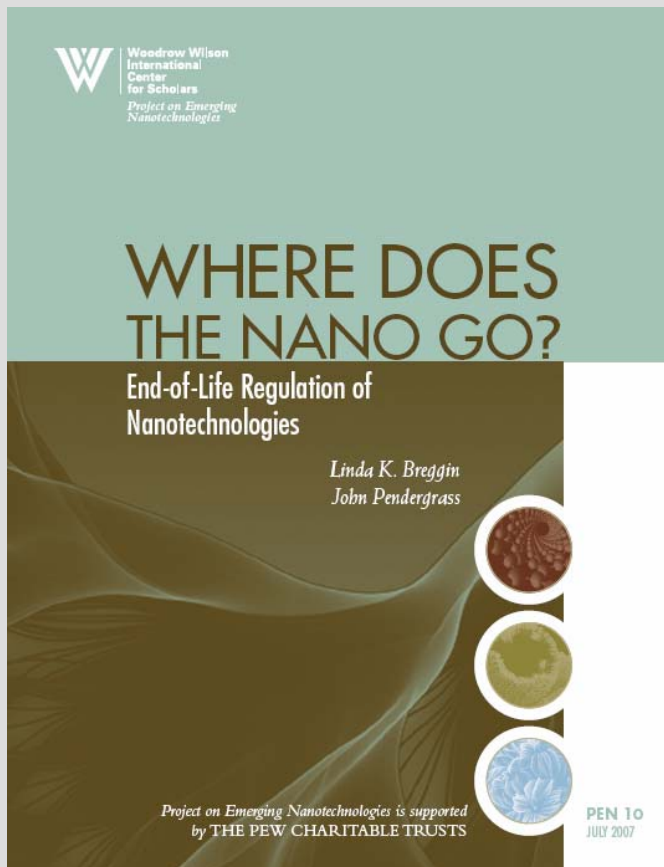


# ***Where Does the Nano Go? End-of-Life Regulation of Nanotechnologies***



July 26, 2007

12:30 PM

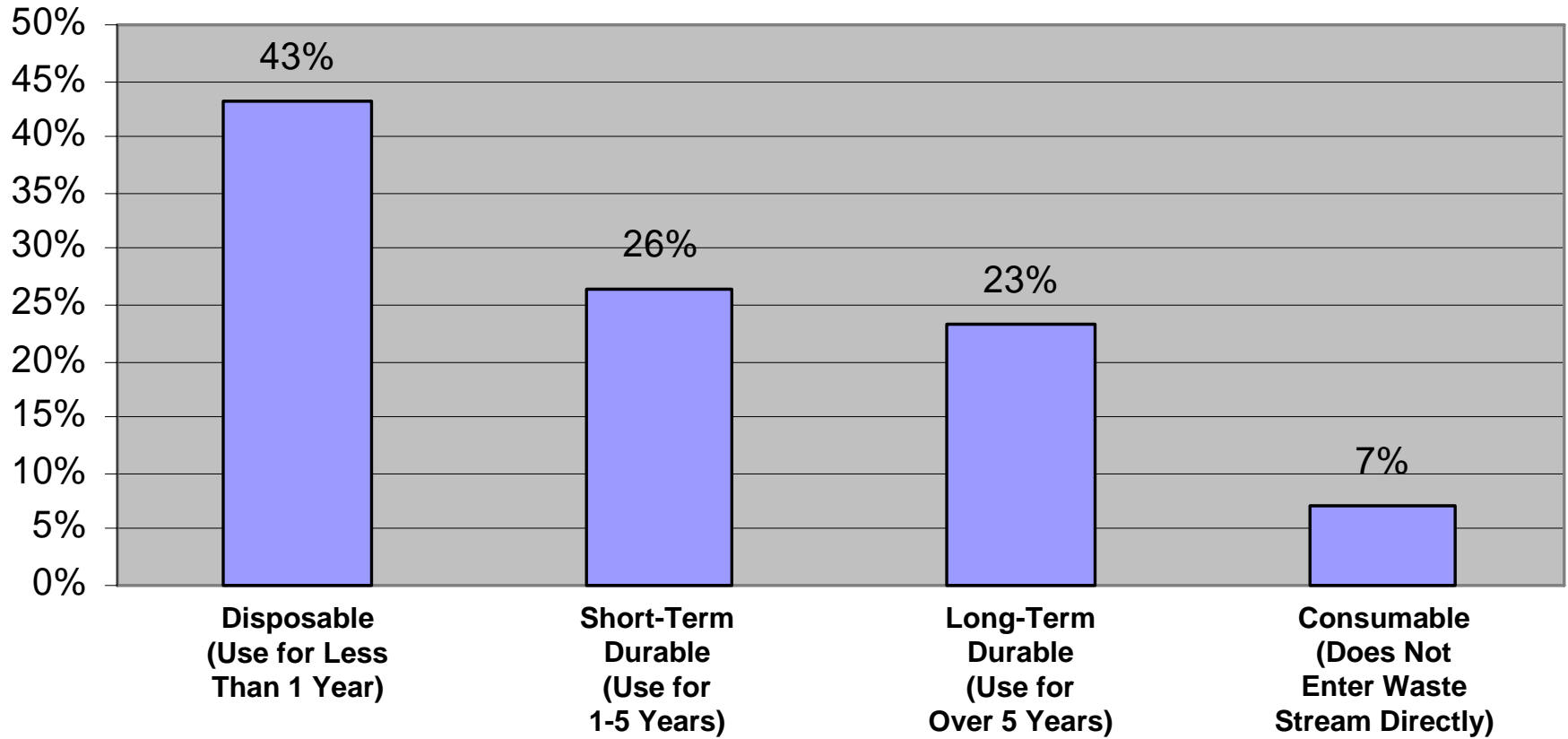
# Estimated Global Production Rates for Various Nanomaterials and Devices

Application	Material/device	Estimated Production Rates (metric tons/year)		
		2004	2005-2010	2011-2020
Structural applications	Ceramics, catalysts, composites, coatings, thin films, powders, metals	10	$10^3$	$10^4$ - $10^5$
Skincare products	Metal oxides (titanium dioxide, zinc oxide, iron oxide)	$10^3$	$10^3$	$10^3$ or less
ICT	Single wall nanotubes, nano electronics, opto-electro materials (titanium dioxide, zinc oxide, iron oxide), organic light-emitting diodes (OLEDs)	10	$10^2$	$10^3$ or more
Biotechnology	Nanoencapsulates, targeted drug delivery, bio-compatible, quantum dots, composites, biosensors	< 1	1	10
Instruments, sensors, characterization	MEMS, NEMS, SPM, clip-pen lithography, direct write tools	10	$10^2$	$10^2$ - $10^3$
Environmental	Nanofiltration, membranes	10	$10^2$	$10^3$ - $10^4$

Source: RS/RAE. 2004. *Nanoscience and nanotechnologies: Opportunities and uncertainties*, The Royal Society and The Royal Academy of Engineering, London, UK. Table 4.1. Available at: <http://www.nanotec.org.uk/finalReport.htm>

Note: Estimated global production rates for various nanomaterials and devices are based on international chemical journals and reviews and market research.

# Nano Products in the Waste Stream



Less Than  
1 Year

1-5 Years

Over 5 Years

Indirectly Enters  
Waste Stream

# Strategies for Manufacturing Waste

- Store on site.
  - Incinerate on site.
- Move off site as hazardous waste and incinerate or landfill.
  - Recycle/Reuse
    - Material substitution
    - New products



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# WHERE DOES THE NANO GO?

## End-of-Life Regulation of Nanotechnologies

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*Project on Emerging Nanotechnologies is supported  
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**PEN 10**  
JULY 2007