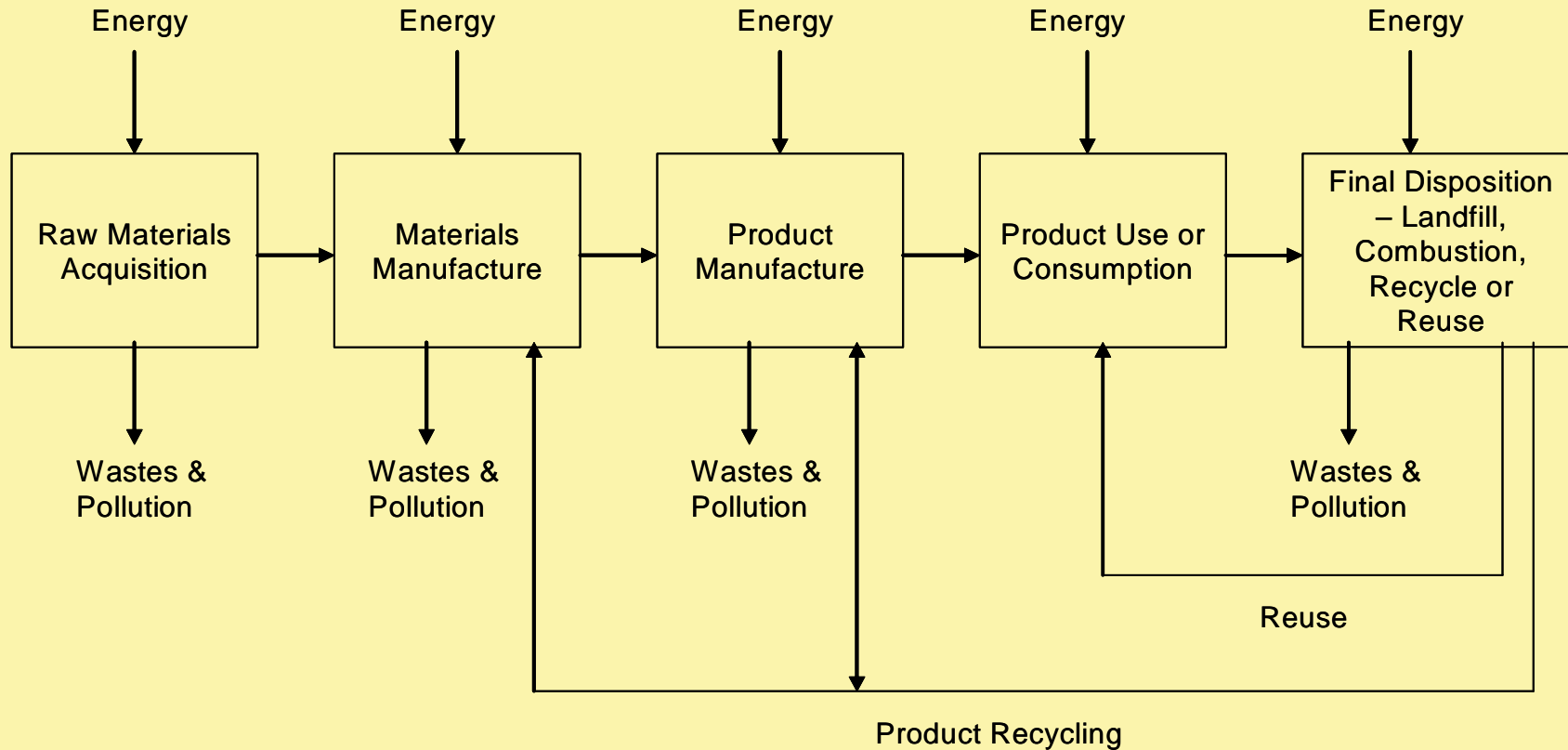




# The Environmental & Economic Waste Caused by Incineration

**Dr. Jeffrey Morris**  
**Sound Resource Management**  
Olympia, Washington, USA  
360-867-1033  
Jeff.Morris@zerowaste.com

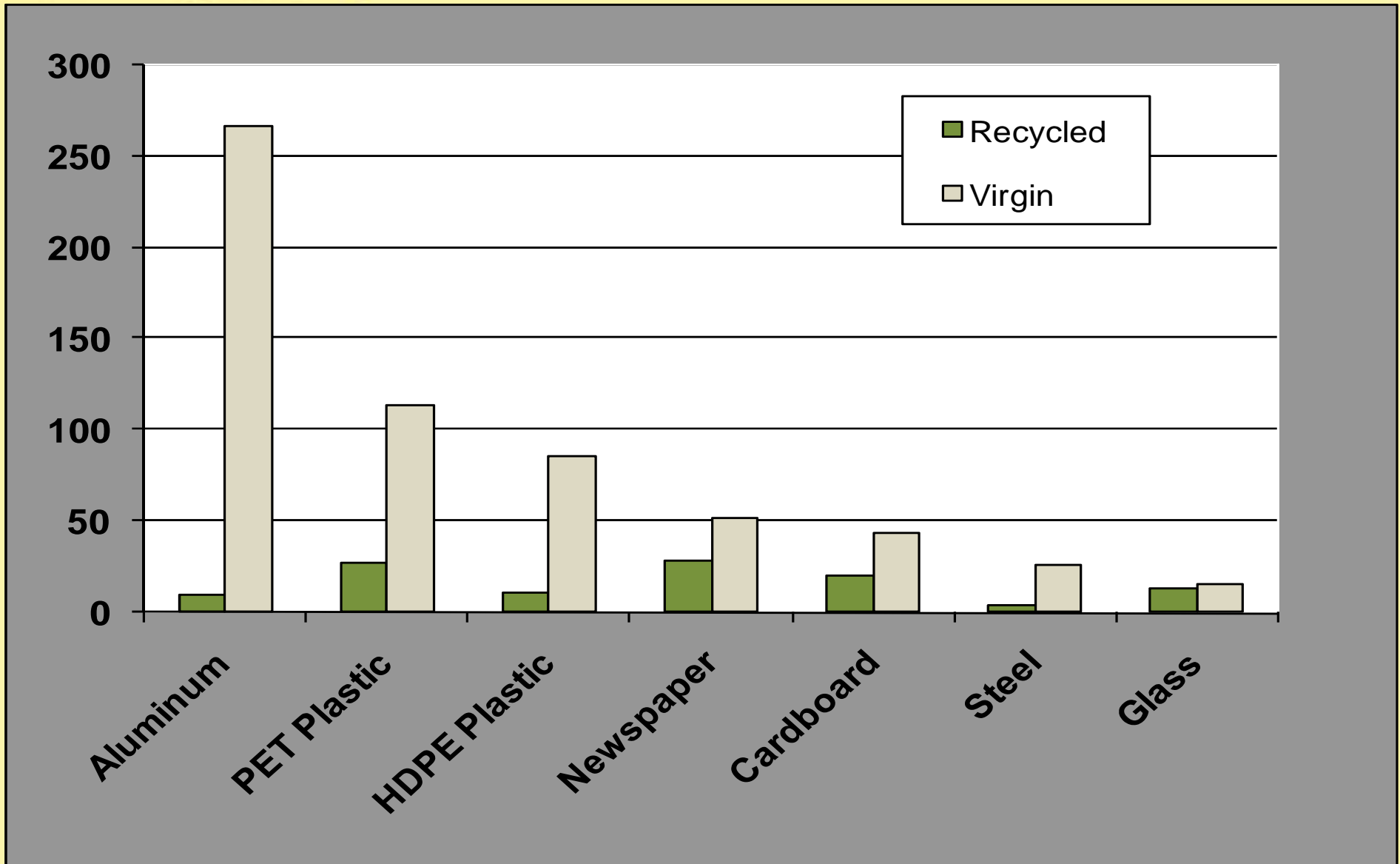
# Life Cycle Analysis (LCA)



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.

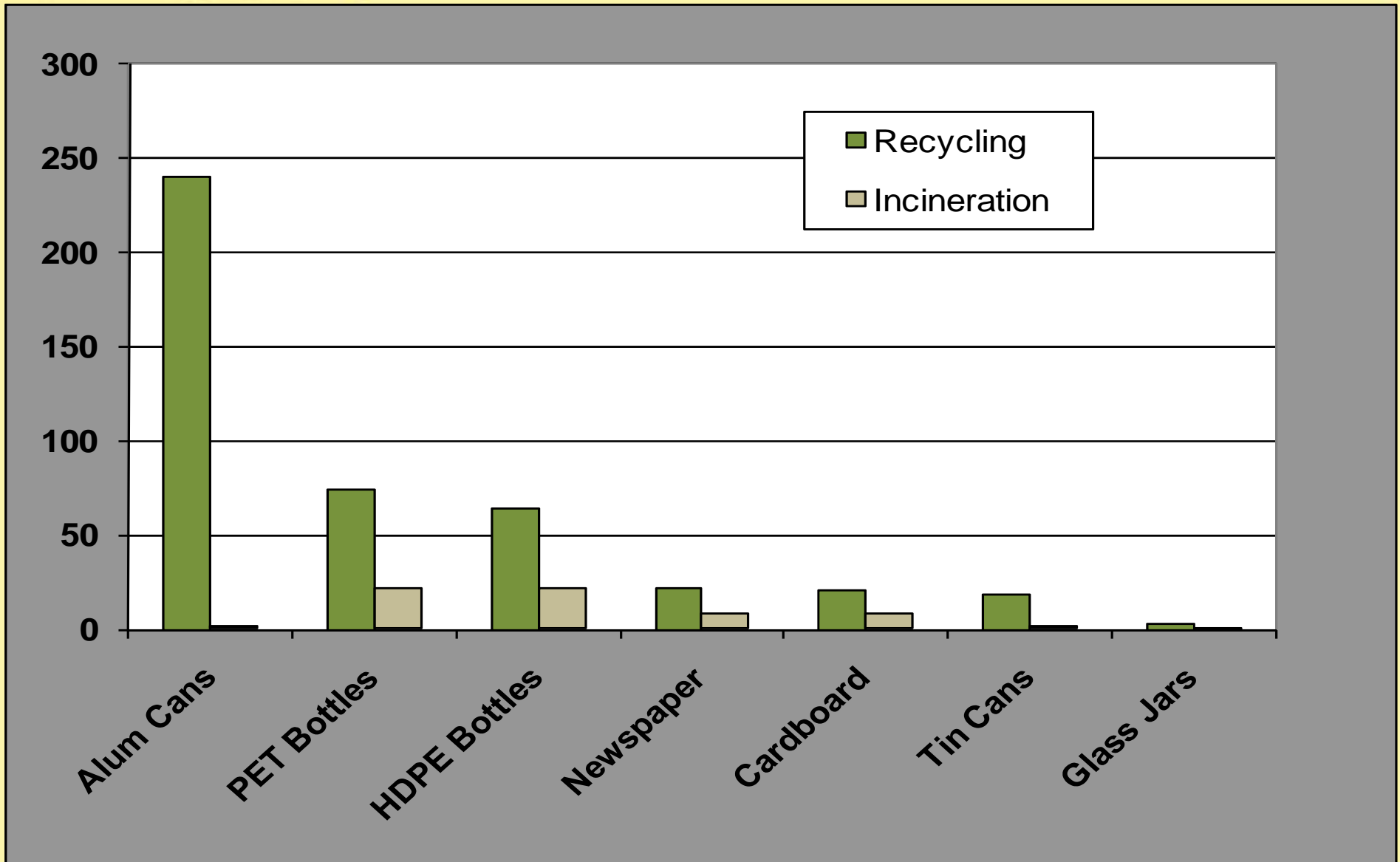


# Energy Use: Recycled & Virgin Content Products (MJ/kg)



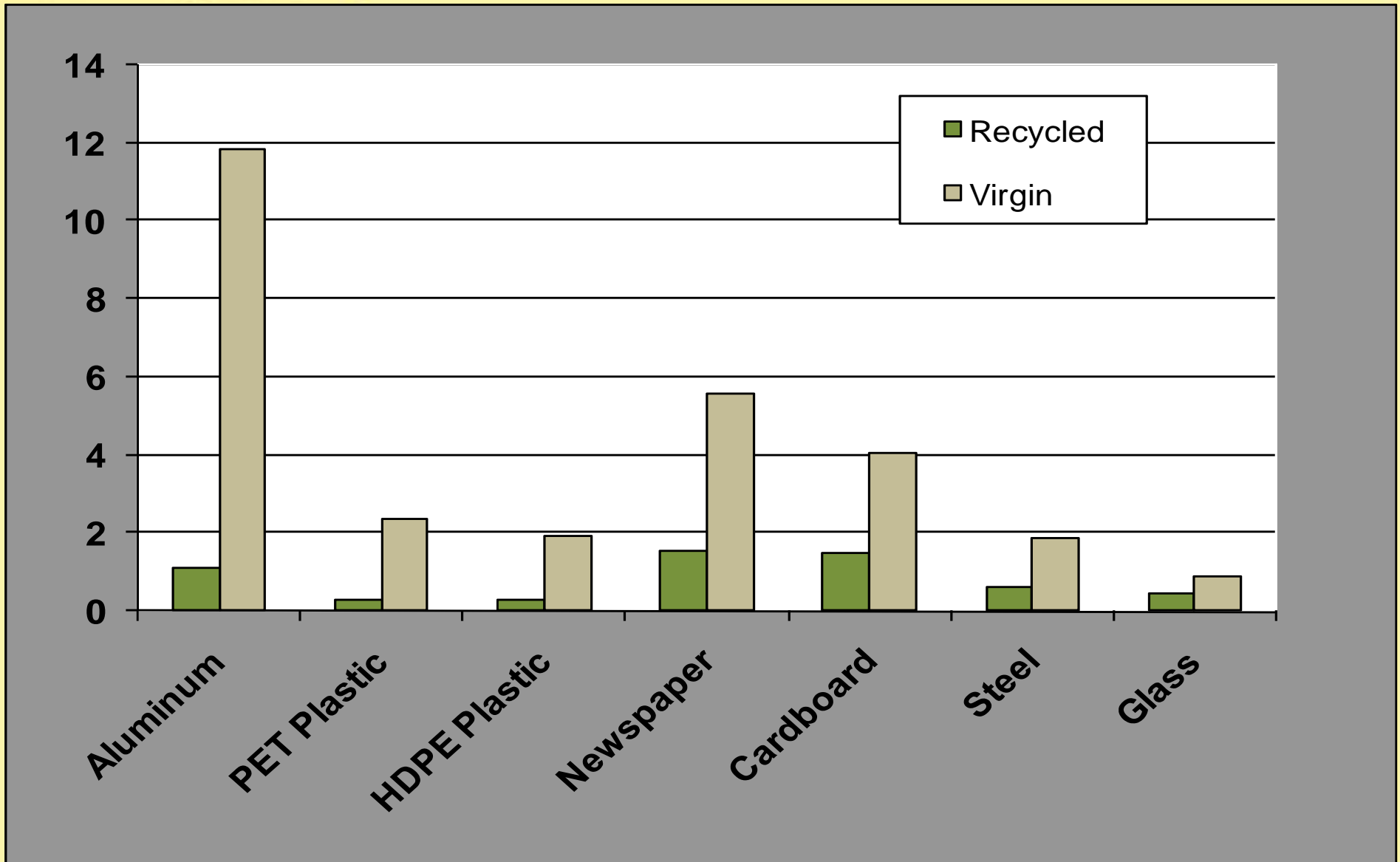


# Energy Savings: Recycling versus Incineration (MJ/kg)



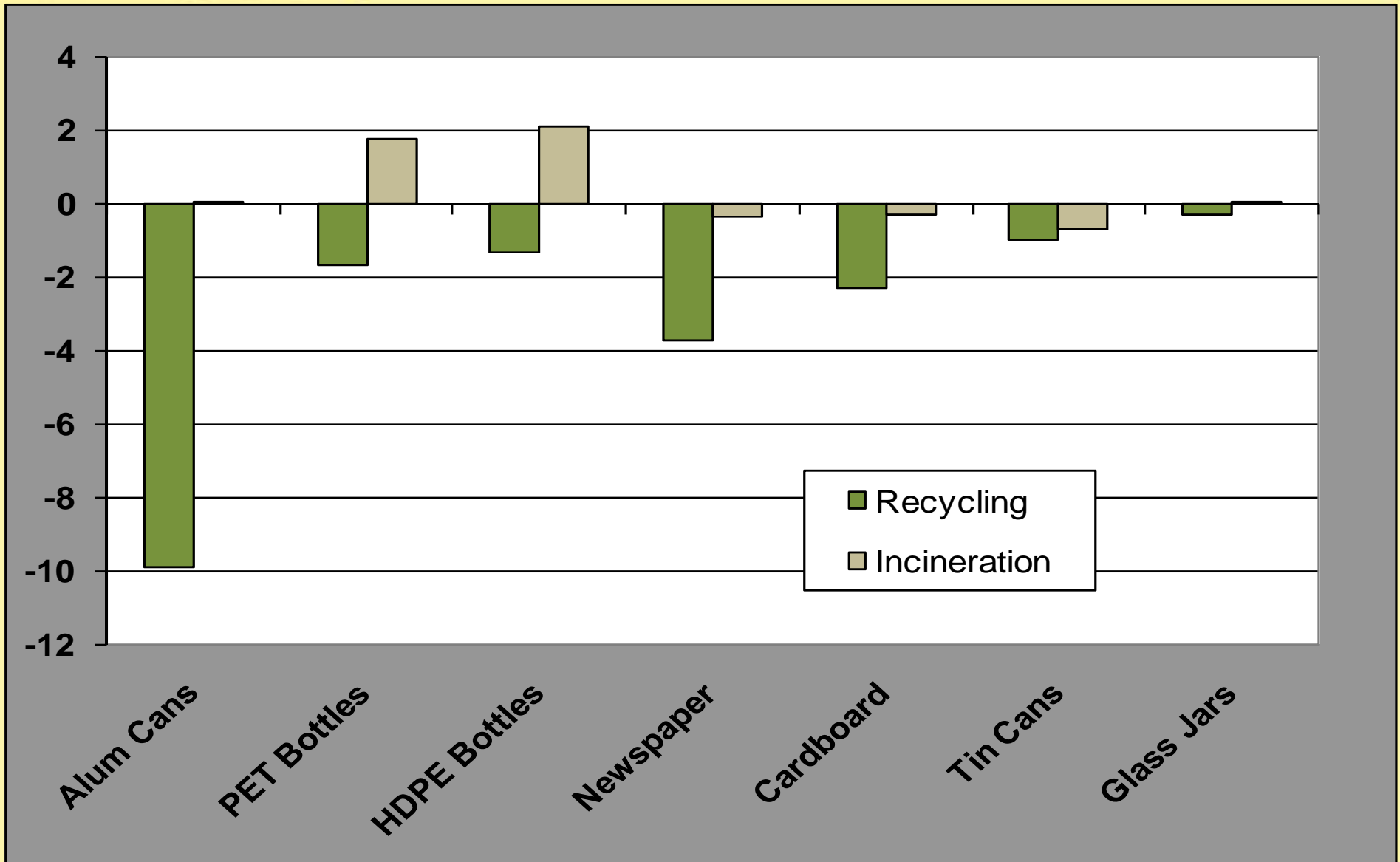


# CO2 Emissions: Recycled & Virgin Content Products (kg eCO2/kg)



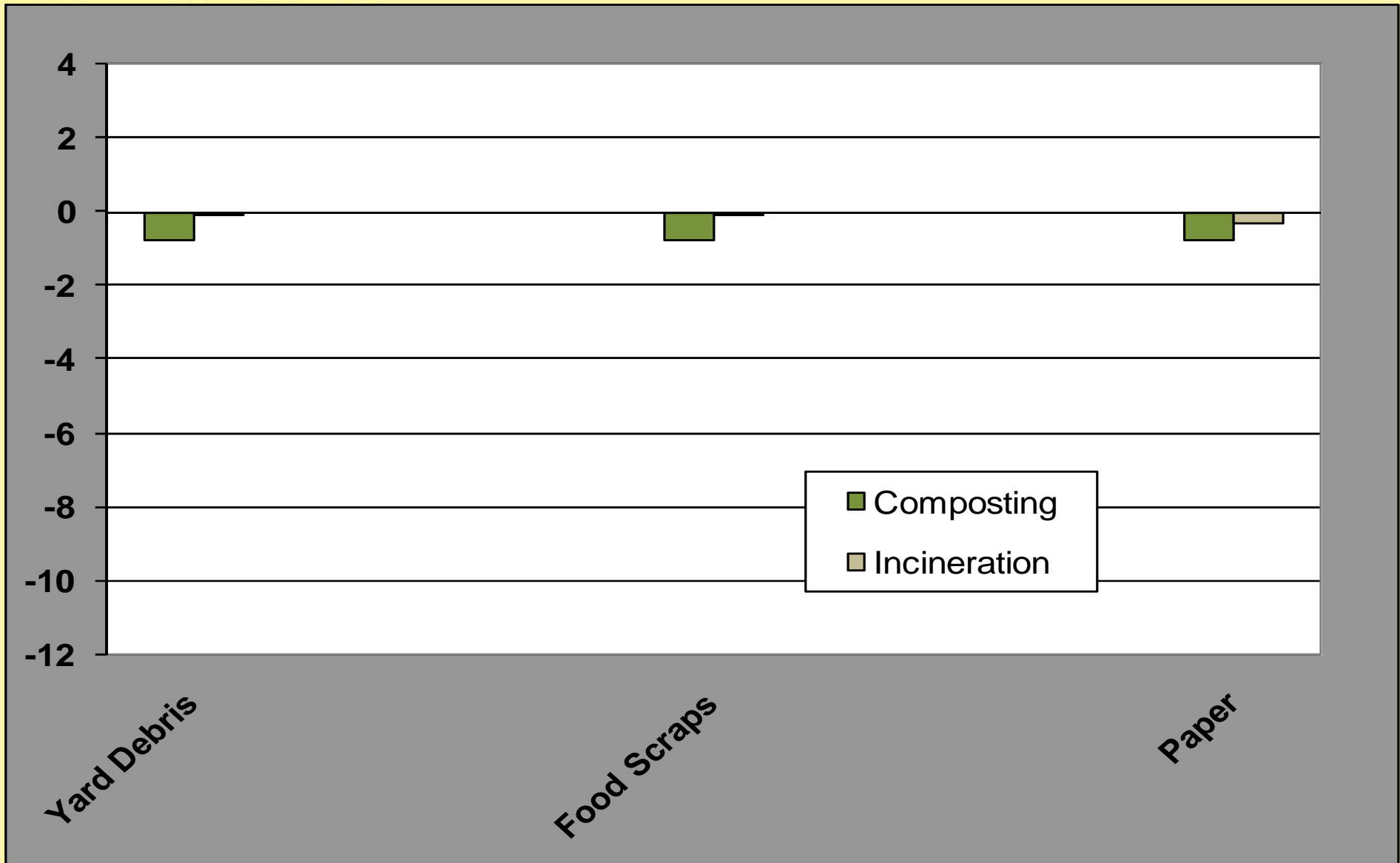


# CO2 Emissions: Recycling versus Incineration (kg eCO2/kg)



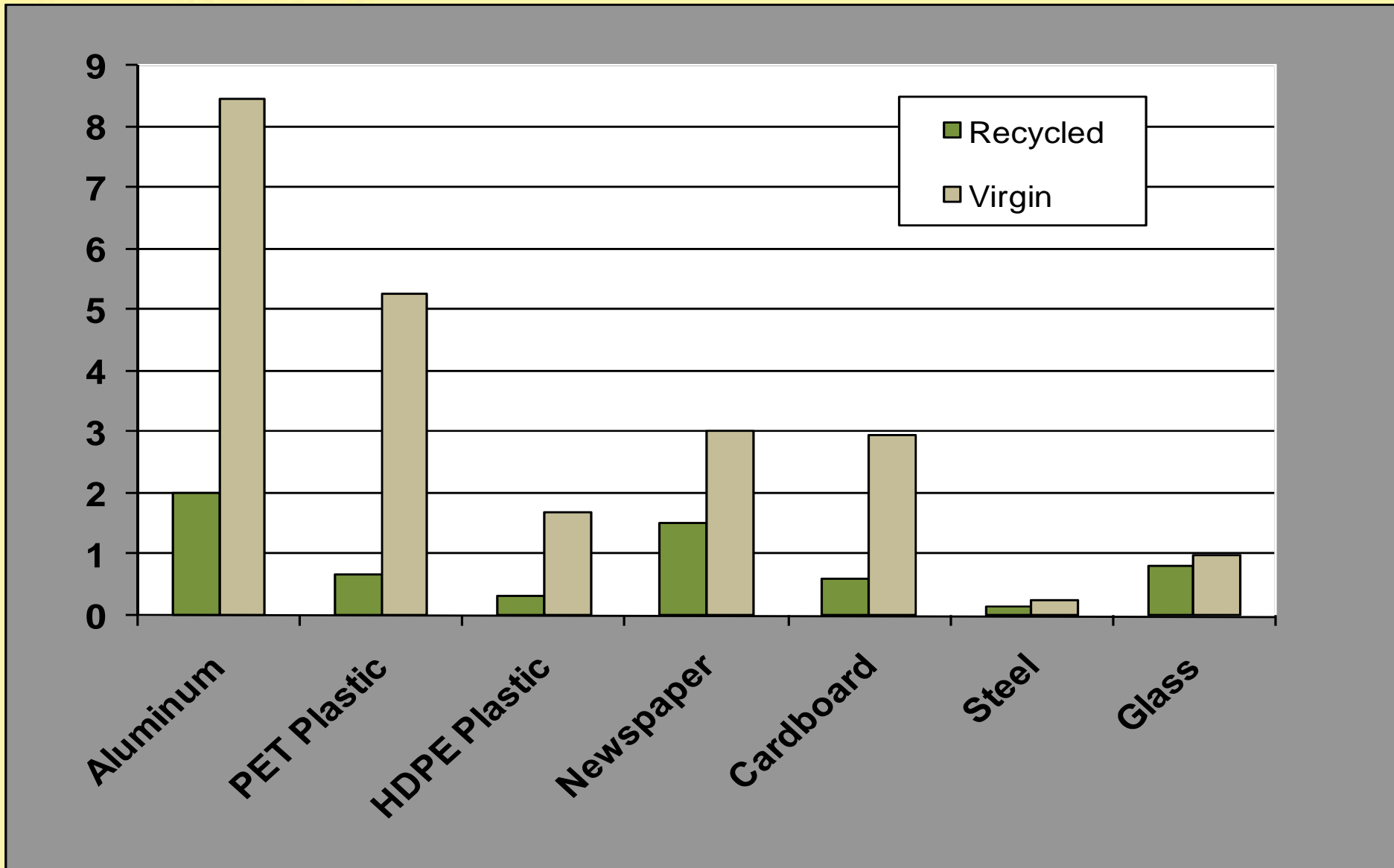


# CO2 Emissions: Composting versus Incineration (kg eCO2/kg)





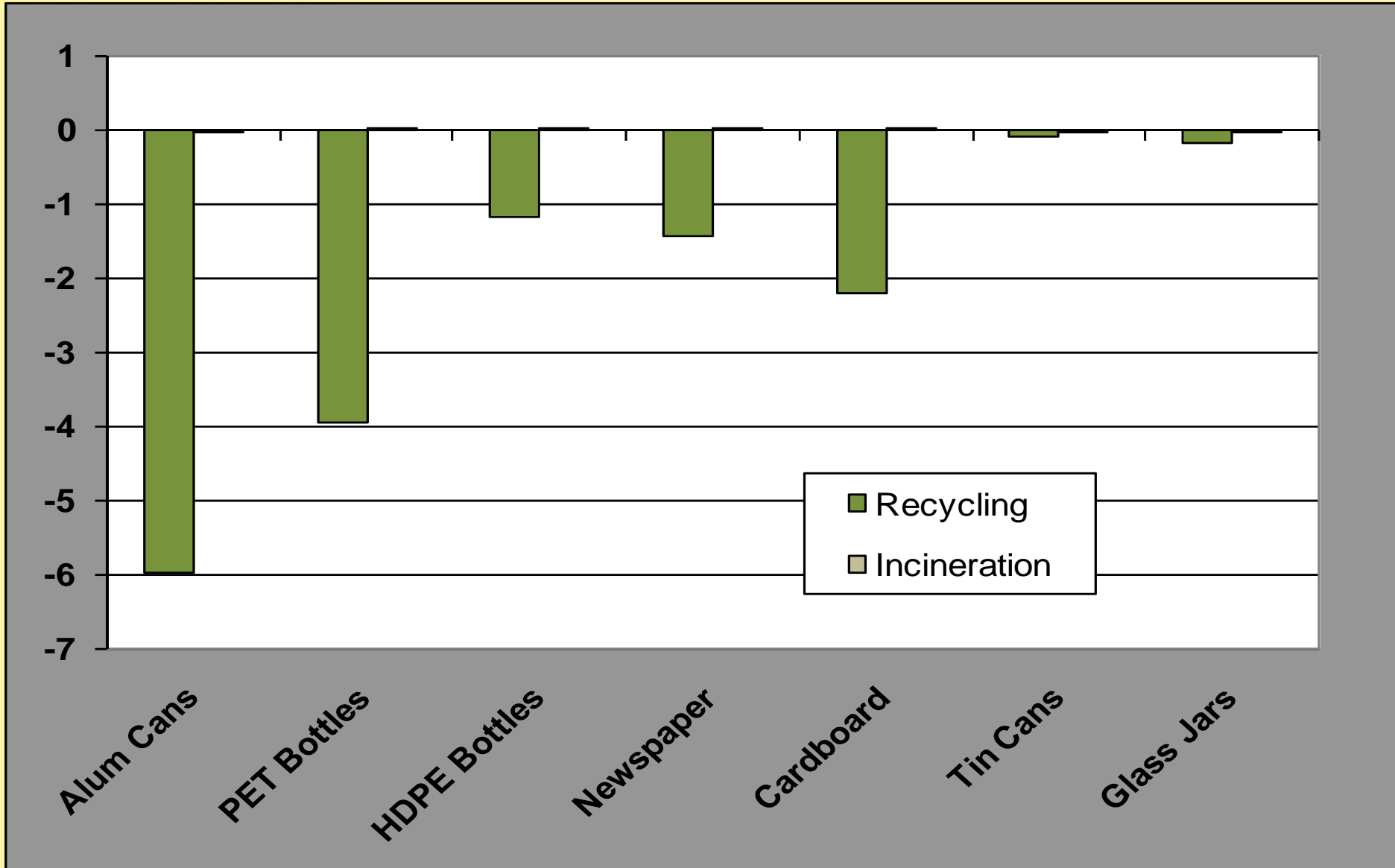
# Toxics Emissions: Recycled & Virgin Products (kg eToluene/kg)





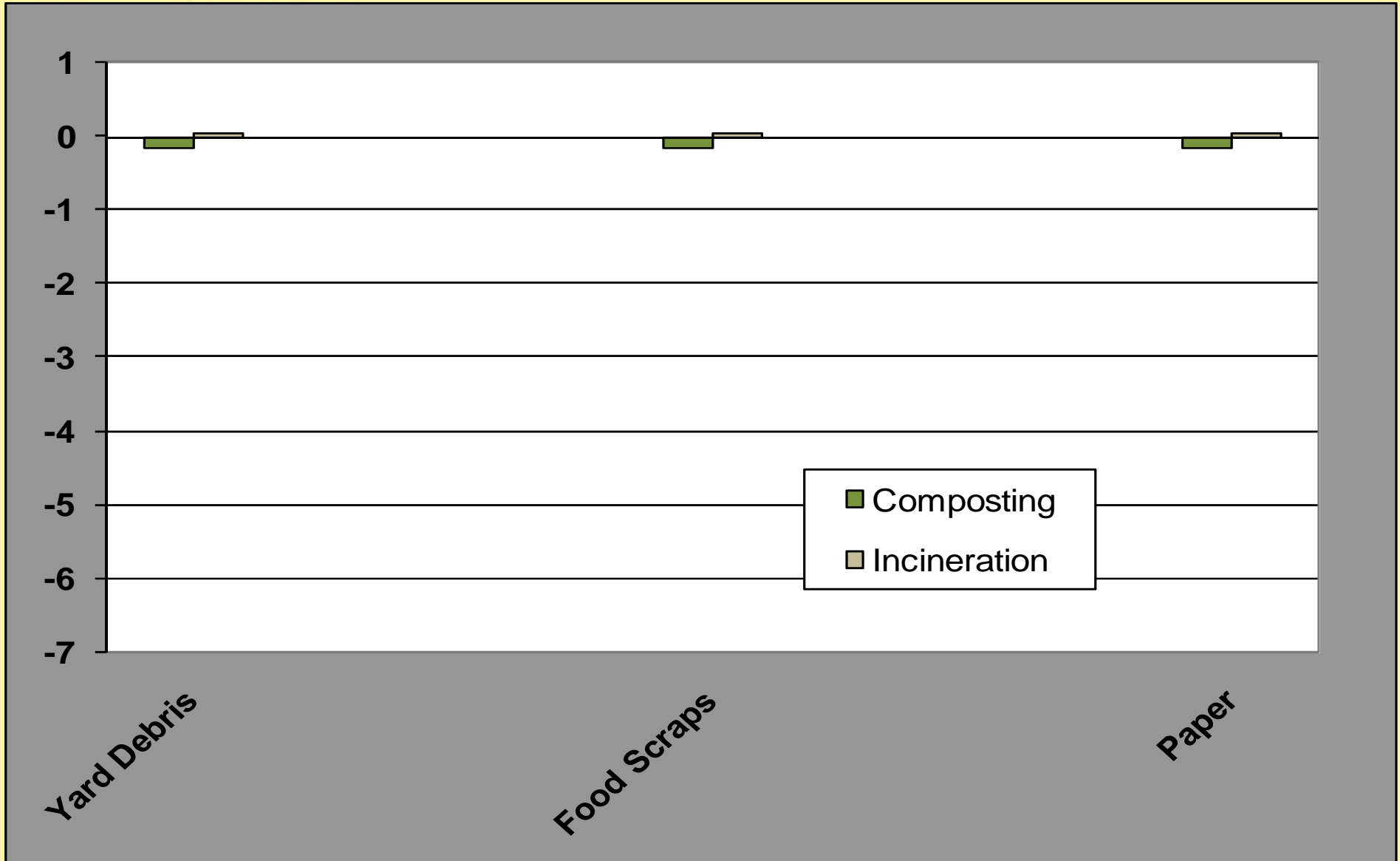


# Toxics Emissions: Recycling vs. Incineration (kg eToluene/kg)



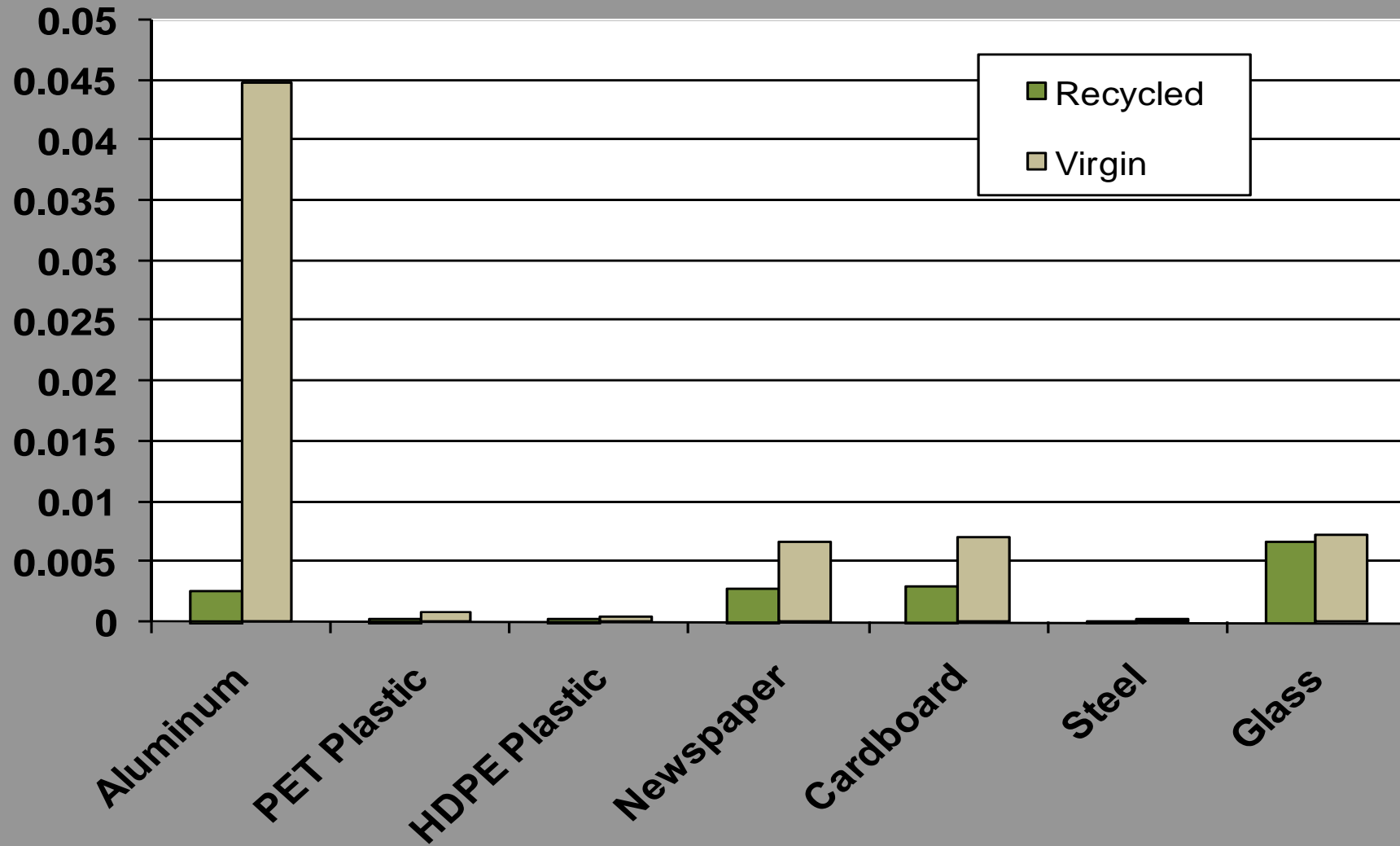


# Toxics Emissions: Composting vs. Incineration (kg eToluene/kg)



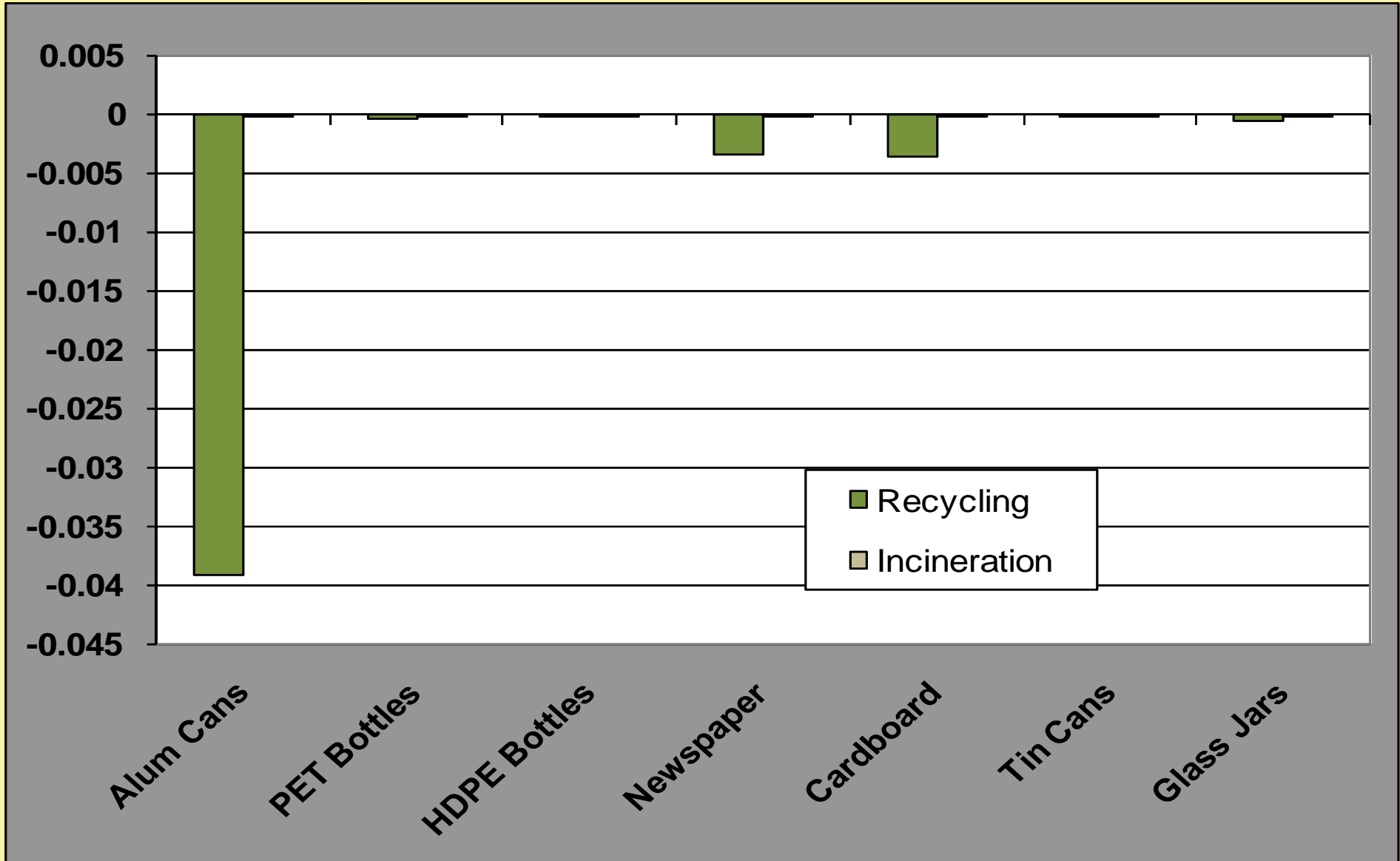


# EcoToxics Emissions: Recycled & Virgin Products (kg e2,4-D/kg)



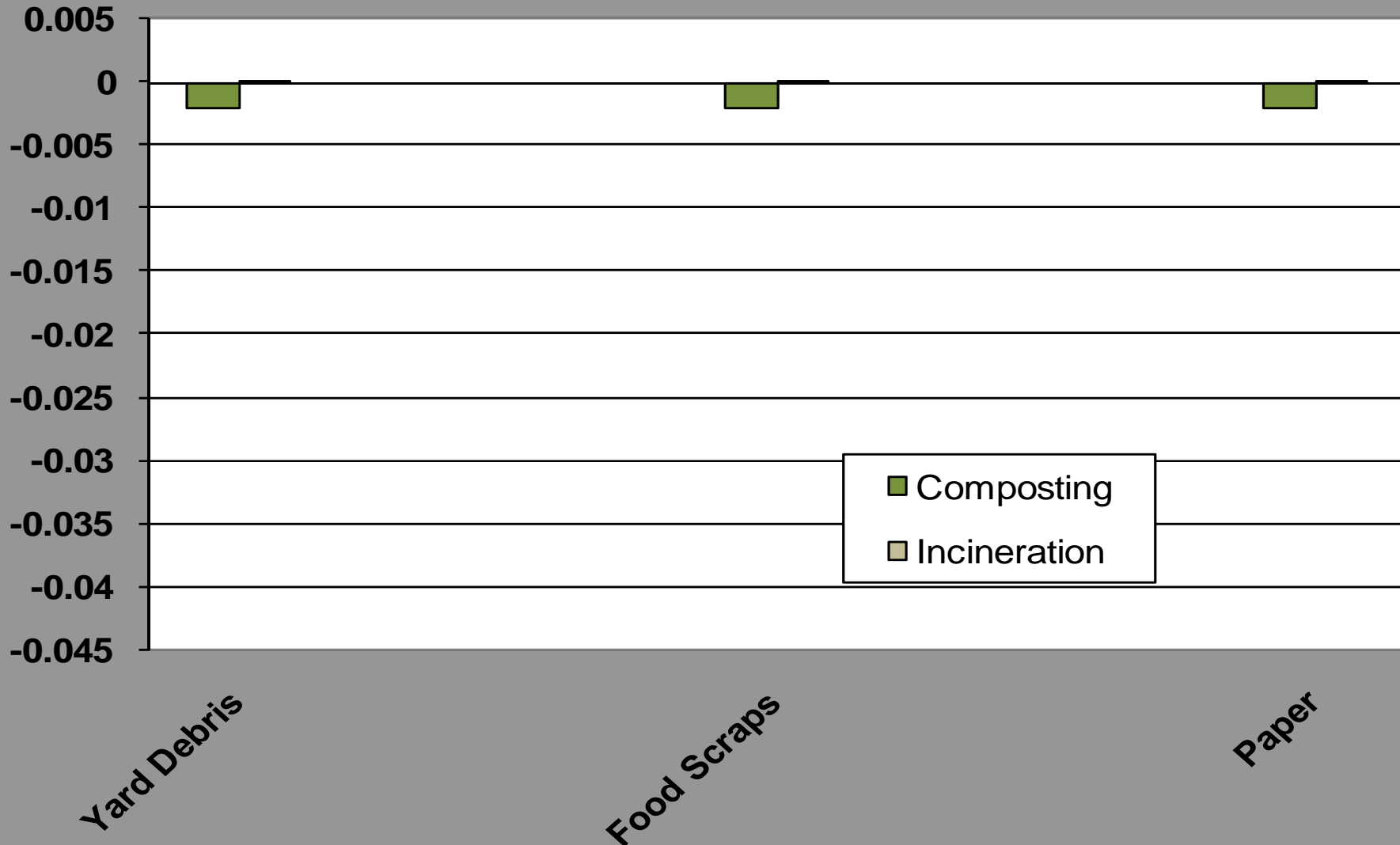


# EcoToxics Emissions: Recycling vs. Incineration (kg e2,4-D/kg)



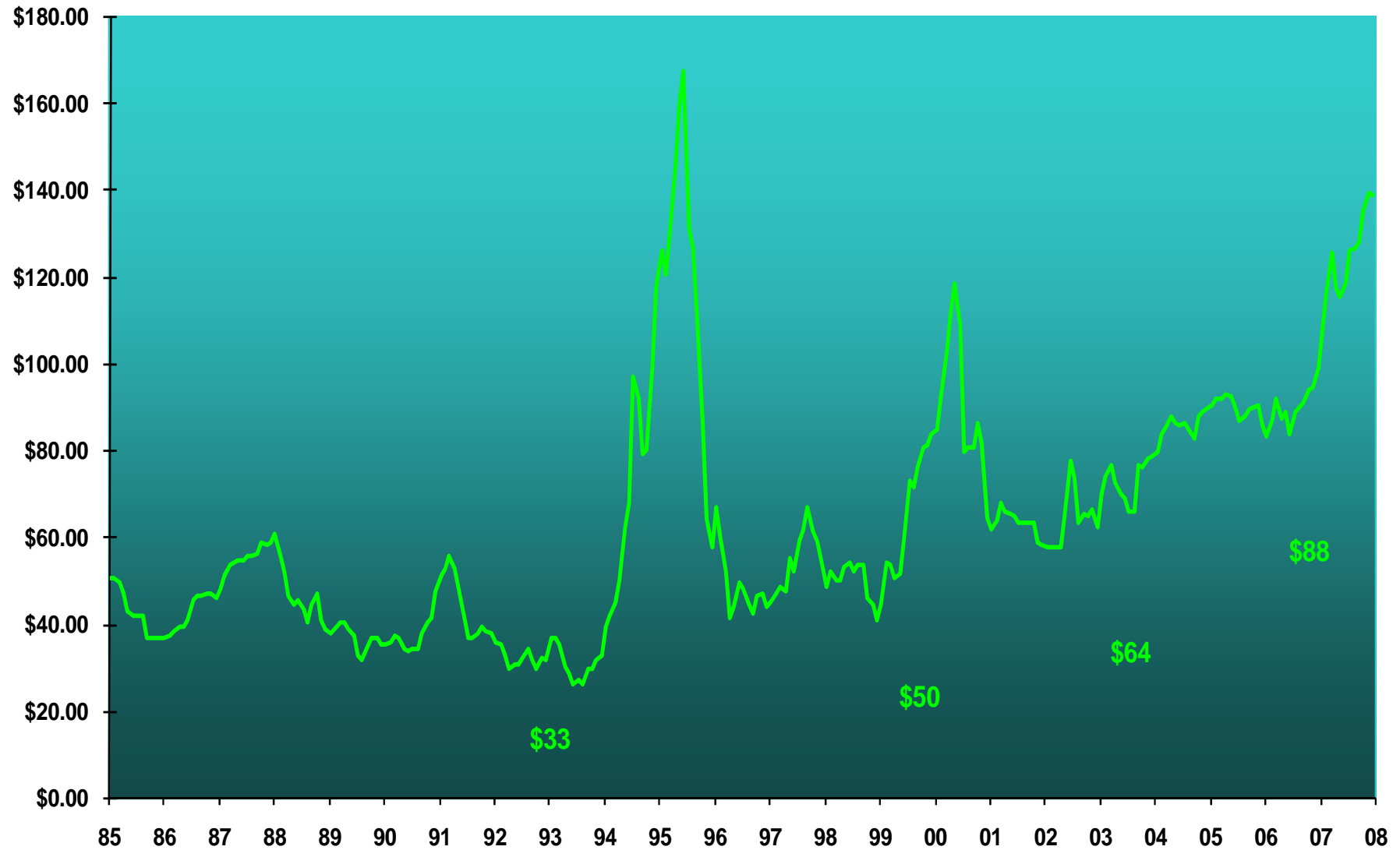


# EcoToxics Emissions: Composting vs. Incineration (kg e2,4-D/kg)





# Market Value of Recyclables – US Northwest (US\$ per short ton)





## **Value of Pollution Reductions from Recycling & Composting**

<b>Discard Type</b>	<b>Environmental Value (US\$/metric ton)</b>
<b>Newspapers</b>	<b>\$367</b>
<b>Cardboard</b>	<b>467</b>
<b>Mixed Paper</b>	<b>172</b>
<b>Glass Containers</b>	<b>61</b>
<b>PET Plastics</b>	<b>712</b>
<b>HDPE Plastics</b>	<b>310</b>
<b>Other Plastics</b>	<b>310</b>
<b>Aluminum Cans</b>	<b>1,607</b>
<b>Ferrous Cans &amp; Scrap</b>	<b>17</b>
<b>Food Scraps</b>	<b>62</b>
<b>Yard &amp; Garden Debris</b>	<b>61</b>
<b>Compostable Paper</b>	<b>52</b>



# Net Societal Costs of Landfill and Incineration Disposal

<u>Costs per Metric Ton</u>	<u>Netherlands (Euros)</u>			<u>Northwest US (US\$)</u>		
	<u>Landfill</u>	<u>Incineration</u>	<u>Inc +/-) Lnd</u>	<u>Landfill</u>	<u>Incineration</u>	<u>Inc +/-) Lnd</u>
Gross private costs	40	103	63			
Energy recovery revenue	(4)	(21)	(17)			
Material recovery revenue	<u>0</u>	<u>(3)</u>	<u>(3)</u>			
Net private costs	<u>36</u>	<u>79</u>	<u>43</u>	<u>20 - 23</u>	<u>80 - 111</u>	<u>57 - 91</u>
Gross Environmental Costs	26	46	20			
Energy recovery offset	(4)	(22)	(18)			
Material recovery offset	<u>0</u>	<u>(6)</u>	<u>(6)</u>			
Net Environmental Costs	<u>22</u>	<u>18</u>	<u>(4)</u>			<u>(6)</u>
Net Societal Costs	58	97	39			51 - 85





## References

- 1) Dijkgraaf, Elbert, and Herman R.J. Vollebergh, Burn or bury? A social cost comparison of final waste disposal methods, ***Ecological Economics*** 50(2004) 233-247.
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- 3) Morris, Jeffrey, Comparative LCAs for curbside recycling versus either landfilling or incineration with energy recovery, ***International Journal of Life Cycle Assessment*** 10 4 (2005) 273-284.
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- 5) Morris, Jeffrey, Recycling versus incineration: An energy conservation analysis, ***Journal of Hazardous Materials*** 47 (1996) 277-293.
- 6) Rand, T., J. Haukohl, U. Marxen, Municipal solid waste incineration: A decision maker’s guide, The World Bank: Washington, DC (June 2000).
- 7) Sound Resource Management, The economics of recycling and recycled materials, The Clean Washington Center: Seattle, WA (June 1993).



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