ptc

LIVEWORX

A NEW ERA IN PRODUCT LIFECYCLE INNOVATION

SESSION ID: ES1079B

PRODUCT SUSTAINABILITY 101

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VP, Sustainability - PTC

May 16, 2023

AGENDA

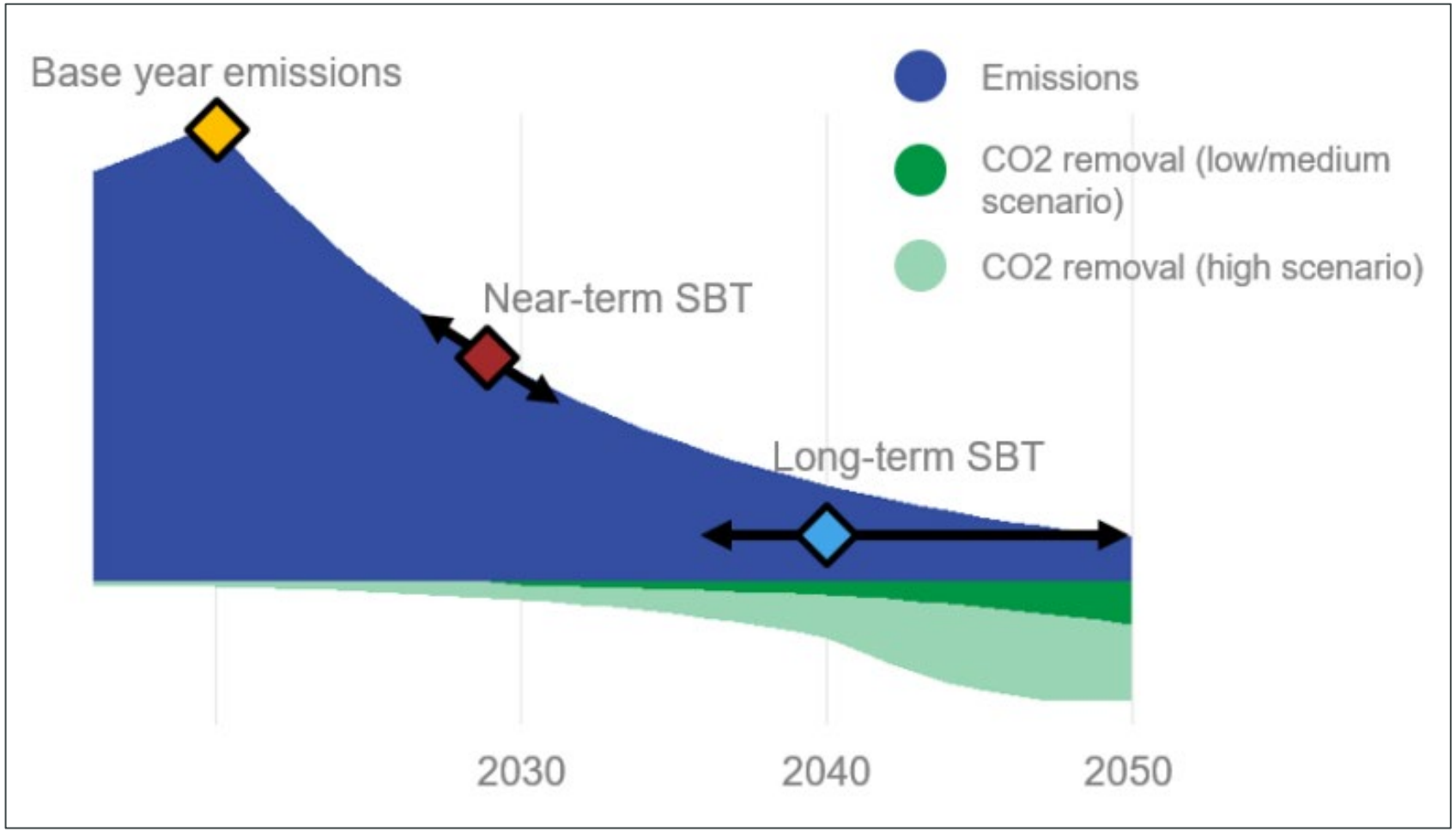
- **Business Framing**
- Technical Framing
- Takeaways & Track Guidance

WHAT IS "SUSTAINABILITY"? WHERE DOES PTC FOCUS?

- Big picture
  - Sustainability strives to meet our needs without compromising needs of future generations
  - The United Nations' 17 Goals for Sustainable Development is the most recognized playbook
  - Companies track sustainability through "ESG" (Environmental, Social, Governance) reporting
- PTC's products help our customers on specific **Environmental** goals:

Customer Goal	Relevant UN Goals	Where PTC helps
Improve Product Sustainability	UN Goal# 7 (Affordable & Clean Energy) UN Goal # 9 (Industry, Innovation, & Infrastructure) UN Goal # 12 (Responsible Consumption & Production)	**Dematerialization** **Energy efficiency** **Waste reduction**

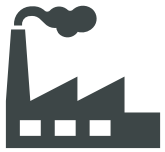
SCIENCE-BASED TARGET INITIATIVE– REDUCTIONS



Science-Based Target (SBT) commitments typically require 50% footprint reduction by 2030, then 50% after that per decade, and "net zero" by 2050 with allowable CO2 removal offsets

GREENHOUSE GAS ACCOUNTING- BASICS

Unit of Measure: Metric Tons of Carbon Dioxide equivalent emissions (MT CO2e)



Scope 1

"Direct" emissions (basically, exhaust pipes)

Counted only once

- Building gas or oil heating units
- Factory furnaces for steam power, smelters, boilers, etc
- Owned and leased gas-powered vehicles

Scope 2

"Indirect" electricity emissions

Electric utility counts as their Scope 1

- Factories and office building electricity
- Private data centers
- Owned and leased electric vehicles

Scope 3

All other "Indirect" emissions

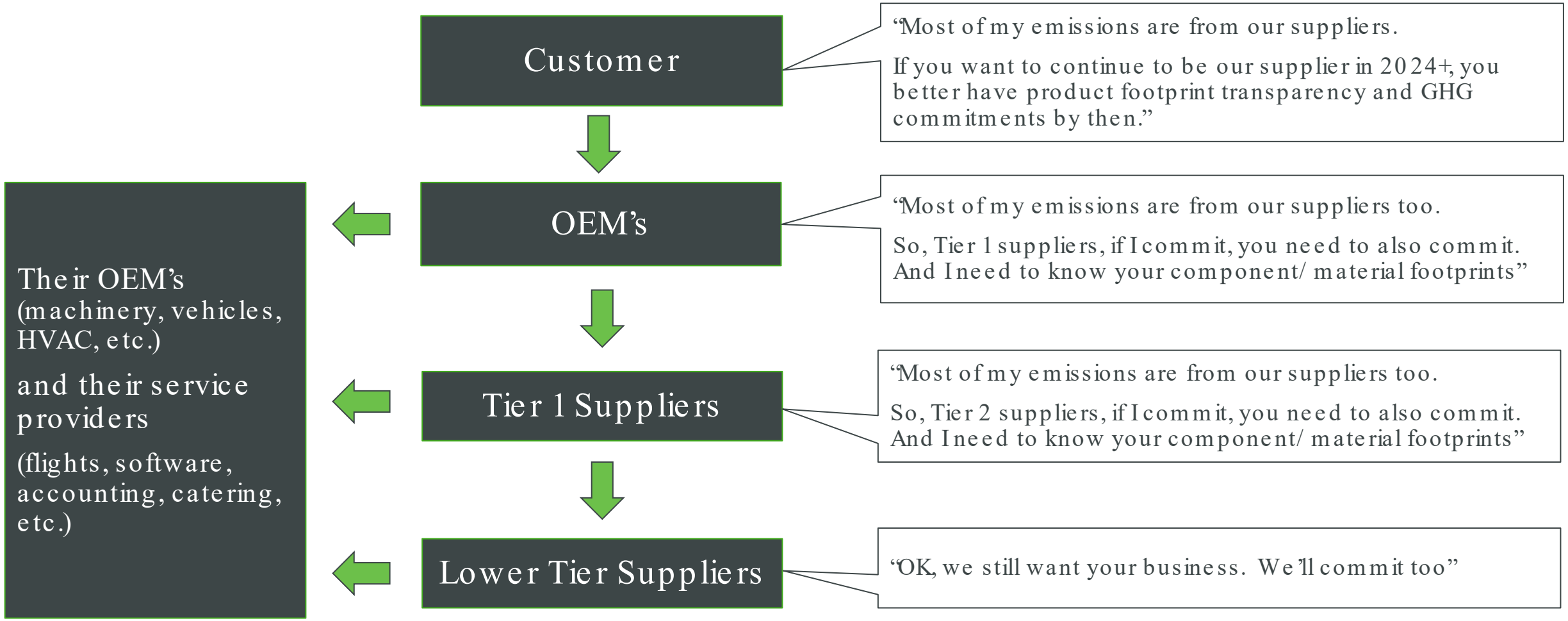
"Upstream" inherited from supply chain

"Downstream" caused by customers using your products

- Purchased goods and services (including factory supplies)
- Customer usage of your manufactured products
- Commuting in cars and mass transit
- Business travel – planes, trains, cars, hotels, meals
- Shared data centers (Microsoft, AWS, etc)
- Events
- Waste

WHY IS SUSTAINABILITY SUDDENLY HOT EVERYWHERE?

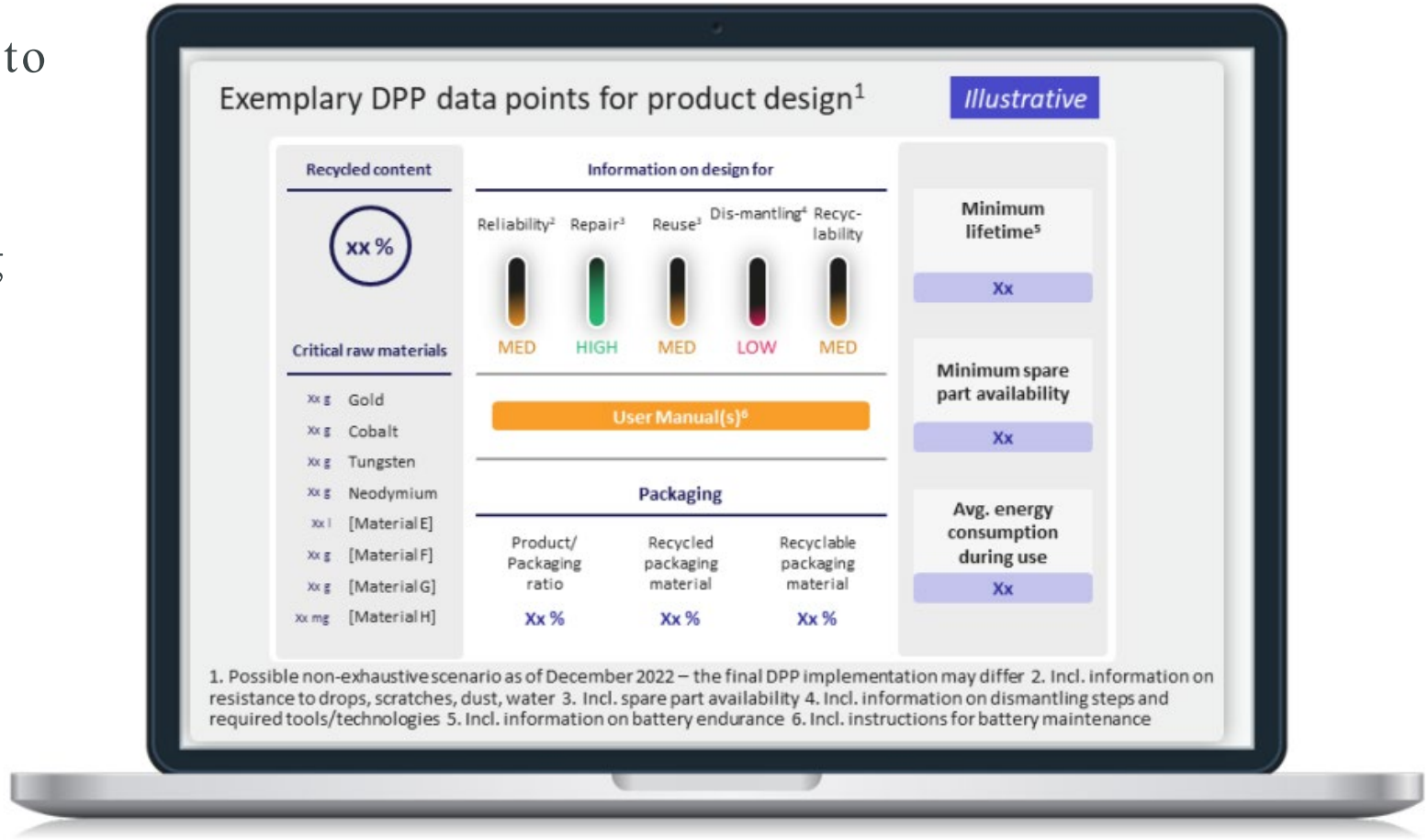
Scope 3 Supplier emissions accounting, paired with commitments, is the catalyst



PRODUCT FOOTPRINT TRANSPARENCY

Customers and regulators are demanding more

- The ‘M’ is necessary in ‘BOM’ to compute these disclosures
- Investors and customers reward manufacturers that have leading product-specific footprint transparency
- Footprints are not just CO2e
  - Hazardous materials
  - Recycled content
  - Circularity
  - Fair labor practices
  - more



SUSTAINABILITY: BUSINESS FRAMING

Global firms are committing to science-based targets due to CDP, CSRD, and other pressures.

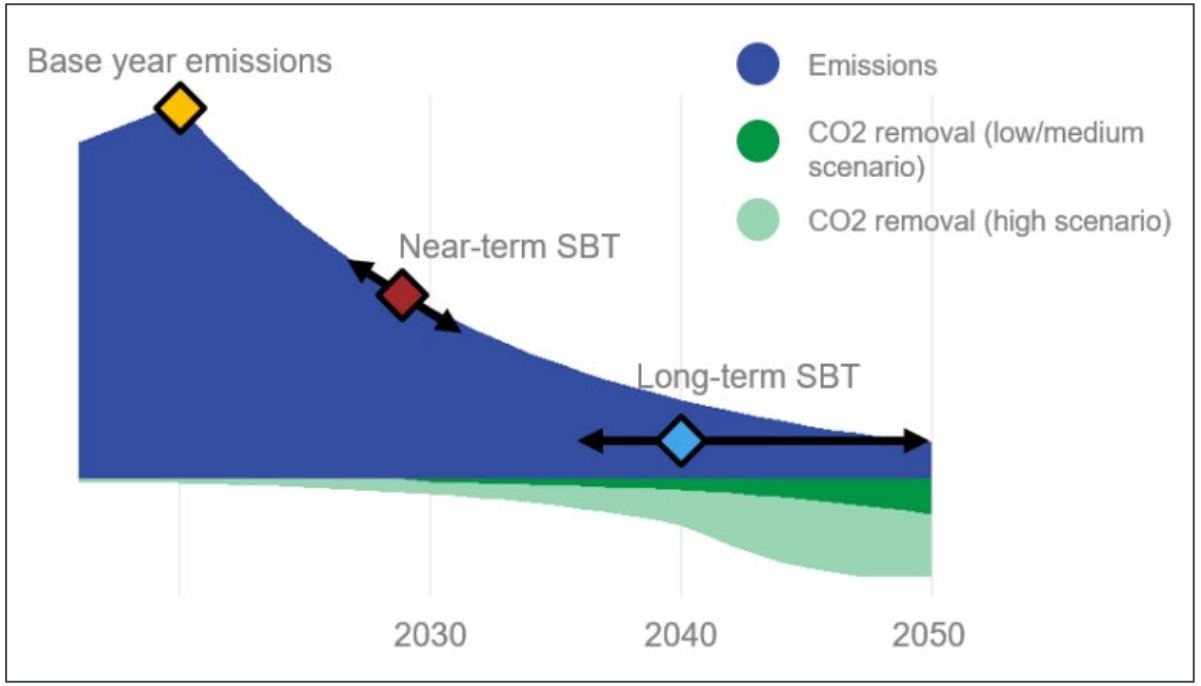
Often, 70%-90% of a firm's footprint is sourced within their supply chain ("Scope 3" emissions).

Customer prefer products with lower and transparent footprints.

Purchasing

"How do we ramp down our footprint? Let's find product, part, and material suppliers with transparent footprints and reduction commitments."

Supplier footprints



Science-Based Target (SBT) commitments typically require 50% footprint reduction by 2030, then 50% after that per decade, and "net zero" by 2050 (with allowable CO2 removal offsets only for the last 10% of emissions).

Sales

"To compete, our products need transparent and improved footprints"

Product footprints and transparency

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- **Technical Framing**
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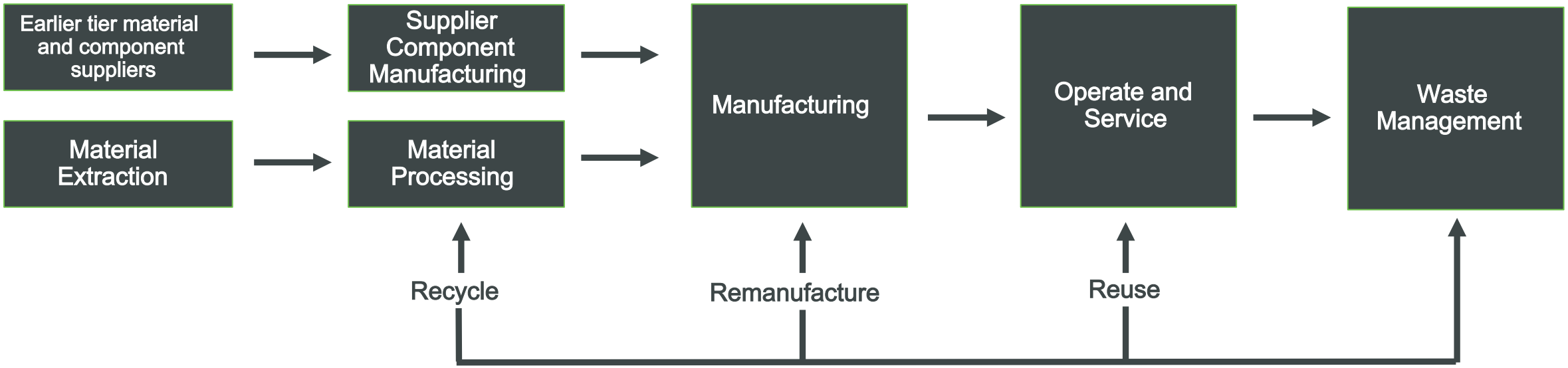
PRODUCT FOOTPRINT ACROSS THE LIFECYCLE

Engineers and other decision makers balance **cost**, **performance**, **risk**, **time-to-market**, **manufacturability**, **serviceability**, and **sustainability**

This is a sustainability-centered view of the product lifecycle:

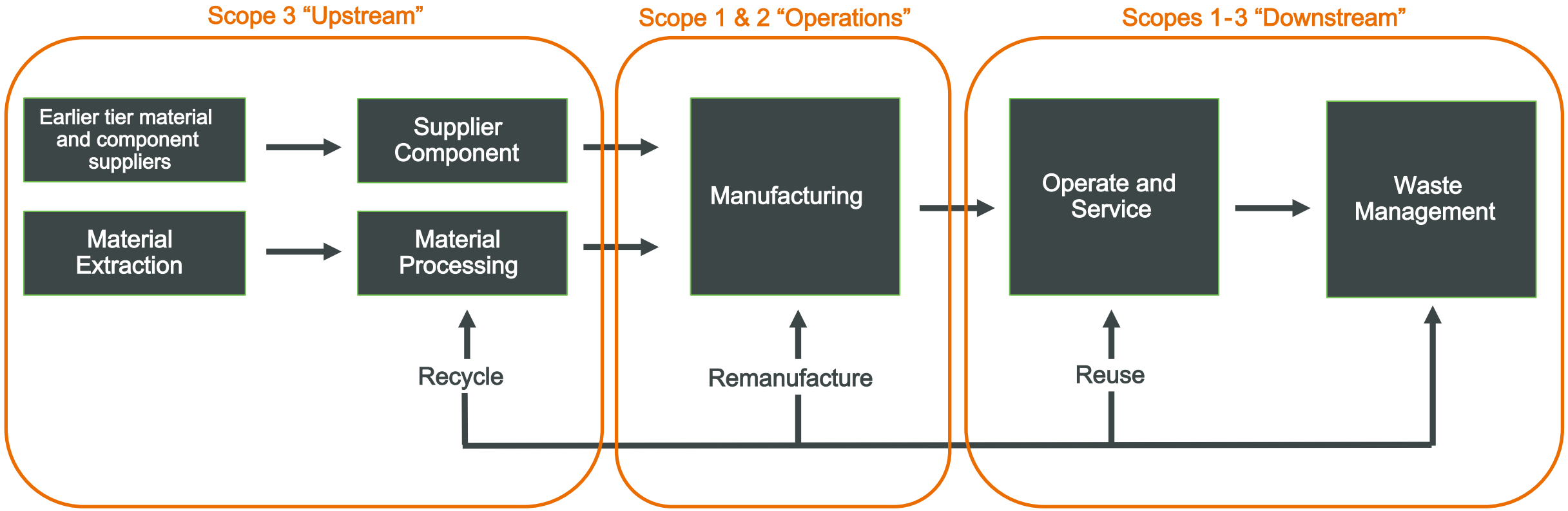


PRODUCT FOOTPRINT– LIFECYCLE PERSPECTIVE

Surprising little of a product's footprint is in the direct manufacturing process

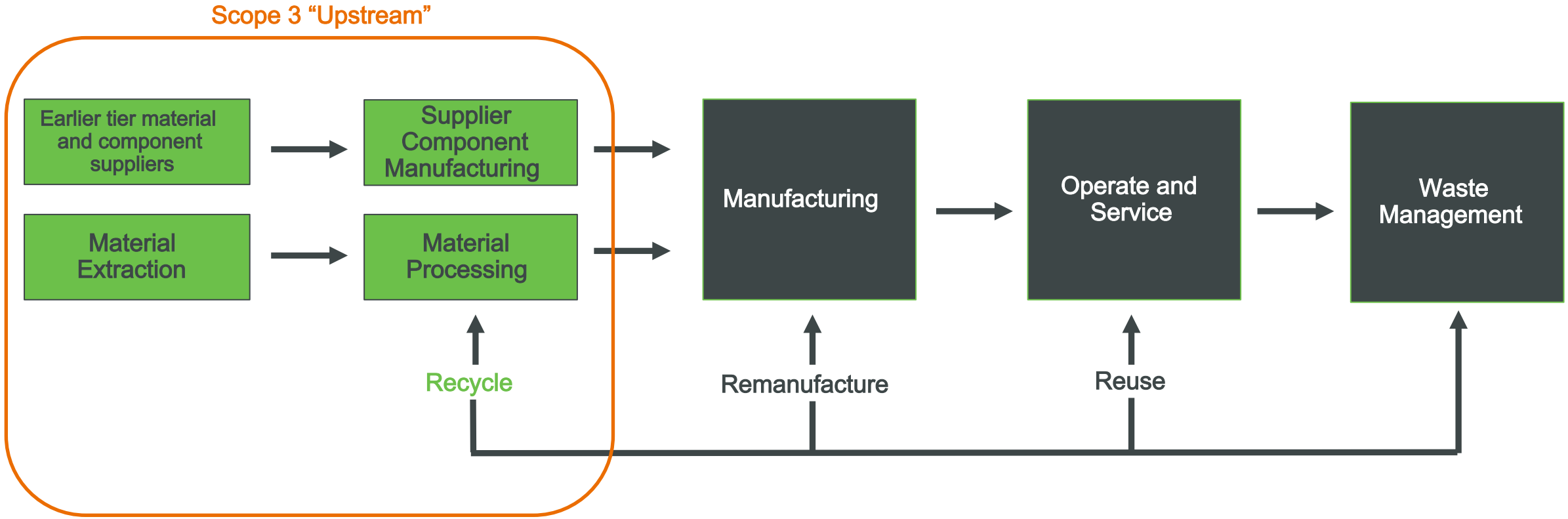
Typically, over 90% of product footprint is with Scope 3.

- "Upstream" materials and components are often the biggest contributors (and vary widely by supplier)
- Mobility and heavily-electrified products may also have big "downstream" footprints



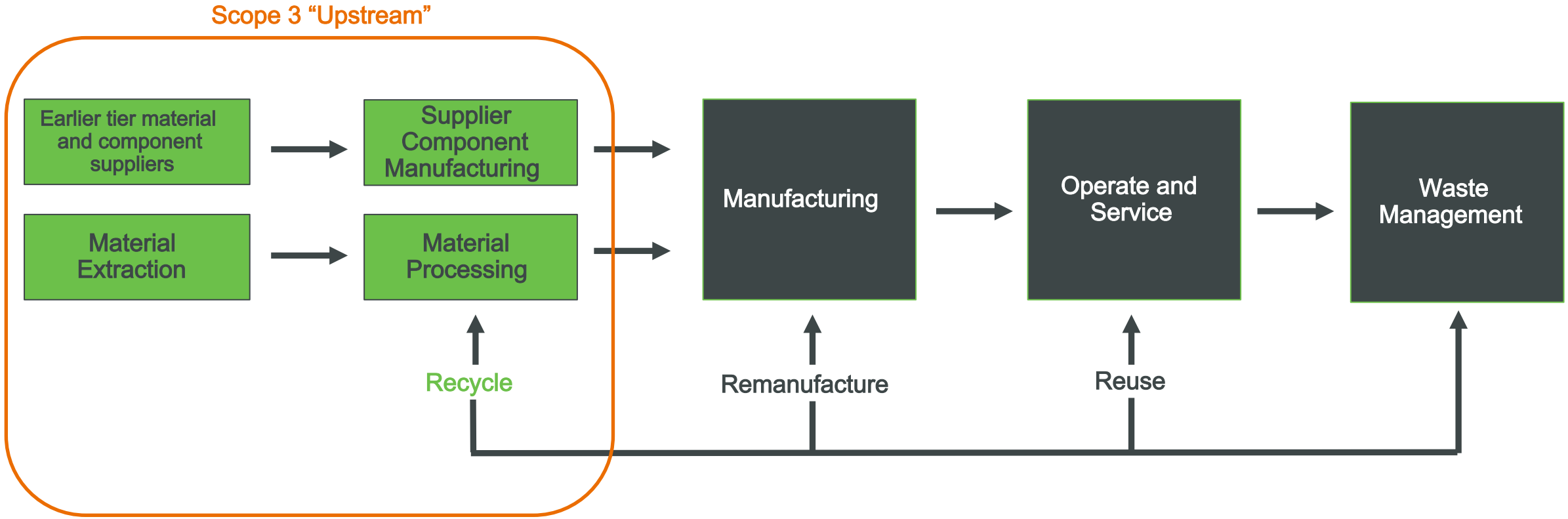
UPSTREAM FOOTPRINT– QUESTIONS TO ANSWER

- What is the form, fit , function of the component/ material (mechanical, thermal, electrical, optical, durability)?
- What are the commercials for the component/ material (supplier name, supplier location, cost)?
- What is the estimated footprint of the component/ material (recycling, hazmat compliance, embodied carbon)?
- What is the risk of the selected supplier (supplier rating, inventory reliability, geopolitical sourcing issues)?
- How may I use as little of the material as possible to meet the specification (light-weighting)?



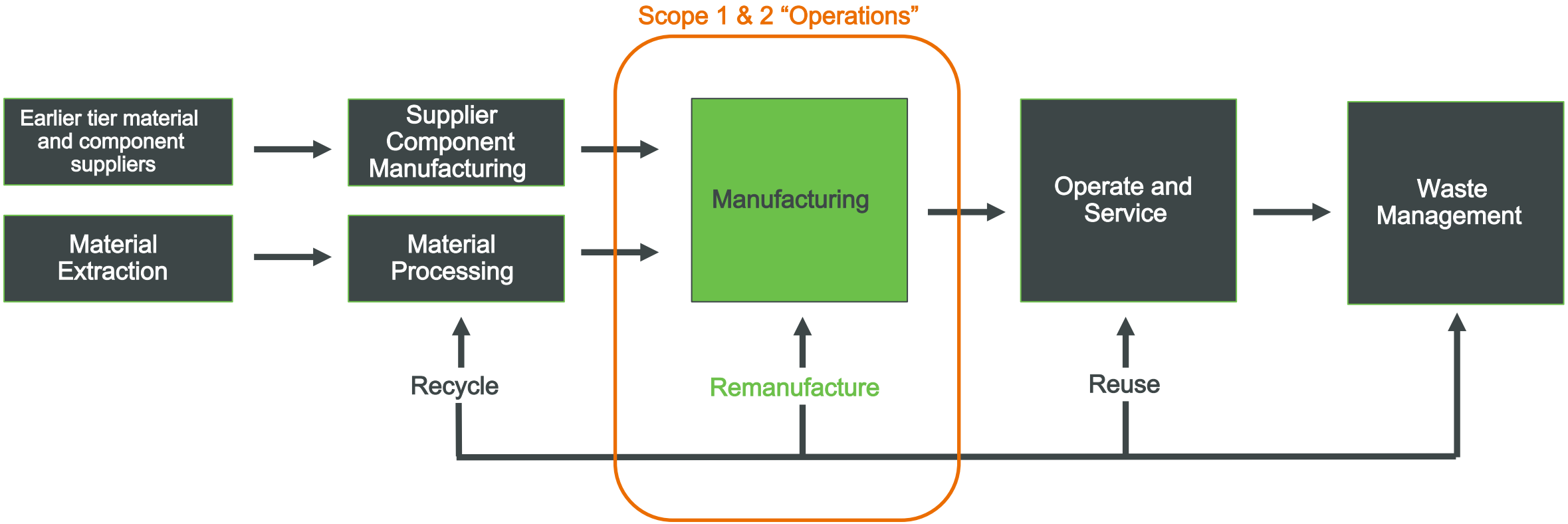
UPSTREAM FOOTPRINT– NEAR-TERM ACTIONS TO CONSIDER

- xBOM management (foundation)
- Material management (for "make" parts)
- Supplier component management (for "buy" parts)
- Generative design (for "make" parts)



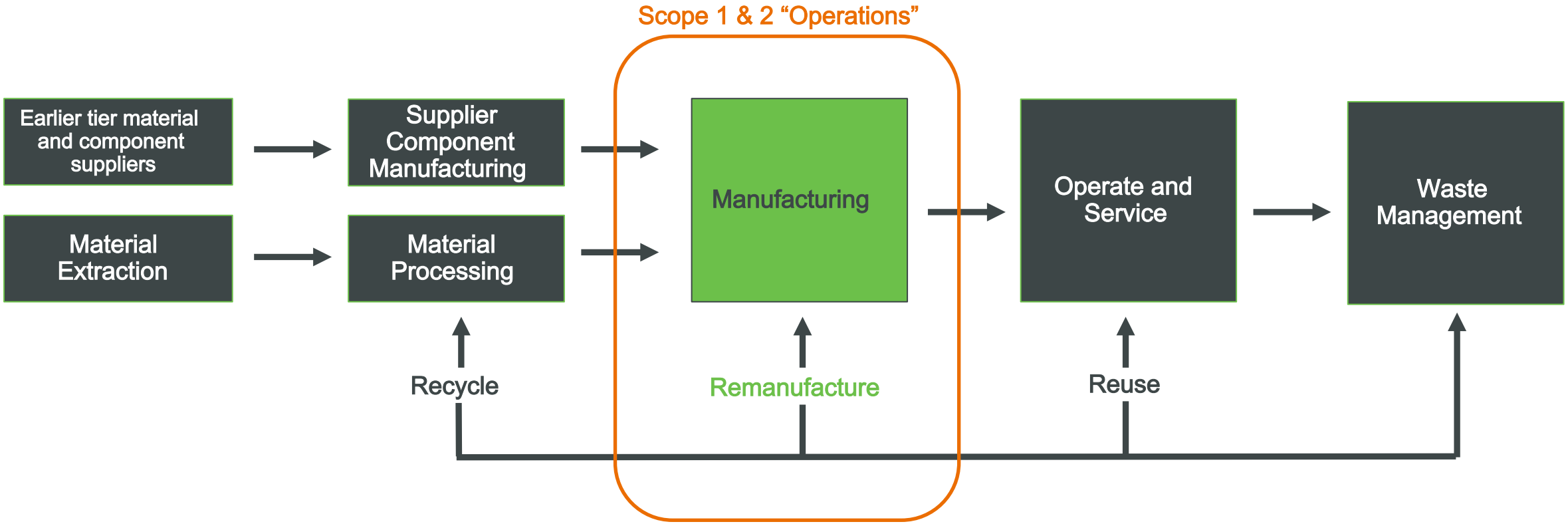
OPERATIONS FOOTPRINT– QUESTIONS TO ANSWER

- Is my part design manufacturable to its specifications?
- What should it cost to manufacture a given lot size of this part?
- What is the estimated manufacturing footprint of the part (waste, energy used, GHG)?
- What opportunities do I have within my factories to improve energy efficiency and scrap rates?
- What are my near-shore opportunities?



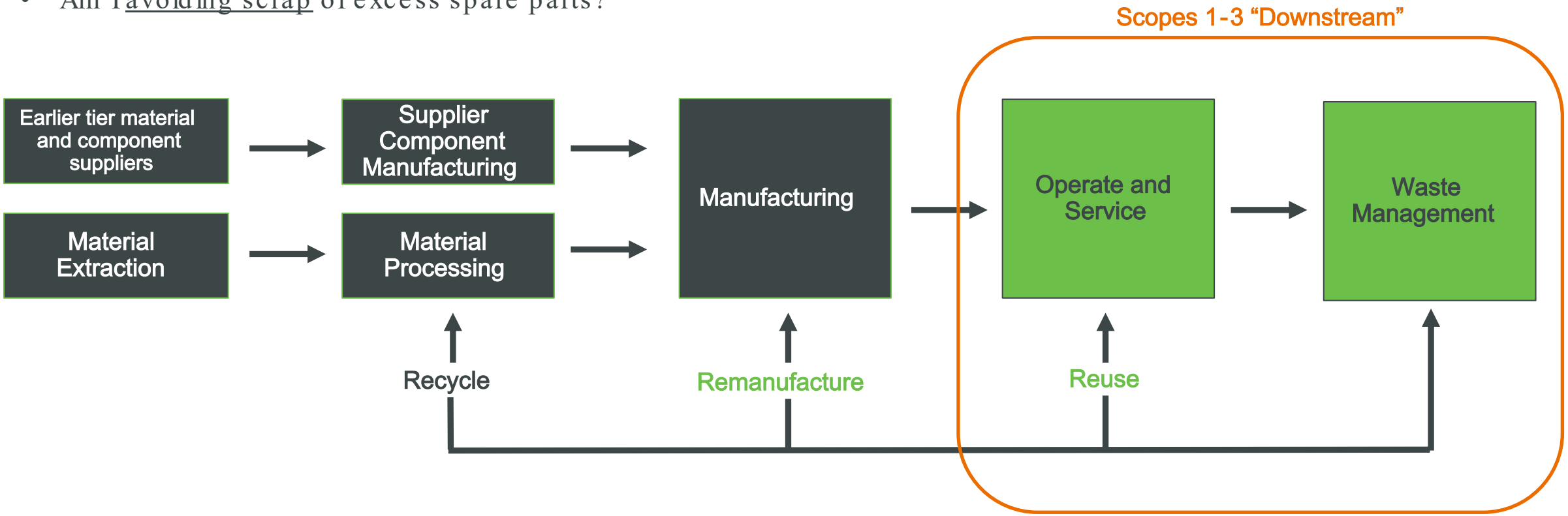
OPERATIONS FOOTPRINT– NEAR-TERM ACTIONS TO CONSIDER

- Manufacturing Insights (for manufacturability, cost, and footprint)
- Manufacturing planning (to enable near-shore flexibility)
- Energy management of factory assets (reduce electricity, fossil fuel, and water usage)
- Digital performance management in factory (reduce waste and energy per unit manufactured)



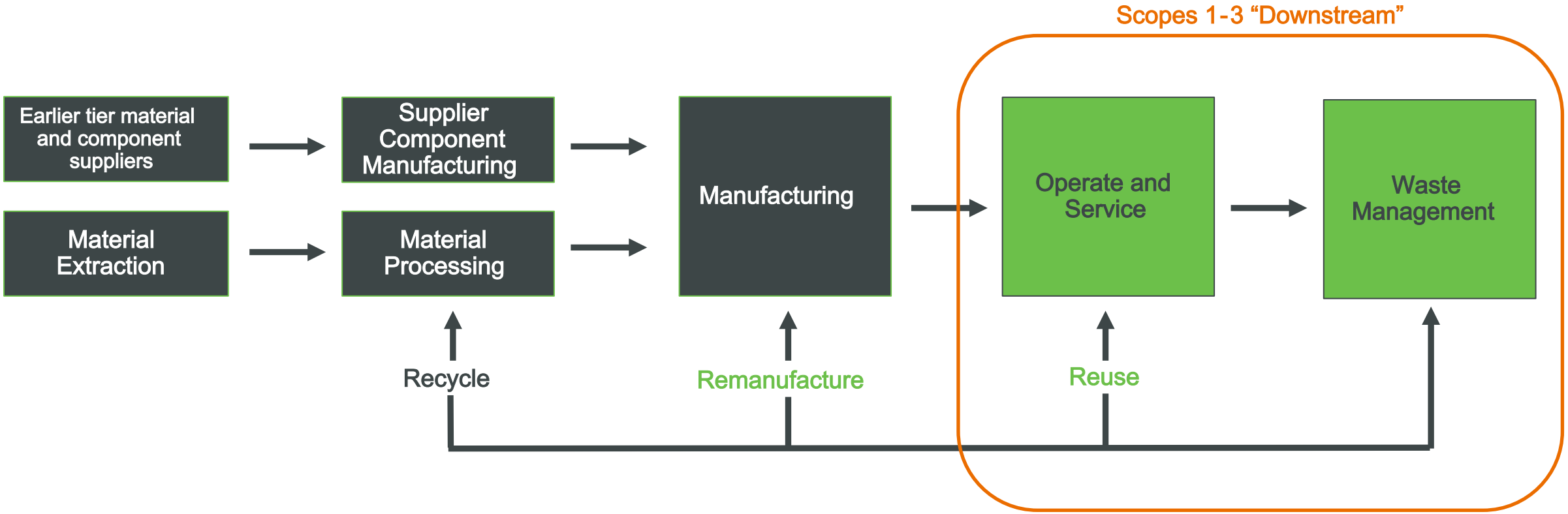
DOWNSTREAM FOOTPRINT– QUESTIONS TO ANSWER

- Is my asset light-weighted (for mobile assets)?
- Is my asset durable and utilized to its fullest extent?
- Am I using the lowest cost/ impact service options to maintain my asset?
- Are my spare parts and end-of-life products recovered at the highest value chain levels?
- Am I avoiding scrap of excess spare parts?



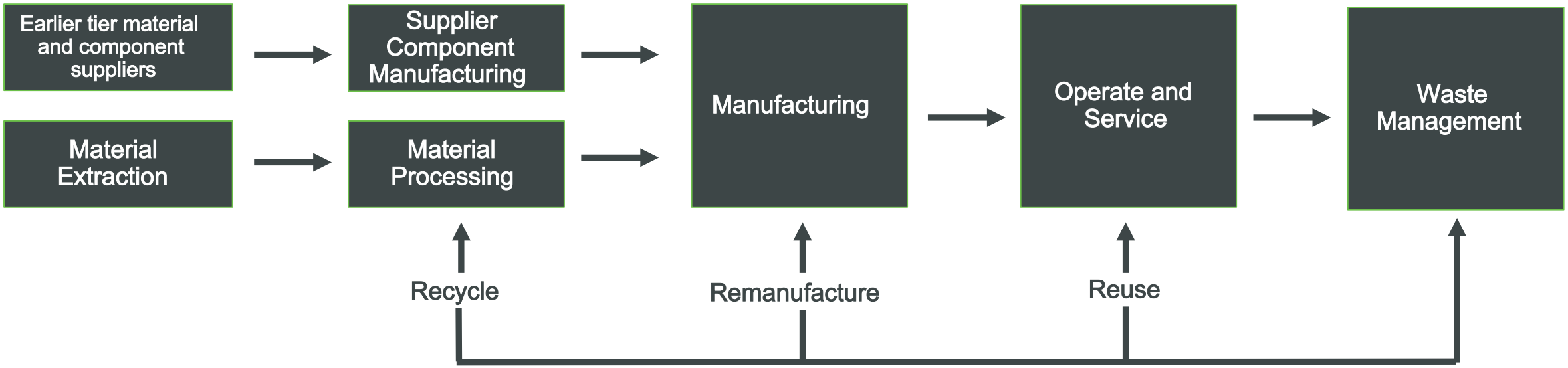
DOWNSTREAM FOOTPRINT– NEAR-TERM ACTIONS TO CONSIDER

- Generative design (for light-weighting mobile assets)
- Modular design with disassembly instructions (to enable circular recovery)
- Asset-centric field service (reduce truck dispatches and part changes)
- Service parts optimization (reduce part inventory scrap and expedited shipping)



PRODUCT FOOTPRINT– MID TERM PLANNING

- Sustainability requirement/ regulation compliance (CSRD, etc)
- Product footprint transparency
- Circular business models



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TAKEAWAYS AND WHERE TO LEARN MORE THIS WEEK

ES1777T: General session on Sustainability. Visit Green@PTC in the Xtropolis to learn more or seek agenda guidance

Sustainability Action	Mainstream timing	Sessions	Xtropolis
Upstream (materials, components)	Near-term	ES1162P – Design for Sustainability panel ES1078C – Cummins spotlight PL1764B – Retail sustainability	Windchill Extensions 1510, ANSYS Granta 205, Altium 1002, Higgs & Made2Flow (retail) 100, Arena 1520
Upstream (generative, simulation)	Near-term	ES1078C – Cummins spotlight CA1492B – ANSYS and PTC on simulation	ANSYS 205, Creo Generative Design 1512, ESI Group 402, Onshape 1522
Operations (manufacturing planning, performance management, energy management)	Near-term	ES1161P – Sustainability in Operations panel ES1163C – Vestas spotlight II1142B – Safran spotlight II1242B – Frost & Sullivan CA1884B – aPriori Manufacturing Insights	ThingWorx Digital Performance Management 1504, aPriori 702, Rockwell-Kalypso 1301, Transition Technologies 704, LTTS 1101, iBASEt 301
Downstream (remote service, dispatch, part inventory, modularity and instructions)	Near-term	SE1349 – SLM and Sustainability panel ES1161P – Sustainability in Operations panel AR1538B – Harpak-Ulma spotlight CA1057C – Onshape modular design SE1847I– Conditioned based maintenance	Servigistics 1500, ServiceMax 1500, Arbortext 1500, Vuforia 1502, Windchill 1510. Aquant 1003, Onshape 1522, DxP 201
Product footprint transparency	Mid-term	ES1162P – Design for Sustainability panel ES1801B – TTPSC on Green PLM	ANSYS Granta 205, aPriori 702, Transition Technologies 704
Requirements tracing with design	Mid-term	PL1111B – Schaeffler spotlight PL1126B – Requirements tracing ES1852I:- Deloitte on ESG	Codebeamer 1508, Deloitte 800, PROSTEP 403, Capgemini 1103
Circular business models	Mid-term	SE1349 – SLM and Sustainability panel SE1430B – Supplier recovery	Servigistics 1500, ServiceMax 1500, Warranty Management 1500

Previous sessions for content downloads if you missed them: PL1125B, SE1063B, PL1118B, ES1772B, PL1119B

QUESTIONS?

Thank you! You can find me at:

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