

GC3 & Hyundai

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Materials Development

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Hyundai · Kia America Technical Center, Inc.

Contents

1. Recognizing Global Issues

2. Green Chemistry & Sustainability

3. Business Case

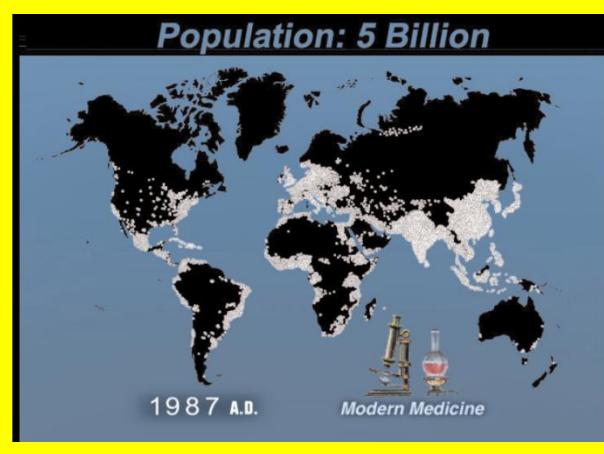
4. Where to focus?

5. Hyundai Activities

1. Global Issues

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ECONOMIC GROWTH



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□ Definitions

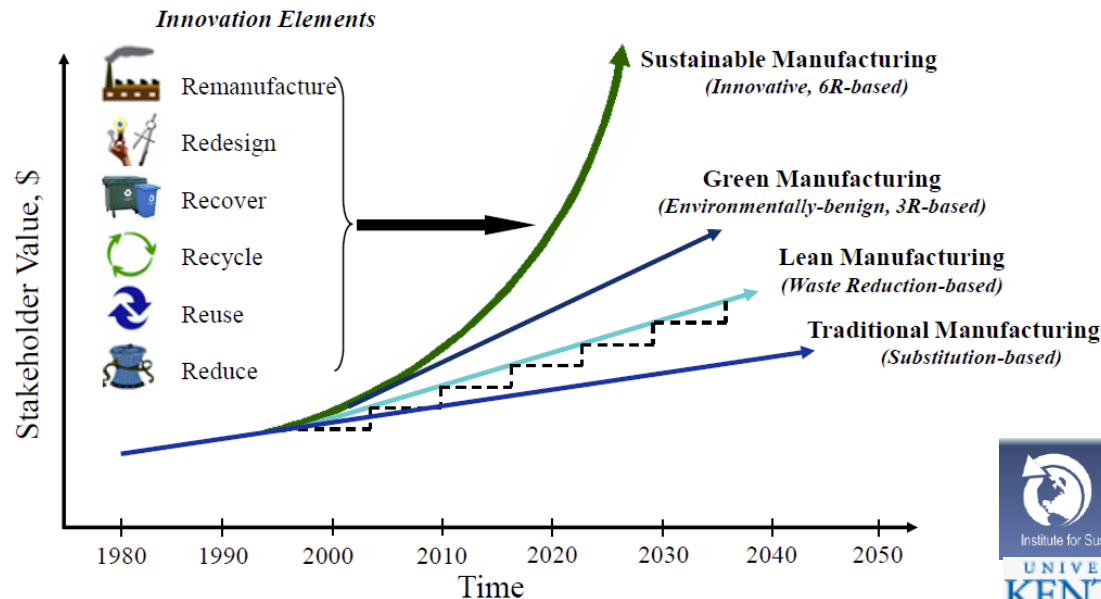
Green chemistry (from Wikipedia), *also called sustainable chemistry, is a philosophy of chemical research and engineering that encourages the design of products & processes that minimize the use & generation of hazardous substances.*

Executive Order 13423 Definition: (2007 Pres. Bush)
“Sustainable” - creating and maintaining conditions under which humans and nature can exist in productive harmony that permits fulfilling the social, economic, and other requirements of present and future generations of Americans.

□ Annual Corporate Reports

Contents Typically include...

- ❖ Sustainability Management: Corporate Philosophy
- ❖ Economy: Global Outlooks, Business Performance
- ❖ Safety: Crash Performance
- ❖ Environment: Climate Change, Recycling, Hazardous Materials, Air Quality
- ❖ Society: Employees, Customers, Suppliers, Community



4. Where to Focus?

Hazardous Material Assessments



California
Green Chemistry

Efficiency Improvements



Bio Roof, Wind Power, Solar Array



HEV, PHEV, EV



Zero Waste



Material Developments



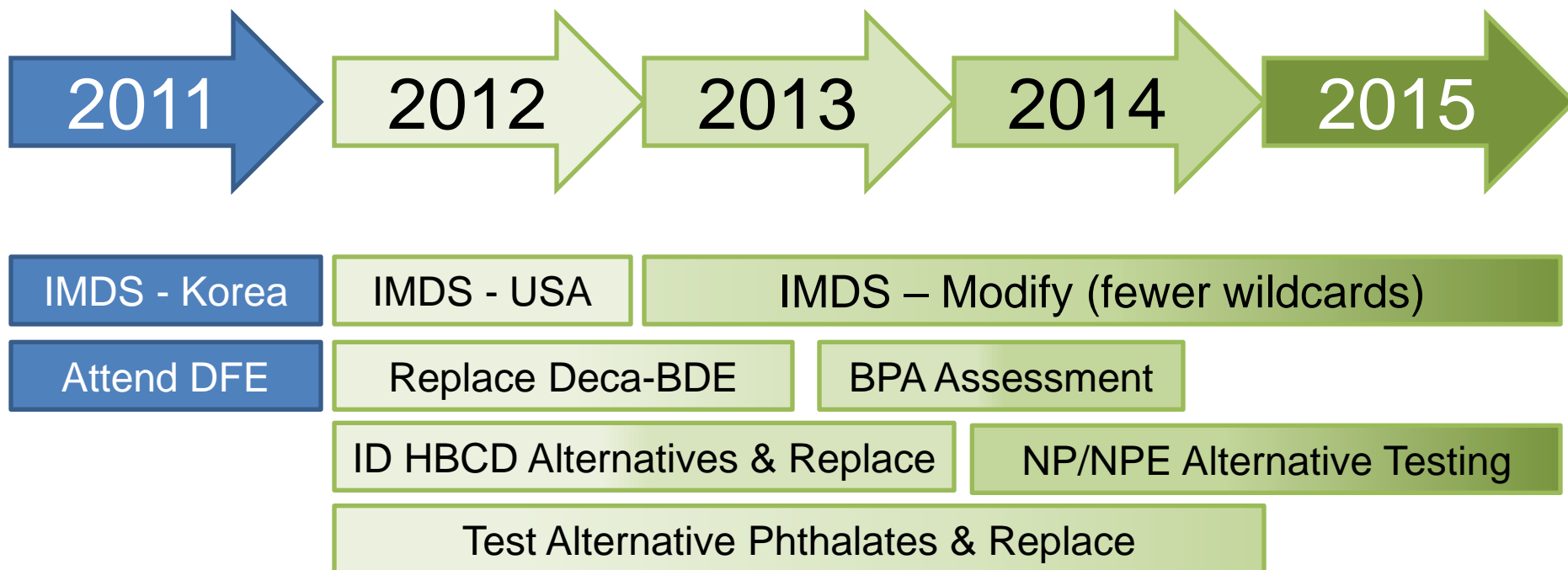
5. Hyundai Activities

Green Chemistry



Chemicals with Action Plans

1. Bisphenol A (BPA)
2. Hexabromocyclododecane (HBCD)
3. Nonylphenyl & Nonylphenyl Ethoxylates (NP/NPE)
4. Penta, Octa, Decabromodiphenyl Ethers (PBDE)
5. Phthalates



5. Hyundai Activities

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- ❑ Renewable Energy Sources
- ❑ Methodologies & Communication



United Soybean Board



SAE *International*[®]
Green Technology Committee










Global Chemical Committee
Sales



5. Hyundai / Industry Activities










□ 2011 Materials Development - *Interior Recycled Materials*

Part	Material	Suppliers	Benefit
	25-100% PCR Yarn	Sage, Miko, Aunde, Freudenberg	<ul style="list-style-type: none"> ▪Reduces consumer waste ▪Reduces depletion of natural resources
	25-40% PIR Upholstery / Carpet	Sage, Aunde , Guilford	<ul style="list-style-type: none"> ▪Reduces energy consumption ~20% ▪Reduces waste ~15% ▪Reduces CO₂ Emissions by ~15%
	10-15% Soy or Castor Oil Foam	Lear, JCI, Woodbridge	<ul style="list-style-type: none"> ▪Reduces depletion of natural resources ▪Reduces CO₂ Emissions ▪Reduces dependency on petroleum
	Liquid Wood (lignin + resin)	Ford	<ul style="list-style-type: none"> ▪Almost carbon neutral material ▪Reduces need to landfill wood waste ▪Improves acoustics
	Recycled Rubber	Seoil	<ul style="list-style-type: none"> ▪Reduces consumer waste
	PIR Denim / Cotton	Levi	<ul style="list-style-type: none"> ▪Reduces consumer waste ▪Reduces energy consumption ▪Improves sound absorption ▪Reduces water & fertilizer consumption
	Wood Flour + Polyolefin	Innovative Plastics & Molding	<ul style="list-style-type: none"> ▪Reduces consumer waste ▪Reduces depletion of natural resources

4. Hyundai / Industry Activities

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□ 2011 Materials Development - *Interior Recycled Materials (cont'd)*

Part	Material	Suppliers	Benefit
	Kenaf / Coconut Fibers	Whole Tree, Visteon, Findlay Ind.	<ul style="list-style-type: none"> ▪Source of income for low income farmers ▪Reduces CO₂ Emissions
	Wheat Straw + PP	A Schullman	<ul style="list-style-type: none"> ▪Reduces CO₂ Emissions ▪Reduces petroleum consumption
 	30% Corn Based Poly Tetra Terephthalate	DuPont	<ul style="list-style-type: none"> ▪63% Less greenhouse gas ▪30% Less energy ▪21% Less processed water
   	30-80% Co-Polyester	DuPont	<ul style="list-style-type: none"> ▪Reduces consumer waste ▪Reduces petroleum consumption
	Re-Engineered Leather	Eagle Ottawa	<ul style="list-style-type: none"> ▪Reduces consumer waste

5. Hyundai / Industry Activities

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□ 2011 Materials Development – *Powertrain Recycled Materials*

Part	Material	Suppliers	Benefit
	PCR Nylon from Carpet	Elring Klinger, Wellman, Bosch, Entec	<ul style="list-style-type: none"> ▪ Reduces landfill waste ▪ Reduces part cost
	Soy Based PU Foam + Recycled Tire	Recycled Polymer Materials	<ul style="list-style-type: none"> ▪ Reduces landfill waste ▪ Reduces part cost ▪ Reduces dependency on petroleum
	60-100% Castor Oil Based PA	DuPont, Asahi Kasei	<ul style="list-style-type: none"> ▪ Reduces depletion of natural resources ▪ Reduces CO₂ Emissions ▪ Reduces dependency on petroleum
	30-40% PCR HDPE	Corvac	<ul style="list-style-type: none"> ▪ 50% Lighter weight alternative ▪ Improved acoustics ▪ Improved durability

5. Hyundai / Industry Activities

□ Current Research

Material	Researchers	Application
Dandelion Rubber	Firestone, Goodyear, Ohio State University	PT Mounts
Orange Peel	Ford, University of York	Monomer source for plastic resins
Chitin	University of Australia Melbourne	Odor Repellent Fabrics
Corn Based Plastics	Ford, GM	Interior Parts
Natural Fiber Filled Plastics	Ford, GM, Iowa State	Interior Parts
PLA from Sugar Beets, Sweet Potatoes, Sugar Cane, Indian Grass	Ford, Iowa State	Interior / Exterior Parts
Fungus Based Foam (replaces Styrofoam)	Evocative	Packaging, Acoustics

□ Steel's Sustainability

- 1 Ton Recycled Steel conserves 4,000 pounds of raw materials
 - 2,500 lbs iron ore
 - 1,400 lbs coal
 - 120 lbs limestone
- Guaranteed recycled material: old steel used to make new steel
- EPA Statistic: Processing used steel saves 74% energy used to process new steel

