Sustainable Materials Management Key Concepts & Approaches

Sustainable Materials Management is an approach to serving human needs by using or reusing resources most productively and sustainably throughout their life cycles, generally minimizing the amount of materials involved and all the associated environmental impacts.

Principles

1. *Natural capital preservation.* Preserve natural capital.
2. *Life cycle thinking.* Design and manage materials, products and processes for safety and sustainability from a life-cycle perspective.
3. *Diverse approaches.* Use the full suite of policy instruments to stimulate and reinforce sustainable economic, environmental and social outcomes.
4. *Stakeholder responsibility.* Engage all parts of society to take active, ethically-based responsibility for achieving sustainable outcomes.

A Paradigm Shift from Quantity to Quality

From *waste management* at end-of-life to *materials management* along supply chains.

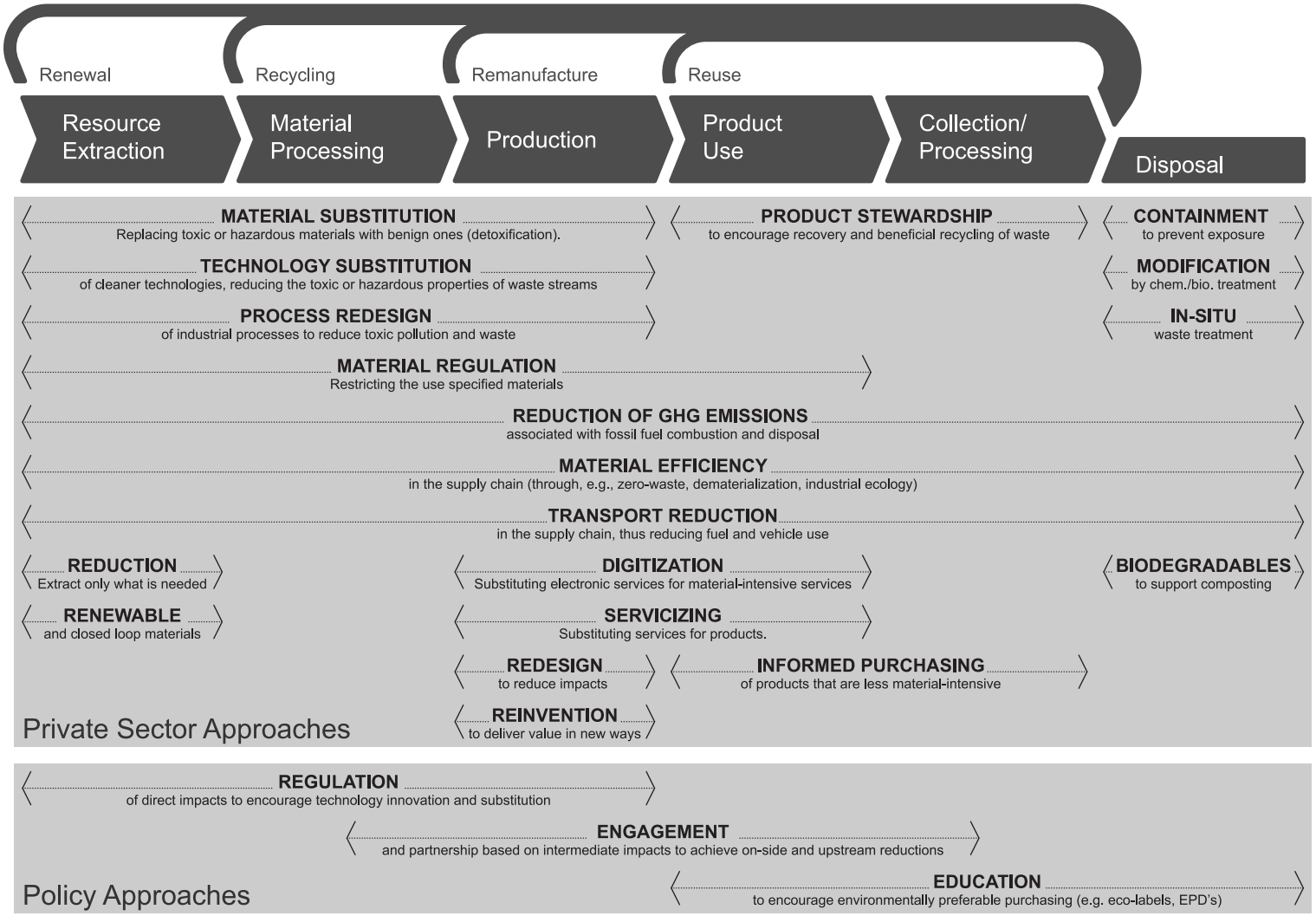
From measuring *volume* of material flows to measuring *impacts* of material flows.

US EPA Workgroup Recommendations

1. *Promote* efforts to manage materials and products on a life cycle basis.
2. *Build capacity* and integrate materials management approaches in existing government programs.
3. *Accelerate* broad, ongoing public dialogue on life-cycle materials management.

US EPA Priority Approaches

1. *Reduce life cycle impacts.* Know and reduce lifecycle impacts across the material flow.
2. *Reduce material inputs.* Use less material inputs throughout (reduce, reuse, recycle).
3. *Optimize materials.* Consider less toxic and more renewable materials.
4. *Substitute services.* Consider substituting services for products.



Supply chain position informs available approaches.

For the private sector, this means that the relative supply chain position of a company or sector determines the types of approaches that will be available for reducing its direct and indirect environmental impacts. Some approaches help to reduce impacts at the scale indvidual life cycle stages, and others help to reduce system-wide impacts. For policymakers, supply chain position informs which policy approaches will be most likely to encourage positive change. Upstream sectors tend to have significant *direct* impacts and may offer opportunities for *regulation* to encourage technology improvement or substitution. Midstream sectors tend to have significant *intermediate* impacts and may offer opportunities for supply chain *engagement and partnership* to achieve on-site and upstream impact reductions. Downstream sectors tend to have significant *final consumption* impacts and may offer opportunities for *education* to encourage environmentally preferable purchasing.

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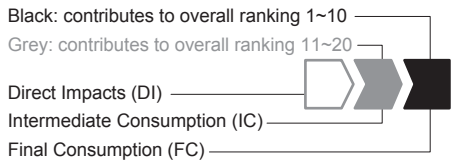
Content based on *Sustainable Materials Management: The Road Ahead* (US EPA, 2009)

Sustainable Materials Management

US EPA 2020 Vision Relative Ranking Analysis



	Material, Product, or Service	Overall Ranking			Criteria Contributing Significantly to Rank																
					Environmental Impact													Resource Use/Waste			
		DI	IC	FC	Abiotic Depletion	Land Use Change	Global Warming	Ozone Depletion	Human Toxicity	Freshwater Ecotox.	Marine Ecotox.	Terrestrial Ecotox.	Freshwater Sediment	Marine Sediment	Photochem. Oxidation	Acid-ification	Eutro-phication	Material Use	Material Waste	Water Use	Energy Use
Food Products & Services	Dairy farm products	19	-	-		■															
	Poultry and eggs	20	-	-		■															
	Meat animals	6	6	-		■				■		■					■				
	Food grains	13	-	-		■											■				
	Feed grains	9	15	-		■				■		■					■	■			
	Miscellaneous crops	16	-	-						■		■					■				
	Meat packing plants		11	7		■				■		■					■				
	Poultry slaughtering and processing	-	-	17		■															
	Eating and drinking places	-	16	5		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Food preparations, n.e.c.	-	-	19						■		■					■				
	Fluid milk	-	-	20		■															
Textiles	Cotton	2	2	-						■		■					■				
	Apparel made from purchased materials	-	13	2				■	■	■		■		■			■				
	Broadwoven fabric mills and fabric finishing plants	-	10	-						■		■					■				
Nonrenewable organics	Coal	5	9	-	■													■	■		
	Crude petroleum and natural gas	4	4	-	■		■								■	■	■				
	Industrial inorganic and organic chemicals	3	3	-				■	■					■	■	■	■		■		
	Petroleum refining	8	5	3	■		■	■						■	■	■	■	■	■		
	Electric services (utilities)	1	1	1	■		■		■		■		■	■	■	■	■	■	■	■	■
	Natural gas distribution	15	14	12	■													■	■		
Mining & Metals	Blast furnaces and steel mills	-	17	-			■		■					■	■				■		■
	Primary aluminum	18	20	-				■	■		■		■	■							
	Motor vehicles and passenger car bodies	-	12	4	■		■	■	■	■	■	■	■	■	■	■	■		■		■
Construction & Development	Dimension, crushed and broken stone	14	-	-														■			
	Sand and gravel	17	-	-														■			
	New residential 1 unit structures, nonfarm	10	8	8			■	■	■					■	■	■		■	■		
	Other new construction	-	-	13			■	■	■					■	■	■		■			
	Owner-occupied dwellings	-	-	11				■	■					■	■	■	■	■			
	New highways, bridges, and other horizontal const.	-	-	10					■						■			■			
	New office, industrial and commercial buildings	-	-	16				■	■					■	■			■			
Forest	Pulp mills	11	-	-					■					■							
	Paper and paperboard mills	7	7	-					■					■							
Other Products & Services	Computer and data processing services[1]	-	-	-											■						
	Photographic equipment and supplies[2]	12	-	14					■					■	■						
	Wholesale trade	-	19	15			■	■	■					■	■						■
	Retail trade, except eating and drinking places	-	-	6	■		■	■	■		■		■	■	■	■	■	■	■	■	■
	Hospitals	-	-	9			■	■	■			■	■	■	■		■		■		■
	Real estate agents, managers, operators, lessors	-	18	18			■		■						■			■			

[1] Analysis suggests that, if relative output were adjusted from 1998 to 2007 levels, the "computer and data processing services" category would rank as high as second from the Final Consumption perspective.

[2] Analysis suggests that, if relative output were adjusted from 1998 to 2007 levels, the "photographic equipment and supplies" category would rank below the top 20 from the Final Consumption perspective.

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