

Zero Waste in Sustainable Cities

The Importance of Zero Waste for Sustainability

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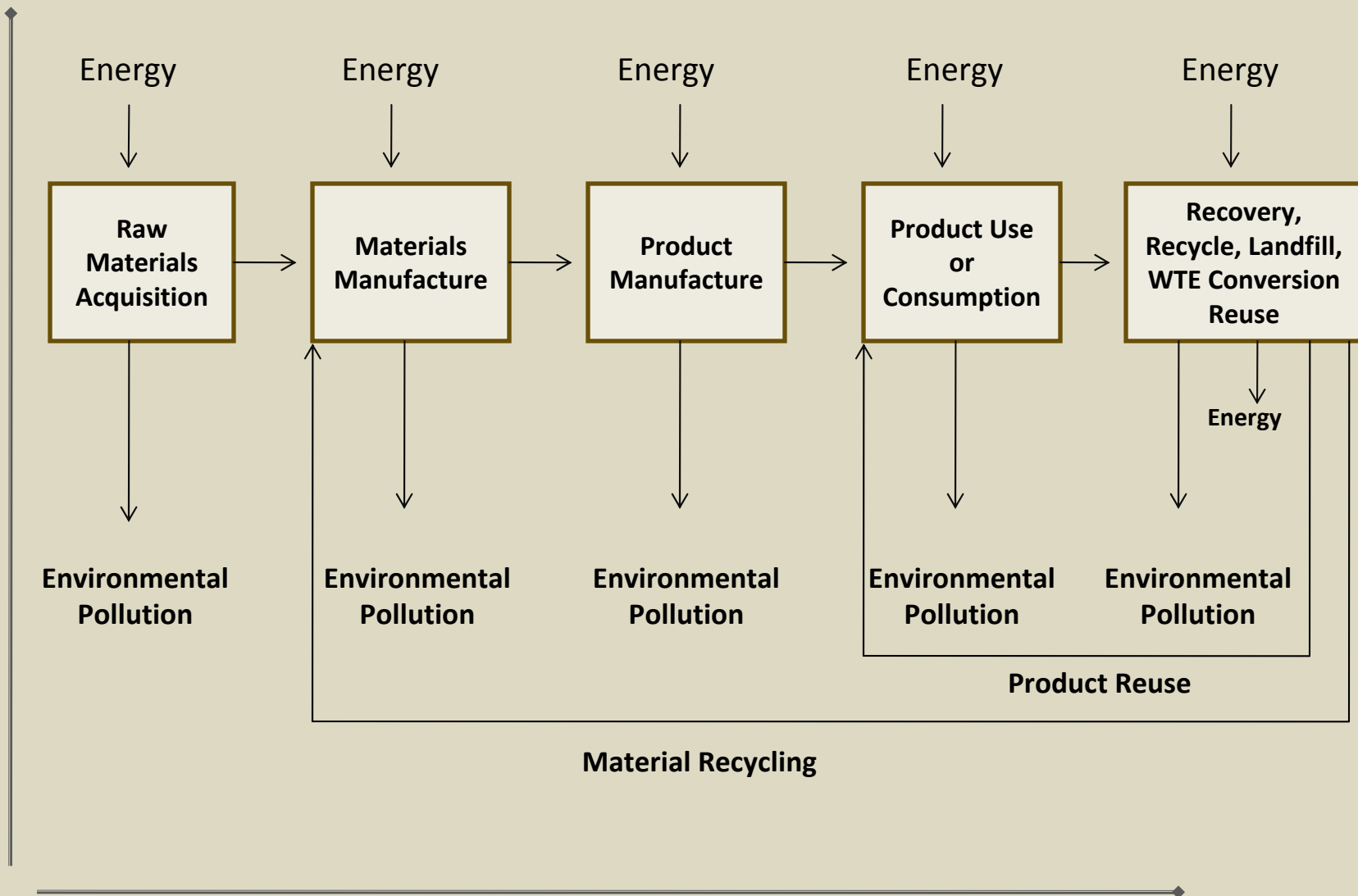
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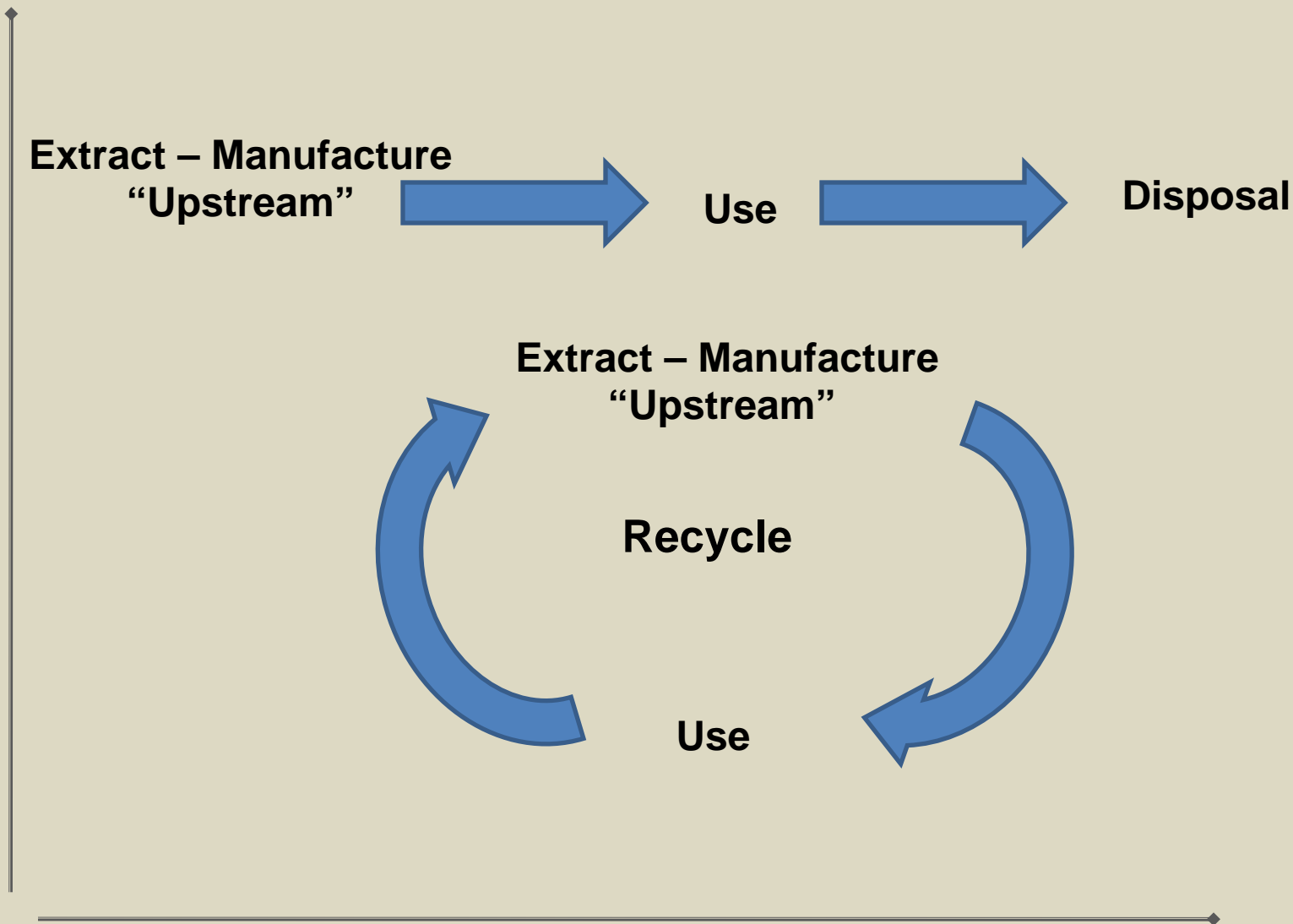
Economics (4Es) & Sustainability (3Es)

- Efficiency & Equilibrium – the magic of competitive markets (Adam Smith's invisible hand creates optimality).
- Externalities – pollution from free disposal (If it doesn't have a price or cost the market ignores it).
- Equity – dollar votes drive markets (Those without dollars don't get to vote; those with more dollars get more votes).

Life Cycle Analysis (LCA)



Linear versus Circular Economies



Measuring Environmental Impacts Using the CEI

- An index like the CPI - except covers all consumer purchases, not just unchanging basket, and measures changes over time in environmental impacts, rather than prices.
- Covers all phases of a product's life cycle.
- Should decline when there are decreases in toxic substances, wastes and/or pollution associated with upstream, use, and/or end-of-life for a product or service.
- Measures consumer impacts on climate, human health and ecosystems.

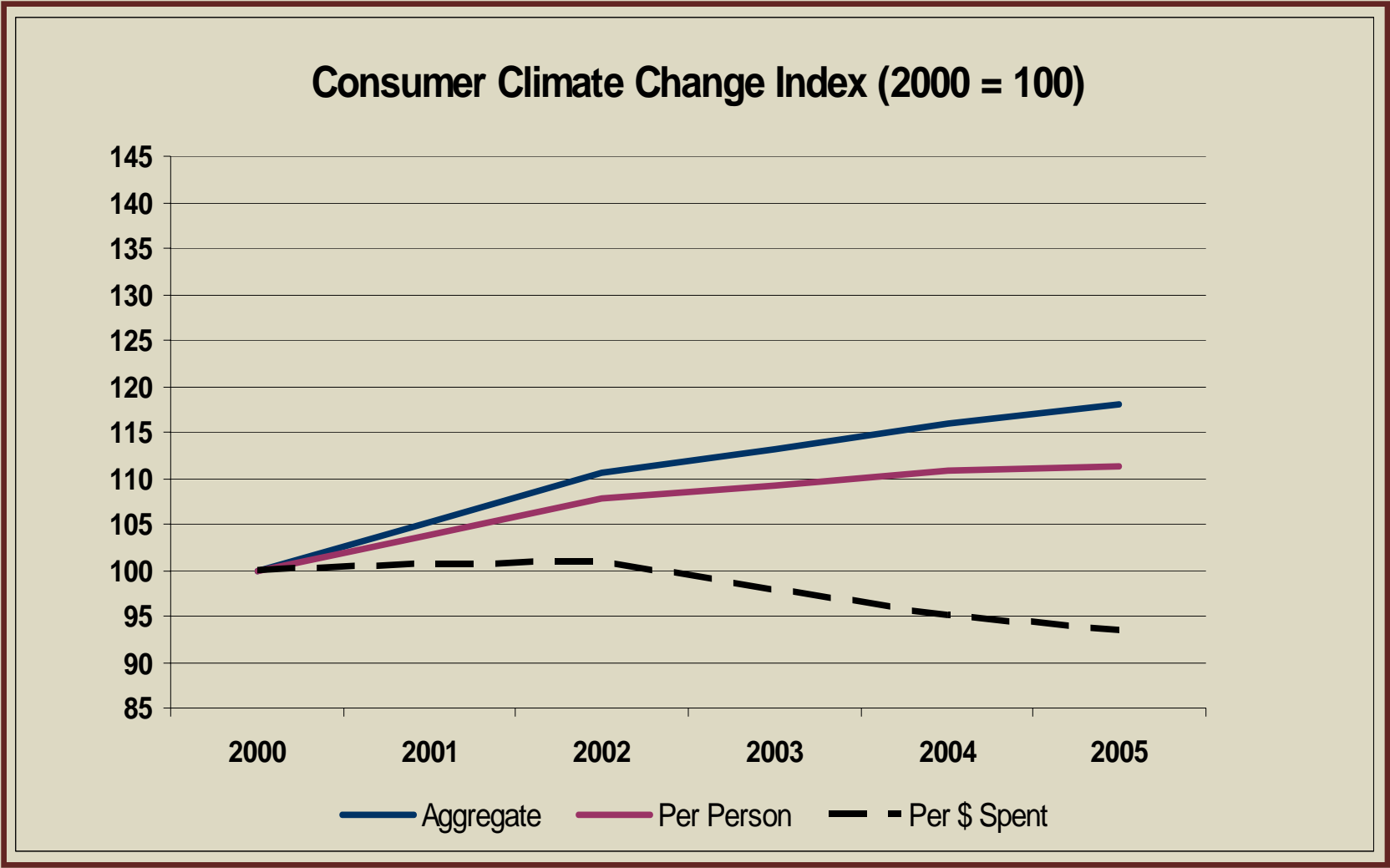
2005 Pollution Intensity WA Consumer Spending

	%Tot\$	<u>Climate</u>		<u>Respiratory</u>		<u>Toxicity</u>		<u>Carcinogenicity</u>		<u>EcoToxicity</u>	
		Kg/\$	%Kg	Kg/\$	%Kg	Kg/\$	%Kg	Kg/\$	%Kg	Kg/\$	%Kg
<i>Home Heat/Cool</i>		High	>10	High	>10	High	>10	High	>10	High	
<i>Transportation</i>	>10	High	>10		>10	High	>10	High	>10	High	>10
<i>Food</i>	>10	High	>10	High	>10	High	>10				
<i>Home Furn/Sup</i>	>10					High	>10			High	>10
<i>Shelter</i>	>10					High	>10		>10		>10
<i>Clothing</i>						High				High	
<i>Tobacco</i>				High							
<i>Kg/\$ Average</i>		0.91		0.001		1.08		0.001		0.01	
		<u>Mg</u>		<u>Mg</u>		<u>Mg</u>		<u>Mg</u>		<u>Mg</u>	
<i>Total Mg/Person</i>		18.52		0.02		21.92		0.01		0.20	

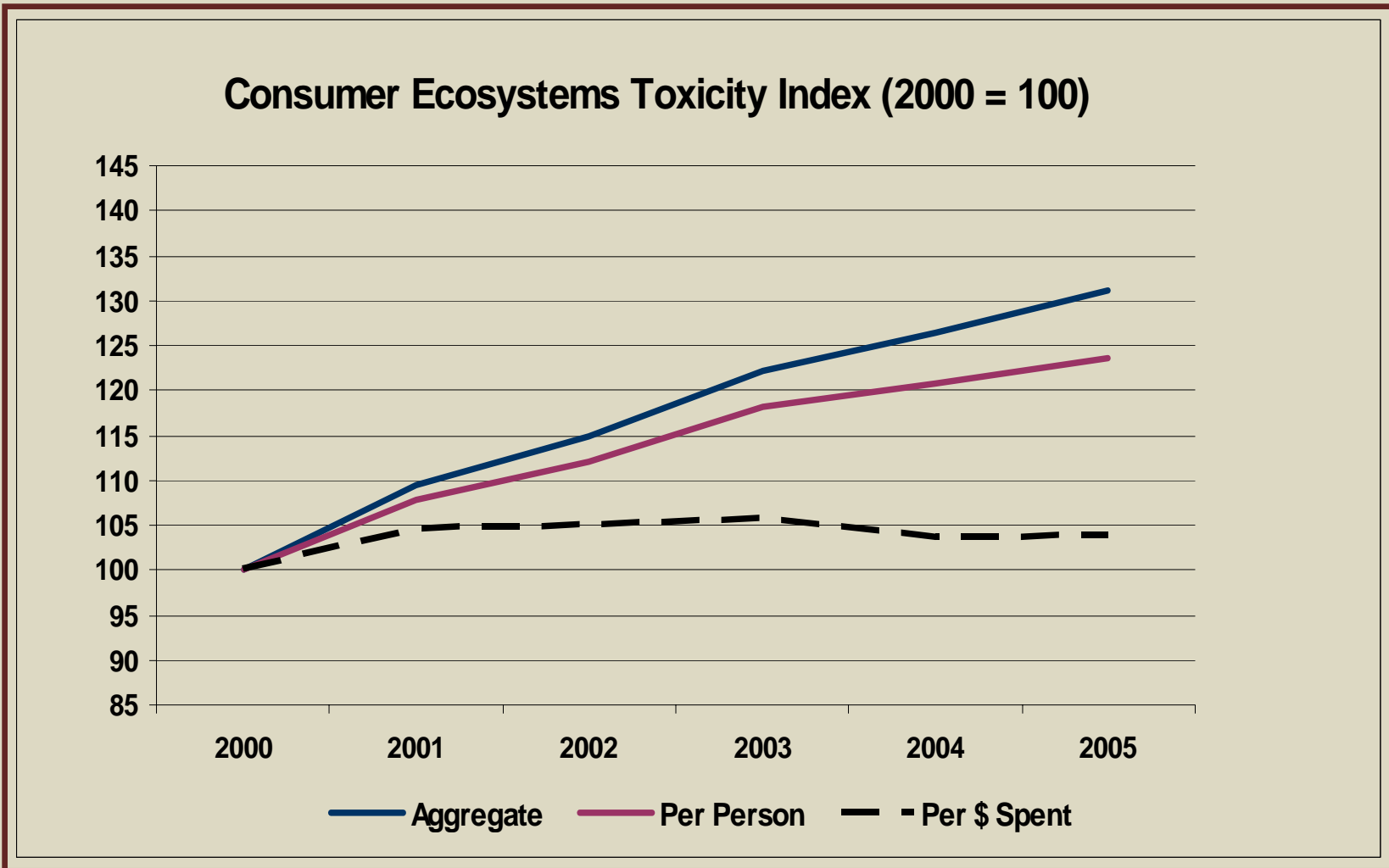
Examples of Product Pollution Intensities

	<u>GHG</u> (kg/\$)	<u>Particulates</u> (g/\$)	<u>Toxics</u> (kg/\$)	<u>Carcinogens</u> (g/\$)	<u>EcoToxics</u> (g/\$)
Natural Gas Heating Fuel	10.9	2.0	1.3	0.5	7.3
Heating Oil	10.7	7.1	2.8	2.6	11.0
Electricity	10.5	14.9	1.6	1.6	41.8
Diesel Vehicle Fuel	9.0	7.6	2.5	2.6	9.9
Gasoline Vehicle Fuel	8.3	2.4	1.4	2.1	8.9
Water/Sewer Utilities	7.8	0.4	0.5	0.2	4.6
Bottled Gas Heating Fuel	6.8	1.5	1.3	0.6	8.0
Wood Heating Fuel	3.4	260.8	1.0	60.8	45.0
Dairy	2.4	1.7	1.5	0.0	8.7
Meat	1.9	2.3	1.8	0.0	9.5
Airline Trips	1.8	0.5	0.7	0.3	4.8
Ship Cruises	1.4	5.2	0.7	0.3	5.6
Sugar	1.4	1.4	1.3	0.8	44.0
Pet Food	1.2	1.1	1.1	0.5	7.7
Train Trips	1.1	2.1	0.7	0.3	6.8
Fruits & Vegetables	1.0	1.7	1.0	0.0	6.5
Grains & Cereals	1.0	2.7	0.8	0.0	5.4
Fish	0.9	0.9	0.9	0.0	5.4
Refrigerators	0.7	0.7	1.6	0.7	32.3
Laundry	0.7	0.6	3.0	1.2	11.3
New Cars & Light Trucks	0.6	0.7	1.7	1.1	32.5
Bus Trips	0.6	2.8	0.8	0.4	5.8
Clothing	0.6	0.8	1.2	0.7	15.0
Televisions	0.5	0.5	1.1	0.5	10.7
Computers	0.4	0.4	2.4	1.0	13.0
Hospital Room	0.4	0.4	1.2	0.5	5.3
Newspaper	0.4	0.4	0.6	0.2	3.1
Cigarettes	0.4	2.4	1.1	0.4	5.2
College Tuition	0.3	0.3	1.0	0.4	4.8
Postage & Delivery Services	0.3	0.2	1.7	0.7	6.5
Movie, Theater, & Ballet	0.2	0.2	0.5	0.2	2.8
Health Care	0.2	0.2	0.6	0.2	2.7
Dating Service	0.1	0.1	0.5	0.2	2.6
Insurance	0.1	0.1	0.4	0.1	1.4
Average	0.9	1.1	1.1	0.5	10.0

Consumer Climate Change Index




Consumer Ecosystems Toxicity Index

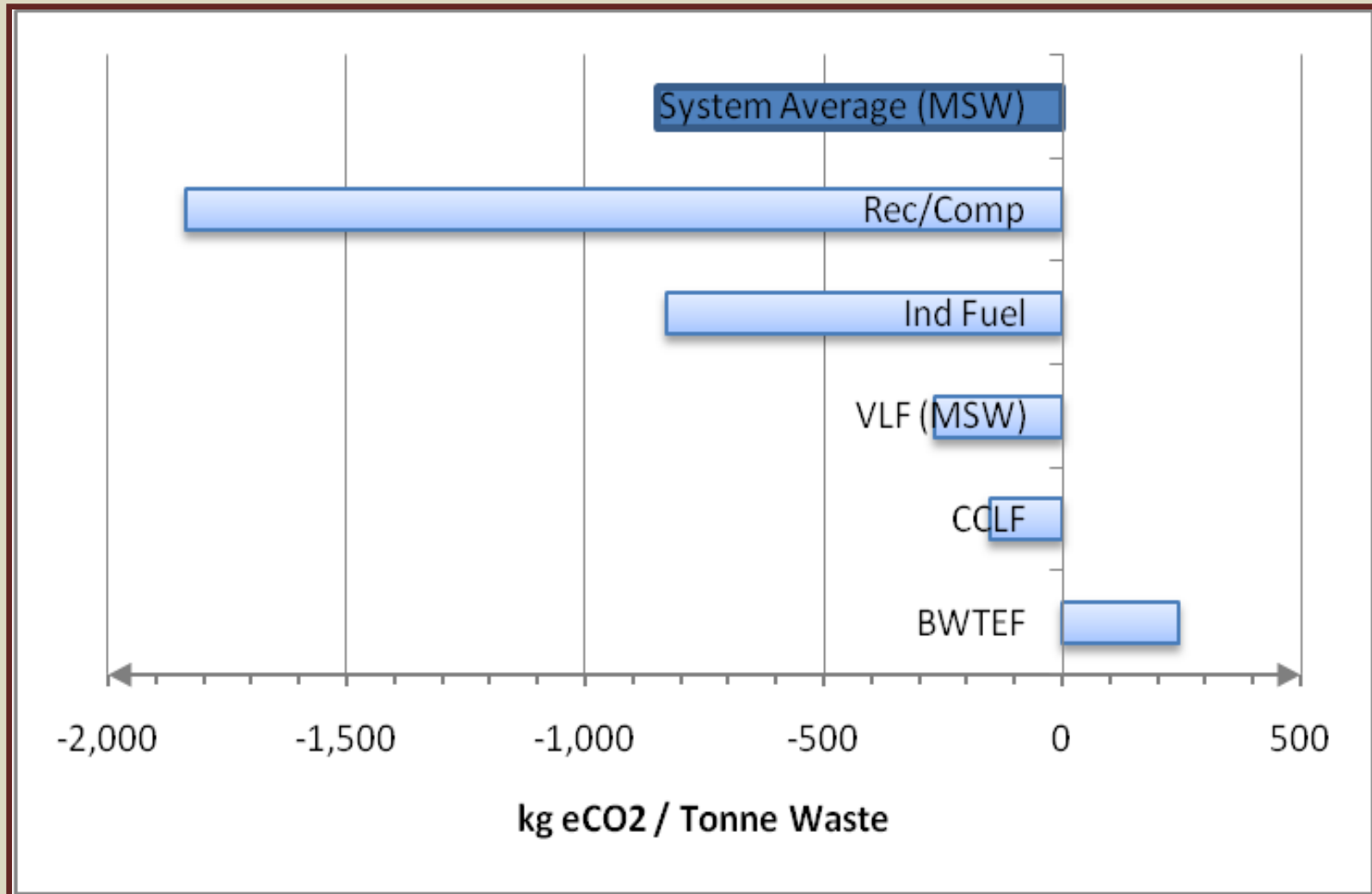


Zero Waste Focus:

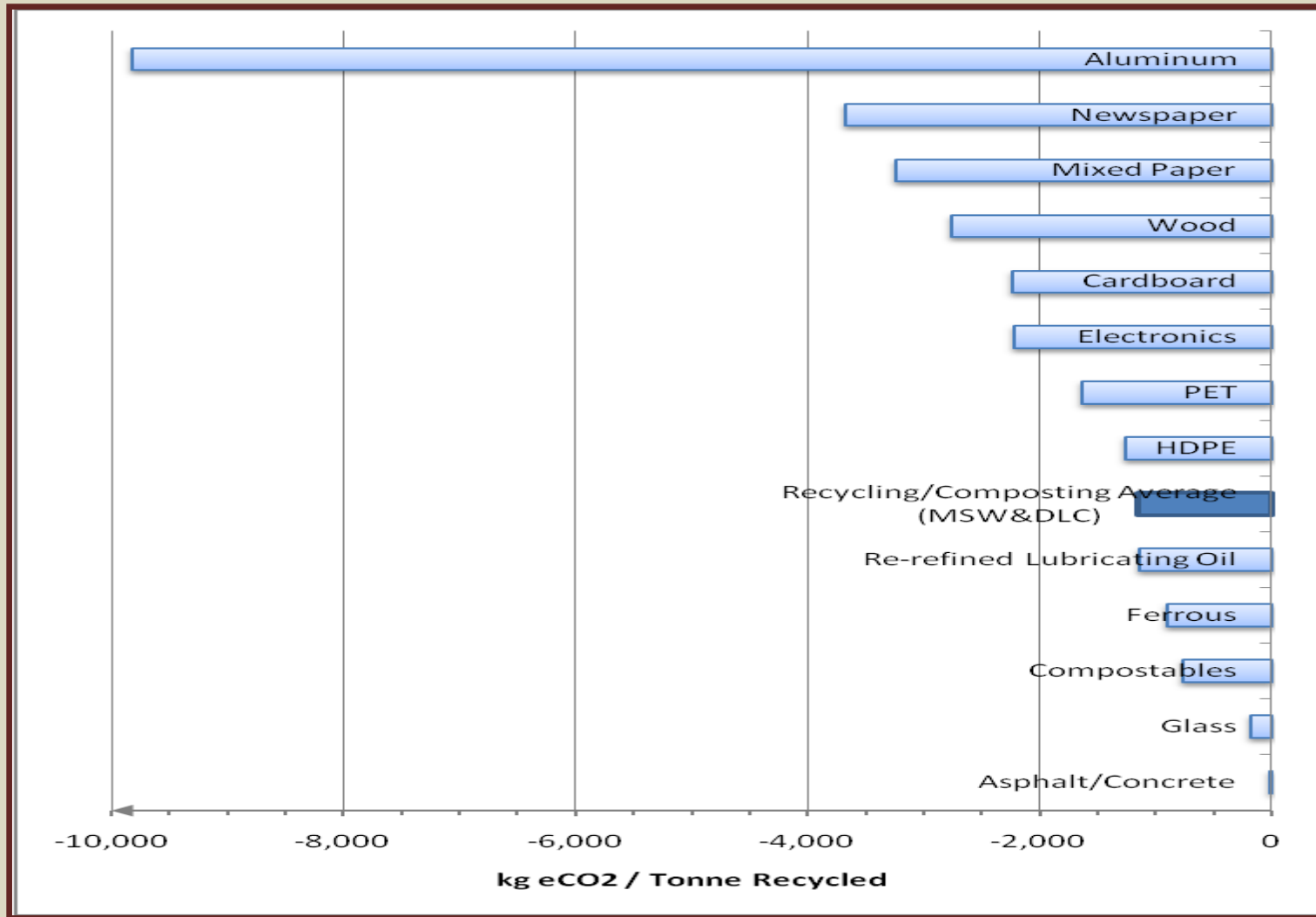
**Waste Materials Are Resources
That Reduce Pollution &
Energy Use!**



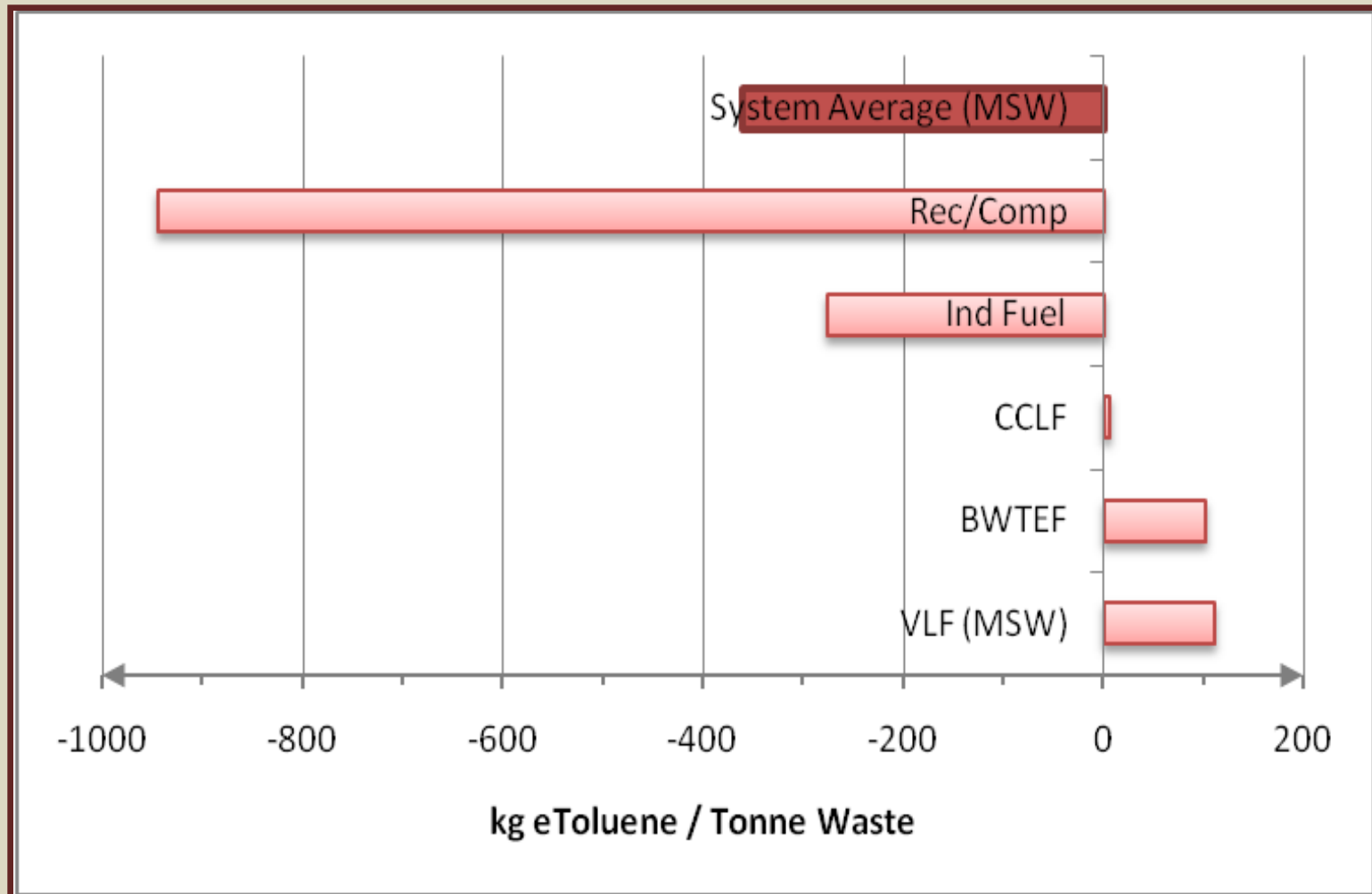
Greenhouse Gas Emissions per Tonne – MSW (2008)



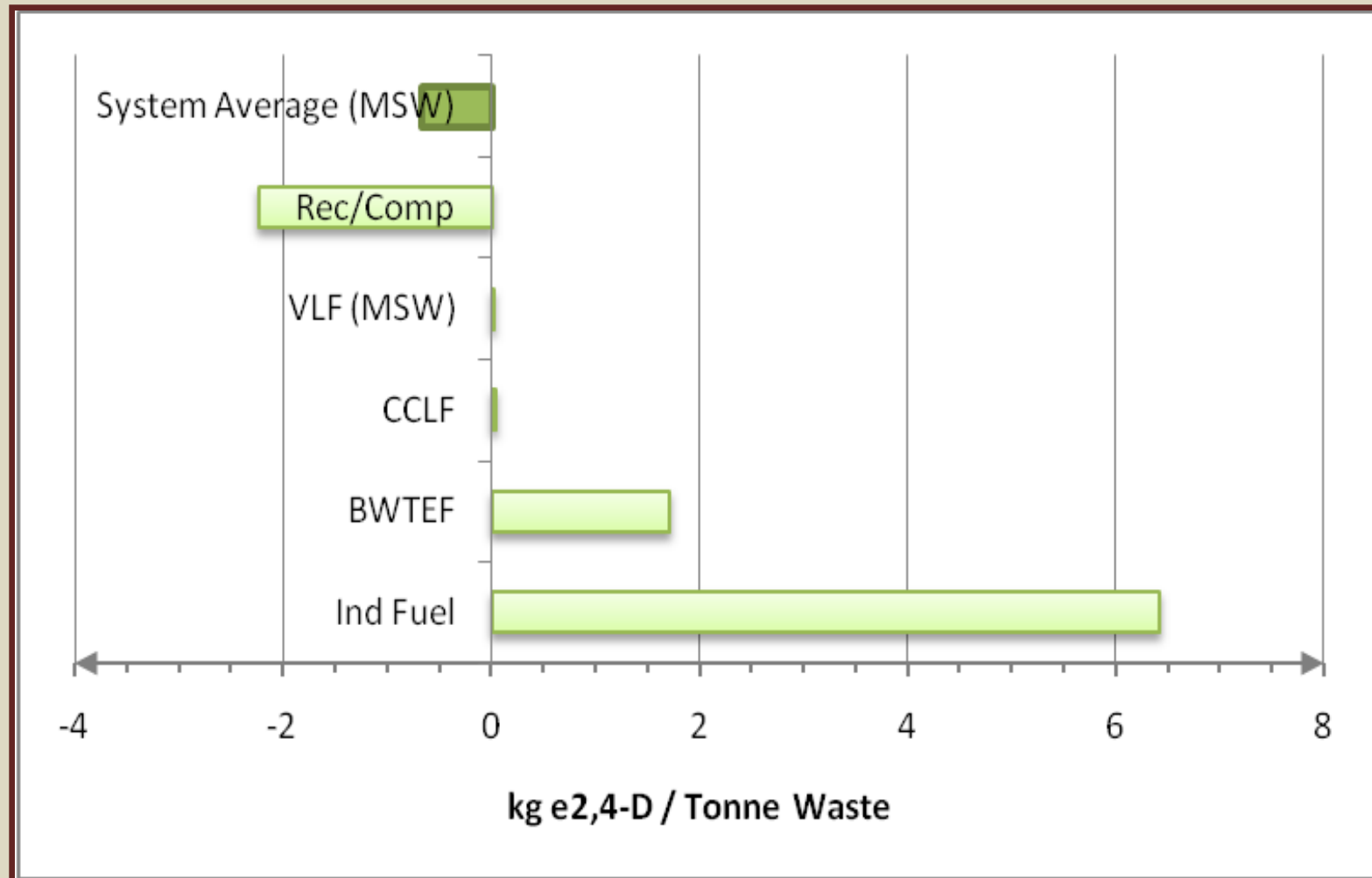
GHG Emissions per Tonne – Select Recyclables



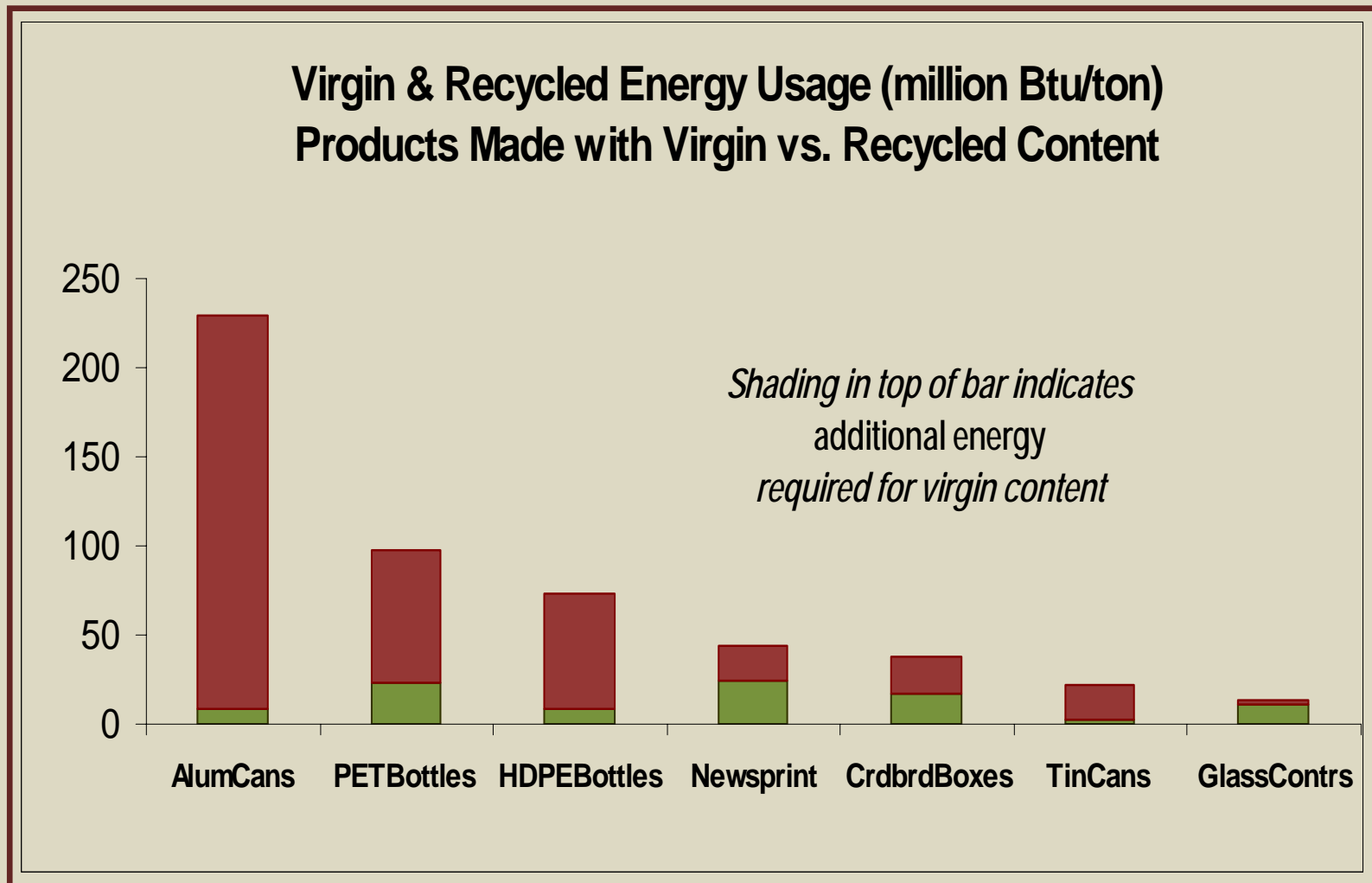
Human Health Emissions per Tonne – MSW (2008)



Ecosystems Toxics Emissions per Tonne –MSW (2008)



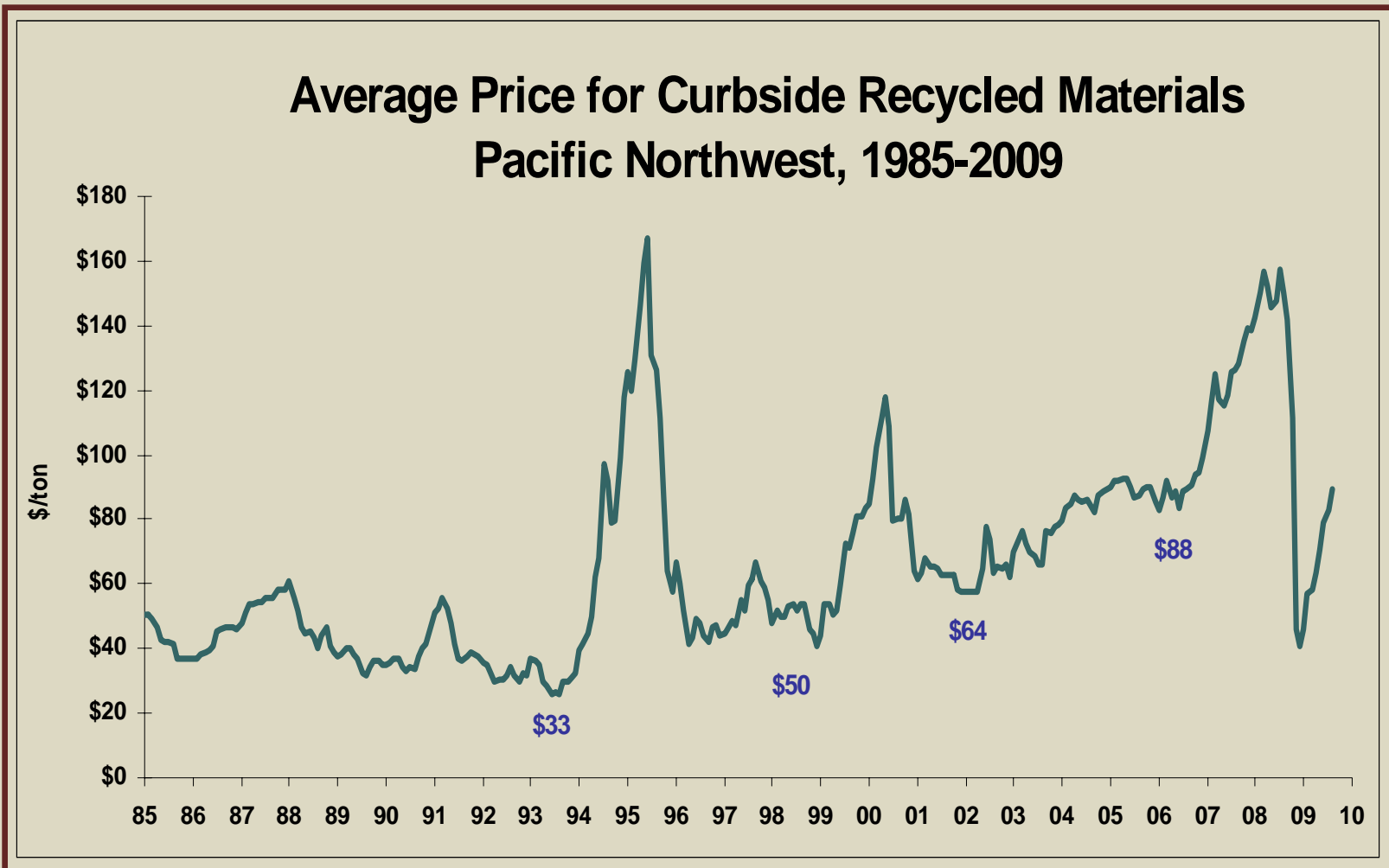
Energy Use: Recycled & Virgin Content Products



Environmental Value of Reuse & Recycling

Diversion Program	Environmental Value (Cn\$/tonne)
Blue Box – average	\$370
– range	70 (HDPE bottles) – 1,950 (aluminum)
WEEE Reuse – average	\$72,750
– range	3,750 (TV) – 116,250 (laptop)
WEEE Recycling – average	\$640
– range	230 (TV) – 980 (desktop)
MHSW – average	\$350
– range	60 (HDPE oil bottles) – 740 (paint)

Market Value of Recyclables



Examples of Zero Waste & Sustainability

- Recycling and composting standard materials at home and work equivalent to cutting gasoline purchases by more than 50%.
- Focus on packaging waste reduction can lead to substituting services for products, bulk purchasing instead of individually wrapped goods, and buying from local producers.
- Focusing on waste reduction can lead to increased reuse of products – don't throw away, pass it on.
- Buy recycled and buy local can lead to local green jobs.



Thank you.

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