Moving beyond the hype to meaningful practice in the Circular Economy

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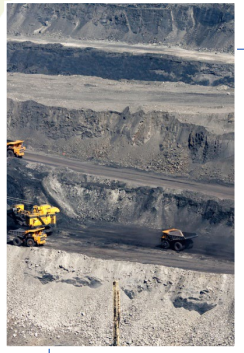
- As a Technical Fellow at ERM, I work with clients to develop and execute Circular Economy and product sustainability programs
- Teach product stewardship at Indiana University and product sustainability at Harvard University Extension School
- Education
  - BS, Chemistry, Indiana University
  - MS, Environmental Engineering, University of Massachusetts

Agenda

- Foundation
- Frameworks
- Practice

The phrase "Circular Economy" seems to be everywhere, from policy statements to company sustainability reports. Pressure to make more sustainable products grows. But how does a company avoid the pitfalls of greenwashing or wasted effort to turn these theoretical constructs into meaningful practice? This session will demystify concepts and provide attendees with practical tools to define strategy and related tactics. We will explore emerging frameworks that define participation in the Circular Economy, using case studies to demonstrate practical alignment of Circularity precepts with product types and business strategy.

Call to Action



Between 2015 and 2021, 70% more virgin materials were extracted than what the Earth can safely replenish.

Our take-make-waste economy consumes 100 billion tonnes of materials a year and wastes over 90%.

70% of all global greenhouse gas emissions are related to material handling and use.

(Circle Hub, 2022)

Foundation

Definition

Scale varies: regions/countries, company and/or products.

- Design out Waste and Pollution
- Keep Products and Materials in Use
- Regenerate Natural Systems

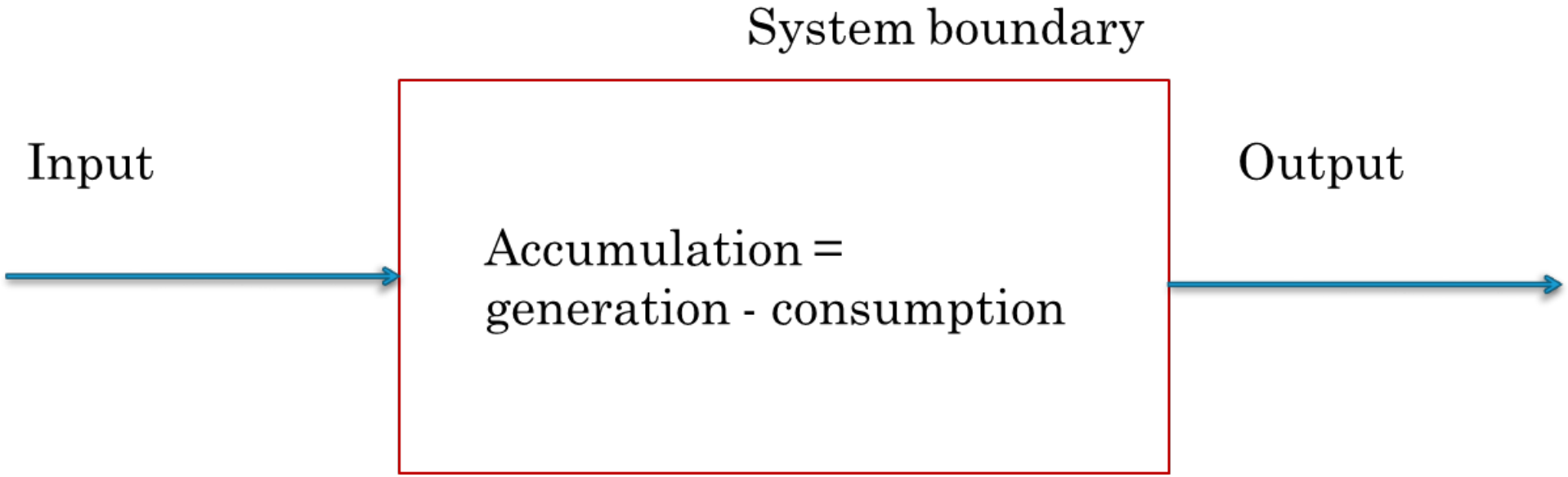
(Ellen Macarthur Foundation, undated)

Challenge #1: Defining a Program

“The debate on the most suited metrics for CE is very much open, no consensus has been reached yet which creates a subjective methodological framework for assessing CE.”

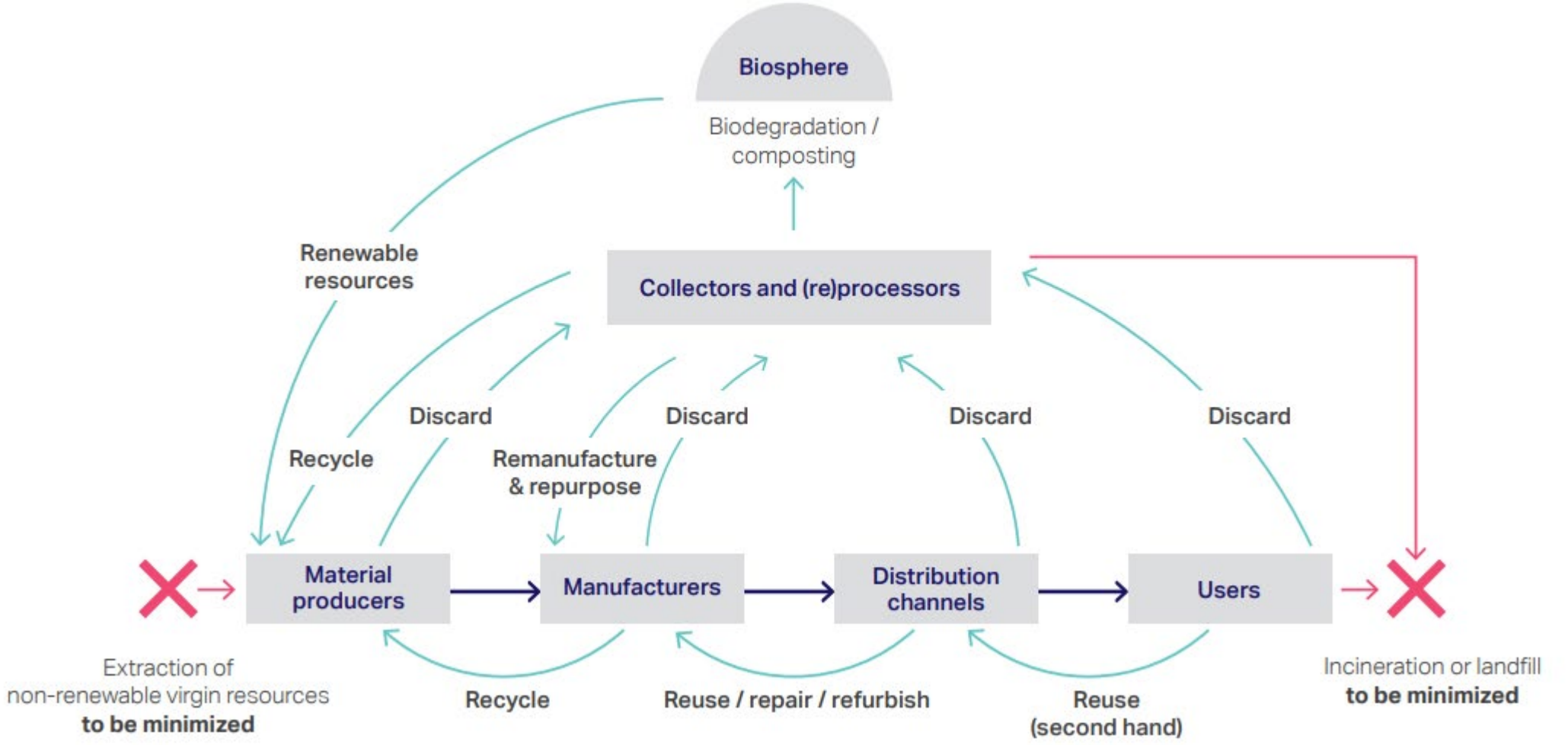
(Niero, 2019)

Essential Concept: Mass Balance



At each step in the product life cycle, we can account for the use of energy and raw materials (input), and the waste generated - solid, liquid, wastewater, air emissions (output).

Essential Concept: Material Flow



(WBCSD, 2022)

Is it just about generation and reuse of waste?

Materials

- Recycled/ recyclable materials for product or packaging
- Biobased / renewable materials
- Chemicals that present lower risk (considering toxicity and exposure)
- Optimized Scope 3 emissions in supply chain

Manufacture

- Make manufacturing more efficient to reduce waste
- Use less water / energy
- Use renewable energy
- Minimize GHG emissions

Distribution and Use

- Minimize cold chain; rethink distribution networks
- Design for durability (including disassembly and repair)
- Minimize resource demand during use

End of Life

- Minimize weight/volume of product and/or packaging
- Design for disassembly
- Reusable
- Recyclable materials

(For an interesting survey of factors considered, see Kristensen and Mosgaard, 2020.)

Challenge #2: Building a Program

It can be appealing to start with the “fun stuff”, digging into the data and the science. Successful programs require planning and structure.

Planning	Executing	Assuring	Sustaining
• Ambition level • Goals/ components • Metrics / KPIs • Management support	• Systems and processes • Tools • Training	• Certifications and performance • Assurance • Management review	• Communications • Continual improvement

Developing a strategic program

1. Identify drivers and strategic goals

- Determine level of ambition and strategic goals, considering
  - Business goals
  - Stakeholder considerations
  - Sustainability goals
- Determine scope and boundaries
- Consider aiming toward product claims
- **Develop executive support**

2. Identify focus based on business and sustainability value

- Regulatory requirements
- Customer requirements
- Consider:
  - Sourcing: renewable, recycled
  - Greener chemistry
  - Carbon and other resources
  - Process waste
  - End of life impacts (e.g., recyclable)
  - Handprinting, i.e., accounting for positive value

3. Define methodology to fit the focus

- Examples:
  - Relevant frameworks and certifications
  - Product Life Cycle Assessment (LCA)
  - Custom scoring tool
  - Alternative business models, such as adding services to a product line, leasing rather than selling, changing relationship with customers or partners in value chain, and/or additional data collection

4. Develop process and tools

- Engage internal and external stakeholders
- Integrate with existing processes
- Develop fit-for-purpose processes/ tools / support for marketing materials
- Determine measures of success / KPIs
- Engage and train teams

5. Implement program

- “Start small, grow big” – pilot first and then scale up
- Measure business impact
- Build momentum, internally and externally, by telling success stories
- Learn from program experience: modify and extend if appropriate to other products
- Celebrate success

Where do I start?

Determine level of ambition and goals

Business goals	Stakeholder concerns	Sustainability goals	Regulatory requirements and other norms

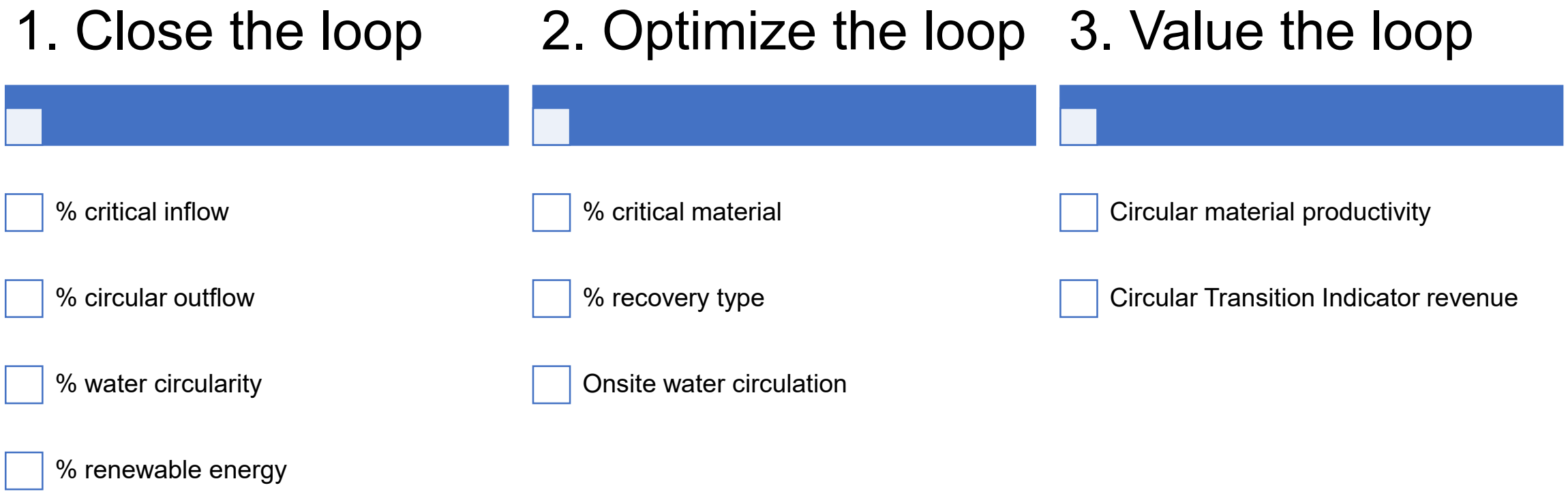
• Innovation
• High volume sales; aim of market advantage and new customers
• Plans for expansion or renovation of facilities
• Potential ROI of minimizing resource use or waste generation
• Brand positioning against competitors
	• Customer expectations, e.g.,
	  • Less toxic
	  • "Free of"
	  • Lower GHG emissions
	  • No single use plastic
	  • Recyclable
	• Shareholder concerns
		• Commitments to UN Sustainable Development Goals
		• Quantitative company goals to
		  • Conserve resources
		  • Reduce GHG emissions
		  • Zero Waste to Landfill
			• Regulatory
			  • EU Green Deal / EU Taxonomy
			  • "Safe and Sustainable by Design"
			  • Evolving restrictions on the use of plastics
			• Other constructs
			  • NGO or industry programs

Frameworks

Overview of example frameworks provided for awareness;

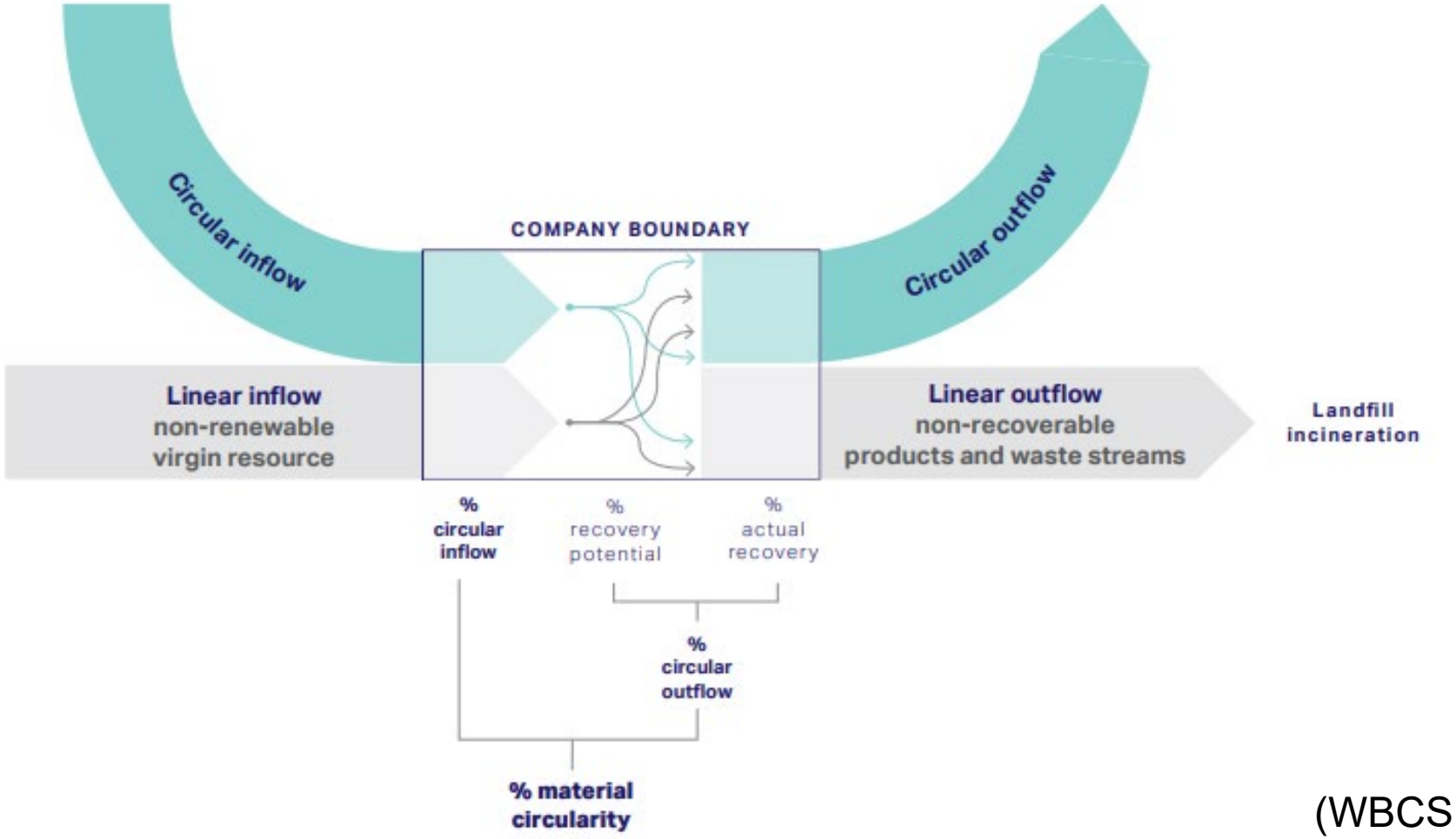
See the references at the end of this file for more information.

WBCSD Circular Transition Indicator (CTI)



(WBCSD, 2022)

WBCSD CTI Calculations



(WBCSD, 2022)

EMF Material Circularity Indicator

Calculation combines three characteristics:

- Mass of virgin raw material used in manufacture (vs recycled or biological originating from sustained production)
- Mass of waste going to landfill or energy recovery (not recycled, recovered, or composted) attributed to the product
- Utility factor that accounts for the length and intensity of the product's use

(EMF and ANSYS Granta, 2019; See also Circulytics approach, EMF, 2017 a, b)

Frameworks

Originator and Framework	Description
ISO Standards (2024)	ISO/TC 323/WG 1: Terminology, principles, frameworks and management system standard ISO/TC 323/WG 2: Practical approaches to develop and implement Circular Economy ISO/TC 323/WG 3: Measuring and assessing circularity ISO/TC 323/WG 4: Circular Economy in practice: experience feedback ISO/TC 323/WG 5: Product circularity data sheet

(ISO, undated)

Tools to Assess Products

Life Cycle Assessment

Climate change	Ozone depletion	Ecotoxicity for aquatic fresh water
Human toxicity – cancer effects	Human toxicity – noncancer effects	Particulate matter / respiratory inorganics
Ionizing radiation – human health effects	Photochemical oxygen demand	Acidification
Eutrophication – terrestrial	Eutrophication – aquatic	Resource depletion – water
Resource depletion – mineral, fossil	Land transformation	

Impact Profit & Loss

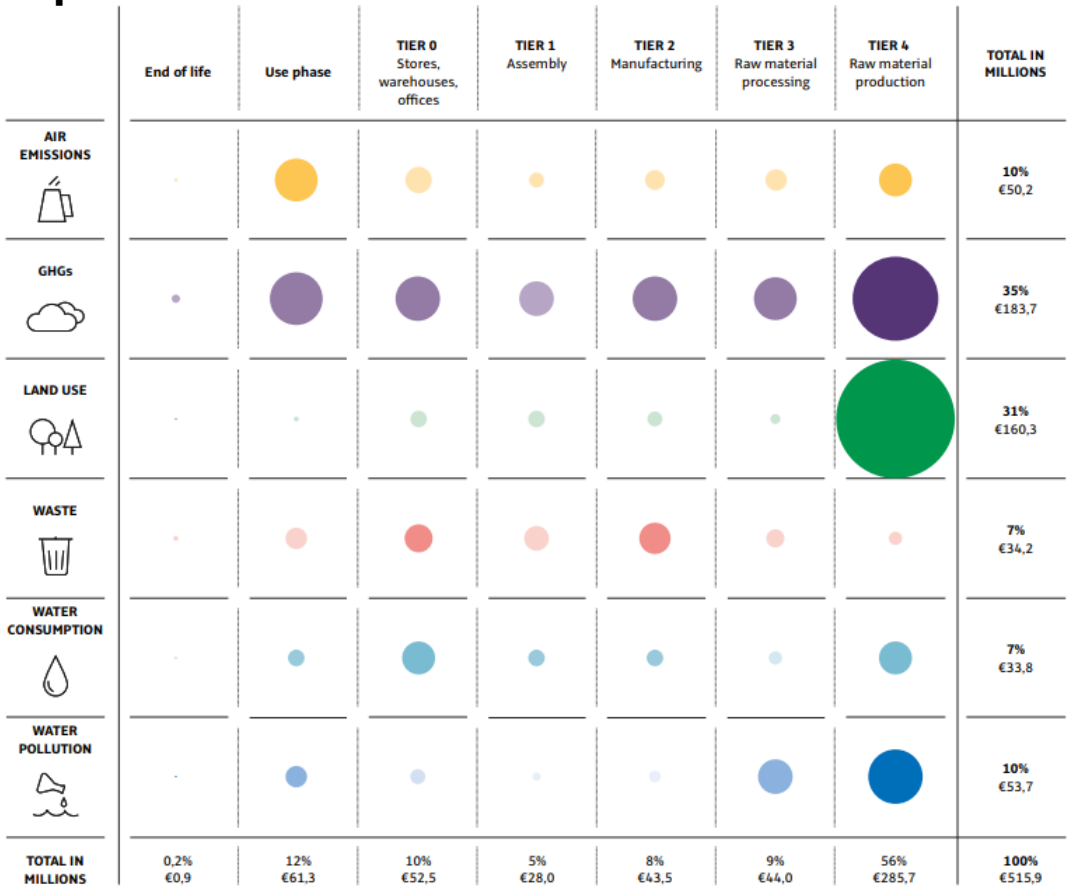


Image credit: Kering EP&L Report 2020

Challenge #3: Implementation

- Initiatives often start with what's obvious, but what's obvious may not have significant impact. Successful programs balance passion and hard-headed quantification.
- Effective programs reflect the company's business model, including the ways in which they work with their suppliers.
- Most companies struggle to compile the data needed to guide and measure their progress.
- Certain actions (e.g., collection of materials for recycling after use) require actions that may be outside of a company's control.
- Circularity can require investments into new partnerships, segments of the supply chain, and technology.
- Companies grapple with the cost implications.

Practice

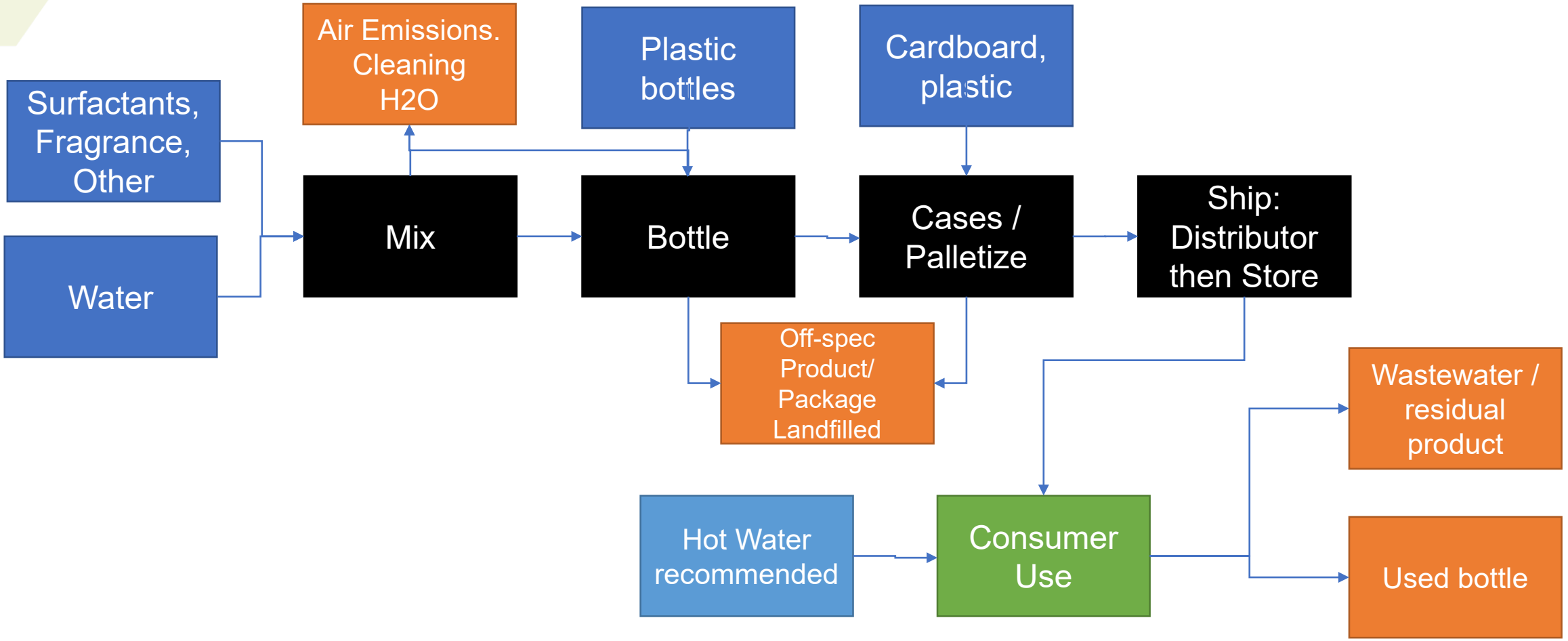
Group Exercise

Your company's flagship product line comprises cleaning solutions for consumers to use at home. Based on a market study, the CEO wants to position the products as being sustainable, and recently read somewhere about circularity. You've been asked to develop conceptual ideas to make the product more circular.

Based on this information and the process flow diagram on the next page,

- Describe qualitative goals for what you would like to achieve
- identify how you would like to reconsider the way the product is made or used in light of those goals.
- Identify unknowns or aspects of the process/ product that you need to learn more about.

Simplified Process Flow Diagram



Thank you

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