Big Picture Thinking™

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What is Big Picture Thinking?

- Starts by defining overarching goals and objectives.
- Approaches change by looking at impacts across the product and packaging system.
- Uses life cycle thinking to determine value, effects, and sensitivity of all inputs, throughputs, and outputs.
- Applies appropriate frameworks and tools to develop action plans and future paths:
  - Sustainable Materials Management
  - Circular Economy
  - Others
- Measures results, modifies plans accordingly.

Defining Goals & Objectives

- These are high level accomplishments, generally about reducing impacts across the entire system or value chain:

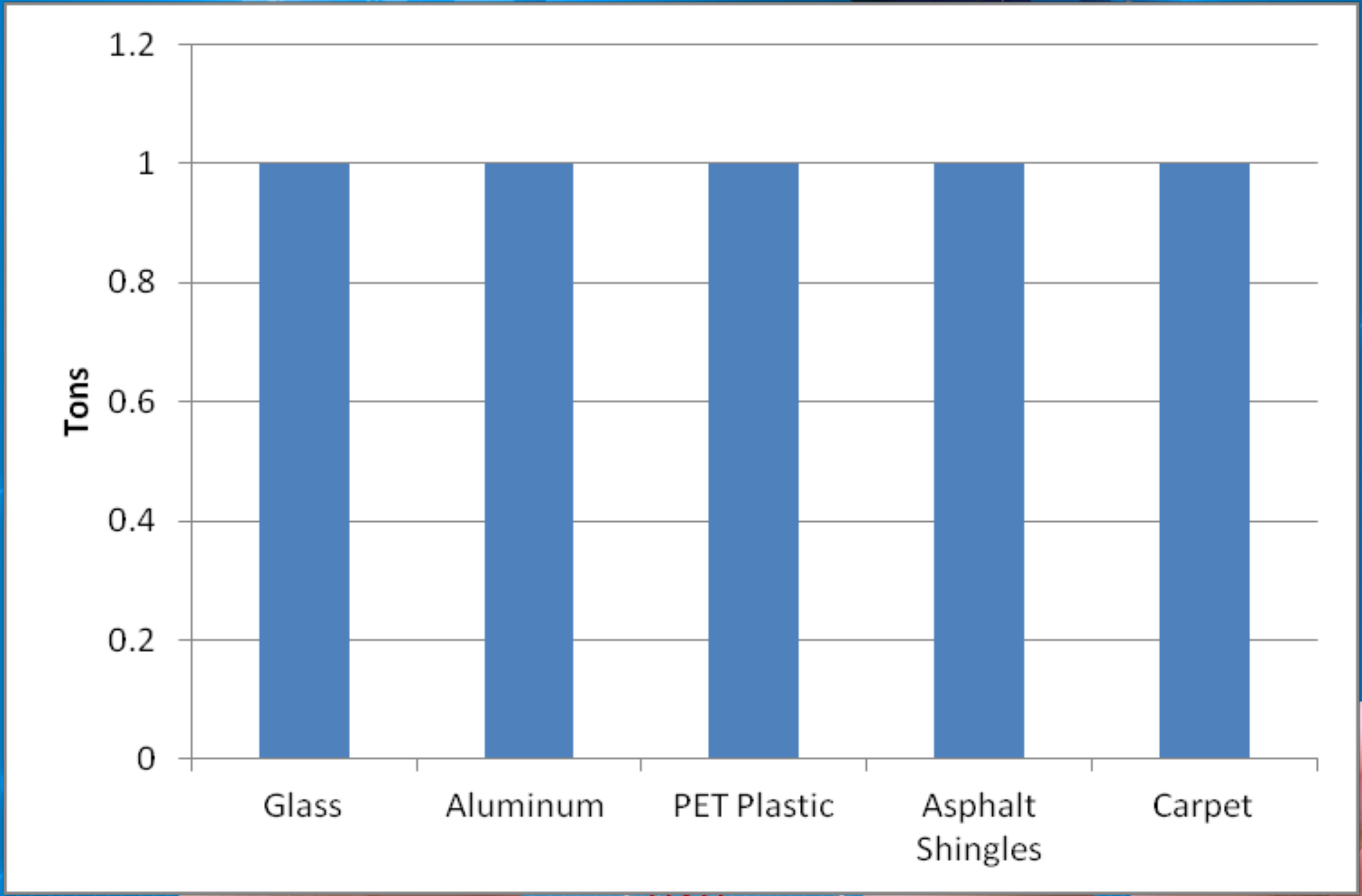
  - Economic costs
  - Use of materials, water, or energy
  - Pollutants, including GHGs
  - Solid waste
  - Land use/habitat destruction

- Goals should be actionable and address the real objectives we are seeking.

Setting the Goal is Key

Goal measurement	Ways to Achieve	Possible Negative Outcome	Net Result
Increase use of renewable energy	Substitute renewable energy for fossil energy OR add renewable energy usage to the existing use of fossil energy OR both.	More total energy used, so a less efficient system.	May be positive (more GHG emissions) or negative (fewer GHG emissions).
Increase % of used renewable energy	Add the use of renewable energy OR decrease the use of fossil energy OR both.	More total energy used, so a less efficient system.	May be positive (more GHG emissions) or negative (fewer GHG emissions).
Decrease use of fossil energy used	Decrease the use of fossil energy OR substitute renewable energy for fossil energy OR both.		Always decreases the use of fossil energy to satisfy this metric, so either action will cause a reduction of GHG emissions.

Setting the Goal is Key



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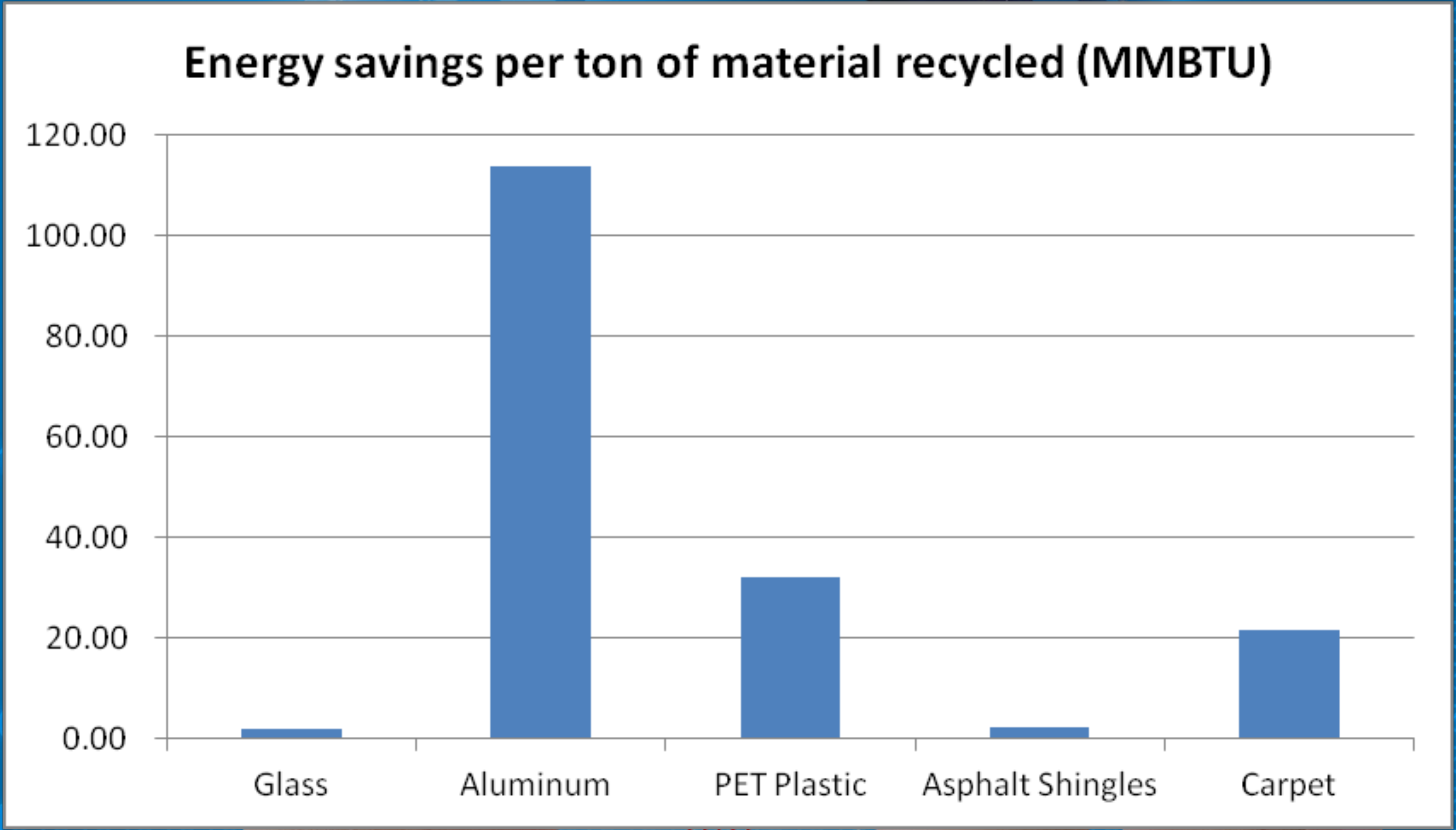


Packaging Requires A Systems Approach

- Packaging is created with the primary purpose of protecting and promoting another product.
- Packaging represents a broad range of materials and components which include multiple resources and supply chain partners—each with own unique challenges/opportunities.
- Transportation, distribution, storage, preparation, and usage costs across the spectrum must also be evaluated.
- When any of these elements are viewed in isolation unintended consequences may occur. Must explore each aspect of the system as well as their intersection with one another.

Frameworks to Inform Action

- There are currently 2 widely respected models being applied to enhance packaging (and product) optimization efforts: Sustainable Materials Management (SMM) and the Circular Economy (CE).

- Both models were designed for universal application. Universality means flexibility but also requires careful adaption to meet industry specific challenges and opportunities.

- Models are not the same, nor are they competing. Each offer similar objectives but the approaches used to get to the ends differ—this can have a significant impact on the big picture.

- Being clear about the end goal and the systems involved will help inform the best framework(s) to apply.

Sustainable Materials Management

- The: "use and reuse of materials in the most productive and sustainable way across entire lifecycles by minimizing the amount of materials involved and minimizing associated environmental impacts."

- Evaluates impacts involved in sourcing, harvesting, processing, manufacturing, transportation, use and end of life in order to identify where, and how, resources are being consumed and pollution and other wastes are occurring.

- By identifying "hotspots' can identify where the greatest impact may be made. *Evaluating tradeoffs.*

- Supported by the G7 & OECD. Has become the primary framework adopted by the USEPA

Circular Economy

- A Circular Economy (CE) model re-conceptualizes economic and production systems in order to retain products and materials at their highest value and utility at all times.
- Key objectives are to create new business models which permit the design of materials and processes that continuously loop material goods, or to use materials and systems which utilize regenerative natural life cycles.
- Both the European Union (EU) and China have developed policy frameworks to support CE principles and business models. Strong support amongst global business community.

Frameworks Deconstructed

	Circular Economy	Sustainable Materials Management
Perspective/Vision	Evaluate and design within a system. Aspirational/Future State.	Evaluate and design across the lifecycle. Current State.
Objective	Create new business and economic models.	Build analytical and policy frameworks to evaluate and support tradeoffs.
Definition of Waste	Direct material use—preservation of materials used in production.	All externalities associated with material use –preservation of natural capital.
Goals	Waste is 'designed" out. Every material can be repurposed towards continuous use or multiple uses.	Waste is multi-attributed. Need to evaluate tradeoffs and hotspots to identify most sustainable choice.
Key Tools	Cradle-to-cradle thinking, systems-thinking, biomimicry, industrial ecology, supply-chain analysis	Material flow analysis, integrated policy, systems-thinking, lifecycle analysis.
Design Focus	Recover, reuse, refurbishment, products as a service.	Source reduction, design for recovery, integrated systems.

Frameworks Applied to Packaging

	Circular Economy	Sustainable Materials Management
Source Reduction	**Prioritizes material re-use over usage efficiency**. Seeks to achieve efficiency through re-use of materials, avoiding extraction. Prefers associated energy demand be addressed through renewable sources.	**Prioritizes material usage efficiency over re-use.** Recognizes source reduction may require non recyclable material choices—hence evaluates tradeoffs in order to identify best ways to reduce overall material **and** resource demand.
Technical Feasibility	Aspires that innovation will address the technical challenges associated with material reuse	Would require identification and evaluation of current technical and environmental restrictions which may limit application of material reuse
Quality	Does not inherently address the risks of quality degradation or contamination, rather prioritizes he use of materials whose quality can be maintained. Seeks to avoid feeding virgin material back into system	Would calculate the need for virgin material as needed and degradation of quality to ascertain best value.
End Markets	Infers local end markets. Because you are building the system, believe the markets will naturally grow.	Evaluates flow of materials between processes and across geographies. Includes evaluation of disruptions to, or lack of existing markets.

Seeing From A Big Picture Perspective

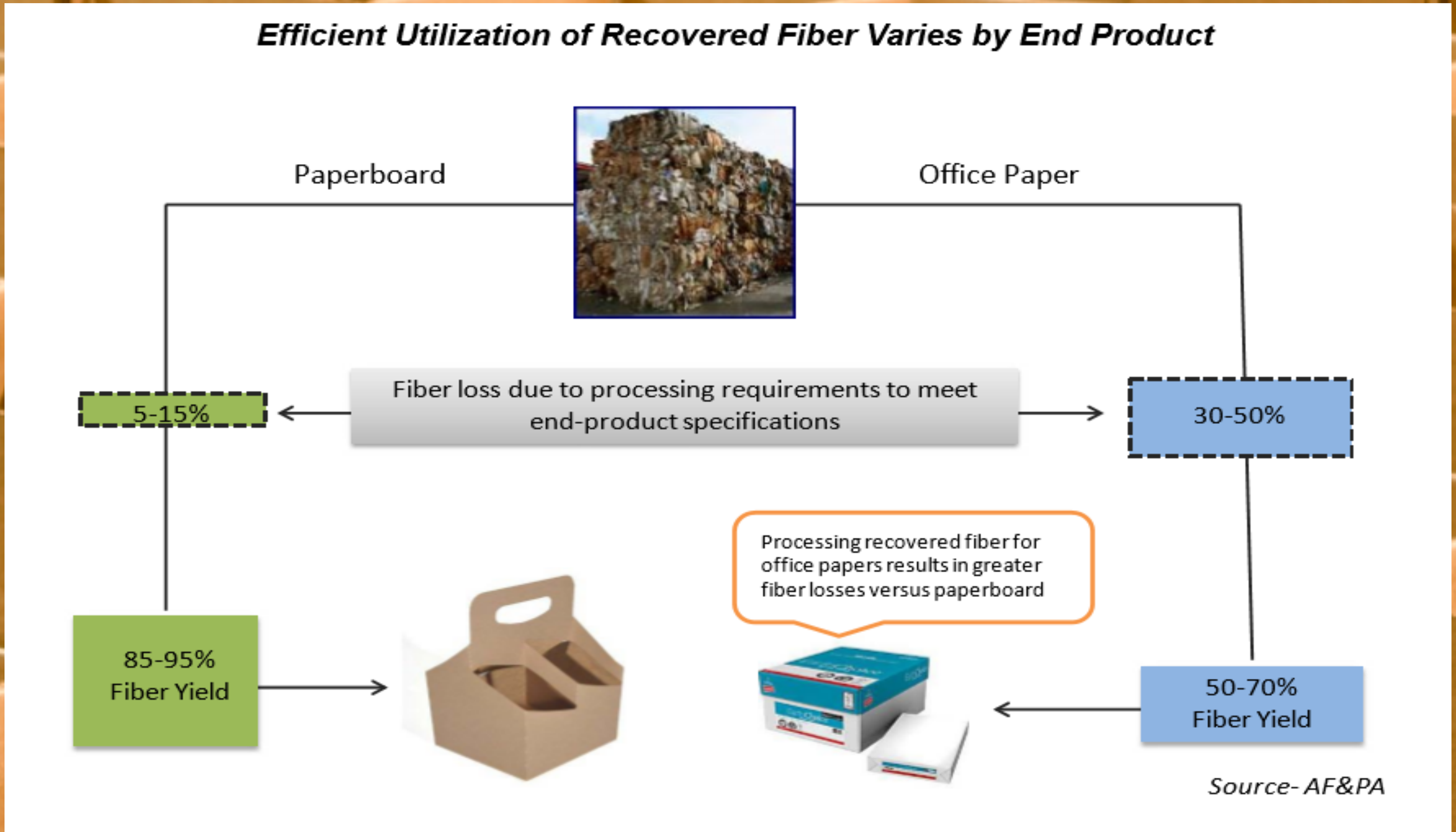
Case Studies:

1. Avoiding Unintended Consequences (paperboard)
2. Valuing Source Reduction (coffee packaging)
3. Life Cycle Thinking (food waste and packaging)

Avoiding Intended Consequences

- Recycled content mandates are a common policy currently used to promote recycling and the development of viable end markets for recycled material.
- It is argued that a mandate will stimulate markets by increasing demand for recycled content. This would therefore create more jobs and encourage a virtuous loop of material reuse.
- While using recycled content may generally provide an environmental benefit, there are circumstances where the opposite occurs (unintended consequence).

Example: Recycled Content Mandates



Example: Recycled Content Mandates

- A CE model, with its vision of reuse, offers an ideal aspirational state. Infers an effective policy.
- However, the SMM model would require evaluation of paper hierarchy uncovering where the greatest benefits and least environmental impacts will occur.
- Combined, they could create an effective strategy to identifying best use for recycled content.

Source Reduction – Coffee Packaging

Coffee Packaging Choices and Associated Environmental Impacts Source: USEPA	Steel Can 	Rigid Plastic Container 	Flexible Pouch 
Package weight, oz./11.5oz of coffee	4	3	0.4
Recycling rate by consumer	73%	28%	0%
MSW landfilled after recycling (lbs./100,000oz of coffee)	598	1171	217
Packaging GHG emissions, lbs. CO2e/11.5oz of coffee	0.77	0.28	0.05
GHG benefit of packaging recycling, lbs. CO2e/11.5oz of coffee	-0.45	-0.16	-0.02
Packaging net GHG emissions, lbs. CO2e/100,000 oz. of coffee	3,800	1,996	413
Packaging energy consumption, MJ/11.5oz of coffee	7.5	11.5	0.9
Energy benefit of packaging recycling, MJ/11.5oz of coffee	-5.0	-9.4	-1.3
Packaging net energy consumption, MJ/100,000 oz. of coffee	33,489	76,721	7,722

Source Reduction – Coffee Packaging

- If one adopted a packaging material based solely on recycling rate, the steel can would be the preferred material of choice. (It has an established closed loop system and steel is recoverable indefinitely.)
- However, this recycling-only approach overlooks the advantages of the source reduction offered by the flexible film pouch. The pouch produces significantly reduced discards, greenhouse gas emissions, and energy consumption.
- SMM framework here helps encourage material reduction through source reduction and results in cumulative net environmental gain. CE framework would encourage material reduction through material reuse but would result in cumulative net environmental impact.

Life Cycle Thinking – Meat Packaging

- Approximately sixty percent of household food waste arises from products not used because of perishability or shelf life that is too short.
- Since food production results in 80% of all US freshwater use, 10% of total energy demand and 50% of land use in the US, reducing food waste would significantly reduce our environmental impact.

Energy for One Person's Weekly Consumption of Food (MJ/Person/Week)

Energy Demand	51%	6.5%	3.5%	3.5%	3.0%	1.5%	17%	15%
Lifecycle Process	Food Supply	Primary Packaging	Secondary and Tertiary Packaging	Transport from Factory	Retailing	Selection	Storage	Cooking

Source: RMIT

Life Cycle Thinking – Meat Packaging

Environmental Impacts of Different Meat Packages (330g of meat) Source: Denkstatt	Sirloin Steak in Sealed Tray with Modified Air 	Sirloin Steak in Vacuum Sealed Pack 
Primary Package Weight	16 grams	19 grams
Recyclable Components	Polystyrene Tray may be recyclable	None
Shelf Life	6 days	16 days
Food Waste	34%	18%
Packaging GHG Emissions, grams CO2e	100	94
Food Waste GHG Emissions, grams CO2e	4,900	3,800

Life Cycle Thinking – Meat Packaging

- A CE model that may only look at packaging in isolation from its role, would not account for the benefit realized by decreasing the amount of food wasted as a result of shorter shelf life.

- When applying an SMM model to this example, both the packaging and the product would be included and environmental tradeoffs would be taken into account.

- The package choice which minimizes product loss is the better alternative since it reduces total waste (packaging plus product) and significantly reduces total environmental impact. Therefore, the right packaging is one which is optimized to provide better product protection and less total waste.

Policy Implications

- Policy decisions regarding packaging should be made from a systems perspective. Without the big picture, well intentioned strategies may result in unanticipated outcomes.

- Without knowing clearly what it is one wants to achieve unintended consequences are likely to result.

- Both models share similar objectives but each offer different pathways towards achievement. Need to understand where and how to leverage these frameworks in order to drive the greatest environmental benefits.

Conclusions

- We must understand that CE and SMM are not the same, nor in competition. The ways in which each defines the parameters, goals and objectives under which they operate, will set the tone for where and how actions towards sustainable packaging systems are focused.

- Rather than focusing on individual metrics, the specific process, or the framework deployed, we urge careful consideration of the entire packaging system—including packaging's primary role in protecting products.

- When we better define what we want to achieve, we'll be better informed about how to get there.

- AMERIPEN urges "big picture thinking" towards optimizing the packaging system.

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Thank You!

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