

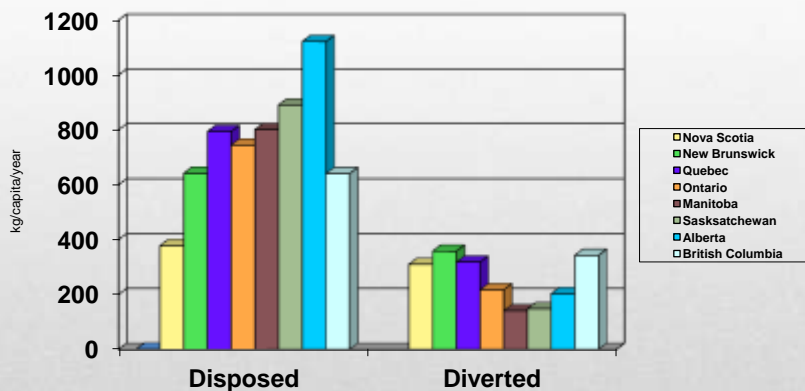
# Recycling Council of Alberta Recycling 101



The Basics of Recycling in Alberta

Presented to 2011 AUMA Convention

Christina Seidel, Executive Director



## 2008 Provincial Trends

Data from the territories, NL and PEI are not provided due to confidentiality reasons  
Source: Statistics Canada 2010



## Disposal of waste — Province and territory

	Total waste disposal			Waste disposal per capita		
	2006	2008	Percentage change 2006 to 2008	2006	2008	Percentage change 2006 to 2008
	tonnes		percent	kilograms		percent
<b>Canada</b>	<b>25,925,964</b>	<b>25,871,310</b>	<b>-0.2</b>	<b>796</b>	<b>777</b>	<b>-2.4</b>
Newfoundland and Labrador	428,809	410,590	-4.2	840	811	-3.5
Prince Edward Island	x	x	x	x	x	x
Nova Scotia	359,105	354,231	-1.4	383	378	-1.2
New Brunswick	511,706	479,461	-6.3	686	642	-6.5
Quebec	6,317,393	6,158,152	-2.5	828	794	-4.0
Ontario	9,710,459	9,631,559	-0.8	767	745	-2.9
Manitoba	904,272	966,199	6.8	764	801	4.9
Saskatchewan	833,753	902,943	8.3	840	891	6.0
Alberta	3,819,872	4,029,435	5.5	1,117	1,122	0.5
British Columbia	2,917,080	2,811,568	-3.6	687	641	-6.7
Yukon, Northwest Territories and Nunavut	x	x	x	x	x	x

# Provincial Waste Disposal

Source: Stats Can 2010



## Disposal of waste by source, province and territory, 2008

	Residential proportion of waste	Non-residential proportion of waste	Residential sources per capita	Non-residential sources per capita
	percent		kilograms	
<b>Canada</b>	<b>33</b>	<b>67</b>	<b>256</b>	<b>520</b>
Newfoundland and Labrador	53	47	429	382
Prince Edward Island	x	x	x	x
Nova Scotia	42	58	158	220
New Brunswick	49	51	313	329
Quebec	33	67	285	530
Ontario	34	66	250	406
Manitoba	41	59	332	469
Saskatchewan	32	68	286	605
Alberta	24	76	267	855
British Columbia	34	66	219	422
Yukon, Northwest Territories and Nunavut	x	x	x	x

Source(s): Statistics Canada, Environment Accounts and Statistics Division, CANSIM tables 051-0001 and 153-0041.

# Provincial Waste Disposal



### Diversion of waste by province and territory

	Total materials diverted			Diverted materials per capita			Diversion rate	
	2006	2008	Percentage change 2006 to 2008	2006	2008	Percentage change 2006 to 2008	2006	2008
	tonnes		percent	kilograms		percent		
<b>Canada</b>	<b>7,727,030<sup>1</sup></b>	<b>8,473,257</b>	<b>9.7</b>	<b>237<sup>1</sup></b>	<b>254</b>	<b>7.2</b>	<b>23.0<sup>1</sup></b>	<b>24.7</b>
Newfoundland and Labrador	x	x	x	x	x	x	x	x
Prince Edward Island	x	x	x	x	x	x	x	x
Nova Scotia	275,983	289,950	5.1	294	310	5.2	43.5	45.0
New Brunswick	252,174	267,467	6.1	338	358	5.9	33.0	35.8
Quebec <sup>1</sup>	2,434,300 <sup>1</sup>	2,463,600	1.2	319 <sup>1</sup>	318	-0.4	27.8 <sup>1</sup>	28.6
Ontario	2,396,856	2,810,900	17.3	189	217	14.9	19.8	22.6
Manitoba	152,799	170,377	11.5	129	141	9.5	14.5	15.0
Saskatchewan	106,868	149,619	40.0	108	148	37.0	11.4	14.2
Alberta	652,637	728,536	11.6	191	203	6.3	14.6	15.3
British Columbia	1,366,191	1,505,112	10.2	322	343	6.6	31.9	34.9
Yukon, Northwest Territories and Nunavut	x	x	x	x	x	x	x	x

## Provincial Waste Diversion

Source: Stats Can 2010

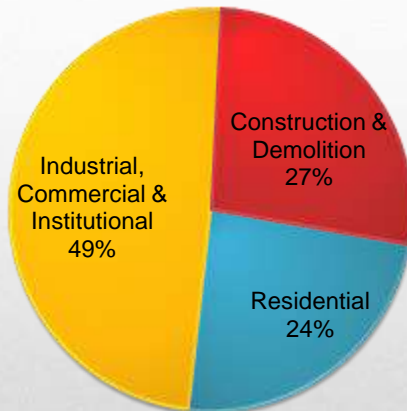


### Materials diverted by source, province and territory

	Residential sources <sup>1</sup>		Non-residential sources <sup>2</sup>		All sources	
	2006	2008	2006	2008	2006	2008
	tonnes					
<b>Canada</b>	<b>3,722,843<sup>1</sup></b>	<b>4,360,505</b>	<b>4,004,187<sup>1</sup></b>	<b>4,112,752</b>	<b>7,727,030<sup>1</sup></b>	<b>8,473,257</b>
Newfoundland and Labrador	x	x	x	x	x	x
Prince Edward Island	x	x	x	x	x	x
Nova Scotia	138,809	149,961	137,114	139,989	275,983	289,950
New Brunswick	32,675	62,076	219,499	205,391	252,174	267,467
Quebec <sup>3</sup>	912,260 <sup>1</sup>	1,046,000	1,522,040 <sup>1</sup>	1,417,600	2,434,300 <sup>1</sup>	2,463,600
Ontario	1,511,467	1,878,899	885,389	932,001	2,396,856	2,810,900
Manitoba	70,239	74,168	62,560	96,209	152,799	170,377
Saskatchewan	38,578	78,381	68,290	71,238	106,868	149,619
Alberta	329,541	391,709	323,094	336,827	652,637	728,536
British Columbia	625,627	614,204	740,364	890,908	1,366,191	1,505,112
Yukon, Northwest Territories and Nunavut	x	x	x	x	x	x

## Provincial Waste Diversion

Source: Stats Can 2010

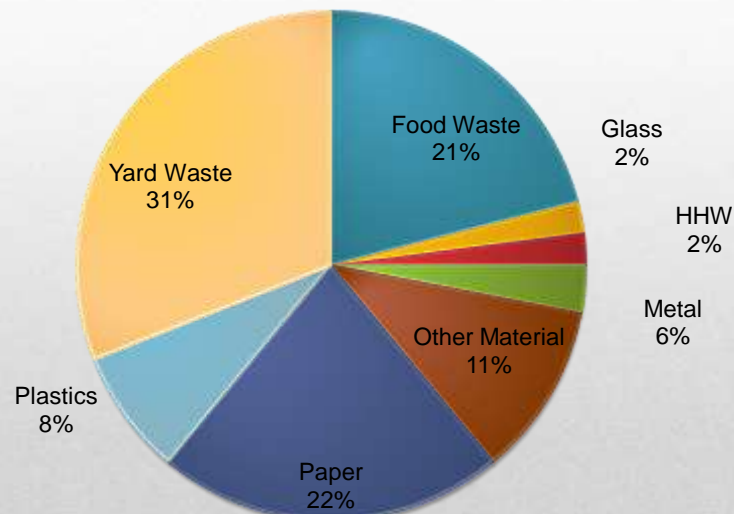


## Sources of Waste Materials generated in Alberta

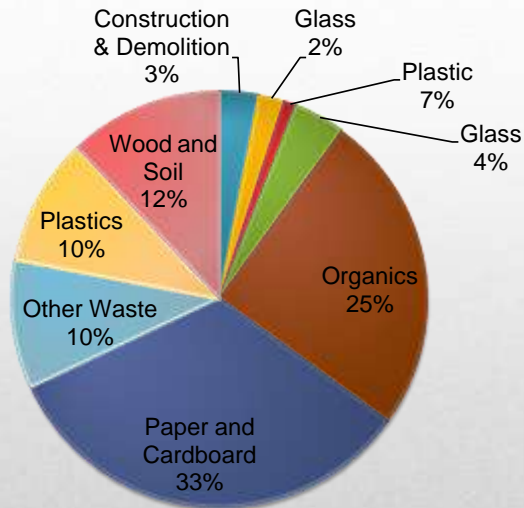
Source: Stats Canada



## Composition of Residential Waste

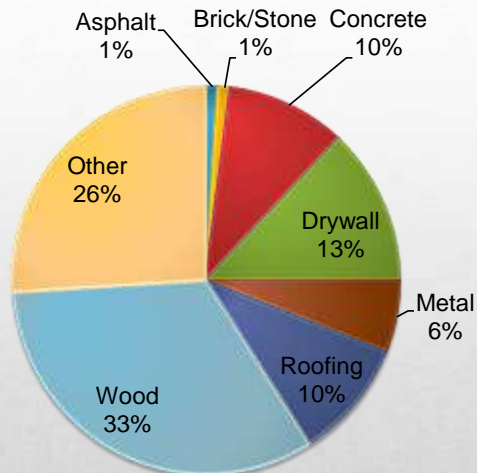


Source: Provincial Waste Characterization Framework, Oct. 2005



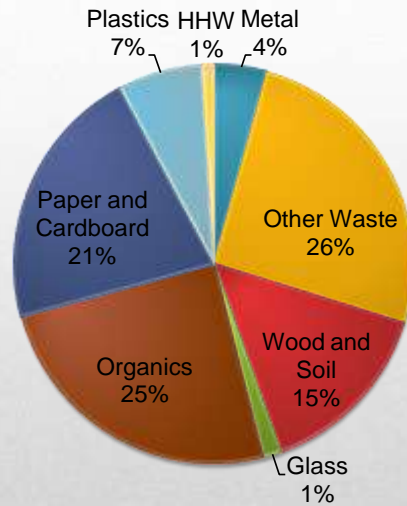
## ICI Waste Composition

Source: Provincial Waste Characterization Framework, Oct. 2005



## C&D Waste Composition

Source: Provincial Waste Characterization Framework, Oct. 2005



## MSW Waste Composition

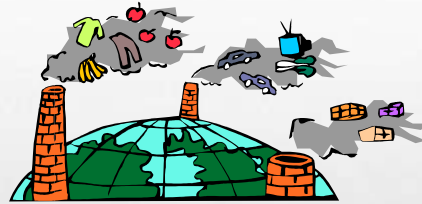
Source: compiled from charts found in Provincial Waste Characterization Framework, Oct. 2005



## Environmental Impact



- Fill up landfills
- Fire hazards
- Toxic hazards
- Pollution
- Climate change / greenhouse gas emissions



## Effects of Waste

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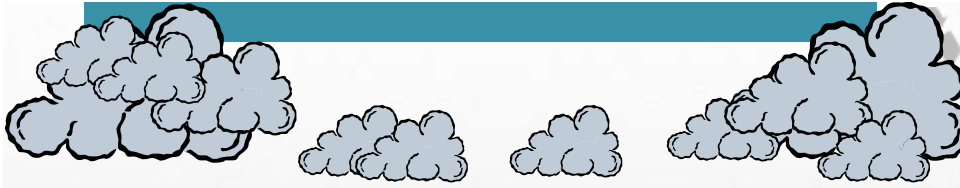


- Garbage = 750 to 1250 lb/yd<sup>3</sup>
- 1 tonne garbage ~ 2-3 yd<sup>3</sup> landfill space
- Key recyclables have lower densities, magnifying their impact on landfill costs:
  - Cardboard: 750 lb/yd<sup>3</sup>
  - Plastic containers: 355 lb/yd<sup>3</sup>
- Landfill tipping fees vary:  
\$20/tonne - \$135/tonne



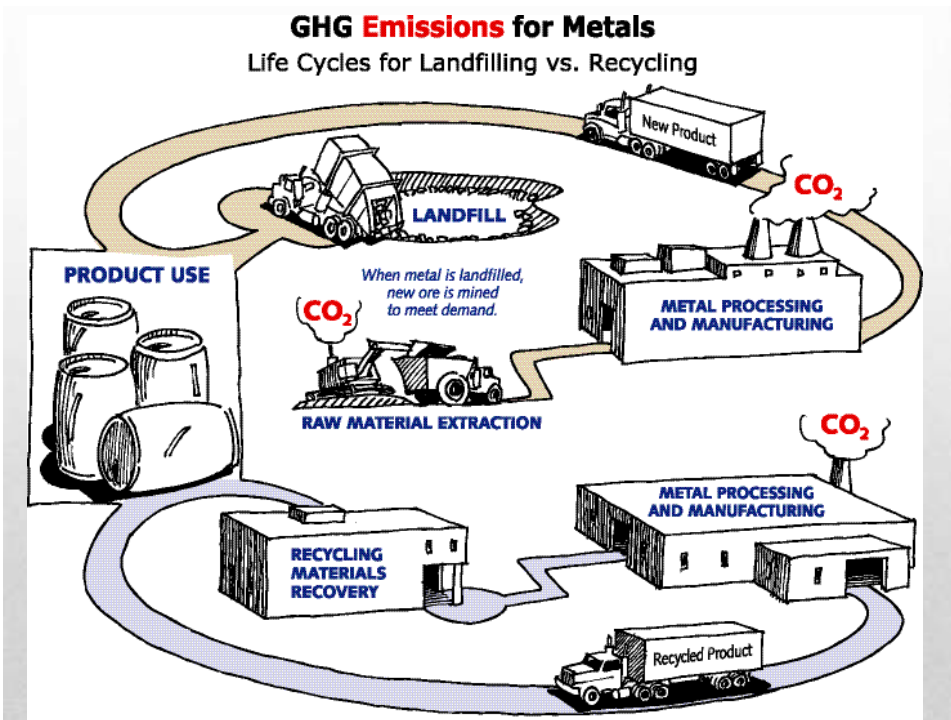
## Landfill Space Savings

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- EPA / Environment Canada studies
  - Reducing waste (eliminating it at the source) has the most dramatic impact on reducing greenhouse gasses
  - Recycling is also effective way of reducing GHGs
    - less energy is required to manufacture materials from recycled materials than from virgin material
    - no gases occur from landfilling or incinerating those materials

## Climate Change



## Net GHG Emissions from MSW Management Options

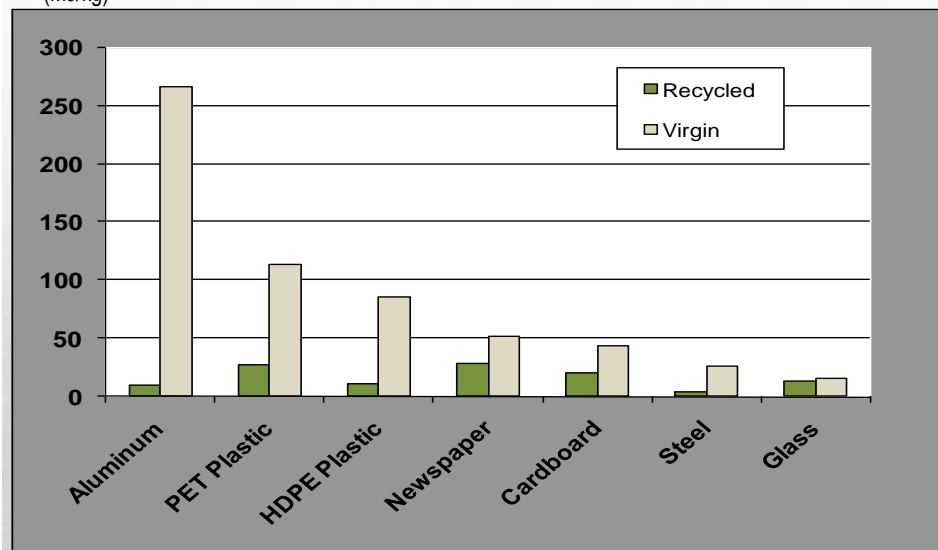
(tonnes eCO2/tonne)



Material	Source Reduction	Recycling/ Composting	Anaerobic Digestion	Thermal Treatment	Landfill
Newspaper	(3.81)	(2.81)	(0.49)	(0.05)	(1.22)
Fine Paper	(5.93)	(3.33)	(0.34)	(0.04)	1.18
Cardboard	(5.22)	(3.34)	(0.32)	(0.04)	0.29
Aluminum Cans	(4.55)	(6.49)	0.01	0.01	0.01
Steel	(1.95)	(1.15)	0.01	(0.99)	0.01
Glass	(0.40)	(0.10)	0.01	0.01	0.01
HDPE	(2.74)	(2.27)	0.01	2.85	0.01
PET	(3.50)	(3.63)	0.01	2.13	0.01
Computers	NA	(1.59)	0.01	0.41	0.01
Food Waste	NA	(0.24)	(0.10)	0.02	0.80
Yard Waste	NA	(0.24)	(0.15)	0.01	(0.33)

## Energy Use: Recycled & Virgin Content Products

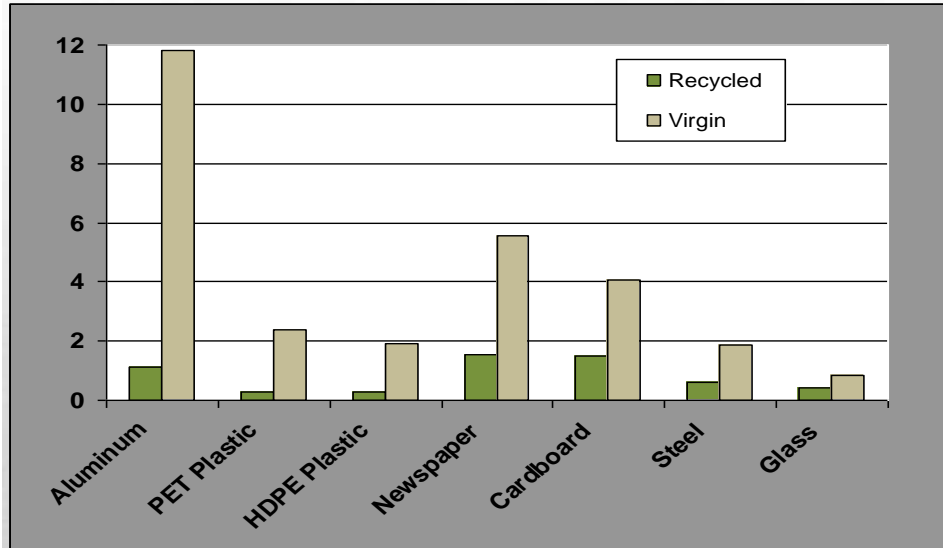
(MJ/kg)



Source: Dr. Jeffrey Morris, Sound Resource Management

## CO<sub>2</sub> Emissions: Recycled & Virgin Content Products

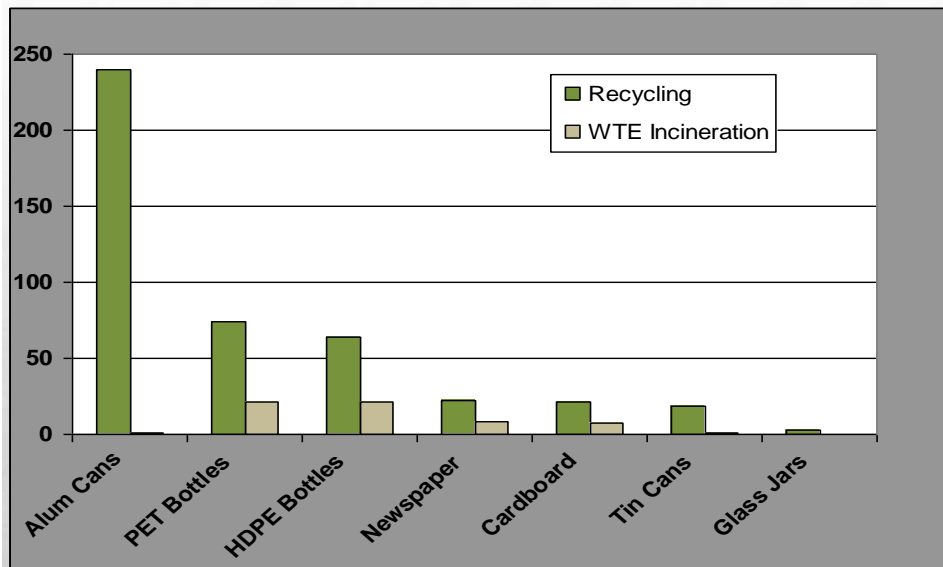
(kg eCO<sub>2</sub>/kg)



Source: Dr. Jeffrey Morris, Sound Resource Management

## Energy Savings: Recycling versus WTE Incineration

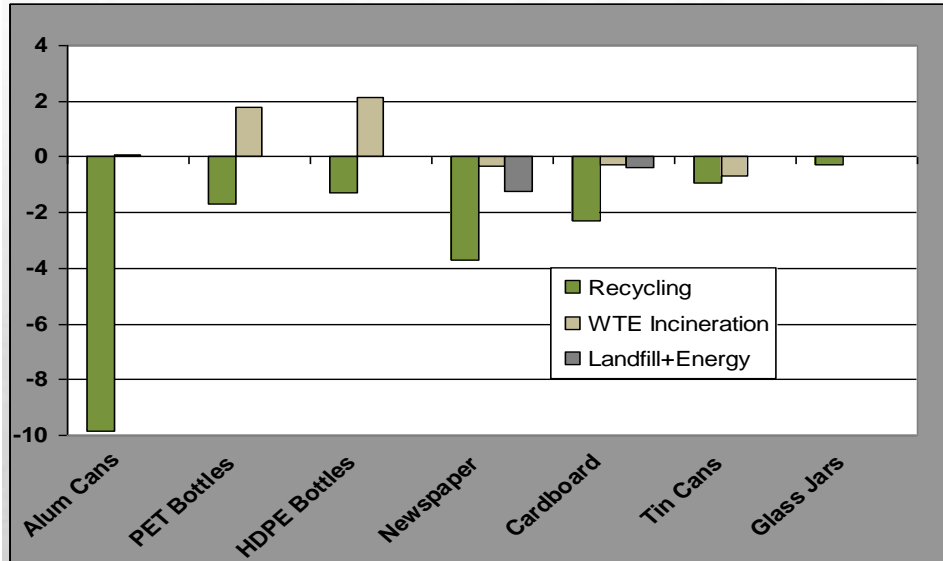
(MJ/kg)



Source: Dr. Jeffrey Morris, Sound Resource Management

## CO<sub>2</sub> Emissions: Recycling versus Disposal

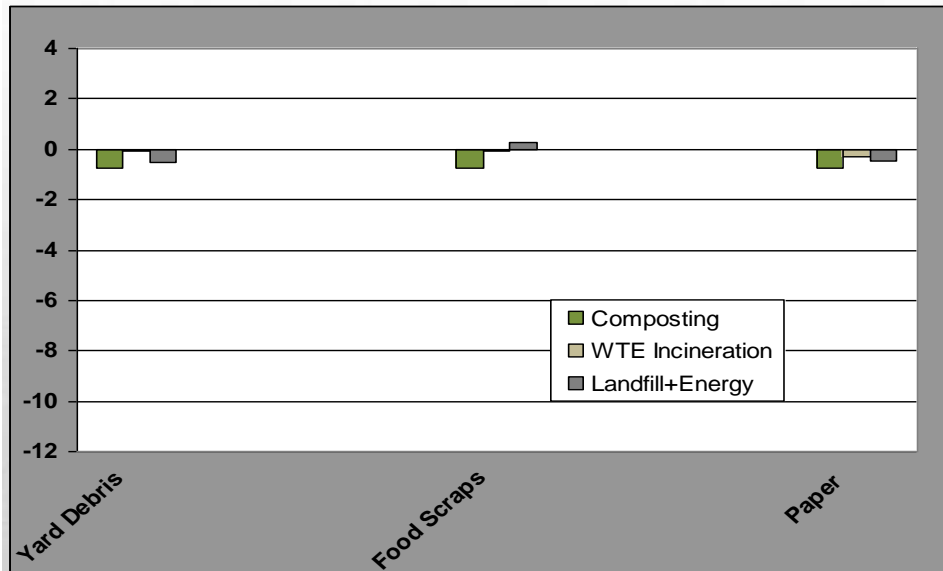
(kg eCO<sub>2</sub>/kg)



Source: Dr. Jeffrey Morris, Sound Resource Management

## CO<sub>2</sub> Emissions: Composting versus Disposal

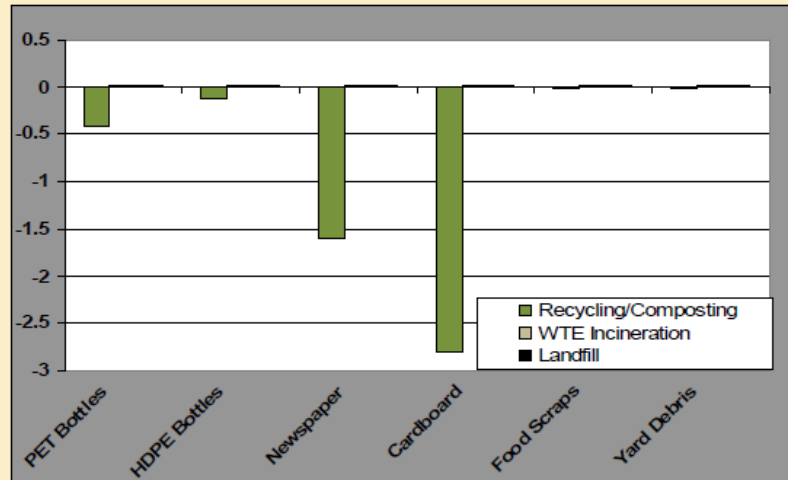
(kg eCO<sub>2</sub>/kg)



Source: Dr. Jeffrey Morris, Sound Resource Management



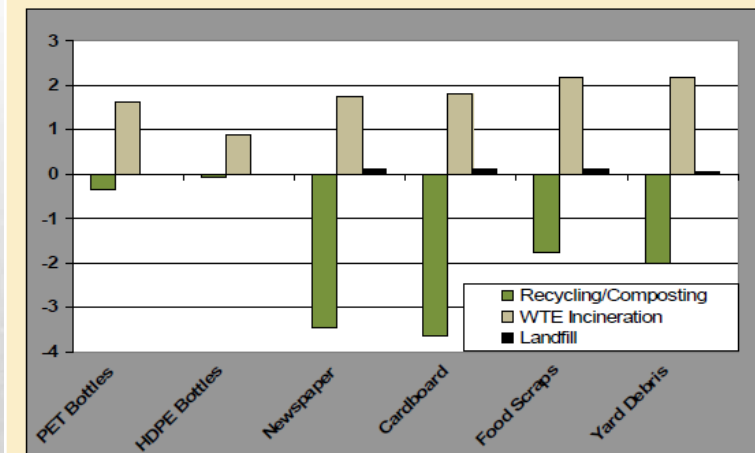
### Health Threatening Emissions Increase/(Decrease) (tonnes eToluene per tonne)



Source: Dr. Jeffrey Morris, Sound Resource Management



### Ecosystems Toxicity Emissions Increase/(Decrease) (kilograms e2,4-D per tonne)



Source: Dr. Jeffrey Morris, Sound Resource Management

Discard Type	Environmental Value (US\$/metric ton)
Newspapers	\$363-367
Cardboard	467-496
Mixed Paper	172-197
Glass Containers	61
PET Plastics	639-712
HDPE Plastics	224-310
Other Plastics	224-310
Aluminum Cans	1,607
Ferrous Cans & Scrap	18-72
Food Scraps	62-107
Yard & Garden Debris	61-74
Compostable Paper	52-78



### Value of Pollution Reductions from Recycling & Composting

Source: Dr. Jeffrey Morris, Sound Resource Management

Zero Waste is a goal that is both pragmatic and visionary, to guide people to emulate sustainable natural cycles, where all discarded materials are resources for others to use. Zero Waste means designing and managing products and processes to reduce the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them. Implementing Zero Waste will eliminate all discharges to land, water or air that may be a threat to planetary, human, animal or plant health."



## Zero Waste Definition

Source: Zero Waste International Alliance



- **Zero Waste to landfill or incineration**
  - divert more than 90% of solid wastes from landfill
  - no solid wastes are processed in facilities that operate above ambient biological temperatures (more than 200 degrees F) to recover energy or materials

## Zero Waste Principles

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Source: Zero Waste International Alliance



## 3Rs Hierarchy

- **Reduce**
    - Source reduction can be achieved by purchasing durable, long-lasting goods, as well as seeking products and packaging that represent a reduction in materials, energy consumption or toxicity
  - **Reuse**
    - Reusing involves the use of a product more than once without altering its form, either for the same or for a different purpose
  - **Recycle**
    - Diverting products from disposal at the end of their useful lives, sorting, transporting and processing them to produce secondary sources of materials that are subsequently used in the production of new goods
-



- Materials that cannot reasonably be reduced, reused or diverted for recycling or composting.
  - ~20% of the municipal waste stream
- The long-term zero-waste objective is to eliminate residuals from the waste stream.
- Residuals may be a temporary situation
  - Lack of markets
  - Poor product design
- True residuals require a disposal option.

## Residuals

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- Energy recovery involves utilizing the embodied energy in waste materials to produce needed heat or electricity.
  - Energy recovery is represented by a variety of combustion processes.
- Recovery is considered an alternate disposal method, not a recycling alternative.

## Residuals Disposal Options – Energy Recovery

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- Disposal of residual materials on land, in a specially engineered site constructed to minimize hazard to public health and safety.
- Landfills are still required with waste-to-energy for disposal of residual ash (~10-25%).

## Residuals Disposal Options – Landfill

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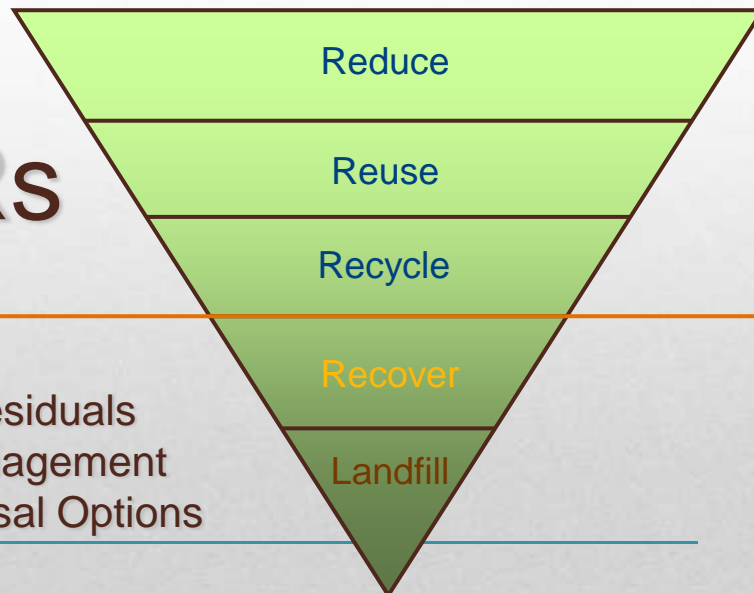


### Waste Management Hierarchy

**3Rs**

Residuals  
Management  
Disposal Options

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- Considered 3 community sizes
  - population of 20,000 / 80,000 / 200,000
- Looked at a number of management methods
  - composting
  - anaerobic digestion
  - sanitary landfill
  - bioreactor landfill
  - thermal treatment
- Full report available on RCA website

## MSW Options Report



- Key Thermal Treatment Findings
  - Can reduce material 90% by volume; 70-75% by weight
  - 450 to 500 kWh of electricity per tonne of waste processed
    - 24 tonnes of waste can heat the average Canadian home
  - New and emerging technologies such as plasma gasification are generally not yet commercially available or proven on a full scale
  - Costly waste treatment alternative
    - comparable to cost of anaerobic digestion
    - more costly than landfill disposal

## MSW Options Report



## WTE Costs (from operating facilities)

	<b>Annual Volume (tonnes)</b>	<b>Capital Cost (millions)</b>	<b>Operating Cost (per tonne)</b>
<b>Batch Process Starved Air</b>	2600 – 5200	\$5 – \$7	\$430 – \$466
<b>Semi-Continuous Starved Air</b>	6,000 – 160,000	\$9.5 – \$118	\$110 – \$257
<b>Mass Burn</b>	300,000	\$200	\$100
<b>Gasification (Edmonton estimates)</b>	100,000	\$90	TBD



- Very different policy framework
  - Recycling strongly established
- Strong focus on hierarchy
  - Prevention, reuse, recycling key elements
- EU Target: by 2020, 50% of municipal solid waste and 70% of waste from construction, demolition, industry and manufacturing must be re-used or recycled.
  - Netherlands currently at 66% diversion
  - Germany at 65% diversion
- New targets increase recycling; limit recovery

## But, What About Europe?



- Waste-to-energy should be considered a residuals treatment (or disposal) option
- Waste prevention, reuse and recycling must be priorities over WtE
  - WtE does not provide best environmental option
- 3Rs must be optimized prior to WtE being considered
- Plan for Zero Waste
  - from disposal, not from landfill

## So, What is the Role of Waste-to-Energy in a Zero Waste World?

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## Trends in Recycling





- Blue Cart Recycling
  - Service for single family homes
- Community Recycling Depots
  - Service for multi-family homes
  - Network of over 50 depots

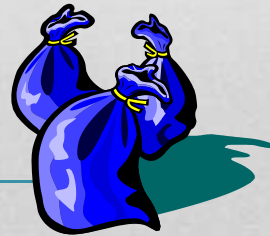


City of Calgary





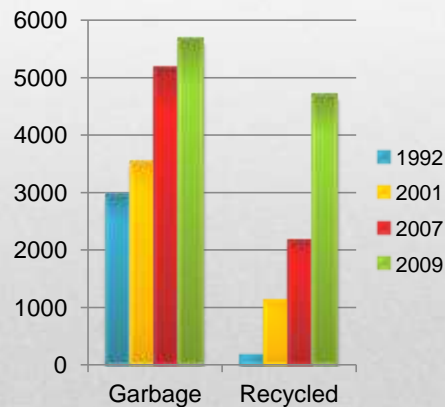
- Blue bag, curbside pickup of recyclables
- Co-composter composts organics contained in the general waste stream
- Depots for drop-off of multi-family recyclables
  - New program for blue bag collection of multi-family
- Year-round EcoStation household hazardous waste drop-off





## Edmonton Co-Composter

- First Alberta community to implement “user-pay” garbage system
- Residents assigned bag limit of 5 Bags in 1992
  - Annual reductions
  - bag limit now 2
- Drop-off depot for collection of recyclables
- Opened new Westside recycling facility
- Participation rate – 72%
  - Population ~38,091



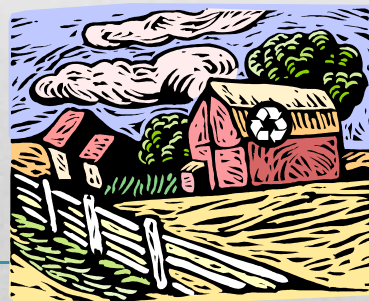


Strathcona County Green Routine



- Primarily drop-off depot collection of recyclables
- Varied levels of service
- Bag limits, user-pay and landfill bans common tools used to promote waste reduction

Rural Alberta



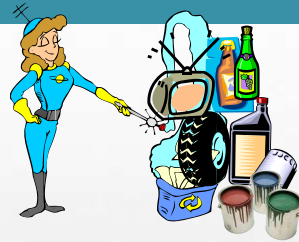


Edson & District Recycling Depot

- “[Packaging] stewardship is a concept by which industry, governments, and consumers assume a greater responsibility for ensuring that the manufacture, use, reuse, recycling, and disposal [of packaging] has a minimum impact on the environment.”

## CCME Stewardship Definition

- Beverage Containers
- Scrap Tires
- Used Oil Materials
- Electronics
- Paint



- ◆ Electronics Recycling Alberta
- ☑ Paint Recycling Alberta
- Tire Recycling Alberta

## Alberta Stewardship Programs - Regulated

- Pesticide Containers (<http://www.environment.alberta.ca/01535.html>)
- Dead Drugs (Envirx) (<http://www.ec.gc.ca/epr/default.asp?lang=En&n=CDA75A7C-1>)
- Portable Rechargeable Battery Collection ([call2recycle.ca](http://call2recycle.ca))
  - Covers Nickel-Cadmium (Ni-Cd), Nickel Metal Hydride (Ni-MH), Lithium Ion (Li-Ion) and Small Sealed Lead (Pb) rechargeable batteries.
- Recycle My Cell ([www.RecycleMyCell.ca](http://www.RecycleMyCell.ca))
- MoU for a Voluntary Strategy to Reduce Plastic Bag Distribution in Alberta
  - Agreement made in June 2010 between Alberta Environment and Retail/Grocery Associations to reduce the per capita and overall distribution of plastic bags at point-of-sale from the amount distributed in 2008 by 30% by 2012 and by 50% by 2014.



## Programs - Non-Regulated / Voluntary



- Program launched in 1992
- Regulated retail advance disposal surcharge
- Program administered by non-profit stakeholder board (Alberta Recycling Management Authority – Tire Recycling Program)
- Dedicated Fund
- Board Funding Strategy
  - *Pay for results*
  - *Value-added products*
- Over 60 million tires recycled



## Scrap Tires

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- Passenger car, motorcycle and pickup truck tires - \$4
- All-terrain vehicle, forklift, skid-steer (bobcat) tires - \$4
- Tires on trucks, transporters, trailers and buses - \$9
- Industrial/Off-the-Road (OTR) Tires (except farm tires)
  - Rims < 24" - \$40
  - Rims > 24" - \$100
  - Rims > 33" - \$200

## Which Tires are Covered under the Program?

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- Rubber patio bricks, tiles and mats
- Crumb instead of sand in playgrounds
- Spreadable poured-in-place playground cover
- Sports field and running track applications
- Roofing products
- Undercushion
- Dairy “mattresses”



## Recycled Tire Products



- Environmental Handling Charge (EHC) on new oil materials (oil, filters, plastic containers)
- Industry-established non-profit, AUOMA, governs funds
- Return Incentive (RI) paid for collection / transport to recyclers
- Similar program in effect in BC, Saskatchewan, Manitoba, Quebec and Ontario



Alberta Used Oil Management Association

## Used Oil Management Program

Paid by the first seller in the province to AUOMA, may be passed on to resellers / consumers



- Oil
  - 5 cents per litre of new oil
- Filters
  - \$0.50 on filters under 8 inches in length,  
\$1 per filter equal to or greater than 8" in length
- Containers
  - 5 cents per litre-size of container  
(5 cents for a one-liter container;  
20 cents for a four-litre container)



## Environmental Handling Charges

- "Re-refined" Motor Oil
- Industrial Heating Oil
- Numerous Recycled Industrial Plastic Products
  - New Oil Containers
  - Railroad Ties
  - Guardrail Posts
  - Curbs and Fence Posts
  - Plastic Pipe
  - Dimensional Lumber
  - Other Durable Goods
    - Flower Pots
    - Plastic Patio Furniture
- Recycled Industrial Metal Products



## Recycled Products



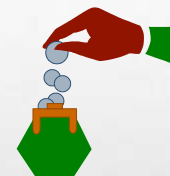
- Return system established in 1972
- Containers are returned for deposit at over 278 collection sites in Alberta (216 bottle depots for all products and 62 retail locations for beer only)
- >1.7 billion containers collected and recycled in 2009 (82% return rate)



## Beverage Container Recycling



- Deposit paid at retail level on ready to drink beverage containers (including milk)
  - 10 cents on containers up to and including one litre
  - 25 cents on containers larger than one litre
  - 10 cents for beer bottles and cans
- Container Recycling Fee (CRF) shown visibly on till slips – non-refundable



## Beverage Container Management System



- Launched October 2004
- Environmental fees collected on the sale of new eligible electronics in Alberta. Fees are used to:
  - Collect, transport and recycle scrap electronics,
  - Develop research into new recycling technologies, and
  - Build awareness and support for the electronics recycling programs.
- More than 300 collection sites across Alberta
  - Some communities hold e-waste roundup events
- Over 2,800,000 units or 53,500 tonnes of electronic components recycled

## Alberta's Electronics Recycling Program

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- Regulated advance disposal surcharge
  - Televisions
    - 18-inch screen and smaller: \$15
    - 19-inch to 29-inch screen: \$25
    - 30-inch to 45-inch screen: \$30
    - 46-inch and larger screen: \$45
  - Computer Equipment
    - Computer monitors (LCD and CRT): \$12
    - CPUs and servers (also covers recycling of keyboard, mouse, cables, and speakers): \$10
    - Printer/printer combinations: \$8
    - Laptop and notebook computers: \$5

## Eligible Products and Recycling Fees

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- Launched April 1, 2008
- Over 225 collection sites have been established throughout Alberta
- Over 3.8 million litres of paint and 480,000 aerosol containers have been recycled



## Paint Recycling Program



- Unpressurized paint containers:
  - 100 ml to 250 ml: \$0.10
  - 251 ml to 1 L: \$0.25
  - 1.01 L to 5 L: \$0.75
  - 5.01 L to 23 L: \$2.00
- Aerosol paint containers all sizes: \$0.10
- Paint is sorted into different streams and sent to processors
  - Recycled into new paint, used for fuel blending, or sent for proper disposal if necessary



## Paint Recycling Fees



- Stewardship programs have been successful in diverting waste
- Regulation provides level playing field to producers
- Dedicated funds ensure targeted programs
- DAOs maintain “arm’s length” from government



## Stewardship Summary

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## Priorities for the Future

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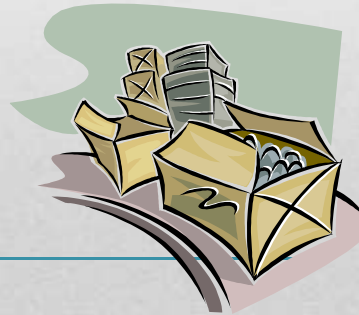


- Cardboard
- Organics
- Construction / Demolition Waste



## Focus on Recovery of Priority Materials

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- Prior to collection, assess markets for material:
  - Stable, long-term
  - Accessible
  - Processing requirements



## Markets

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- Integrated waste management system
- Full-cost accounting
- Develop goals and objectives
- Public review
- User-pay options

## Develop Long-term Waste Management Strategy

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- Very important component of success
- Apply social marketing principles
  - Identify barriers and benefits
  - Utilize Social Marketing tools
    - Commitment
    - Prompts
    - Norms
  - Develop effective communications materials
  - Use incentives where appropriate
  - Pilot and evaluate your strategy



## Promotion / Education

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- Buy Recycled
  - Support recycling industry
  - Encourage use of recycled materials
- Green Procurement Sources
  - RCA' s Enviro Business Guide  
[www.recycle.ab.ca/ebguide](http://www.recycle.ab.ca/ebguide)
  - Environmental Choice Program  
[www.environmentalchoice.com](http://www.environmentalchoice.com)
  - Ask for Green choices



## Closing the Loop

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- Vision
  - Zero Waste
  - Extended Producer Responsibility
  - Social Conscience
- Mission
  - To Promote and Facilitate Waste Reduction, Recycling, and Resource Conservation in Alberta



*Recycling Council  
of Alberta*

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