Data Matters: Managing Data to Improve Decision Making for Today & Tomorrow

Neil Menezes

Consultant to CIF

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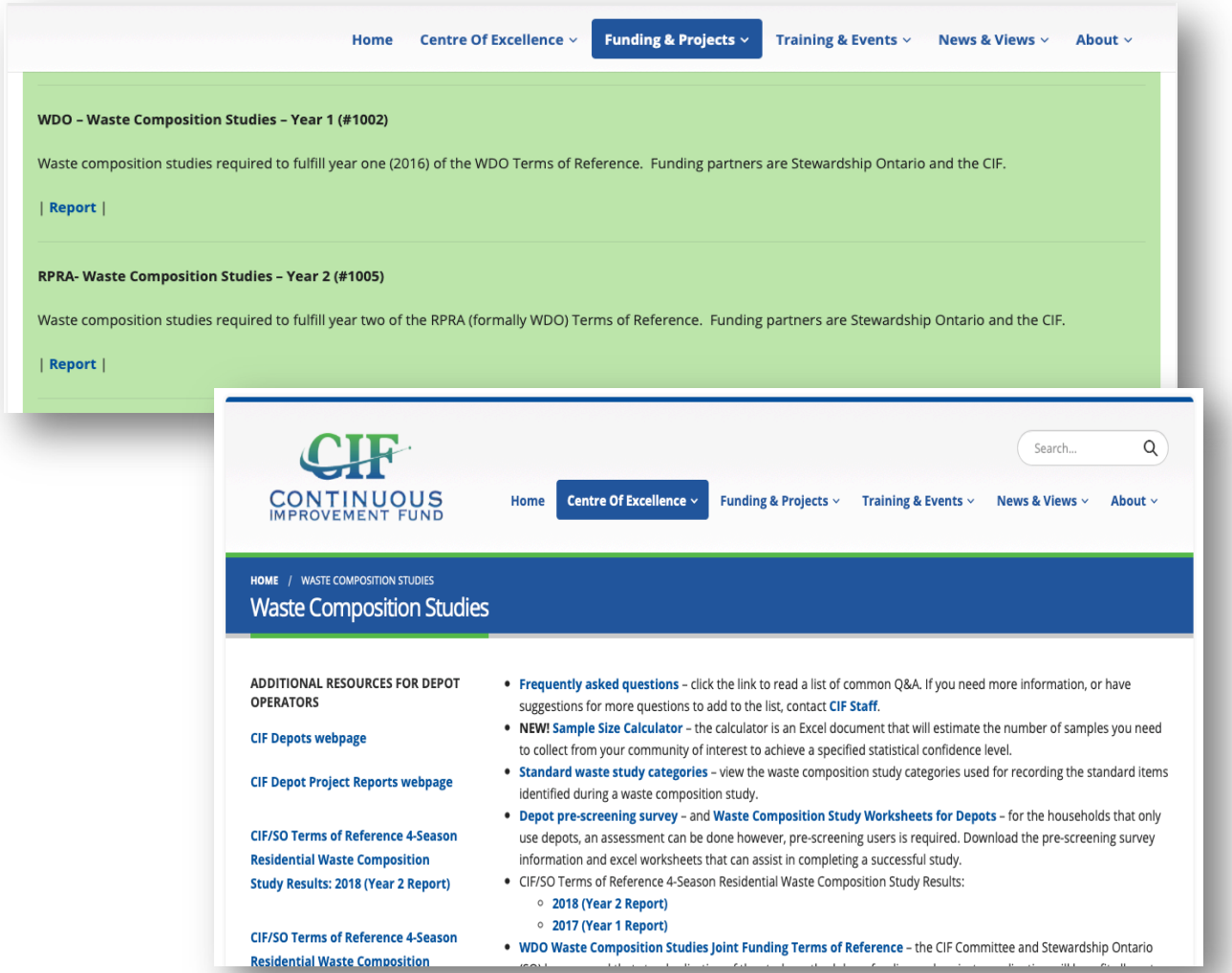
Waste Composition Studies: Status Update

- Year 3 (2018/2019):
  - The CIF is wrapping up it up now
- Year 4 (2019/2020):
  - consultants being hired this summer
- Year 5 (2020/2021):
  - REOI will help us secure the study locations
  - Opportunities still available
- Special Note:
  - Study selection criteria to be evaluated summer 2019

Waste Composition Studies: Resources Available



- Summary reports available on CIF website:
  - Year 1 (2016/2017)
  - Year 2 (2017/2018)
  - Year 3 (2018/2019)
    - dataset will be available this summer
- CofE:
  - Waste Composition Studies Hub
  - Guides

Today's Line Up

- Sandra Brunet, Manager of Environmental Operations & Tracy Quinn Strasser, Waste Diversion Supervisor, City of Barrie
  - *Big change many options - Data modeling for the decision-making process*
- Rachel Vaillancourt, Senior Environmental Engineer, Region of Waterloo
  - *Developing data collection, analysis & decision procedures for MRF investment evaluation*
- Dan Lantz, Principal, Crow's Nest Environmental
  - *Learnings from BC could improve your Blue Box program*

Waste Composition Strategy Development (1059)
&
FPR/IPR Transitional Support Project (1041)

Tracy Quann-Strasser & Sandra Brunet

City of Barrie

Waste Composition Strategy Development (1059)

Project Goal

To develop a 5-year strategy for waste composition studies

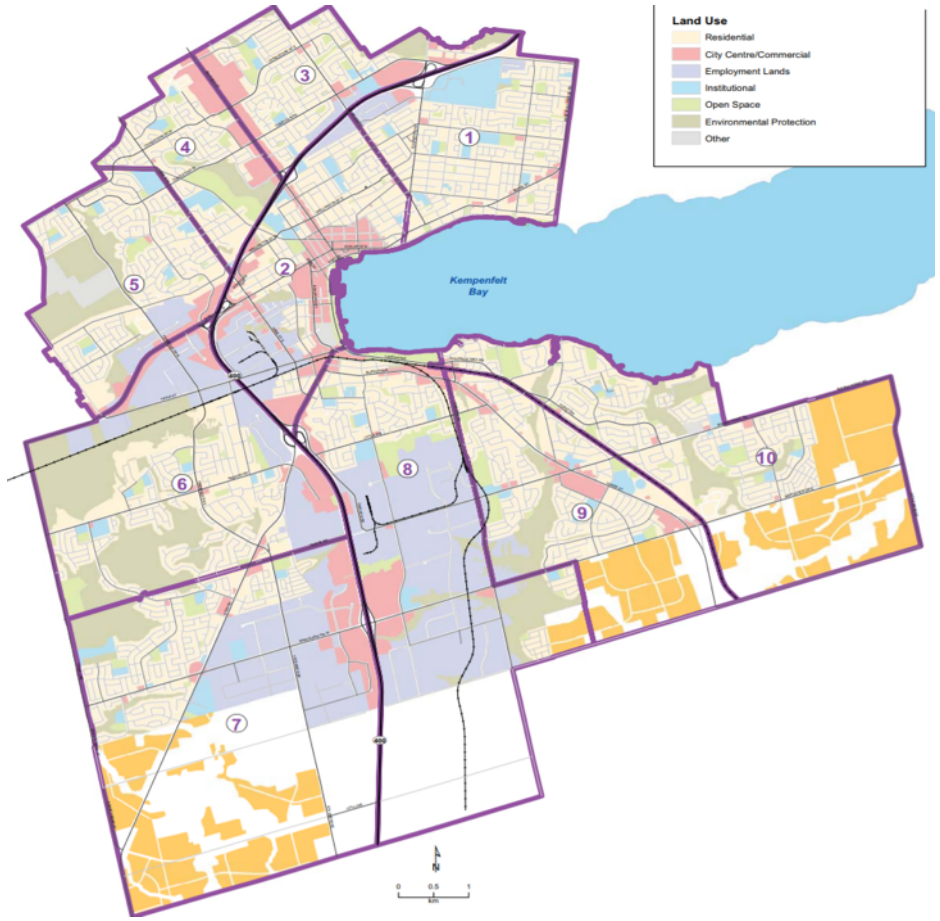
Results

- Allocate budget to get best representative dataset
- Estimate the validity / confidence of the strategy

For more information

Sandra.Brunet@barrie.ca| Tracy.Quann-Strasser@barrie.ca
www.barrie.ca

Waste Composition Strategy Development



1. Socio-Demographic starting point:
   - Barrie's 10 Municipal Wards
   - Known factors affecting waste generation:
     - Income
     - Housing type
     - Population density

2. Analysis of Variance (ANOVA)
   - Consolidated 10 wards to 3 study areas

Waste Composition Strategy Development (1)

- Getting the most out of our limited budget:
  - Step 1: Split between SF & MR
  - Step 2: Allocated across sample areas

Study Block	Ward Number	# SF HH Sampled
SF – 1	Wards (3,6,7,8,10)	210 SF HH
SF – 2	Wards (9,5,4,1)	160 SF HH
SF – 3	Ward 2	20 SF HH
	Ward Number	**# MF Buildings Sampled**
MR – 1	Wards (3,6,7,8,10)	4 Buildings
MR – 2	Wards (9,5,4,1)	2 Buildings
MR – 3	Ward 2	9 Buildings

Waste Composition Strategy Development (2)

- Other suggestions:
  - Reducing households per sample
  - Prioritize sample size over seasonality
  - Consider other factors in MR programming
  - Review the assumptions regularly and be flexible

Waste Composition Strategy Development (3)

Key Takeaways

- Results of study to be used for procurement purposes
- Will be changing sampling strategy from the current collection day based sampling to a ward based sampling
- Combining 10 Wards into 3 unique samples
- Improve efficiency and maximizing budget by running one audit a year
- An important exercise to assist data collection strategies
- It provides more confidence in future results

FPR/IPR Transitional Support Project (1041)

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Uncertainty?

Source: Tenor.com

Help!!

Source: giphy.com

Project Purpose

How? – Project Approach (1)

Phase 1: Project Initiation

- Identify gaps, risks and scenarios for modelling
- Develop project plan and report framework

Phase 2: Data Collection

- Identify requirements for each scenario, relevant data sources & a data collection plan
- Data types included:
  - Contract requirements
  - Contract cost and payment structure
  - Municipal administration & promotion & education costs
  - Tonnage information
  - Other financial information

How? – Project Approach (2)

Phase 2: Data Collection

- Data Sources included:
  - DataCall (2013-2017)
  - Collection Contractor Contract and Schedules
  - Waste Audits
  - Historical Commodity Prices
  - Projected Generation for Recyclable Materials
  - City of Barrie Census Data
  - Costs and Demographics
  - City of Barrie 2014-2018 Collection Contact Price Per Tonne

How? – Project Approach (3)

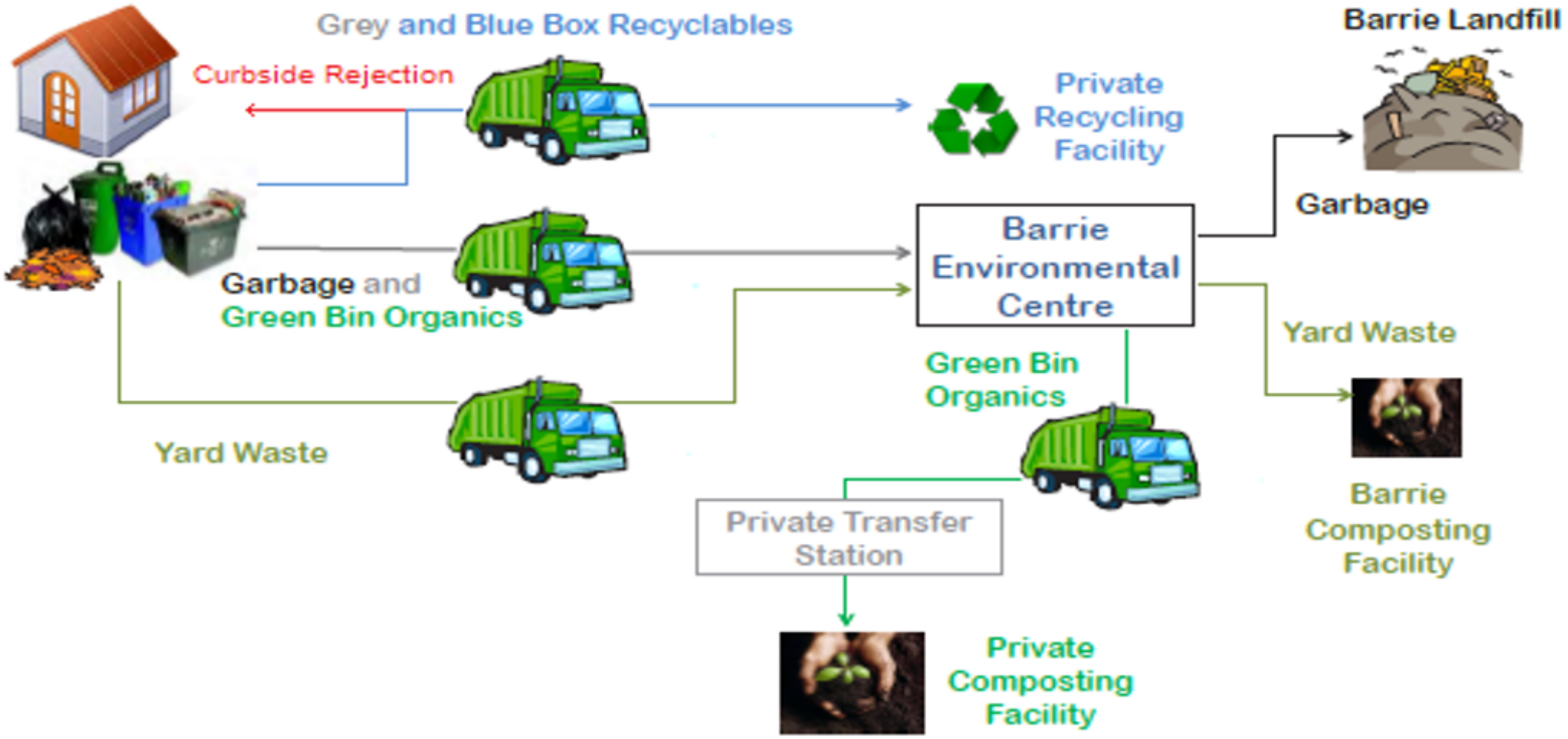
Phase 3: Financial Modeling and Analysis

- Developed current operational & financial flows
- Material & financial flowchart of current services – developed model
- Assessed operational changes & adjusted the model for each scenario
- 6 scenarios quantitatively & qualitatively

Phase 4: Reporting

- Draft report, analysis of results, summary presentation

Baseline – Current Operation



Scenarios Modelled

Non Transitioned	Transitioned
Status Quo = current state	Municipality operating as Contract Manager – 100% funding for Blue Box Program only
Status quo with ***reduced*** funding allocation provided by SO	SO fully responsible for Blue Box Program
	Individual Producer Responsibility option 1
	Individual Producer Responsibility option 2

Scenario Analysis Framework

Factor	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5a	Scenario 5b
SO - Funding Allocation	✗	✓	✓	✓	✓	✓
SO – Eligible Costs	✗	✗	✓	✓	✓	✓
Marketing Revenue	✗	✗	✓	✓	✓	✓
Service Contracts	✗	✗	✓	✓	✓	✓
Contamination Target	✗	✗	✓	✗	✓	✗
Materials Collected	✗	✗	✓	✓	✓	✓

✗ = no change ✓ = change

Summary Results – Model

2018-2022	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Eligible Costs					
Blue Box Program Contract Costs					
Municipal Costs					
Administration Costs					
less: Revenue					
Eligible Net Costs					
Contribution received					
Ineligible Costs					
Additional Garbage Collection Costs					
Additional Landfill Costs					
Waste Connections Break Contract Cost					
Municipal Costs					
Administration Costs					
Ineligible Net Costs					
Summary					
Total Costs					
less: Contribution received					
City of Barrie - Incurred Costs					
Difference with Scenario 1					

Dashboard

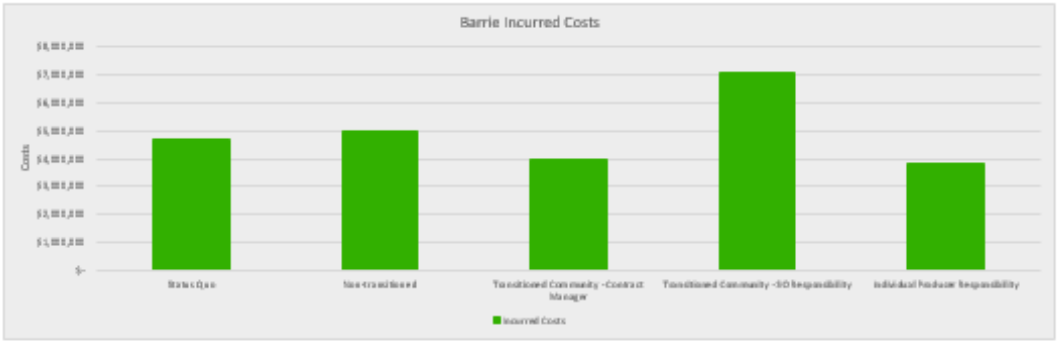
	Status Quo	Non-Transitioned	Transitioned Community - Contract	Transitioned Community - SO Responsibility	Individual Producer Responsibility
Eligible Costs					
Contract Costs					
Municipal Costs:					
Municipal Collection Costs:					
Direct Curbside Collection Cost					
Blue Boxes					
Public Space Bin Costs					
Other - Single Family and Multi-res Recycling and Bin					
Curbside Collection Capital Cost - Carts					
Public Depot Costs:					
Material Handling Operating Cost					
Depot/Transfer Facility Operating Cost					
Total Depot/Transfer Station Capital Cost					
Promotion and Education Costs:					
Administration Staff Cost					
Total Blue Box Promotion & Education Material Costs					
Interest on Municipal Capital					
Administration Costs					
Less: Revenue					
Eligible Net Costs					
Contribution Received					
Ineligible Costs					
Additional Garbage Collection Costs	$ -	$ -			
Additional Landfill Costs	$ -	$ -			
Waste Generation Break Contract Related Cost	$ -	$ -			
Municipal Costs	$ -	$ -			
Municipal Collection Costs:					
Direct Curbside Collection Cost	$ -	$ -			
Blue Boxes	$ -	$ -			
Public Space Bin Costs	$ -	$ -			
Other - Single Family and Multi-res Recycling and	$ -	$ -			
Curbside Collection Capital Cost - Carts	$ -	$ -			
Public Depot Costs:					
Material Handling Operating Cost	$ -	$ -			
Depot/Transfer Facility Operating Cost	$ -	$ -			
Total Depot/Transfer Station Capital Cost	$ -	$ -			
Promotion and Education Costs:					
Administration Staff Cost	$ -	$ -			
Total Blue Box Promotion & Education Material C	$ -	$ -			
Interest on Municipal Capital	$ -	$ -			
Administration Costs	$ -	$ -			
Less: Revenue	$ -	$ -			
Ineligible Net Costs	$ -	$ -			
SUMMARY					
Total Costs	$ -	$ -	$ -	$ -	$ -
Less: Contribution Received	$ -	$ -	$ -	$ -	$ -
Incurred Costs	$ -	$ -	$ -	$ -	$ -

Cell "P5" determines the dashboard output results based on a range of years described below:

Input	PY year	Range		
1	2018	2018-2022	Index	1
2	2018	2020-2022		
3	2018	2018-2027		
4	2018	2025-2027		

Cell "P22" determines the scenario Sim modelled as described below:

Input	Scenario 5: Individual Producer Resp Index	1
1	Equivalent to scenario 3	
2	Equivalent to scenario 4	



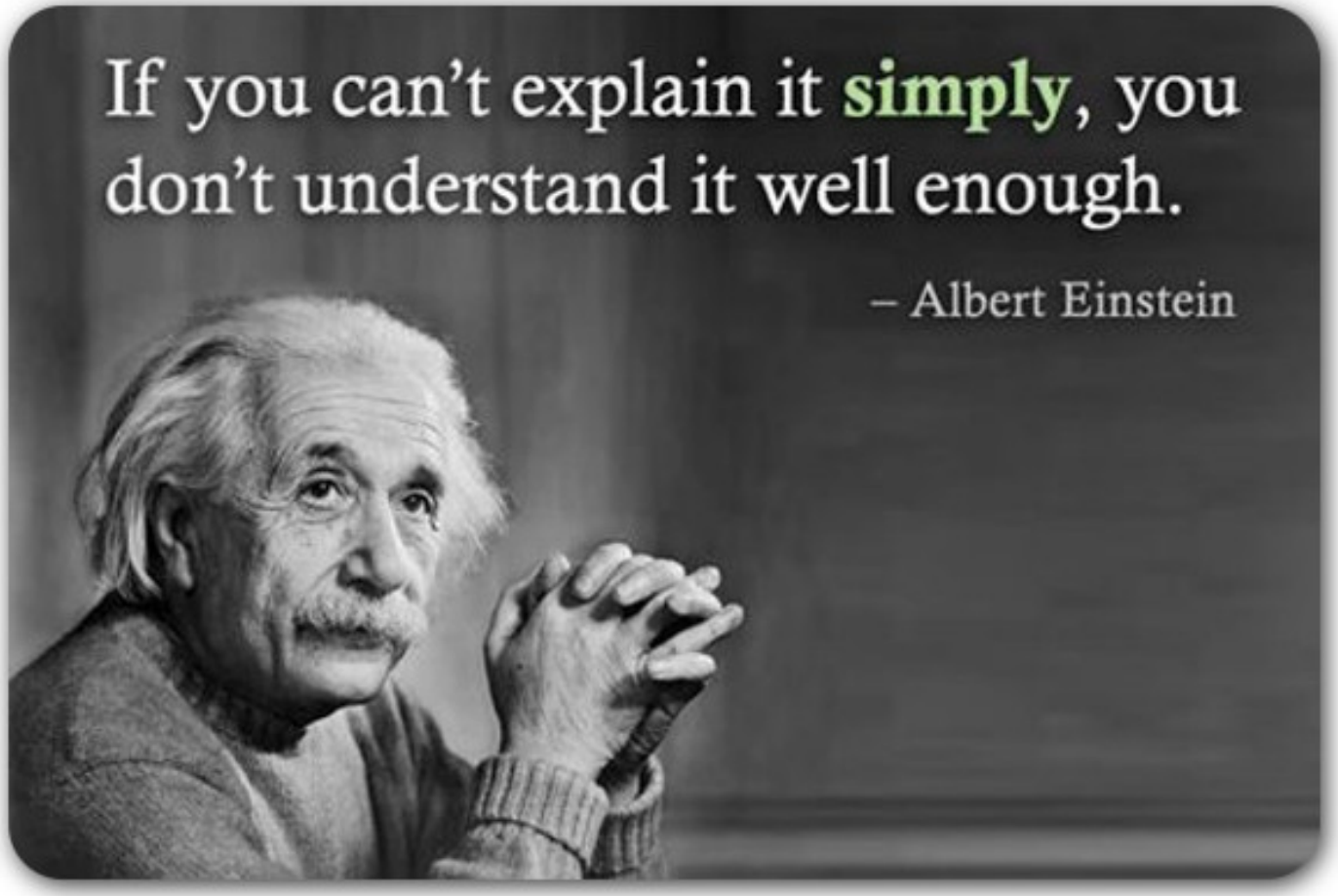
Key Findings

- Scenario 5a provides the best financial outcome followed by Scenario 3
- Scenario 2 if choose not to transition under a-BBPP
- Scenario 4 provides the worst financial outcome followed by Scenario 5b
- Difference between is largely reduced if implementation is post 2022

Recommendations? – Keep Going!

- Review waste management contracting strategy for post 2022
- Explore potential break costs with Collection Contractor
- Explore potential costs associated with curbside rejection rate increases
- Conduct medium to long-term human resource planning
- Undertake continuous update of the financial model as new info becomes available

Lessons Learned!!



Source: pinterest.ca

Developing Data Analysis, Collection and Decision Procedures
CIF Project #935

Rachel Vaillancourt

Regional Municipality of Waterloo

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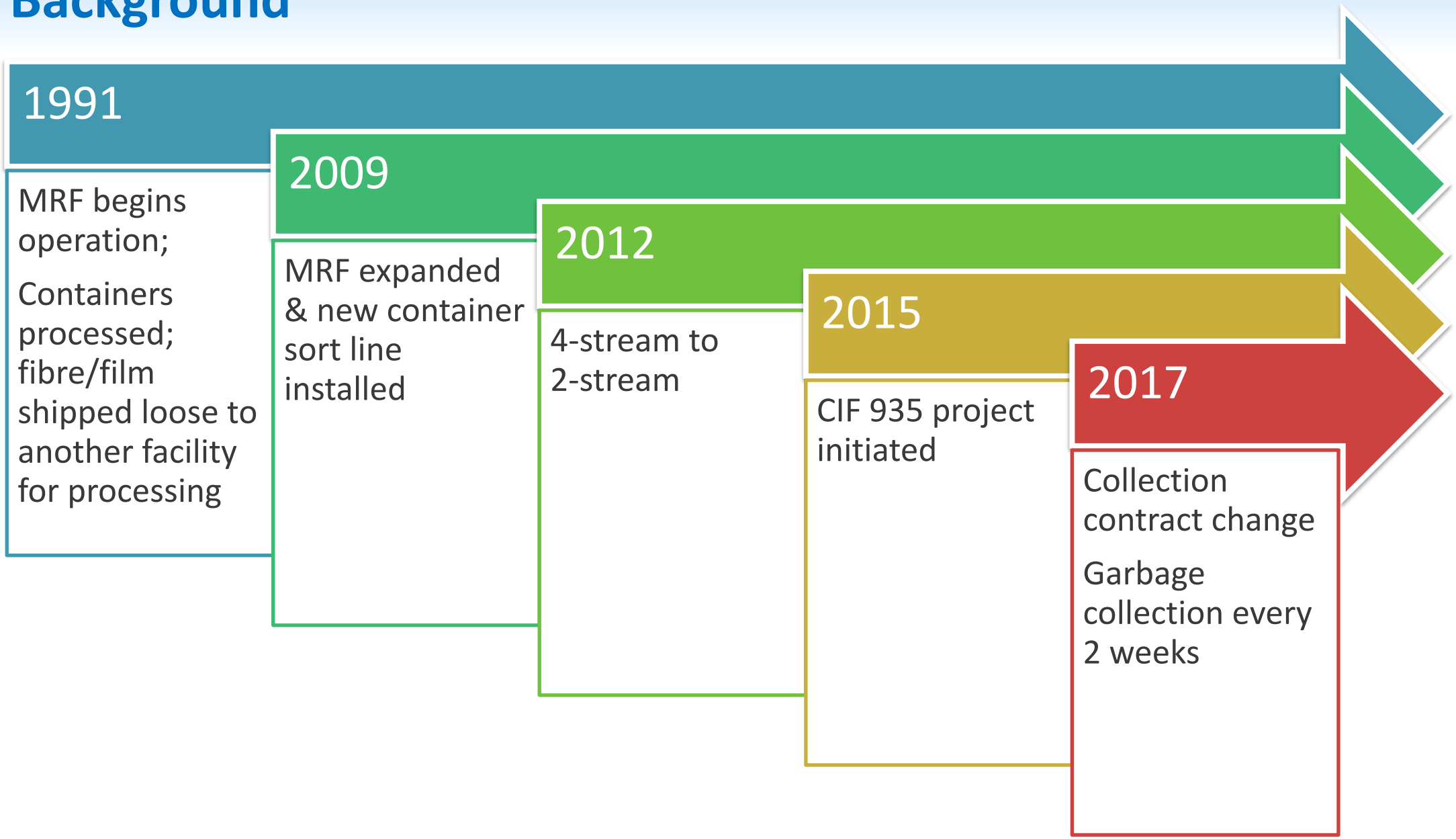
Project Highlights

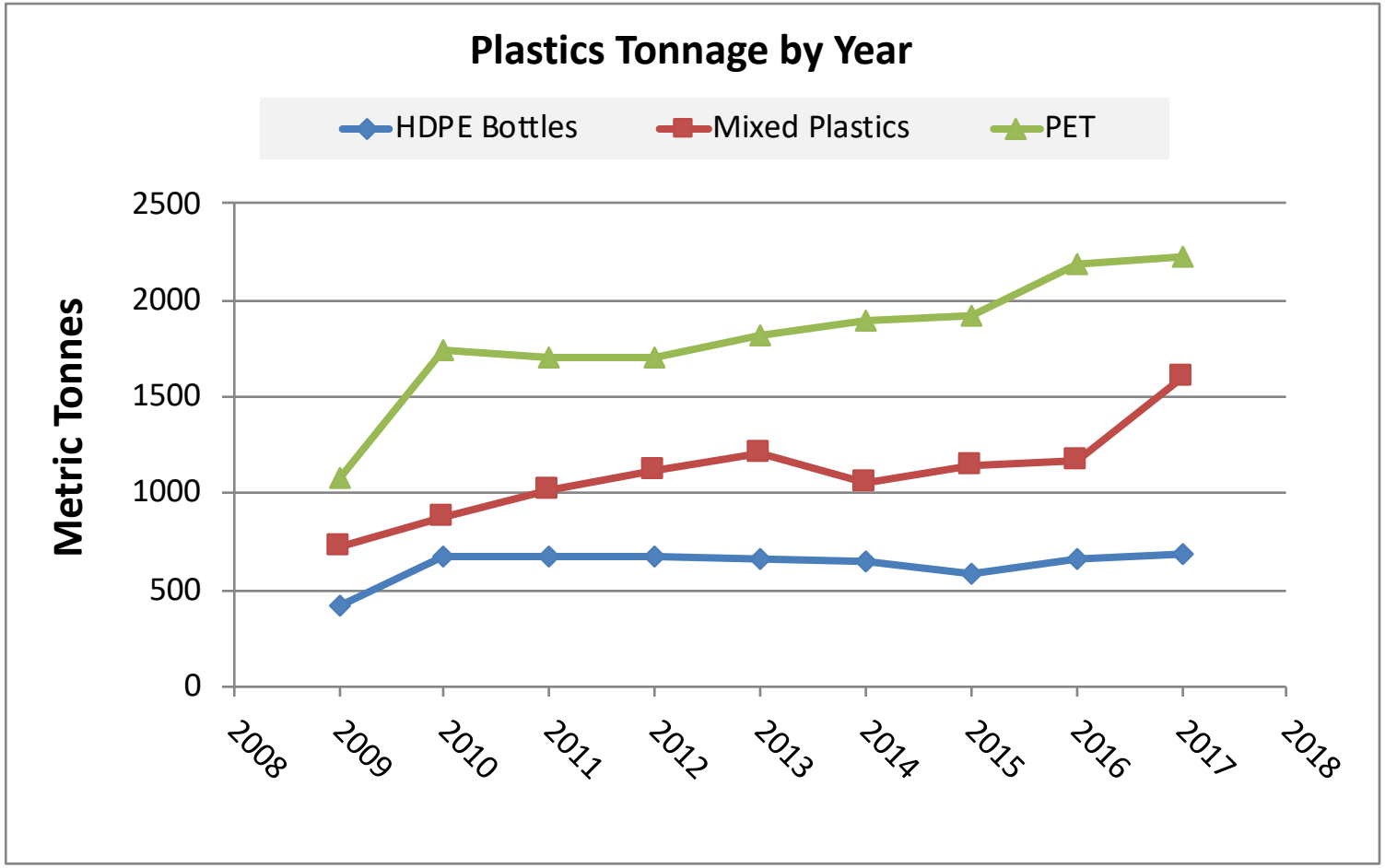
- Project goal: equipment upgrades
  - Infeed conveyor, optical sorter, glass breaker & Programmable Logic Controller (PLC)
- Impacts:
  - Reduced operating costs & increased capture & diversion
- More information:
  - rvaillancourt@Regionofwaterloo.ca
  - https://www.regionofwaterloo.ca

Background


1991
MRF begins operation;
Containers processed; fibre/film shipped loose to another facility for processing
2009
MRF expanded & new container sort line installed
2012
4-stream to 2-stream
2015
CIF 935 project initiated
2017
Collection contract change
Garbage collection every 2 weeks

Issues Observed

- Infeed conveyor
  - Material roll back, down the steep incline
- Glass breaker
  - Unable to keep up with increased volume of glass resulting from switch from 4-stream collection to 2-stream
- Optical sorter
  - Container tonnage was increasing & concern that optical sorter was not keeping up with increased volume



Additional Considerations

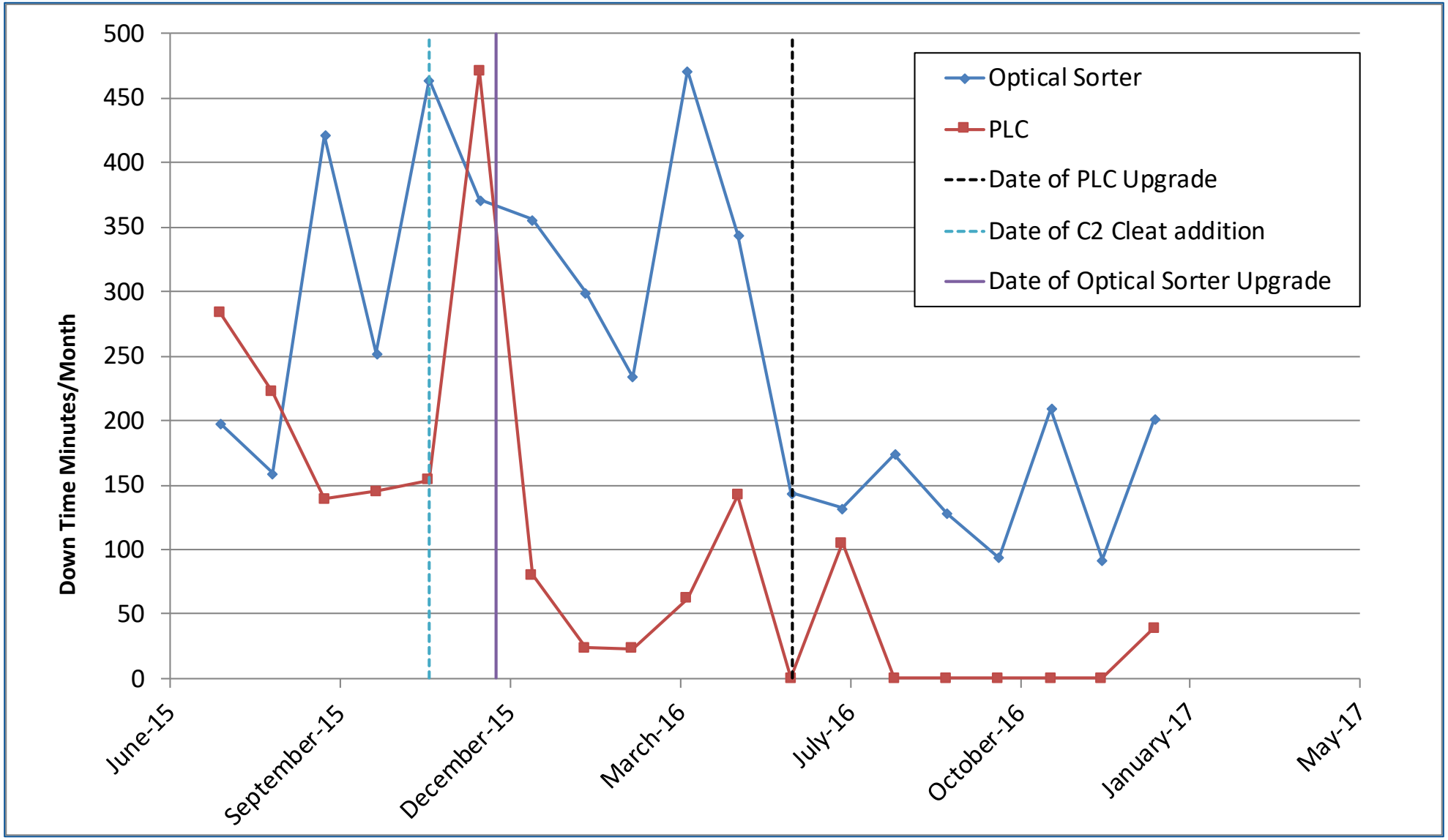
- We had money in budget for equipment replacements based on equipment age
- The PLC that ran the container sort line was not communicating well with the equipment causing significant down time
- Anticipated increase in recyclables due to garbage collection changes
- Compaction on trucks
- Legislative changes & uncertain timelines

Making Informed Decisions

Data We Were Collecting

Data	Value	Approximate Cost
Downtime by equipment	Confirm correct equipment being upgraded	Low
Maintenance cost by equipment	For cost benefit Analysis	Low

Tracking Downtime



Data We Needed

Data	Value	Approximate Cost
Process Flow Audit	Evaluate equipment efficiency, capture	$10K
Feasibility Studies	Provide multiple options for solutions	$4K
Cost Benefit Analysis	Evaluate payback	$15K
Time and Motion Studies	Evaluate effects from ongoing equipment adjustments	Low

Process Flow Audit Highlights

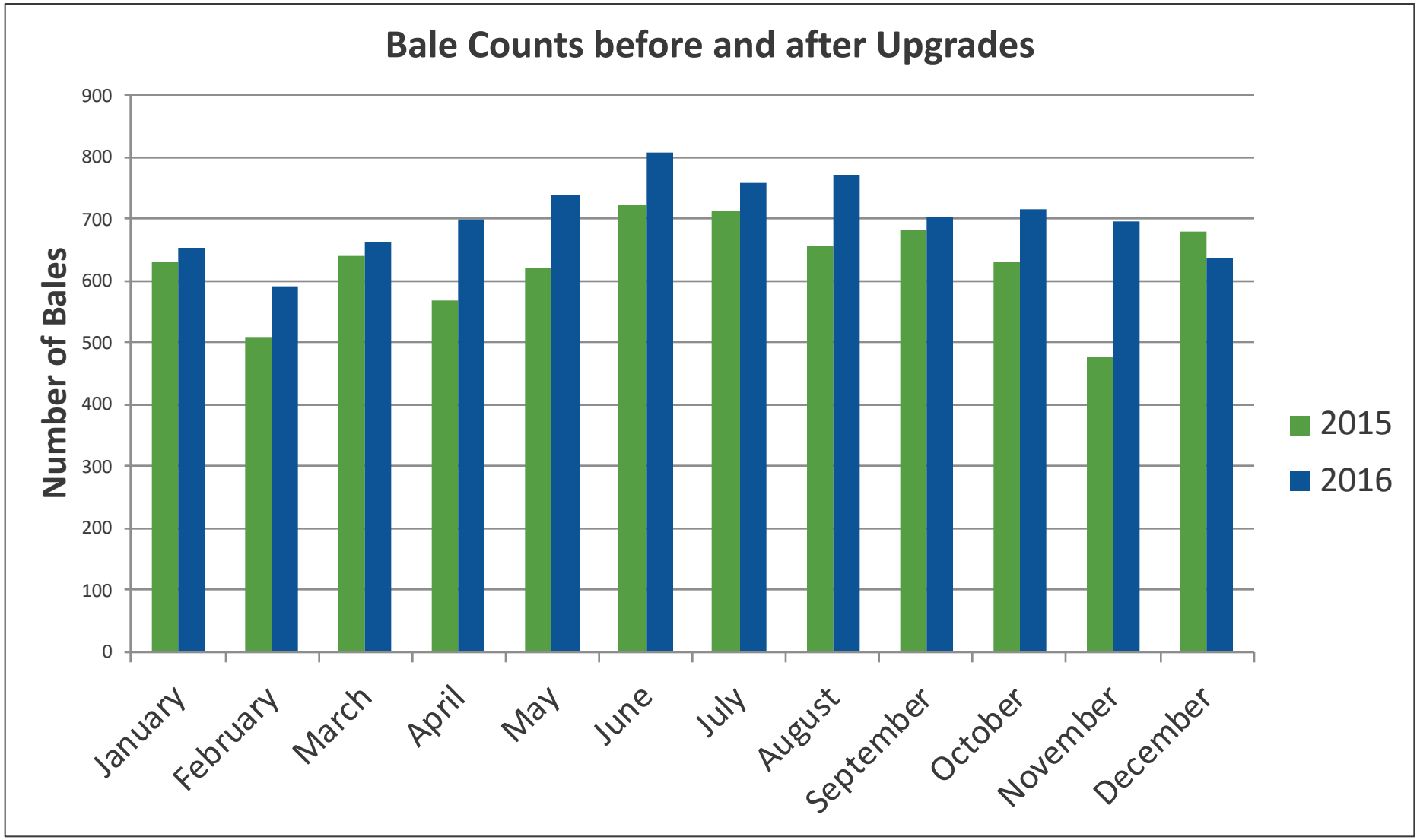
- 91% capture rate for PET & 92% capture rate for HDPE
- Confirmed that 33% of glass was not captured by the glass breaker
- Perforator was not perforating plastics but overall it didn't have significant effect on capture
- Other issues observed were not the result of equipment being undersized
  - The problem could be solved with better management of the material flow

Project Highlights

- Process flow audit provided good baseline data
  - Showed success of low cost software upgrade for optical sorter
  - Recommended: Drum Feeder, Trommel screen to break glass & get it out early & manage flow
  - Perforator maintenance not necessary
- Cost Benefit Analysis
  - 2-year timeframe due to pending legislation changes
  - Full glass breaker replacement made most sense
  - Cost for drum feeder & trommel screen – est. $500K vs. actual cost for glass breaker replacement $160K

Image source: Carr Industrial

Measuring Success (1)



Measuring Success (2)

- In the 10 months since glass breaker was installed, only one instance of downtime & minimal costs for maintenance
- More glass is being captured:
  - estimate **1.8** tonnes more/day
- Post installation audit showed:
  - **97%** of glass being captured – up from...
  - **67%** prior to replacement

Key Message

Projected Cost	Actual Cost	Savings
$ 550K	$ 265K	$ 285K

**Actual cost includes process flow audit & feasibility study cost*

Learnings from British Columbia

Daniel Lantz, Principal

Crow's Nest Environmental

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Key Takeaways

- Role for municipalities if desired
- Important to know and understand your program
  - Have data on program available
  - Be able to explain potential of your infrastructure to meet needs of stewards
  - Be flexible
- More information:
  - dlantz@crowsnestenvironmental.com | www.crowsnestenvironmental.com
  - 416-986-7733

Service Delivery – Collection

- Municipalities maintained control of collection
  - Option to have RecycleBC do collection, e.g., City of Vancouver, Prince George
- Single stream or two stream possible
- Payment per household
  - Varying rates for single stream, two stream, curbside, multi-family
- Over 210 depots across province
  - Mix of Encorp, municipal & privately held
  - Only collection point for PS (colour separated) & film
  - Now collecting all multi-laminated plastic films
- Payment per tonne

Service Delivery – Processing (1)

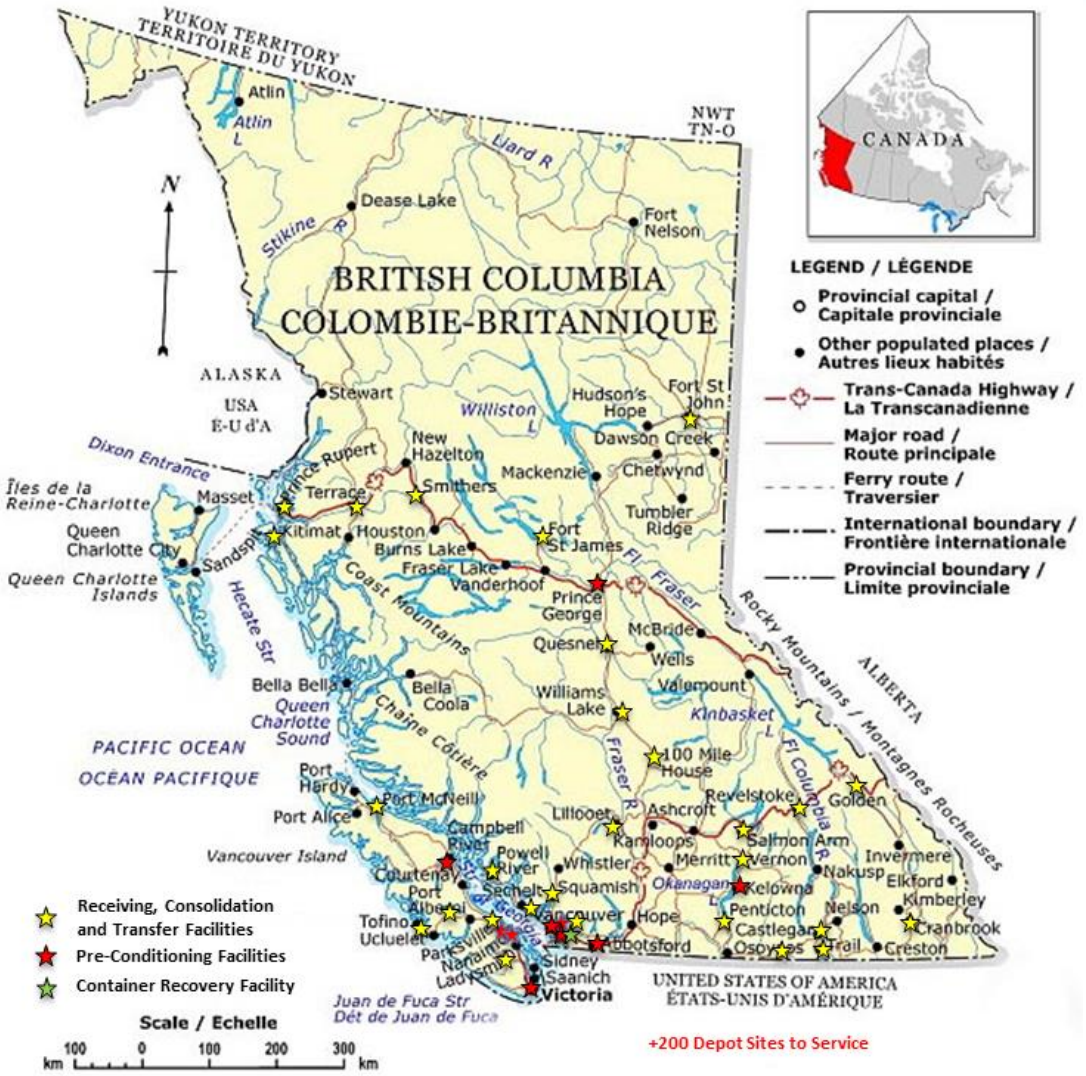
- One overseeing body
- Receiving, Consolidation and Transfer facilities (RCT)
  - No sorting, baling and shipping only
- Pre-Conditioning Facilities (PCF)
  - Minimal sorting (fibres from containers only, steel and glass removal)
  - No plastics or aluminum sorting
- Container Recovery Facility (CRF)
  - Plastics, aseptics, polycoat & aluminum sorting
- Use of municipal and private sector facilities in addition to plants owned by overseeing body

Service Delivery – Processing (2)

31 RCTs
Receiving, Consolidation & Transfer Facilities

15 PCFs
Pre-Conditioning Facilities

1 CRF
Container Recovery Facility



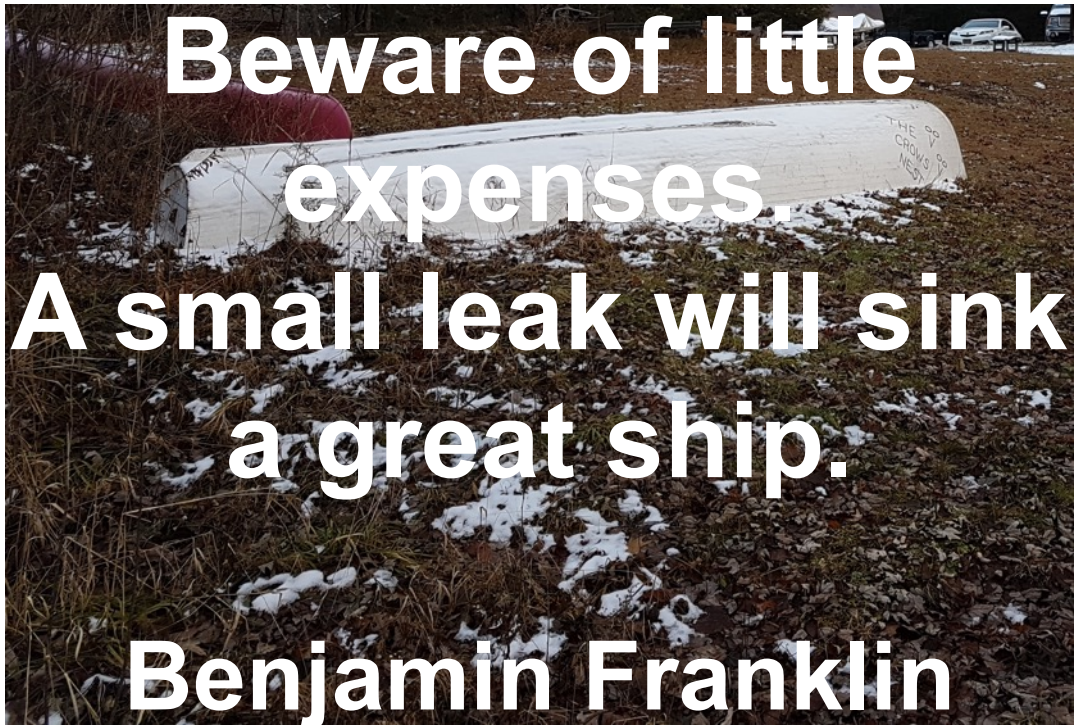
- Focus on capabilities & efficiency of network
- Repurposed plants
- Reduced unnecessary capital investment

Data Management

- Daily reporting of inbound tonnes
  - By facility, by truck, by stream
  - By depot, by material
- Monthly reporting of outbound tonnes
  - By material, by market
- JIT & monthly summary reporting of audit results
  - By source, by material stream, by material (50 materials)
  - >14 tonnes of materials randomly audited each month
- Additional reports on throughput and recovery rates by facility
  - Important to track operations very closely – re: mass balance, control of outbound tonnes vs. inbound audit results

Key Performance Indicators

- Recovery rate & residue rate
  - Is the system capturing material as expected?
  - Where is the leakage?
- Productivity
  - Efficiency in operations – where is the weakest link?
  - Where is the leakage?
- Mass balance
  - Where does everything flow?
  - Where is the leakage?



Preparing for Transition – Learning from BC

- Know & understand your program
- Know your capabilities
- Know your shortcomings
- Know where you can add value
- Know what you want
- Look at options where collaboration provides a better value proposition
- Prepare a business plan
- Be flexible

Transition – Learning from BC

- Transition does not mean full loss of control
  - Partnership approach to materials management
- Transition means harmonization which can be beneficial
  - Easier messaging & education
  - Less frustration for residents
  - More consistent inbound material
- Look for win-win

Thank you

Thank you for your time this afternoon

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416-986-7733