The Energy Implications of Recycling

Energy Management Task Force

Dec. 4, 2013

SASKATCHEWAN WASTE REDUCTION COUNCIL

Saskatchewan Waste Reduction Council

- ENGO, 22 years old
- Multi-stakeholder
  - Municipal/government
  - Business/industry
  - Citizens

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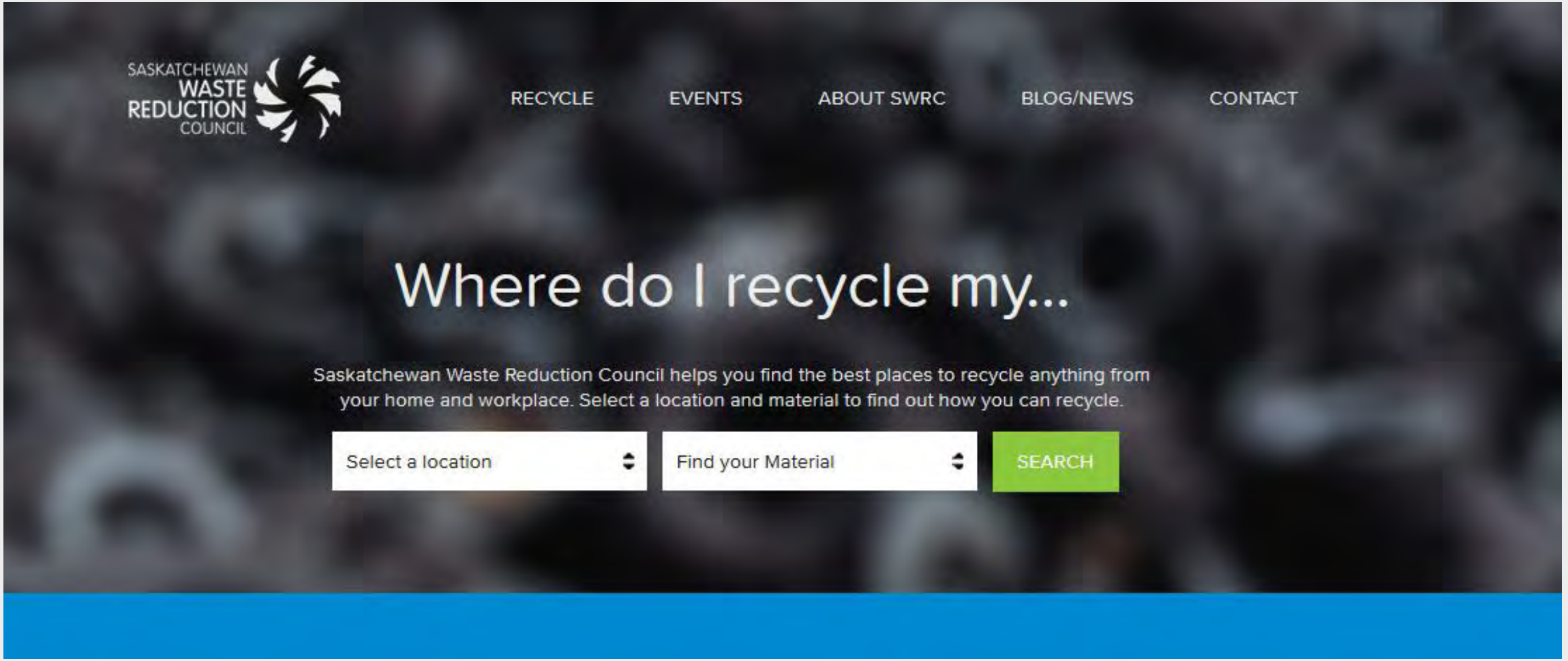
Recycling database – saskwastereduction.ca



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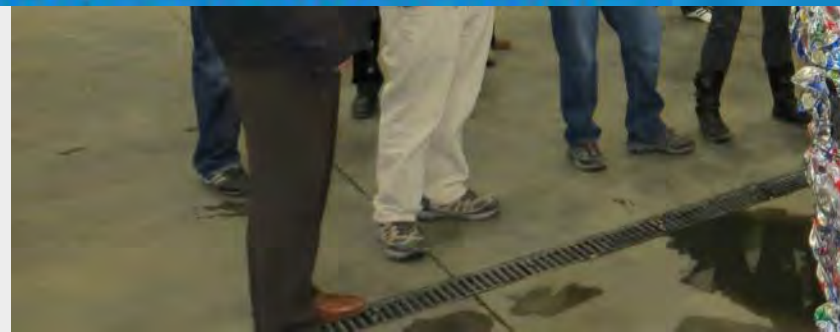
Conferences/workshops



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Projects

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Other events

Waste Minimization Awards

Waste Reduction Week

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Current Issues

- Household hazardous waste
- Food waste / organics

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Waste Management Hierarchy

- Reduce
- Reuse
- Recycle
- (Recover)
- It works!

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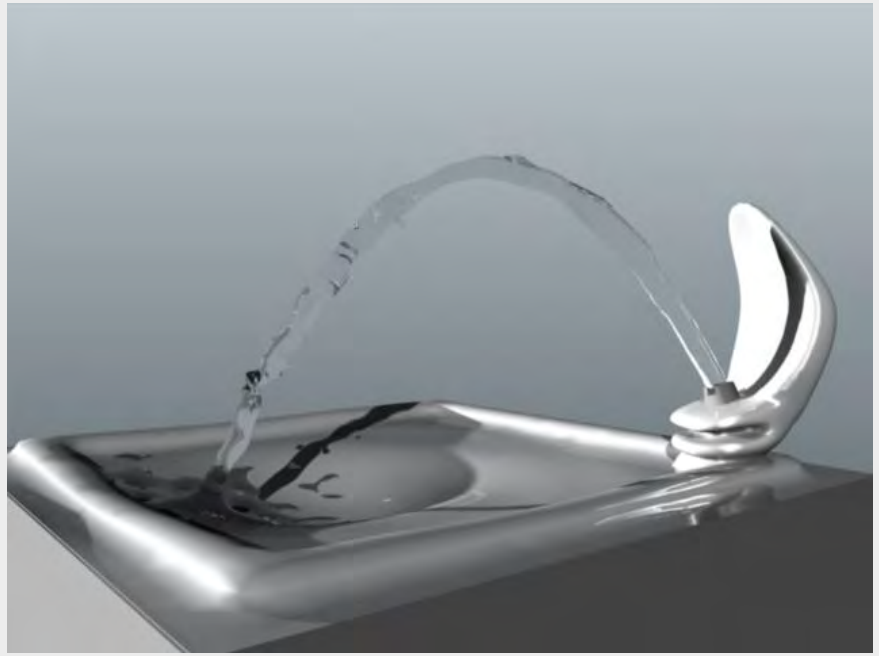
Waste Reduction



- Avoid producing product in the first place
- Use less
- Find another way to accomplish goal

- Energy implications: avoid entire product life cycle

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Reuse

- Use same product again for same function
- Avoids production of single-use products

- Energy implications: no raw materials extraction; no product manufacture
  - Reusable product still needs to be created

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Recycling

- Involves collection, processing, transportation, re-manufacturing
- Closed loop vs open loop (vs upcycling)

- Energy implications:
  - Less energy than original products
  - How much depends on material

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Recovery

- Extract energy or some raw materials, discard the rest

- Energy implications
  - No savings on product life cycle
  - Avoids energy production from other feedstocks

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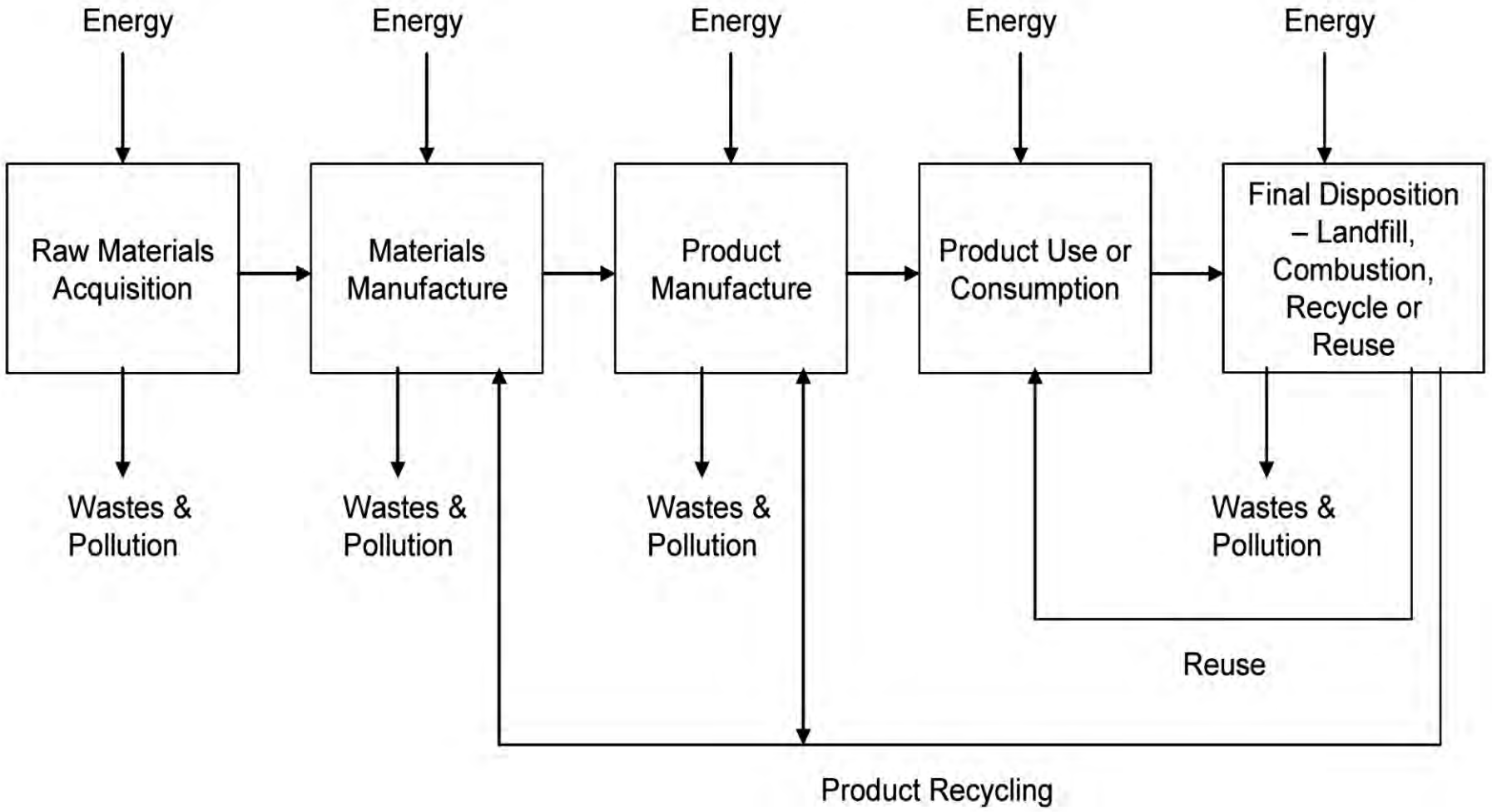
Typical Product Life Cycle



One or limited number of return cycles into product that is then disposed – open-loop recycling. Repeated recycling into same or similar product, keeping material from disposal – closed-loop recycling.

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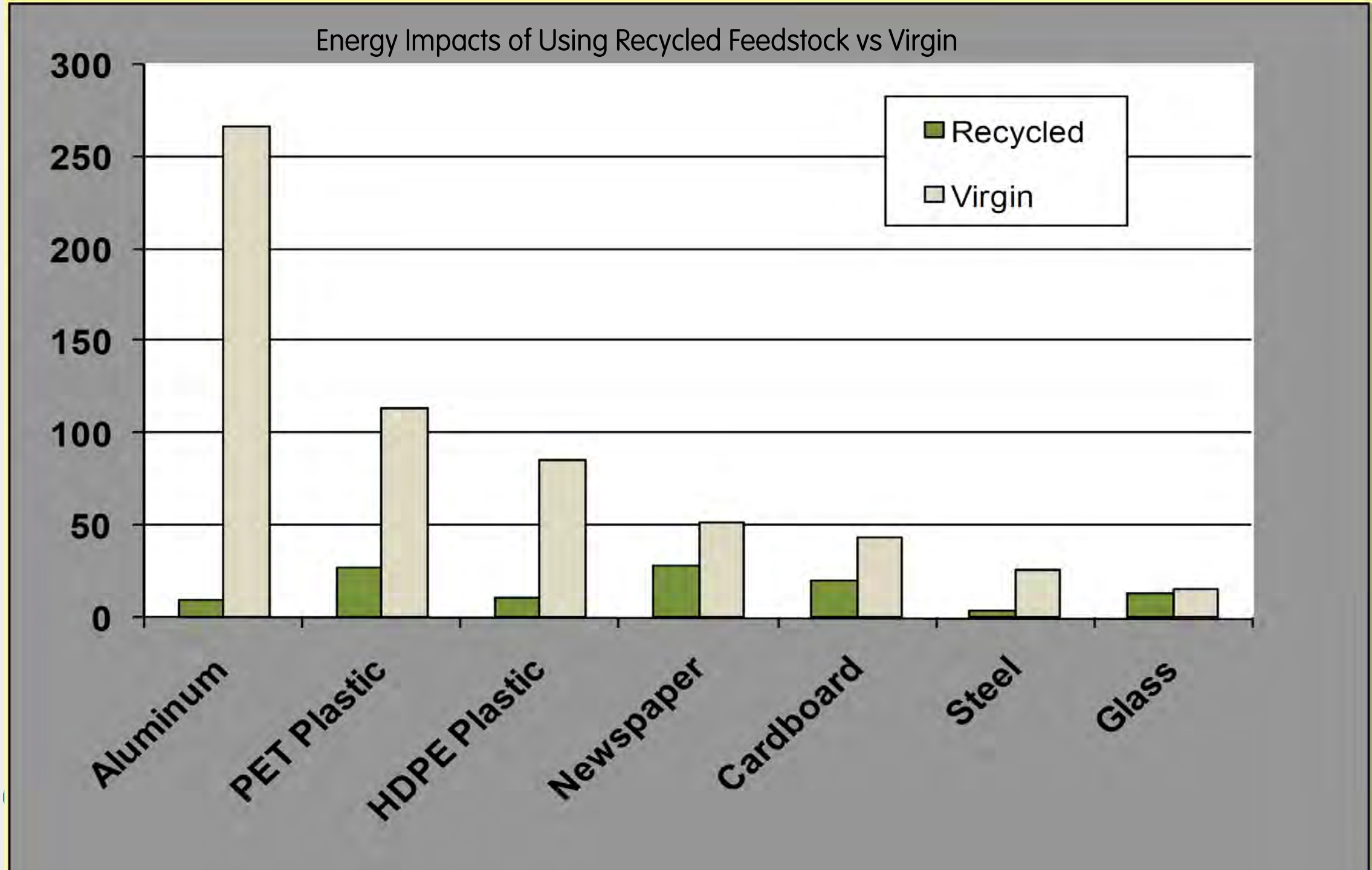

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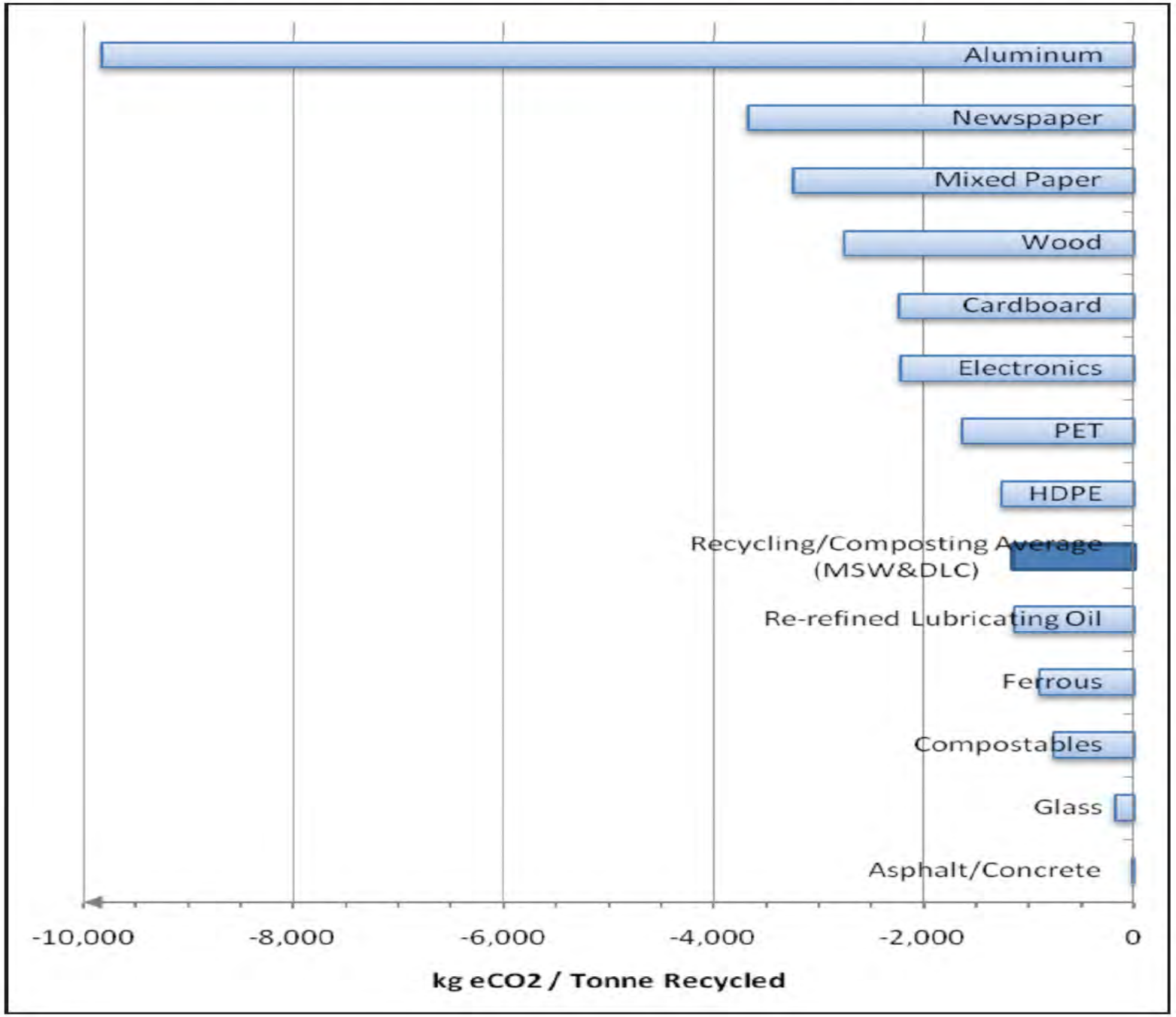
Table 3.2 Greenhouse Gas Emissions – Select Recyclables (2008)

Product / Material	kg eCO2 / Tonne Recycled or Composted
Aluminum	(9,827)
Newspaper	(3,666)
Mixed Paper	(3,236)
Wood	(2,753)
Cardboard	(2,236)
Electronics	(2,220)
PET	(1,638)
HDPE	(1,258)
Re-refined Lubricating Oil	(1,133)
Recycling/Composting Average (MSW & DLC)	**(1,152)**
Ferrous	(900)
Compostables	(757)
Glass	(181)
Asphalt/Concrete	(14)

Figure 3.1 Greenhouse Gas Emissions per Tonne – Select Recyclables (2008)



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)

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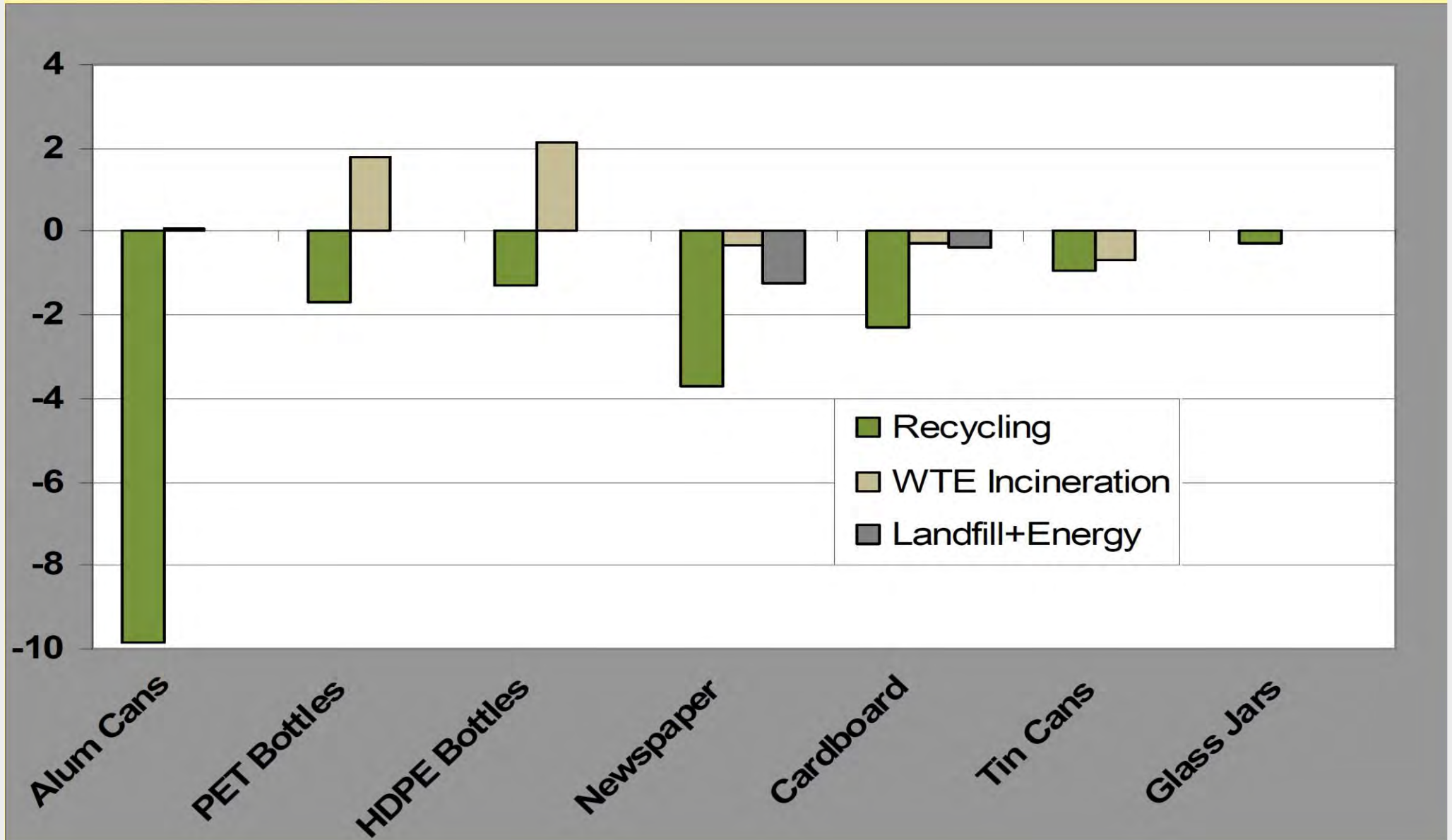
CO2 Emissions: Recycling versus Disposal (kg eCO2/kg)



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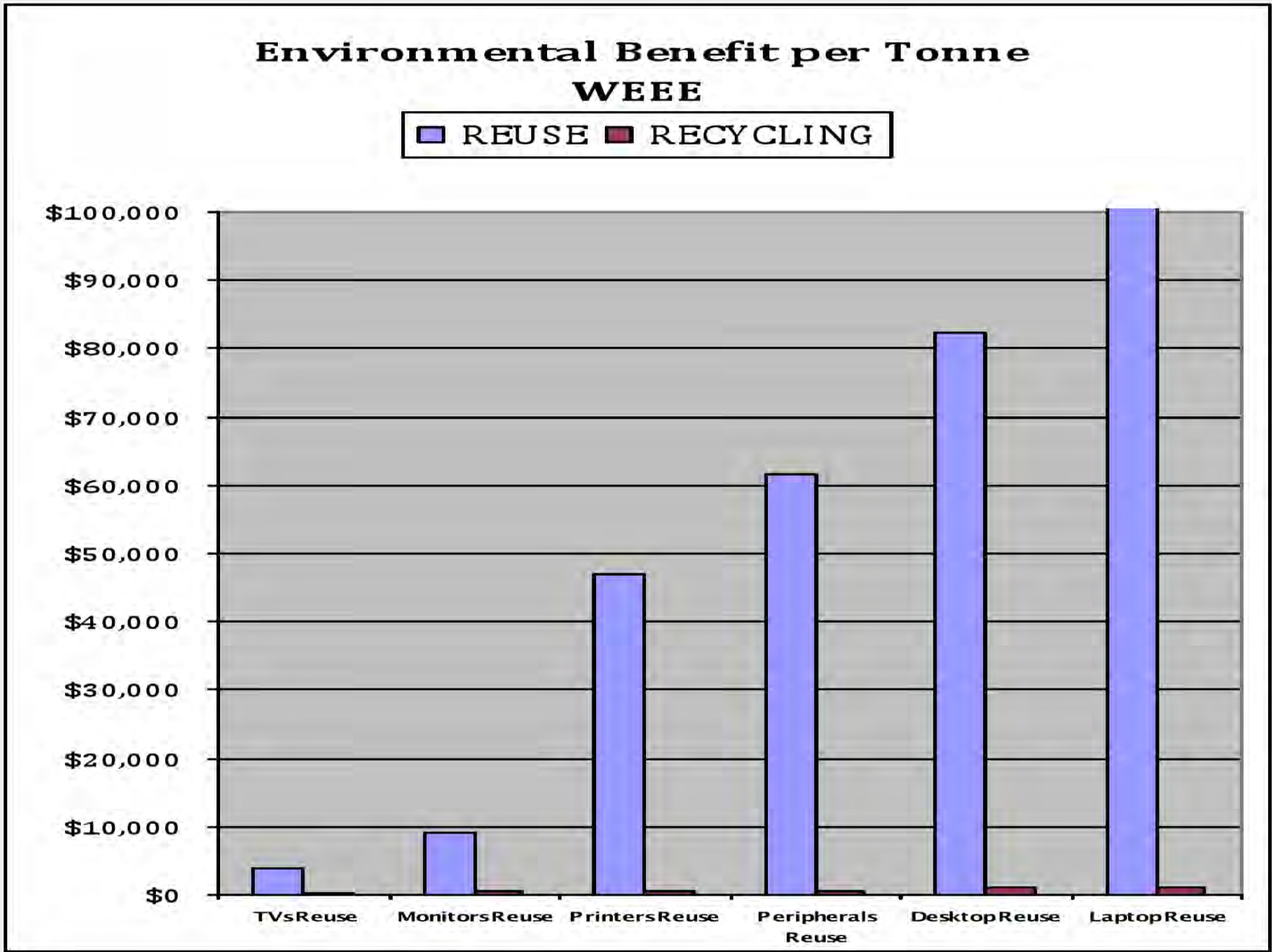
- Note: total environmental benefit – pollution, human health impacts, not energy



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Thank you!

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