Welcome Back

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This Afternoon

- CIF update
- Presentation by project consultants for the Blue Box Optimization Study
  - discussion & input
  - demo in early section

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CIF Update

Andy Campbell, P.Eng.
Director, CIF

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Funding Solution

- Agreement between Association of Municipalities of Ontario, City of Toronto, Stewardship Ontario and Waste Diversion Ontario to set aside funding
- CIF serves as ad hoc centre of excellence for blue box (BB) best practices (BP) & has the financial resources to assist municipal implementation

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CIF Strategic Goals

- To assist municipalities to make facility operations more efficient and effective
- Build long-term efficiencies
- Increase & standardize collection of BB materials
- Help municipalities and stewards reduce costs
- Address systemic challenges
- Create partnerships with purpose
- Foster stakeholder engagement
- Promote innovation

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Overall CIF Project Status

Total Applications	632
Total Approved Projects	462
Total Approved Funding	$31.5 million
Total Project Value	$74 million

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Funding Highlights

Program Area	Number of Projects	Total Approvals
Increase existing packaging and paper	183	$7.4 million
Increase plastic packaging	27	$2.1 million
Geographic optimization	39	$7.9 million
Technology improvements	52	$10.6 million
Other	150	$3.4 million
Knowledge Resource Centre	11	$0.1 million

171 projects approved in 2011

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Completed Projects

- 178 fully completed - $7.6 million
  - 33 recycling plans - $480,000
  - 4 sets of depot transfer compactors - $520,000
  - 19 program reviews & RFPs - $271,000

Over 280 projects still underway

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Outstanding Applications

- 23 applications currently on the books requesting $18.6 million in funding
  - MRF projects
  - material transfer projects
- Available budget in 2012 is $20.1 million

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Curbside & MRF Audits

- REOI issued for interested municipalities
  - 7 curbside audits
  - 9 MRF audits
- Curbside - $415K to AET
- MRF & CPP - $30K to 2cg

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A Study for the Optimization of BB Material Processing System in Ontario

- Purpose is to seek an optimal BB system on a "waste shed basis," not on municipal boundaries
- Utilize more transfer stations & regional MRFs
- Minimize transportation logistics
- Include municipal and private sector facilities
- Options to include analysis for 2012 and 2025
- $10 million budget to assist with implementation of recommendations

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Today's Discussion

- StewardEdge Inc. & Resource Recycling Systems are the consultants
- Review the model parameters
- Demonstrate the GIS model
- Seek input on model variables & assumptions

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Next Opportunities

- Knowledge Resource Centre
  - training – Fall 2012
  - studies – film plastics
- REOI for new funding – fall 2012

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Questions

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Study of Optimization of Blue Box Materials Processing System in Ontario

Guy Perry, StewardEdge Inc.
Aaron Burman, Resource Recycling Systems

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Today's Objective

- Inform stakeholders about the study, its current status & anticipated outcomes
- Discuss how municipalities could benefit from the study
- Discuss how stakeholders can contribute to the study

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Today's Agenda

- Study objectives, scope & timeline & project team
- Overview of GIS Model
- Expected outcomes
- Solicit feedback from stakeholders
- Next steps

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Project Team

StewardEdge
- Toronto
- Guy Perry
  - Project Manager & StewardEdge Team Director

Resource Recycling Systems
- Ann Arbor, Michigan
- Jim Frey
  - RRS Team Director

HMI Consulting Services, Ontario
- Toronto
- Bob Marshall
  - MRF Technical Advisor

CIF Continuous Improvement Fund

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Study Objectives

- Produce a model that will
  - reflect a cost-effective, efficient & successful recovery system for packaging & printed paper in Ontario
  - inform decision-making targeted at achieving best practice (BP) in provincially optimized Blue Box (BB) materials transfer & processing network
- Study completion by end of June, 2012

CIF Continuous Improvement Fund

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Study Scope

- Model an optimized (greenfield) system of MRFs & transfer stations to handle a standard suite of materials
- Compare that to existing infrastructure & conditions
  - public & private
- Identify gaps
- Develop options on a region by region basis to guide transition to an optimized system
  - addressing the costs, benefits & trade-offs
- Propose high-level plan for the transition

CIF Continuous Improvement Fund

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Project Status & Timeline

- Current status
  - developed model
  - existing system profile
  - greenfield facilities & wasteshed profiles
  - approach to options development
  - initial options analysis underway
- Draft report due May 11, 2012
- Final report due week of June 25, 2012

CIF Continuous Improvement Fund

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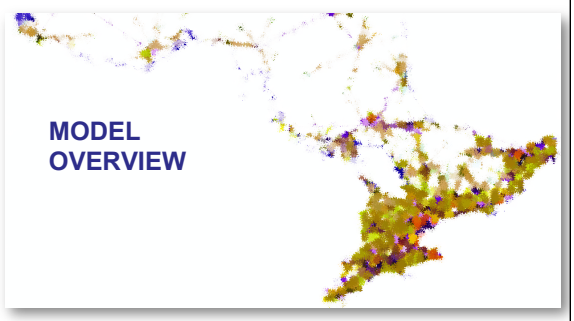
MODEL OVERVIEW



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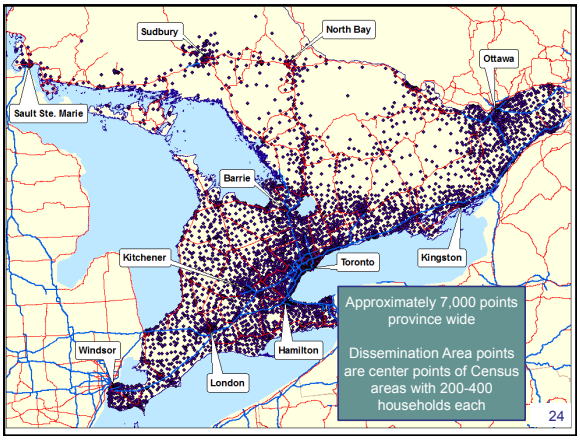

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Current Generation

- Stewardship Ontario waste generation figures used
  - waste audits conducted during 2005 to 2007
  - trends in stewards' sales 2007-2010
- Dissemination areas classified as Large Urban or Small Urban & Rural
- Material-specific generation rates (kg/hh/yr) multiplied by households in each dissemination area

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Generation Projections (2025)

- Will reflect changes to:
  - material composition
  - population
- Uncertainty
  - household growth assumed equal to population growth
  - changes to material compositions based on:
    - qualitative research on lifestyle, technological & economic trends
    - quantitative trends over recent years

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Change in Per Household Generation

- 2012 generation: 1,312,350 tonnes
- Per-household generation decrease of 6%
- Projected Ontario population increase from 2012 to 2025: 20%
- 2025 generation: 1,511,000 tonnes

Material	Assumed Change
Newspaper	-40%
Telephone Books	-75%
Old Magazines	-25%
Other Printed Paper	+10%
OCC	+35%
Gable Top & Aseptic Cartons	+40%
Paper Laminants	25%
OBB	0%
PET bottles	+30%
HDPE bottles & jugs	-10%
Polystyrene	-50%
Film	-10%
Plastic Laminants	+30%
Other Plastics	+60%
Aluminum – cans & other	-10%
Steel Cans	-20%
Aerosol	0%
Paint Cans	-30%
Container Glass Clear & Coloured	-30%
Total Generation	-6%

Recovery

- **Current** recovery based on data reported by municipalities into WDO Datacall
- **Projections for 2025**
  - natural growth – trends continue, but no substantially different approaches or initiatives
  - high – system is enhanced to:
    - collect consistent set of materials
    - promote them widely
    - ensure best practices in collection to provide access and incentives
  - loose density ~30% less than current mix
    - based on assumed consumption trend

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Year/Scenario	Current Recovery	Recovery Rate - 2025	
Material		Natural Growth	High Recovery
Newspaper	97.2%	98%	98%
Telephone Books	97.2%	98%	98%
Old Magazines	97.2%	98%	98%
Other Printed Paper	55.6%	60%	75%
OCC	87.2%	88%	95%
Gable Top	34.2%	50%	75%
Paper Laminants	1.0%	5%	30%
Aseptic	11.8%	30%	75%
OBB	55.2%	60%	80%
PET	60.9%	65%	75%
HDPE	56.6%	60%	75%
PS	3.9%	10%	50%
Film	6.4%	15%	40%
Plastic Laminants	1.0%	1%	10%
Other Plastics	19.2%	40%	60%
Aluminum Food & Beverage Cans	49.6%	55%	75%
Foil and Other Aluminum	9.0%	20%	50%
Steel Cans	61.1%	65%	75%
Aerosol	27.7%	30%	50%
Paint Cans from Steward Reports	18.1%	20%	50%
Food and Beverage Glass Clear	88.9%	90%	95%
Food and Beverage Glass Coloured	70.5%	72%	80%
Total	67.6%	67%	78%

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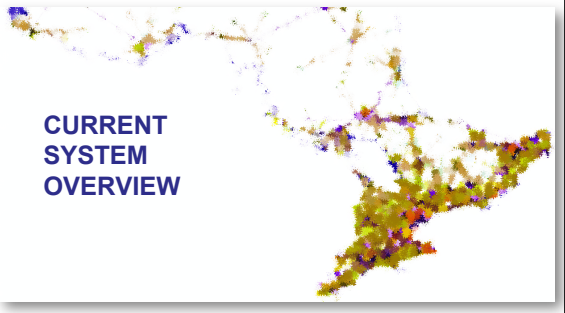

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Current System Overview

- Existing transfer and processing system
  - documenting where material is flowing
    - direct haul
    - Transfer
    - process
  - based on WDO data, CIF & Stewardship Ontario studies
  - no prior contact with municipalities to verify information

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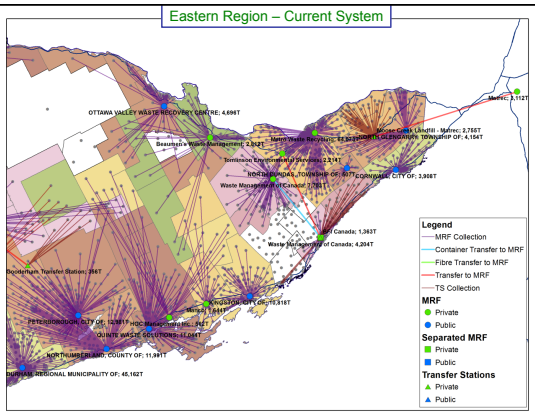
Eastern Region – Current System



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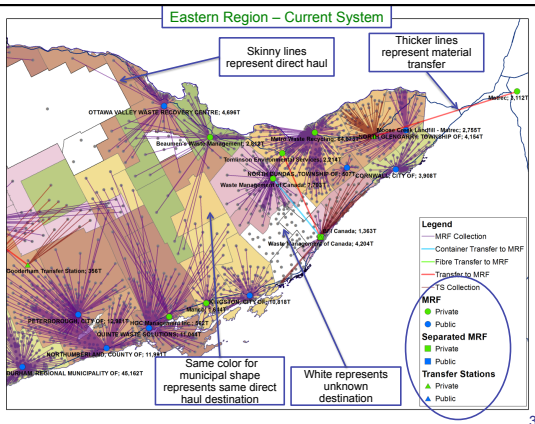
Eastern Region – Current System



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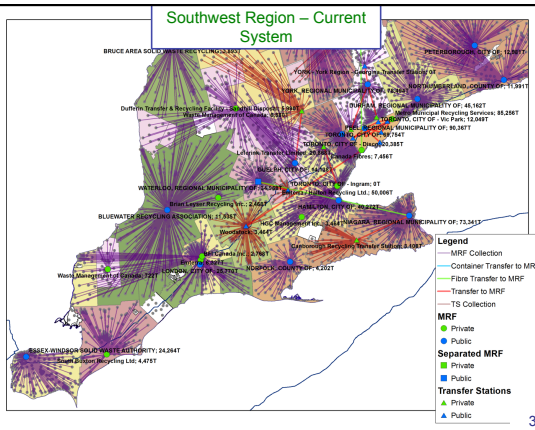
Southwest Region – Current System



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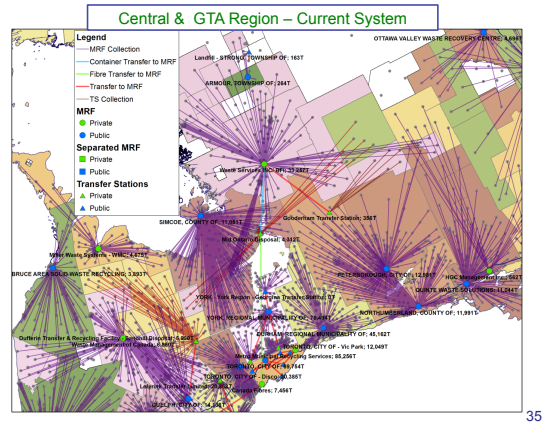
Central & GTA Region – Current System



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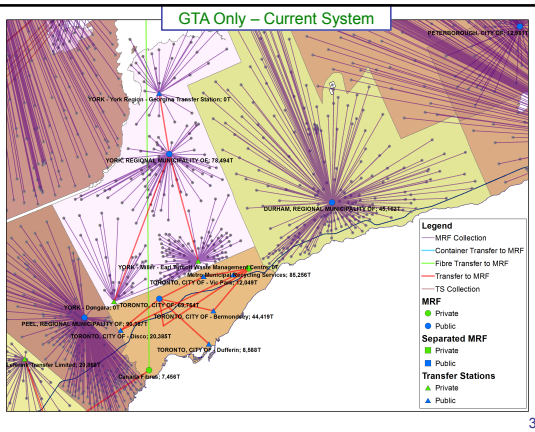
GTA Only – Current System



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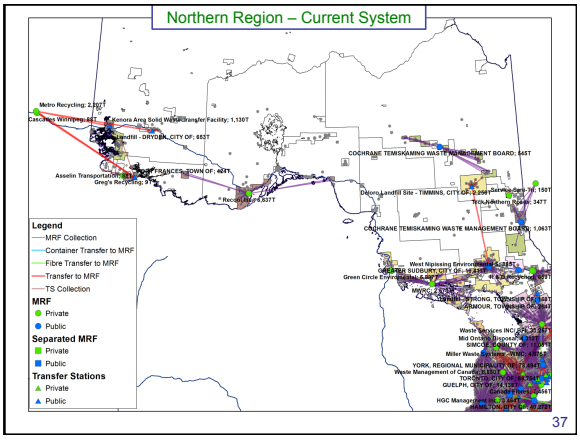

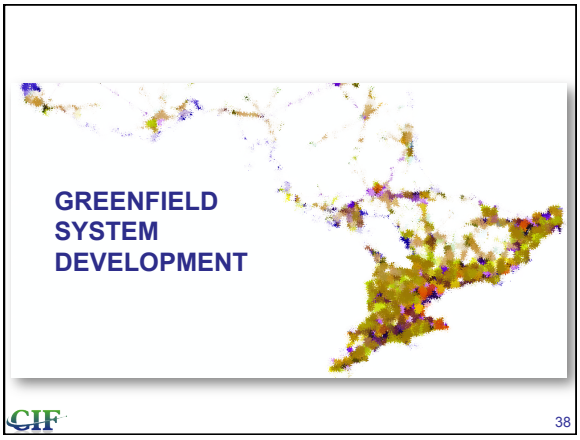

Baseline Model Assumptions

- Standard list of materials accepted province wide
  - simplifies education & outreach
- Move toward single stream collection
  - conservative cost estimate for processing
  - consider some dual stream in far north
- Ability for collection to be simplified & move toward carts
- Municipal boundaries are removed for the analysis
  - transfer stations & MRFs would be placed optimally based on location of material
- Looking for savings on both a local & system wide level

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Model Flowchart

Households Generation rates Recovery Rates by Material

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Dissemination areas in rural and census tracts in dense urban areas

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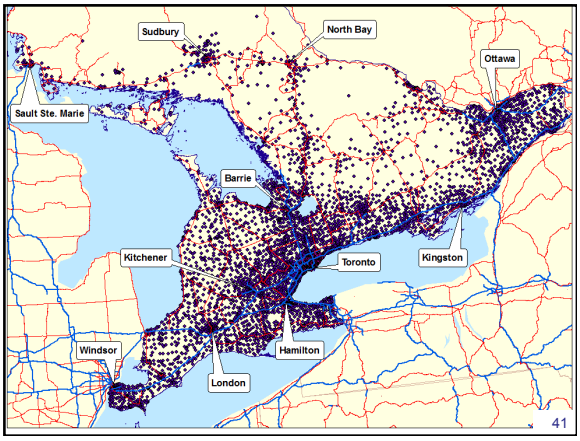

Model Flowchart

Households Generation rates Recovery Rates by Material

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Dissemination areas in rural and census tracts in dense urban areas →

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Route Type: Dense Urban Suburban/Rural Northern Rural

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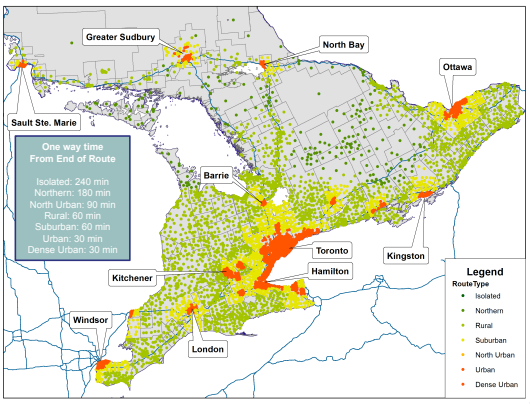

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Model Flowchart

Households Generation rates Recovery Rates by Material

Dissemination areas in rural and census tracts in dense urban areas

Find Minimum # of generic facilities that can receive route tons (Aggregation Points)

Route Type: Dense Urban Suburban/Rural Northern Rural

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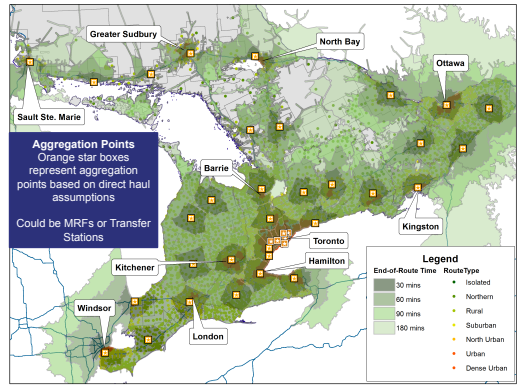

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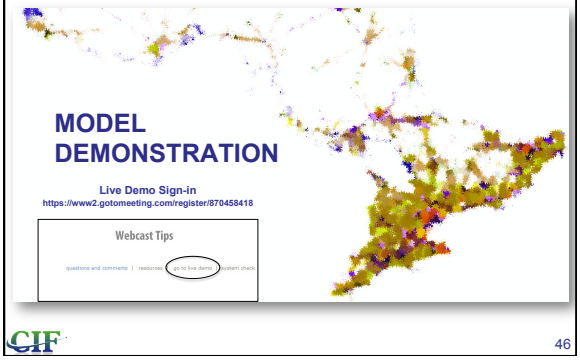

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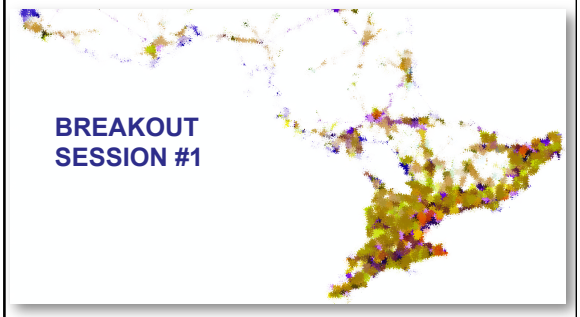

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Breakout Session #1

1) Are assumptions about recovery rates reasonable (natural growth and high recovery)?
   - Does a common suite of materials help to achieve higher recovery?
2) Does the common suite of materials help to simplify or streamline collection?
3) Are the direct haul time assumptions reasonable?
   - How might these haul times affect your collection operation?
   - How should this be reflected in the study, noting collection is not part of the study?

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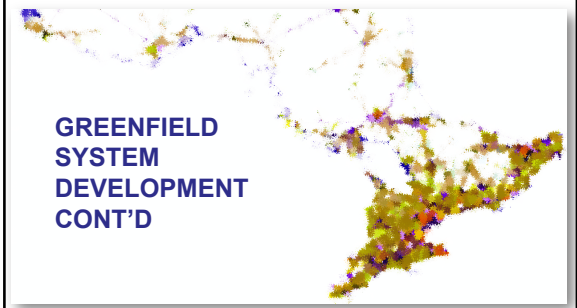

GREENFIELD SYSTEM DEVELOPMENT CONT'D

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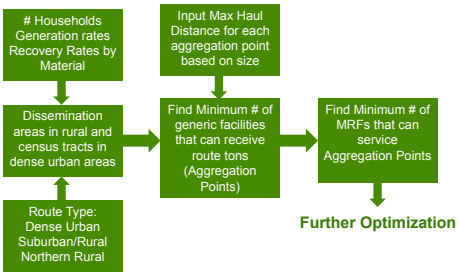
Model Flowchart



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Model MRF Throughput & Capacity

	Tph	Annual Tonnes (1-shift)	Annual Tonnes (2-shift)
Small Transfer Station	-	2,500	-
Medium Transfer Station	-	10,000	-
Large Transfer Station	-	50,000	-
Dual Stream Small MRF	6	10,492	20,984
Dual Stream Medium MRF	14	22,324	44,647
Single Stream Small MRF	14	22,324	44,647
Single Stream Intermediate MRF	20	32,741	65,482
Single Stream Medium MRF	32	52,088	104,177
Single Stream Large MRF	64	104,177	208,353

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Transfer Stations

1) Building for tipping & loading areas
2) Large doors for easy tipping
3) Tip area to hold 3-4 days of incoming material
4) Stationary compactors used to increase haul weights
   - 40.5 m^3 boxes used for small transfer station
   - 92 m^3 boxes used for medium & large transfer stations
5) Rolling stock
   - small to large wheel loader used load material

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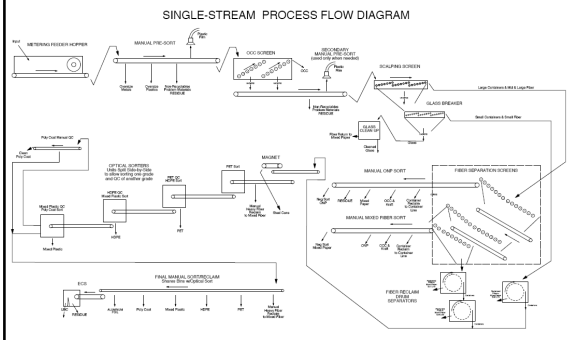
Cost Model Assumptions



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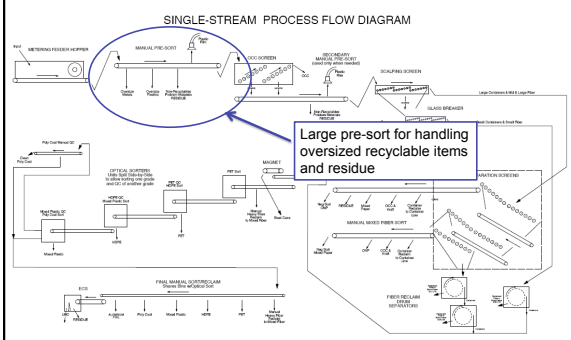
Cost Model Assumptions



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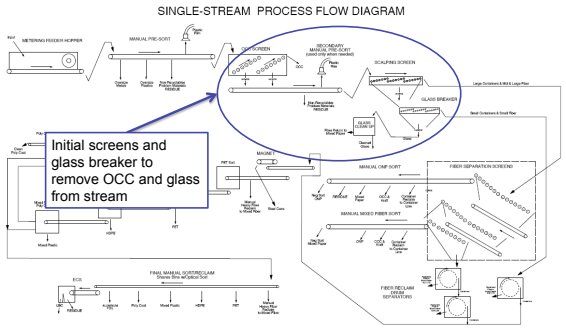
Cost Model Assumptions

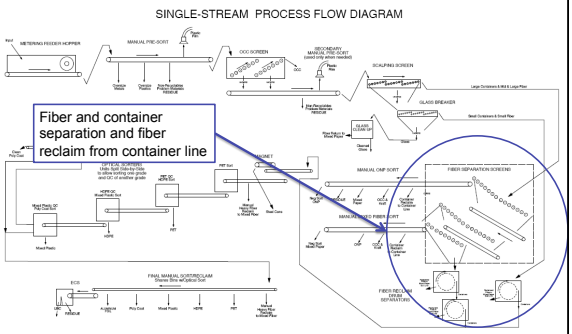
SINGLE-STREAM PROCESS FLOW DIAGRAM



Initial screens and glass breaker to remove OCC and glass from stream

Cost Model Assumptions

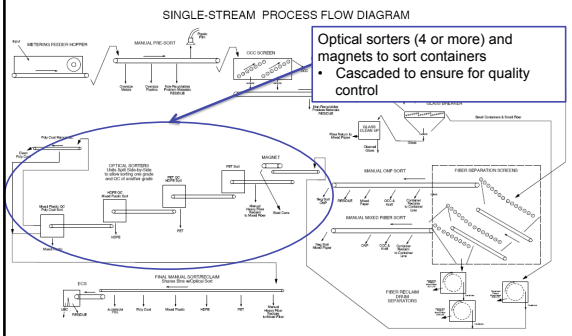
SINGLE-STREAM PROCESS FLOW DIAGRAM



Fiber and container separation and fiber reclaim from container line

Cost Model Assumptions

SINGLE-STREAM PROCESS FLOW DIAGRAM

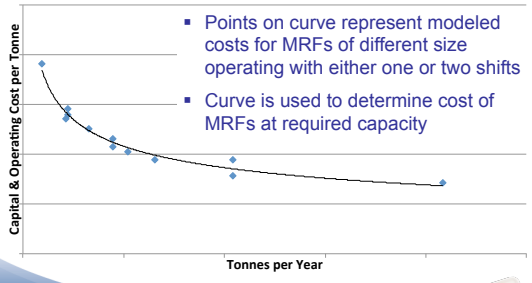


Optical sorters (4 or more) and magnets to sort containers
- Cascaded to ensure for quality control

Cost Assumptions

- Detailed cost assumptions to be posted on CIF website for review & comment, including:
  - building & equipment capital costs
  - wage rates for all labour
  - labour productivity
  - operating costs – maintenance, utilities, etc.
  - residual rates
  - compaction rates
  - overheads – financing, taxes & profit, etc.

Greenfield MRF Cost Curve



- Points on curve represent modeled costs for MRFs of different size operating with either one or two shifts
- Curve is used to determine cost of MRFs at required capacity

Transfer or Process?

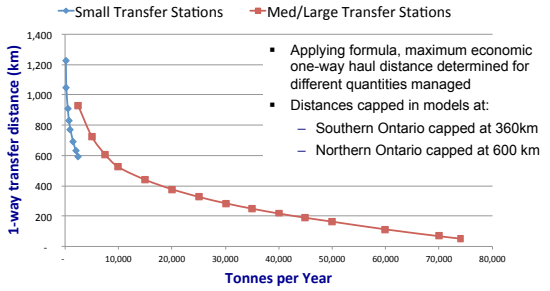
- Each transfer station has a unique cost structure
- Each MRF has a different operating cost
- For each combination:

Cost if material was processed locally – (Transfer Station Load cost + Destination MRF Cost) = $/tonne available for Haul

Based on cost curve for tonnage at each aggregation point

Based on operating Model for MRF size likely for each region

Transfer Distances



- Applying formula, maximum economic one-way haul distance determined for different quantities managed
- Distances capped in models at:
  - Southern Ontario capped at 360km
  - Northern Ontario capped at 600 km

CIF

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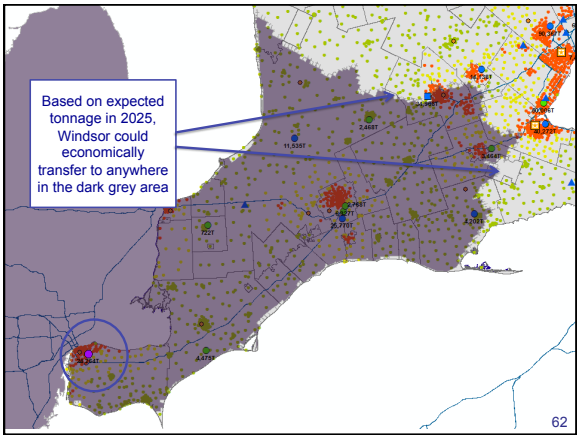

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Summary of Model Capability

- Existing & alternate systems
- Adjust volume to be processed for targeted year
- Determine waste sheds
- Determine direct haul & transfer haul routes
- Determine facility locations, size & capabilities (MRFs, transfer)
- Assess system costs
- Impact of changing key parameters

CIF CONTINUOUS IMPROVEMENT FUND

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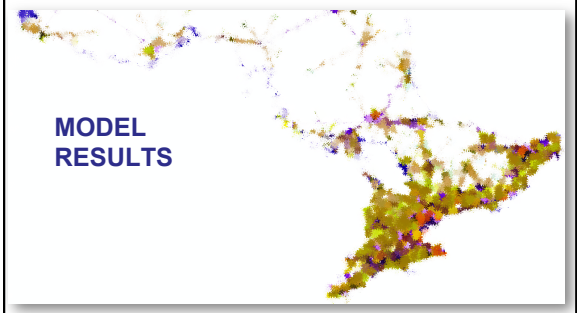

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Preliminary "Lessons Learned" from Greenfields

- Preliminary observations/results
  - strong hub and spoke system potential
  - options with fewer MRFs and more transfer stations
  - distinct regions and waste sheds emerging
  - options to utilize existing infrastructure
  - in many cases existing facilities could be used as transfer
- Sensitivity analysis completed − volumes, costs (including fuel), traffic, seasonality & peak

CIF CONTINUOUS IMPROVEMENT FUND

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Preliminary Sensitivity Analysis

- High Capital – increase capital costs by 20%
- Low Labour – decrease labour costs by 20%
- Reduce Compaction – ratio reduced by 20%
- Fuel Cost – increase fuel cost by 200%

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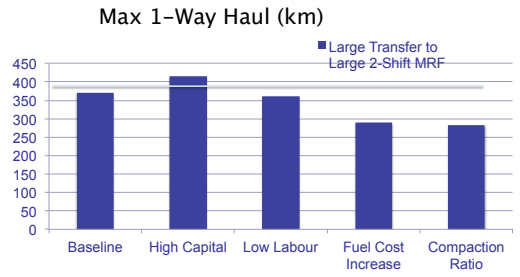
Sample Results of Sensitivity Analysis



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Impact on Haul Distance

Max 1-Way Haul (km)

Scenario	Small Transfer Medium 2-Shift MRF	Small Transfer Large 2-Shift MRF	Medium Transfer Medium 2-Shift MRF	Medium Transfer Large 2-Shift MRF	Large Transfer Large 2-Shift MRF
Baseline	454	511	632	699	371
High Capital	519	571	713	776	415
Low Labour	431	481	600	659	366
Fuel Cost Increase	316	357	497	551	289
Compaction Ratio	356	401	498	552	282
MRF Revenue	471	536	652	729	401

Majority of haul distances would be less than 250km

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Initial Model Conclusions

- Hub & spoke system offers savings over distributed MRFs
- Hub & spoke system is robust & not significantly affected by fuel cost & expected density changes
- Do not need to get to minimum number of MRFs to achieve savings
  - savings should be achieved even under various options within each region

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Where Do Savings Come From?

- Lower processing cost per tonne at larger MRFs if utilized
  - higher tonnage at large MRFs
  - increased transfer to those large MRFs
- Better utilization of capital
  - 2-shift operation
  - higher mechanization
  - less labour per tonne
- Higher market revenue
  - better product control
  - better market relationships

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Barriers To Realizing Savings

- Contracting
  - existing long-term arrangements
  - procurement process challenges
- Technology
  - limitations of existing infrastructure
  - capital availability & timing
- Competition
  - or lack thereof
  - private sector response
- Current operational and cost practices
  - municipal & private sectors
- Transition costs

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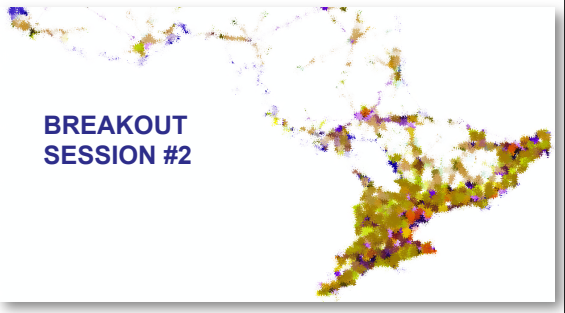
BREAKOUT SESSION #2



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Breakout Session #2

1) What issues come to mind in considering transfer or haul of material across municipal boundaries?
2) What other factors (besides fuel consumption & compaction) could have a strong impact on how far material could be hauled economically?
3) Please identify any concerns with the assumed design of transfer & processing facilities.

CIF CONTINUOUS IMPROVEMENT FUND

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DEVELOPING & SUMMARIZING REGIONAL OPTIONS

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Options Development – Starting Assumptions

1) Four Regions:
   - Eastern Ontario; Central Ontario & GTA; Southwest Ontario; Northern Ontario
2) Modeling excludes collection
   - potential impact on haul times acknowledged
     - could be estimated if existing material flow confirmed
     - changes to collection system could yield efficiencies
3) Identified private sector facilities
   - note potential inclusion in system but use greenfield cost
4) Identified facilities outside Ontario
   - note potential processing capacity but use greenfield cost

CIF CONTINUOUS IMPROVEMENT FUND

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Develop Options – Steps 1 to 3

- Address each region independently
  - noting some options may involve material flowing across regional boundaries
- Establish baseline
  - greenfield scenario natural growth 2025 with lowest number of MRFs
- Establish options
  - increase the number of MRFs
  - define cost implications for natural and high growth scenarios
  - identify potential benefits, e.g. redundancy
    - if benefits not considered significant, do not proceed to next option

CIF

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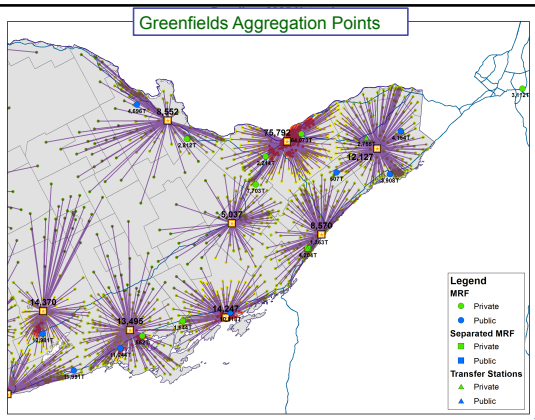
Greenfields Aggregation Points



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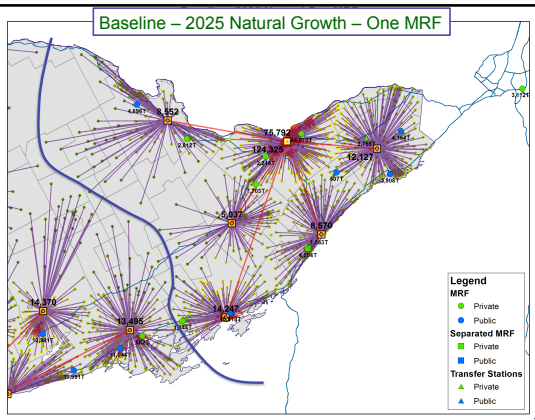
Baseline – 2025 Natural Growth – One MRF



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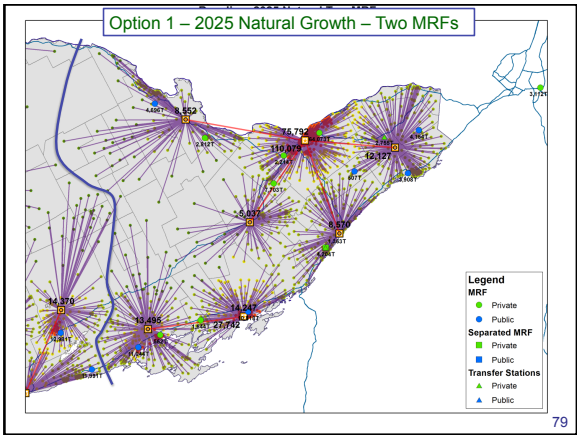

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Develop Options – Step 4

- Variations on options
  - eliminate small aggregation points (e.g. <~2,000 tonnes) & where material currently is hauled further than to nearest alternative
  - consider using existing facilities with population base similar to / greater than greenfield aggregation points
    - cost estimates developed to upgrade & use public facilities
    - how should private facilities be included in these refinements
  - consider transfer of material from large population centres across border when distance small
  - consider using existing MRFs if can minimize impacts on haul distances

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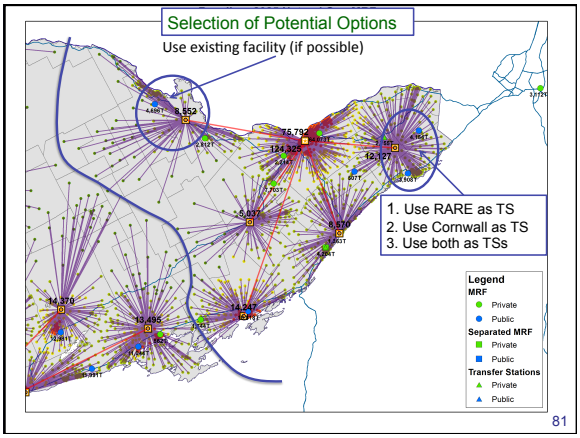

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Additional Scenarios – Step 5

- Additional Scenarios
  - maximize use of existing facilities
  - vary excess capacity to ensure redundancy

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Sensitivity Analyses

We will test:

1) Sorting productivity at key stages in greenfield MRFs
2) Other cost assumptions, including
   - regional labour rates
   - overhead & profit margins
3) Impact of density & compactability of future waste stream
4) Peak tonnes
5) Excess capacity requirements for redundancy

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Presenting Results (1)

- Maps for each region showing:
  - existing system
    - public & private MRFs and transfer stations, & when known, flow of material
  - Greenfields system and options
    - including existing infrastructure & identifying flow of material to aggregation points & transfer to MRFs
    - quantity of material handled at each location
    - total cost per tonne for transfer, haul & processing at each aggregation point

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Presenting Results (2)

Tables summarizing:

- Number of facilities
- Conversions
  - i.e., MRFs to TS
  - TS & MRF upgrades
- Total annual capital and operating cost of option
- Investments in new facilities & conversion
- Implications on neighbouring regions
- Direct haul impacts among options
- Range of throughput and peak loading

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Presenting Results (3)

Commentary:

- Describing the key elements of the option
- The key requirements and constraints, e.g.:
  - CofA requirements
  - Contract timelines
  - Redundancy impacts

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Key Transition Requirements

1. Identify processing locations and capacity, considering:
   - individual municipality locations with excess capacity, or cooperative solutions
   - alignment of contracts with timing
   - upgrading facilities, where applicable
   - new greenfield sites, where applicable
   - schedule, cost and cost-sharing/funding source impacts
2. Identify transfer locations and capacity
   - determine & implement potential conversion or upgrades
   - tender for transfer capacity & operation

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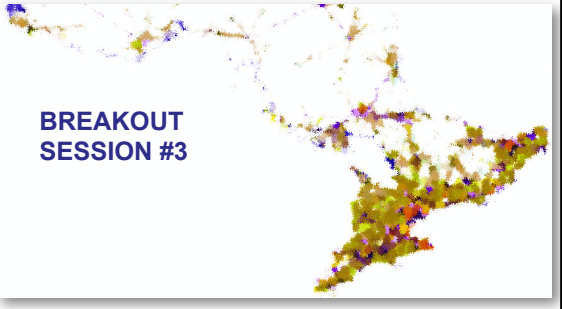

BREAKOUT SESSION #3

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Breakout Session #3

1) Is the region-by-region approach capturing the full range of attractive options?
2) Are there any additional criteria or metrics you would like considered in evaluating options?
3) What should be addressed in the study that will help you in reporting to your senior staff & Council?

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NEXT STEPS

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We Need Your Feedback

- Review assumptions (posted on CIF website)
  - generation & recovery assumptions
  - existing facilities & material flow
  - design & cost assumptions
- On-line survey
  - will be sent by email
  - access through CIF website
- Deadline April 27

Questions?

- **Guy Perry**
  - StewardEdge Inc.
  - (647) 777-3354
  - gperry@stewardedge.ca
- **Jim Frey**
  - Resource Recycling Systems
  - (734) 996-1361
  - frey@recycle.com

Thank you!

Wrap-up

On Behalf of the CIF… Thank You!

- ORW speakers and workshop leaders
  - Aaron Burman, Resource Recycling Systems
  - Alec Scott, MIPC
  - Dave Gordon, York Region
  - Guy Perry, StewardEdge Inc.
  - Jim Frey, Resource Recycling Systems
  - Mike Birett, CIF
  - Monika Turner, AMO
  - Neil Menezes, StewardEdge Inc.
- All participants – on webcast and in room

See You In the Fall!