



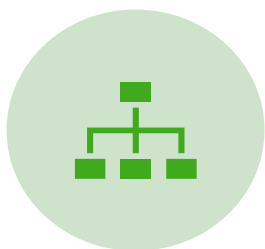
PTC X PLM GREEN ALLIANCE

Dave Duncan
VP Sustainability, PTC



CSRD

Corporate Sustainability Reporting Directive



WHAT

A process where companies communicate their impact on the environment, society, and governance



PROCESS

Discloses information and data about company economics, and ESG performance



WHO

More than 50,000 organizations worldwide need to begin disclosing ESG data and information

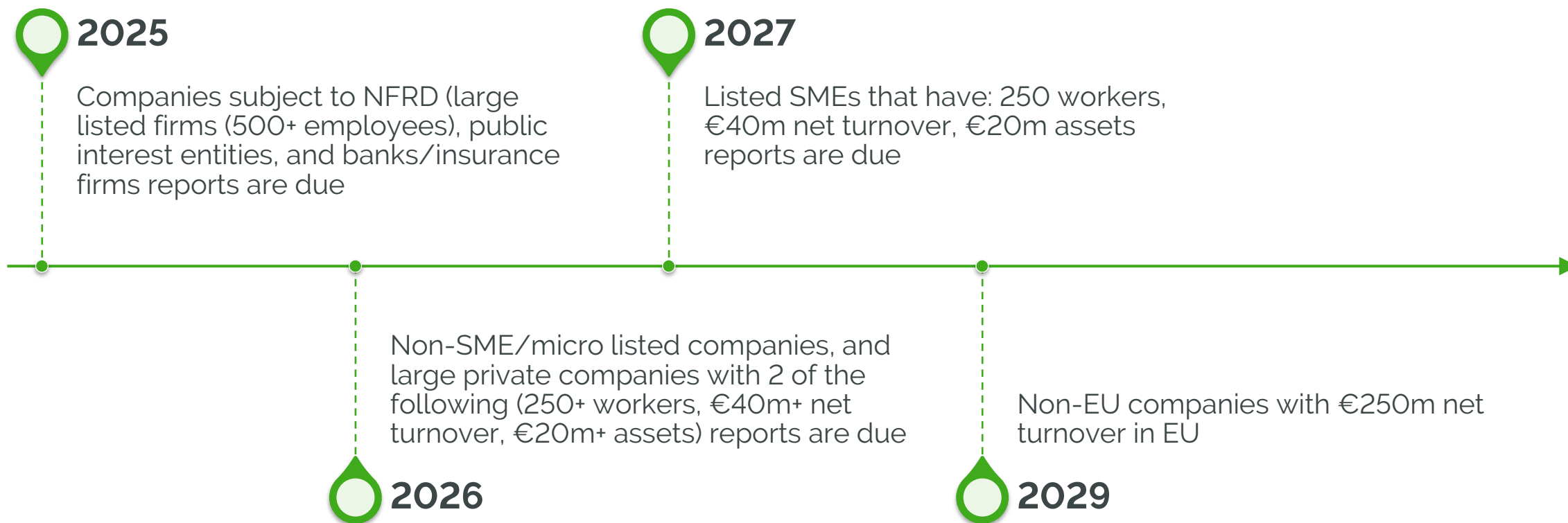


WHEN

In 2025 the EU will require large and listed companies to disclose info on risks and opportunities related to ESG practices

CSRD TIMELINE

All reporting is based on the previous year's data



PTC SUSTAINABILITY TOUR

- 11 weeks
- 21 locations
- 200 manufacturers
- Deep discussions to understand the market and our customers' needs



CIRCULARITY

Definition

- A model of production and consumption which involves sharing, leasing, reusing, repairing, refurbishing, remanufacturing, and recycling existing materials and products as long as possible
- A system where materials never become waste and nature is regenerated
- Products and material are kept in circulation as long as possible

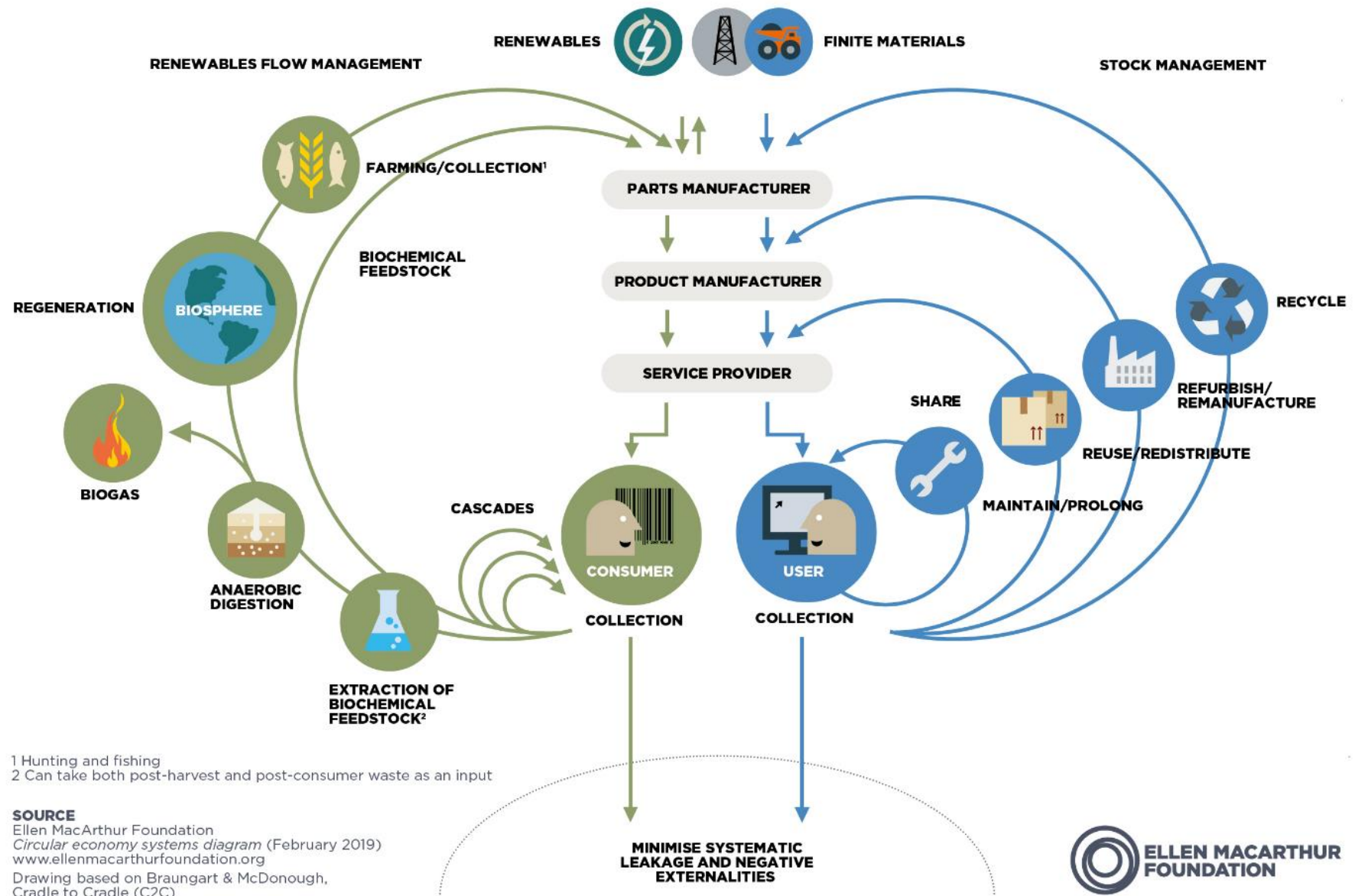
3 Principles of Circular Economy

- Eliminate waste and pollution
- Circulate products and materials
- Regenerate nature

Current State

- Currently the world's industry runs on a 90%+ linear economy; following a 'take, make, dispose' model

CIRCULARITY



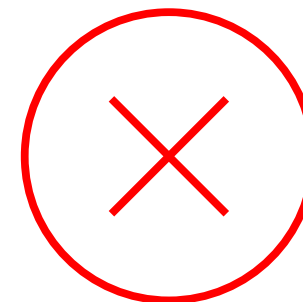
DECARBONIZATION AND CIRCULARITY CONTROLS

The Corporate Sustainability Reporting Directive (CSRD) is new and pressures manufacturers to move fast



Manufacturers must:

- Report their footprints
- Commit to science-based reductions
- Publish “Digital Product Passports” for footprint transparency and circular tracking



Noncompliance is prohibitive:

- Lost contracts (customers liable for suppliers' compliance)
- Fines up to 1% annual turnover
- Corporate director personal liability, including [fines and jail time](#) in some major industrial countries

IDENTIFYING HOTSPOTS



Component



Product



Product-Service System (PSS)

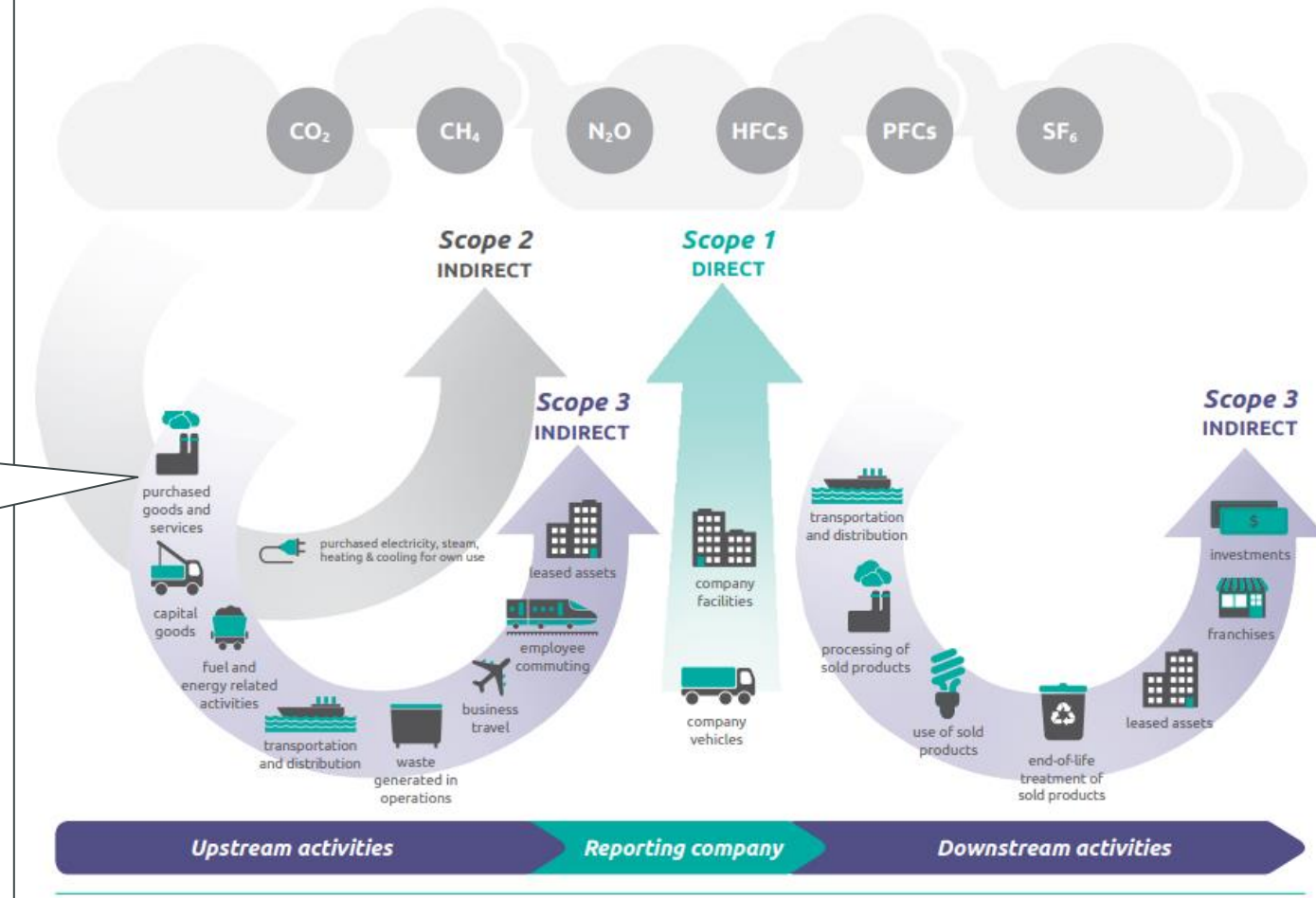
HOTSPOT ANALYSIS



PRODUCT CARBON FOOTPRINT REDUCTION PRIORITIES

Greenhouse Gas accounting perspective. Emissions and circularity goals are intertwined

Figure [1.1] Overview of GHG Protocol scopes and emissions across the value chain



Embodied carbon of supplier material and components is often >90% of footprints for low energy products...

Source: [The Greenhouse Gas Protocol Scope 3 supplement](#)


CIRCULARITY COMPLIANCE – DIGITAL PRODUCT PASSPORTS

CSRD drives circularity in addition to decarbonization. Digital Product Passports are like Environmental Product Declarations with added “cradle to cradle” tracing.

BATTERY PASSPORT ID
RSTE2291345831

BATTERY MODEL
NMC-M50

BATTERY SERIAL NUMBER
T14D0037652




BATTERY

MATERIALS

ESG

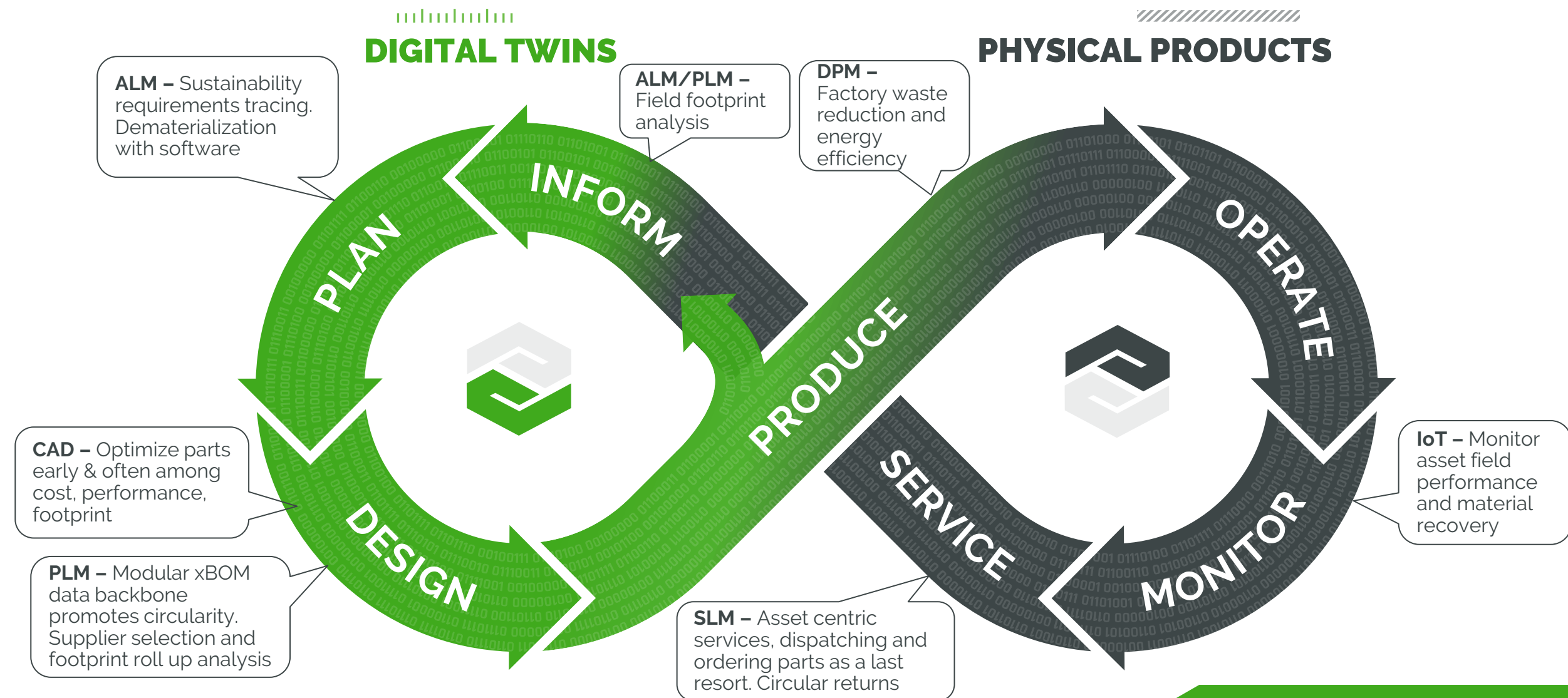
DATA

VALUE CHAIN	IDENTITY	MATERIAL FLOW	ESG DATA	DATA VERIFICATION	MATERIAL FLOW AGGREGATION
Mining	known	traced	reported	(1/3) basic	individual battery
Refining	known	traced	reported		
Precursor	known	traced	reported		
CAM	known	traced	reported	TRACEABILITY (3/3) high	START OF PERIOD 12/19/2021
Cathode	known	traced	reported		END OF PERIOD 8/2/2022
Anode	known	not traced	estimated		
Cell	known	traced	reported	INTEROPERABILITY (0/3) low	DATA COLLECTION ASSURED BY 
Module	n/a	n/a	n/a		
Battery	known	traced	reported		

Example battery passport from the [Global Battery Alliances' pilots](#)

DIGITAL MATURITY – FOUNDATION FOR SUSTAINABILITY

Footprint transparency and reduction require an orderly digital house



Circularity



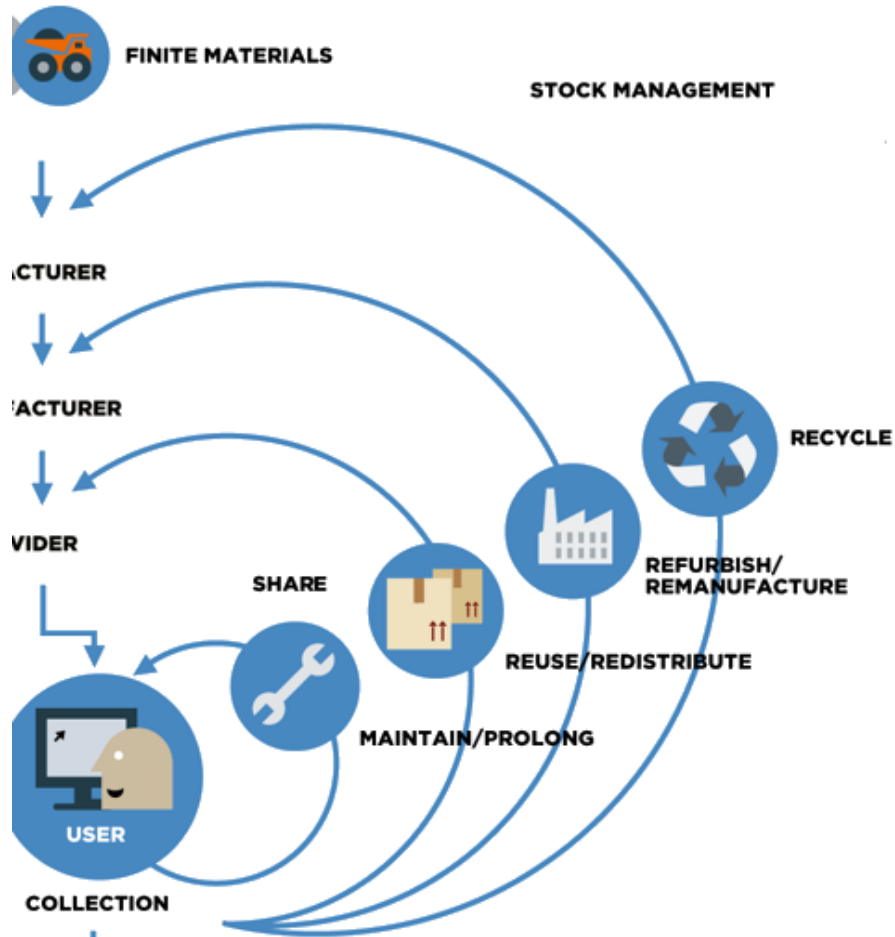
Only way to meet net zero

Modularity



Only way to make circularity profitable

The relation with the circular economy



Recycle: Material choices

Refurbish: Material choices / Manuf. choices / **Modularity !**

Reuse: Design choices / **Modularity !**

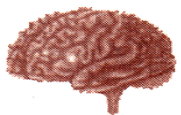
Maintain: Design choices / Repairability / **Modularity !**

Share: Change in business models

The Role of Modular Design in Sustainability

“Modular design allows for mass customization, but more importantly, from a sustainability standpoint, it mandates the need for simple disassembly instructions

Dave Duncan, PTC's VP of sustainability



TacIT

The Know-How to Know Now



Catena-X

Your Automotive Network

OPEN SOURCE
DECENTRALIZED
SECURE

