent all activities and resources necessary to deliver repurpose-ready material.



RRS developed the material category list that would be used in measurement studies that represented unique groups of characteristics

Large Format OCC



SIZE



BULKINESS

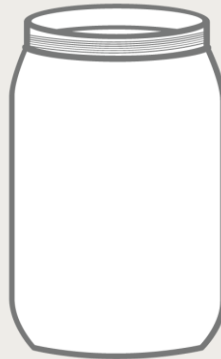


DENSITY



SURFACE
AREA

Glass



DENSITY



ABRASIVENESS (IDC)



BREAKABILITY/FRIABILITY

Film



FLEXIBILITY



MANUAL/VISUAL IDENTIFIABILITY

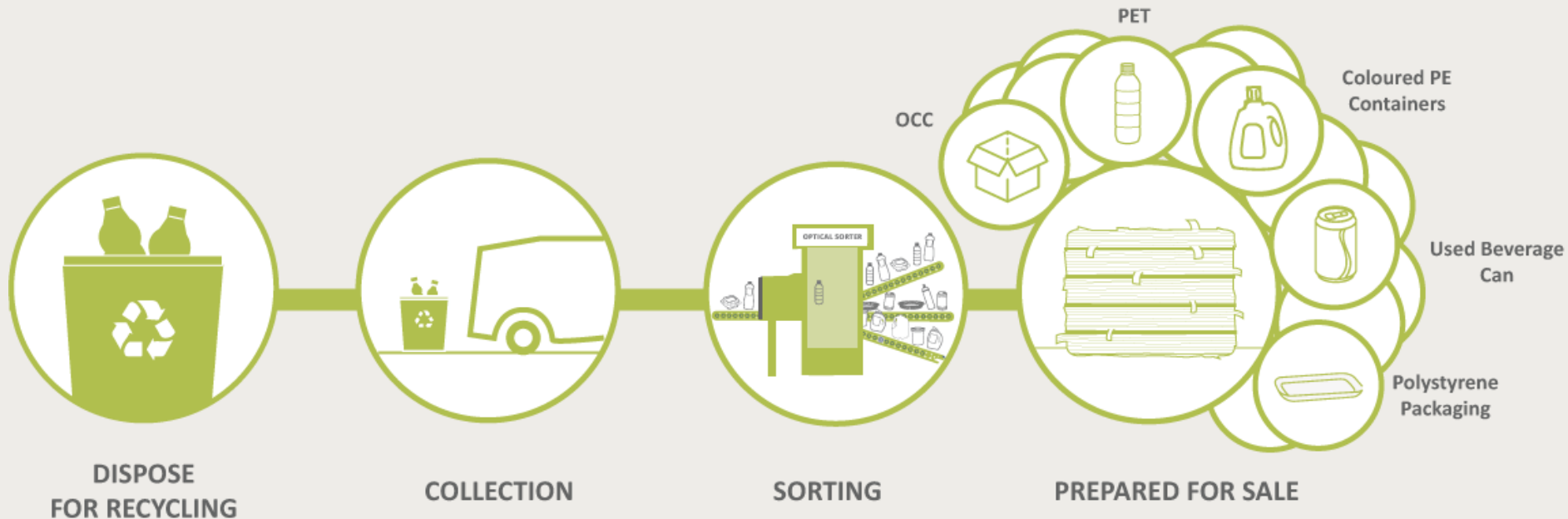


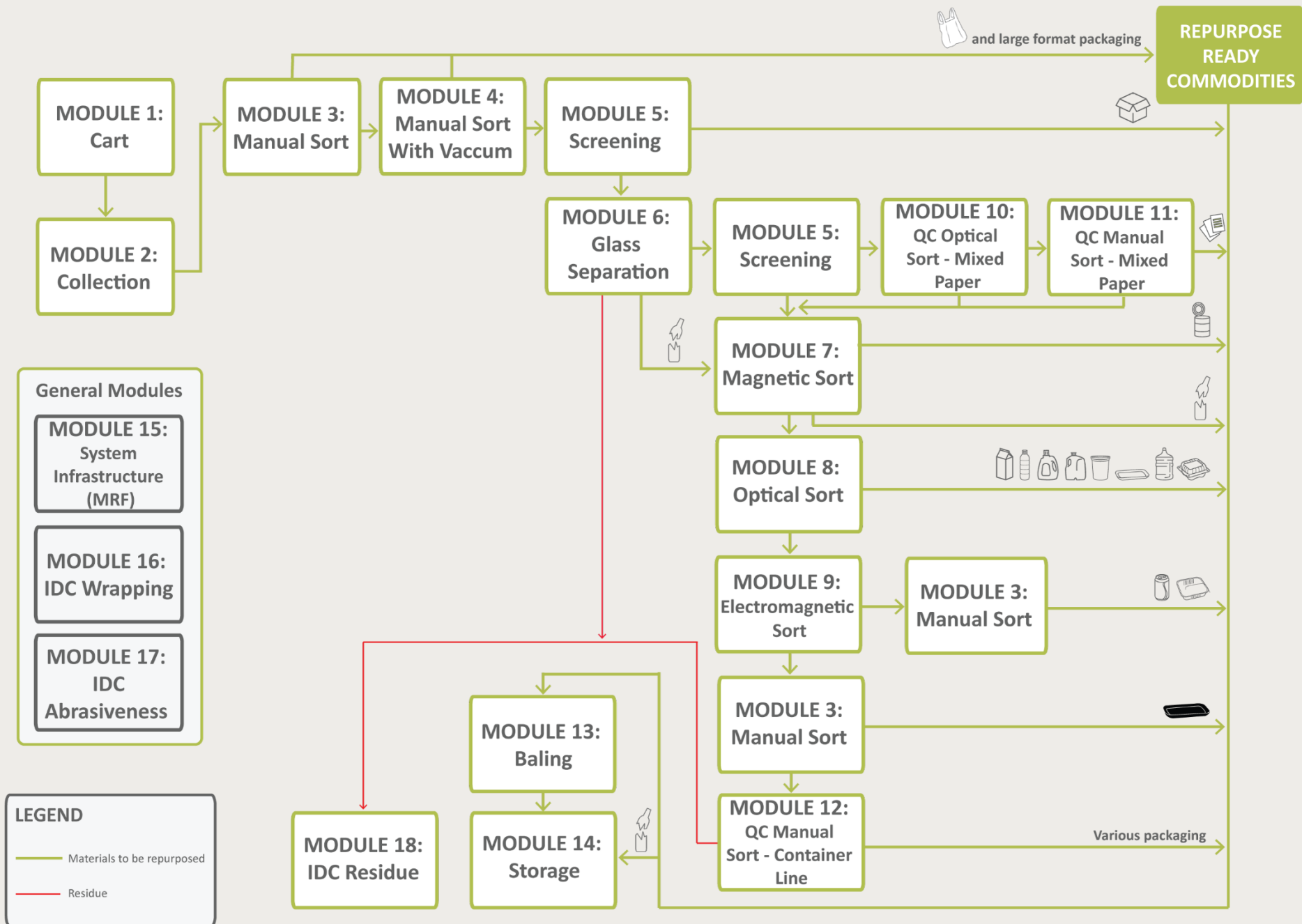
WRAPPABILITY (IDC)



DENSITY

System boundaries define where materials enter and exit the system





Recap

- The MCD Methodology allows us to calculate a Material Cost Index (MCI)
- The MCD Methodology has four components
- The first is the Guiding Principles
- The second is the context which:
 - Inform material categories by referencing material characteristics
 - Has determined system boundaries defining the entry and exit point that were used when engineering the conceptual recycling system – a system that includes all the activities necessary to manage material within those system boundaries and to produce material that is ‘ready to be repurposed’

The MCD Model

Material Cost Differentiation Methodology

1 Guiding Principles



2 The MCD Context



3 The MCD Model



4 MCD Methodology Maintenance

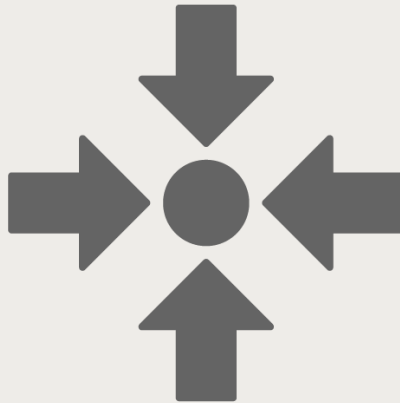


3 The MCD Model

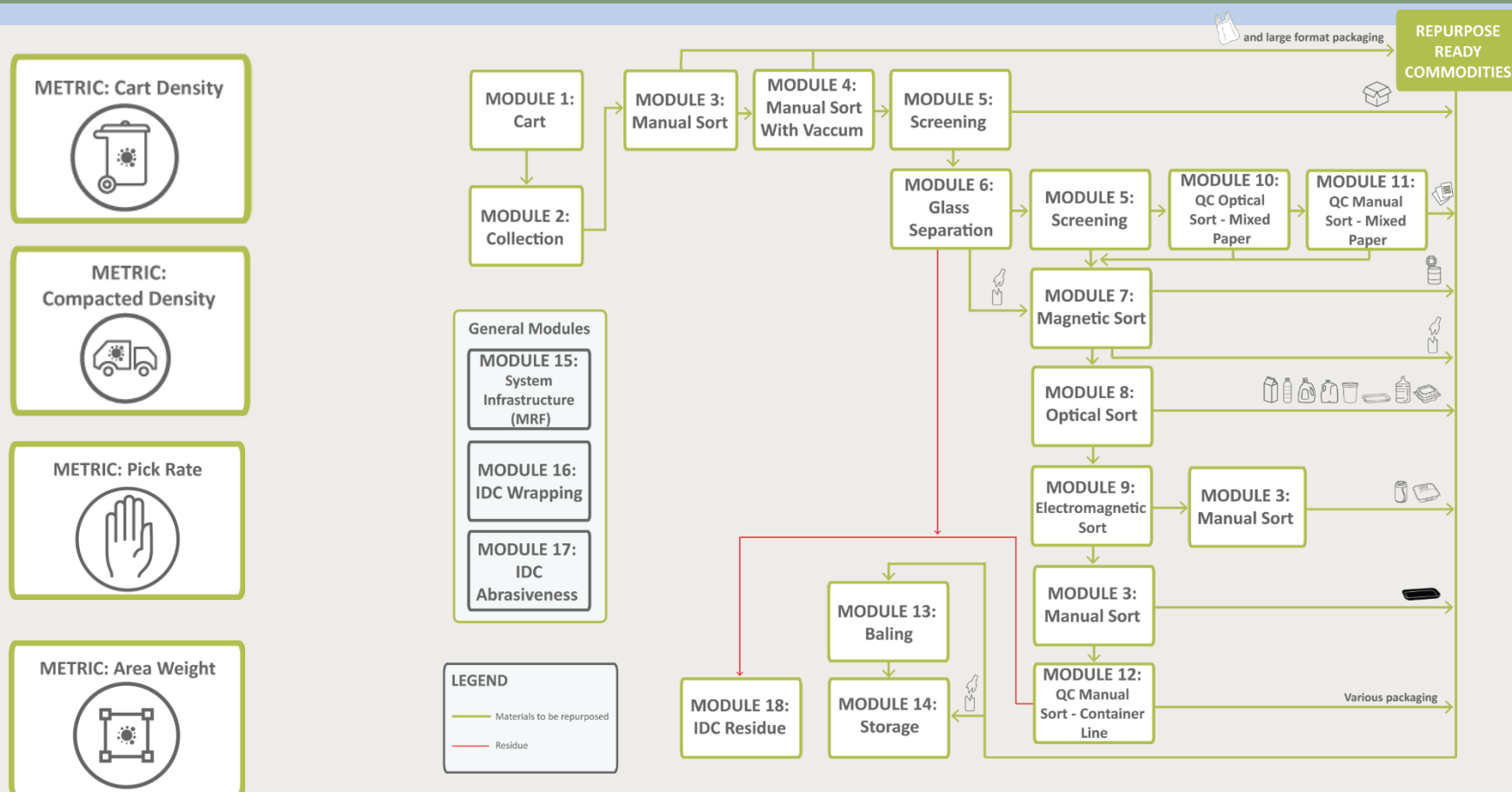


The MCD Model provides the tools needed to calculate the MCI

3 The MCD Model



The MCD Model connects MCD System Modules with metrics
Metrics represent how materials impact the resources of the module



Each metric has a measurement protocol

Metrics



10
metrics

Measurement Protocol



10
measurement
protocols

Material Categories



36
material
categories

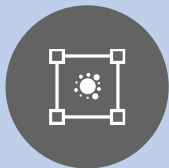
RESULTS (+200)



Some of these metrics provide new ways to measure impacts that will improve accuracy, and therefore fairness, of the input to fees



Compacted Density



Area Weight



Pick Rate

Our ability to measure material under compaction is entirely new and will improve our understanding of the impact on Collection



Compacted Density

- Previously, we had no way to measure a material's utilization of the collection truck which represents 30% of the system cost
 - We now have a repeatable, defensible, measurement protocol and a test device engineered specifically to enable this measurement
- This is important as will impact fees



The new area weight protocol allows for the measurement of each material's impacts on sorting equipment in the MCD System MRF



Area Weight

- Mechanical sorting in the MRF includes opticals for plastics, screens for fibres, and magnetic/ electromagnetic sortation for metals
- To work effectively, materials must be presented to mechanical sorting equipment in a single layer
- By including a measurement of the weight of one layer of material, we are now able to accurately reflect the utilization of equipment and measure each material's impacts on mechanical sorting equipment

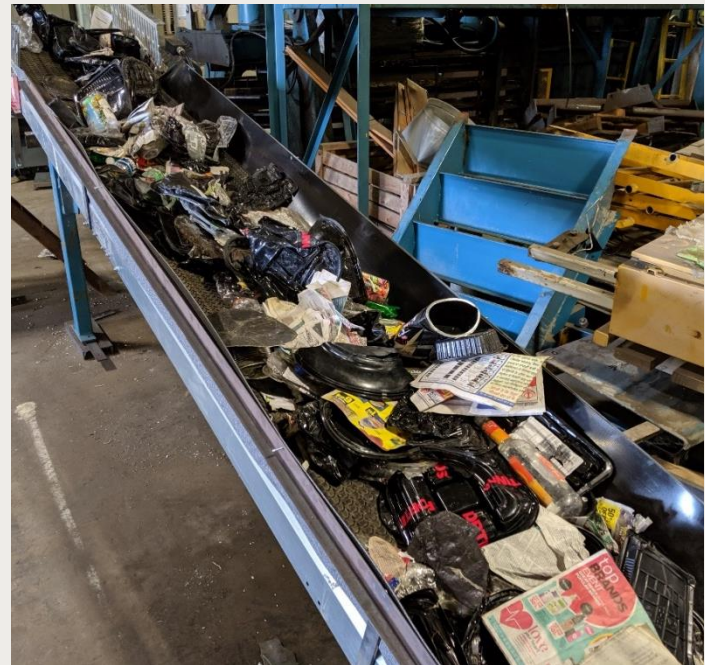


The improved pick rate approach measures the impacts of a single material category at a time, it is now independent of composition and quantity in the stream



Pick Rate

- Previously, pick rate measurements were impacted by the mix of materials in the stream
- The MCD pick rate measurement uses standardized equipment and background material ratio that accurately reflects the impacts of a material category's characteristics on the ability of a manual sorter to identify and pick recyclables



Conducting the measurement studies creates hundreds of results

Metrics



10
metrics

Measurement Protocol



10
measurement
protocols

Material Categories



36
material
categories

RESULTS (+200)



The MCD Model instructs us on how to bring together the material's impact measurement with each module's cost

Module-Material Relative
Impact Factor (RIF)

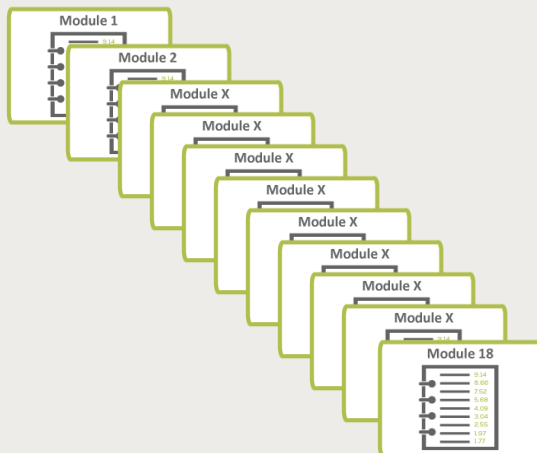
Module Cost Factor (CF)

- Both *impacts* and *costs* are needed to properly express the material's impact on costs of recycling system activities to ensure fairness because:
 - Some material categories have high impact on low cost modules
 - Some material categories have low impact on low cost modules
 - Some material categories have high impact on high cost modules and
 - Some material categories have low impact on high cost modules

Module Cost Differentiation Index (MCDI) for each module in the MCD System

Module Cost Differentiation
Index (MCDI)

Material Cost Index (MCI)



Index

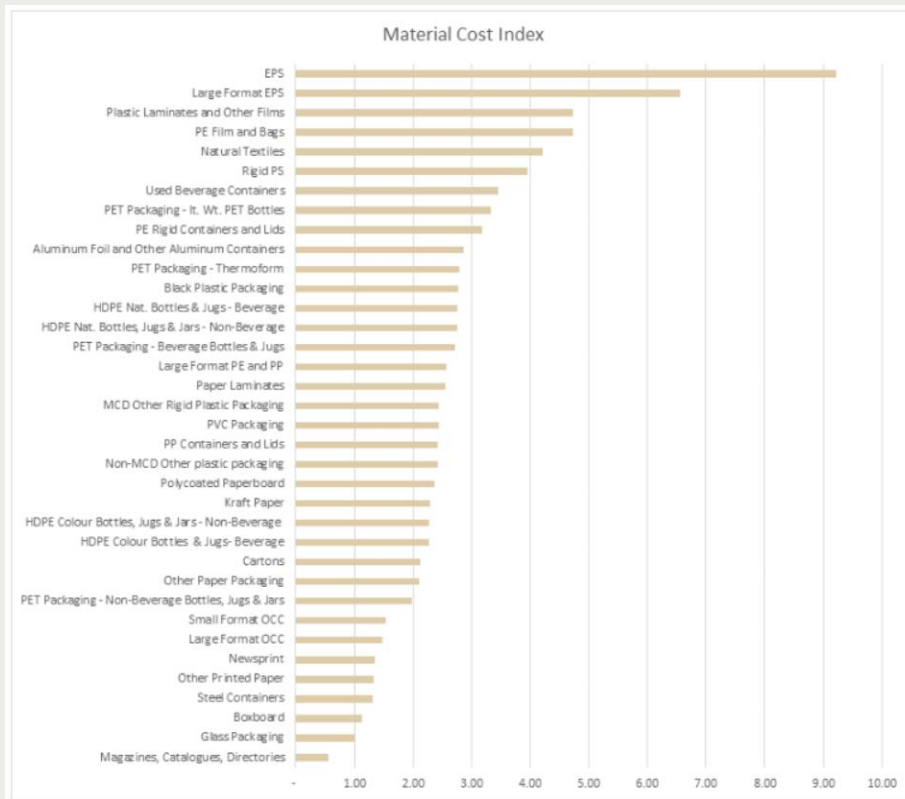
Material Category #1	9.14
Material Category #2	8.66
Material Category #3	7.52
Material Category #4	5.68
Material Category #5	4.09
Material Category #6	3.04
Material Category #7	2.55
Material Category #8	1.97
...	
Material Category #39	1.77

Illustrative Example

To calculate each material category's value on the MCI, we gather its MCDI values for those modules of the MCD System it uses

Module	Material Category	MCDI
Module 1 - Cart	Material #1	0.14
Module 2 – Collection	Material #1	0.25
Module 5 – Screens	Material #1	0.07
Module 10 – QC Optical Sort - MP	Material #1	0.06
Module 11 – QC Manual Sort - MP	Material #1	0.03
Module 13 – Washing	Material #1	0.03
Module 14 – Storage	Material #1	0.02
Module 15 – System Infrastructure	Material #1	0.12
Module 18 - Residue	Material #1	0.01
Total – Value within MCI	Material #1	0.73

Material Cost Index – illustrative example



50% of the materials are concentrated in the 2 – 3 range

9 materials are greater than 3

9 are less than 2

Recap

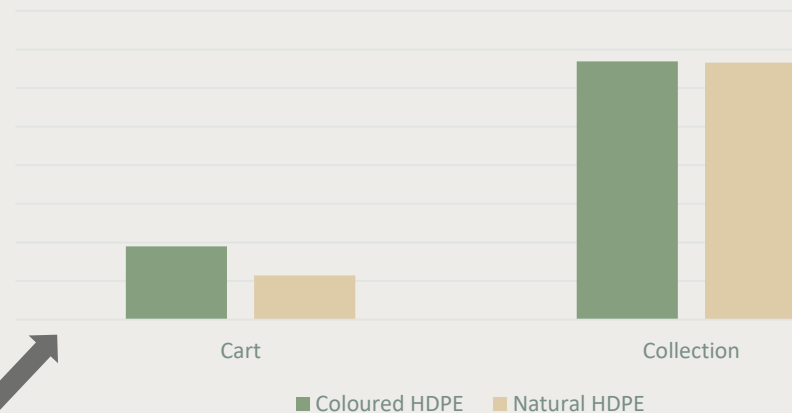
- The MCD Model identifies a metric that best represents the impacts that materials have on each of the 18 MCD System modules
- There is a measurement protocol defined for each metric
- We use the measurement protocol to gather the metric value for each material category
- The completion of all measurement studies provides us with a robust set of measurement results
- Measurement results are then combined with the module's cost factor to produce a cost impact index for the module itself (MCDI)
- These are then added together for each material to produce the final MCI

Confidence in the final Material Cost Index values

- Measurements can be reviewed and rationalized for any material for any MCD System module it uses
- We have more detail about where the materials impact the system than ever before
- We have developed new metrics, supported by new measurement protocols, that are repeatable and defensible
- The MCD Methodology was reviewed in detail with the Steering Committee and members of the Steward Consultation Committee

HDPE Colour Bottles have a lower value on the MCI than HDPE Natural Bottles

Coloured vs Natural HDPE
Metric: Cart & Compacted Density



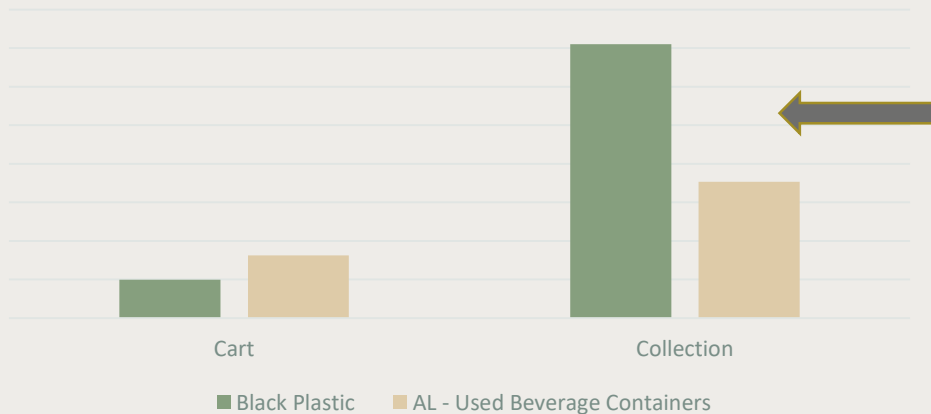
The two materials have similar densities in the collection truck

meaning they both are compressible and impact the collection module in similar ways

Coloured HDPE is more dense in the cart so take up less space and therefore utilizing less of the cart module resources than Natural

Black Plastic has a lower value on the MCI than AL Used Beverage Containers

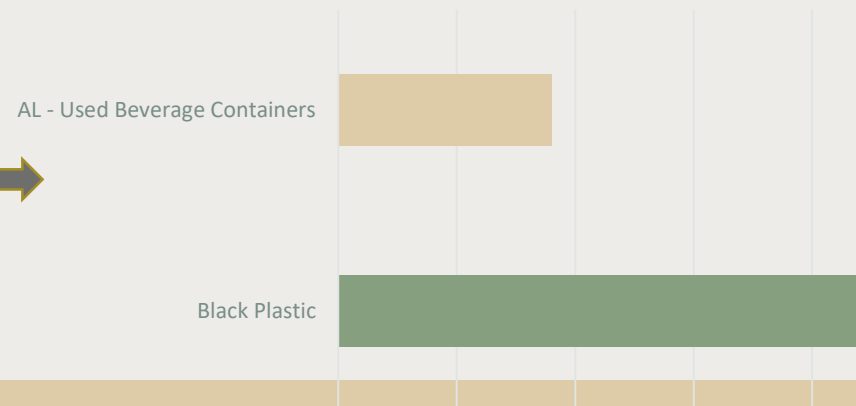
Black Plastics vs AL Used Beverage Containers
Metric: Cart & Compacted Density



- Both materials utilize the resources of the manual sorting module
- Black Plastics has a higher pick rate and therefore utilizes less resources of the module (i.e. sorter time)

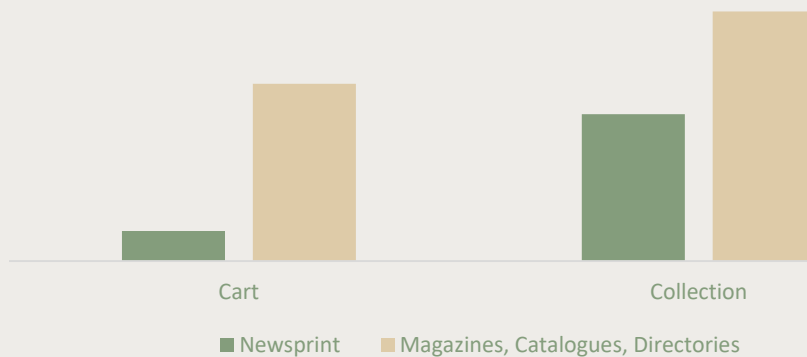
- Two materials have similar densities in the cart
- Black Plastic has a much higher density once compacted and therefore takes up less resources of the collection module

Manual Primary and Secondary Sorting
Metric: Pick Rate



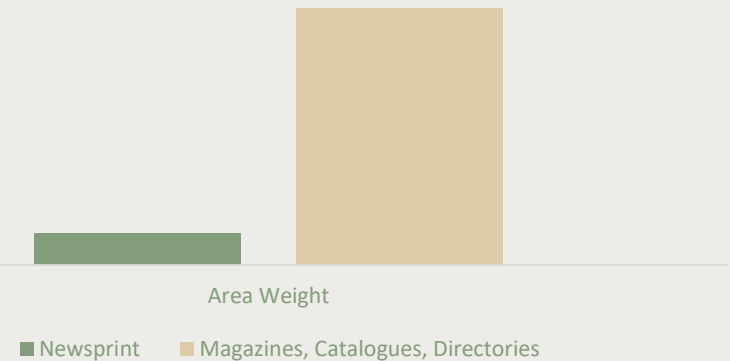
Newsprint has a higher value on the MCI than Magazines

Newsprint vs. Magazines, Catalogues, Directories
Metric: Cart & Compacted Density



Measurement protocols allow us to measure density at various stages of the system

Newsprint vs. Magazines, Catalogues, Directories
Metric: Area Weight (kg/m²)

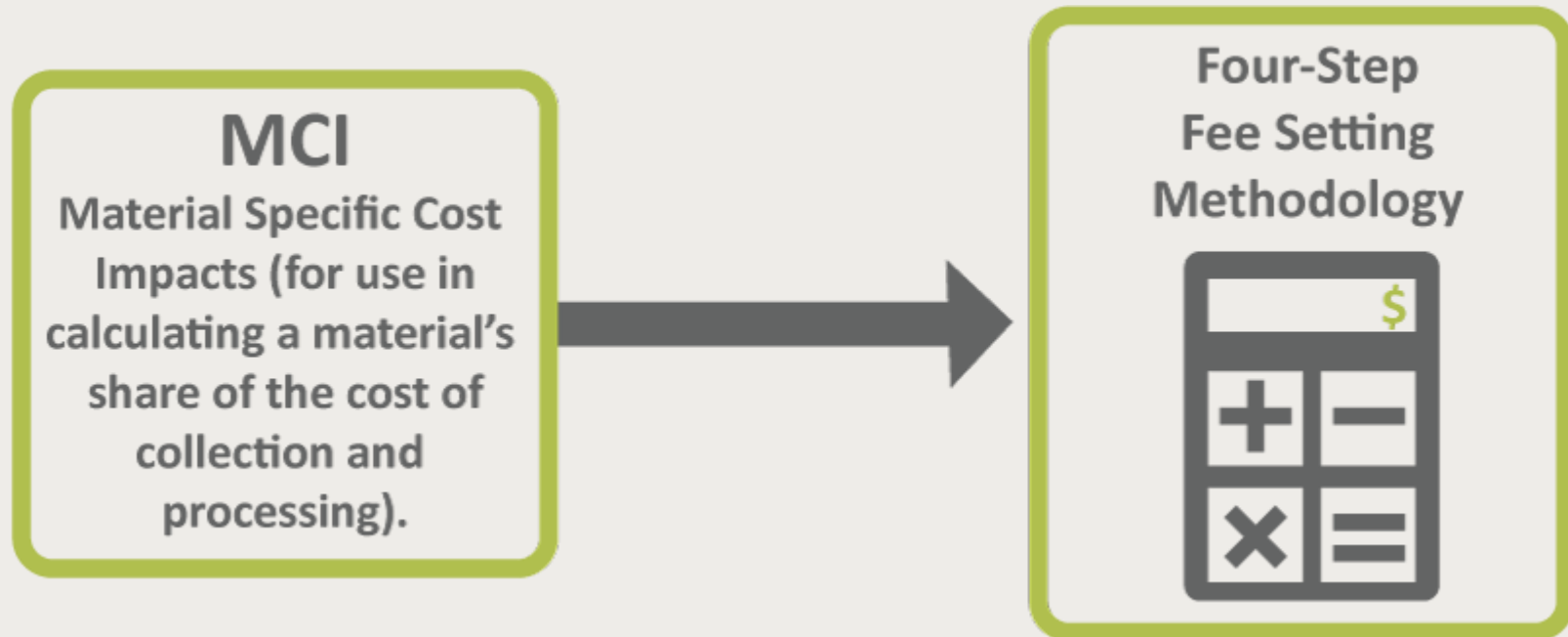


We can see just how much more weight of magazines can be sorted for the same area as compared to Newsprint

Recap

- The MCD Model defines a metric that best represents a material's impact on each of the 18 modules in the conceptual MCD system
- Measurement protocols instruct us on how to conduct studies to gather measurement results for each material for each applicable metric
- These results are combined with cost factors to produce a module specific index (MCDI)
- For each material, we sum all their specific module values to produce its final value on the Material Cost Index (MCI)

What does this mean for fees?





MCD Impacts on Material Fee Rates

Fee comparison tools will be published by June 30

- A fee calculation tool will be published for each of the Recycle BC, MMSW, MMSM and Stewardship Ontario programs
- The tool will allow stakeholders to understand how the MCD Methodology will impact to their fees based on their own mix of materials supplied
- The tool compares the fees using the 2020 data so do not represent the fee rates for the upcoming 2021 obligation year where we hope to use the MCD Methodology for the first time
- Although important to publish fee rates for information, we ask stewards to focus on the principles and the robustness of the methodology

General Trends comparing Four-Step Fee Methodology/MCD to Four-Step Fee Methodology/ABC using 2020 inputs

Category	Direction	Examples	Illustrative Impact
Printed Paper	Up	8-Page retail flyer 50 Page Magazine	Up 100 th of a cent Up 1¢
Paper Packaging	Varies by program	Large Pizza Box 1L Gable Top	Up 1¢ - Down 2¢ Down 1¢ or less
Plastics	Down	2L PET 4L HDPE Laundry	Down less than 1¢ Down between less than 1¢ to 6¢
Steel	Up	284 ml Soup Can	Up 100 th of a cent
Aluminum	Varies by program	355 ml Beverage Can	+/- 100 th of a cent
Glass	Up	1L Pickle Jar	Up 2¢ - 6¢



Next Steps

CSSA requests your feedback by July 23

- Do you agree that the MCD Methodology is sufficiently principle-based, fair, defensible and comprehensive? If not, why not?
- Is it clear how the MCD methodology will be applied and how it will contribute to fee setting?
- Did you find the pre-read and other project materials helpful and will you be able to use them to brief your colleagues? If not, what additional materials would be helpful?
- What else do you want to tell us about the proposed Material Cost Differentiation Methodology?

mcd@cssalliance.ca

Question and answer process

- All Q&As from this webinar will be published
- You can submit questions for the duration of the consultation period to mcd@cssalliance.ca
- New Q&As will be published throughout the consultation period

Upcoming harmonization project

- MCD study categories are more granular than steward reporting categories
 - The SCC cautioned that stewards would need time to manage a change in reporting categories
 - As a result, there is still some aggregation of material results before using in the Four-Step Fee Methodology
 - Our next harmonization project will be an examination of reporting categories and we will be asking for steward participation in this project

MCD Methodology approval process

- Your feedback will be included in a consultation report and submitted to each of the Boards of Directors (Recycle BC, MMSW, MMSM, Stewardship Ontario)
- The Boards will consider your feedback when determining the approval status of the methodology
- If approved, the intent is to utilize the MCI when setting fees for 2021

