Sustainability Trends Within PLM

2025 Market & Industry Forum—27 March 2025

Sustainability Trends Within PLM

2025 Market & Industry Forum—27 March 2025

Key Takeaways

Sustainability is transforming product design, manufacturing, operation, and recycling

1 https://wmo.int/news/media-centre/wmo-confirms-2024-warmest-year-record-about-155degc-above-pre-industrial-level

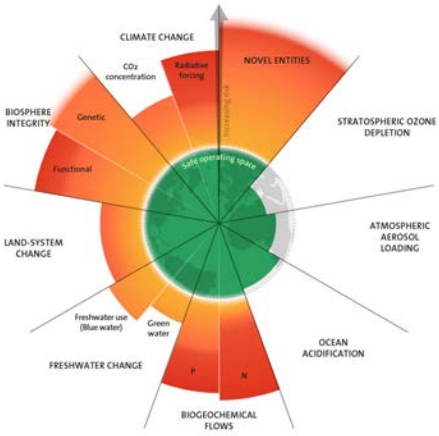
- Sustainability challenges are driving a transition to a circular economy, stricter regulations, and the need to embed sustainability into PLM
- Greenhouse gases continue to rise, causing global warming to reach an average temp of 1.55°C warmer in 2024 than the pre-industrial period[1]
- Corporate net-zero emission pledges are gaining momentum, but few companies understand how to reduce their carbon footprint
- Greater visibility into the supply chain is required to improve a company's environmental footprint
- Climate change & sustainability challenges pose an existential threat and drive significant business opportunities

3

The Sustainability Crisis

"More hottest hots, driest dries, wettest wets, windiest wind conditions." – David Orr

- Global Weirding & Climate Instability
  - Ice sheet melt – 28T tonnes since 1994
  - 150 climate-related events in 2024
- Resource Depletion – deforestation, water scarcity, overfishing & mineral exhaustion
- Biodiversity & Wilderness Loss
  - 23% of wilderness left
- Waste & Pollution – Plastic crisis, chemical runoff, and industrial impact



https://stockholmuniversity.app.box.com/s/sr0nfknm95oydnnsm1zj0c526qzjn1vs/file/1305811057353

4

Sustainability Trends Within PLM

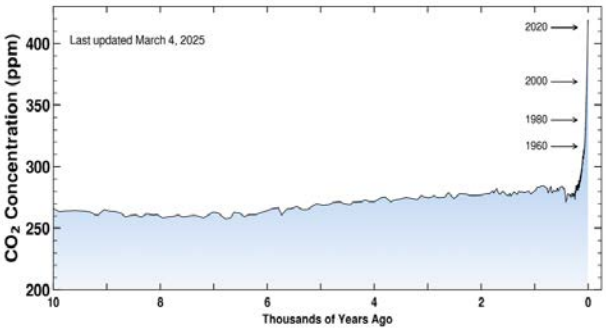
2025 Market & Industry Forum—27 March 2025

Global Warming – Beyond the Threshold

CIMdata

The past ten years have been the ten warmest on record – NASA, NOAA, WMO

- GHG emissions are slowing, but the earth continues to heat up
  - Earth's Avg. Temp. =1.55°C[1]
  - Projection for 2100 = 2.7°-3.1°C[2]
  - GHG = 40.6 $GtCO_2e$[3]
  - CO2e = 37.4 $GtCO_2$[3] +0.08%
  - CO_2 in Atmosphere = 422.5 PPM[3]
- Sustainability starts with awareness and a vision
  - PLM turns it into reality



https://keelingcurve.ucsd.edu/

5

Sustainability Metrics Ramping Up

CIMdata

"Investing in sustainability isn't just ethical—it's smart business." - Unknown

- Accelerating Net-Zero Goals: 10,000 SBTi Commitments
- Renewable Energy and Electrification: 60-70% increase by 2060
- Energy Investment in 2024: $3T (>$2T in Clean Energy)
  - Clean Energy 2024: 30-35%
  - Clean Energy 2050: 70-80%
- China Renewable Energy added 301GW, total = 1.45TW (>50%)
- Purchase Power Agreements: $28.3B in 2023, CAGR 31.7% by 2033
- Evolving Regulations: Omnibus, CSRD, CSDDD, CBAM, etc.

6

Sustainability Trends Within PLM

2025 Market & Industry Forum—27 March 2025

Key Sustainability Trends within PLM

CIMdata

PLM is critical to improving Sustainability and the environmental footprint of the products designed, used, and serviced

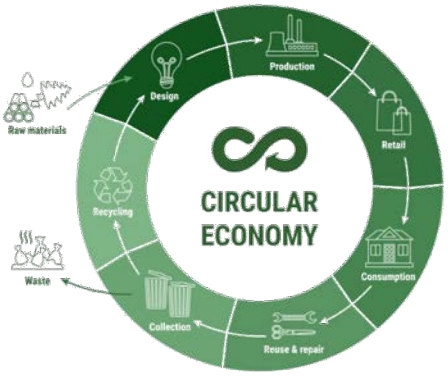
7

Circular Economy

CIMdata

Less raw material, less waste, and fewer GHG emissions – management through EoL

- Rethinking product design, manufacturing & business models
  - Reuse, Repair, Remanufacturing, Recycling, etc.
- Extended Producer Responsibility
- Ecodesign for Sustainable Products Regulations (ESPR)
  - Digital Product Passport (DPP)
- PaaS requires strong supply chain collaboration, multi-view BOMs, Digital Threads/Twins, IoT, etc.



8

Sustainability Trends Within PLM

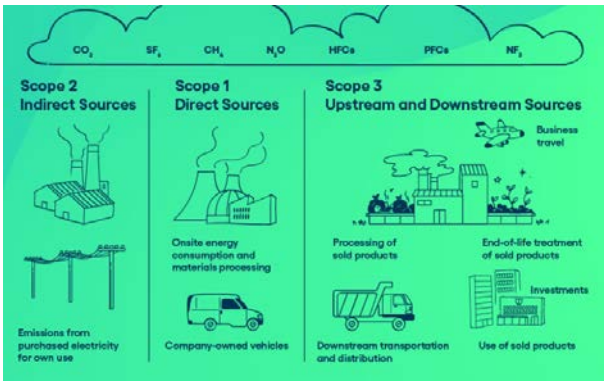
2025 Market & Industry Forum—27 March 2025

Product Carbon Footprint

CIMdata

PCF is crucial to reducing the environmental impact throughout the product lifecycle

- Product Carbon Footprint calculates CO_2e throughout the product lifecycle
  - 80% of the environmental impact is determined during the design phase[1]
  - Track CO_2e (Scope 1,2,3), Biogenic, Water Usage, Cost, Land Use, Energy Consumption, and EoL Impact and other KPIs



https://www.brightlysoftware.com/blog/calculate-carbon-footprint

9 1. https://environment.ec.europa.eu/topics/circular-economy_en

Enhance Supply Chain Visibility

CIMdata

Supply chain transparency is foundational—what you can't see, you can't improve

- Enhanced supply chain visibility provides insights into the embodied carbon in materials and parts, enabling companies to make more informed decisions
- 70-90% of a product's GHGs are in the supply chain (Scope 3)[1]
- Optimize logistics to reduce supplier miles and save CO2e and money

https://www2.deloitte.com/cn/en/pages/risk/articles/supply-chain-sustainability.html

10 1. https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-are-scope-1-2-and-3-emissions

Sustainability Trends Within PLM

2025 Market & Industry Forum—27 March 2025

Design for Sustainability

CIMdata

Designing products with environmental impact and End-of-life in mind

- Designing products to minimize environmental impact and optimize End-of-Life management
- Key principles
  - Lifecycle & Systems Thinking
  - Circular Economy Approach
  - Resource Efficiency
  - Sustainable Material Selection
  - Waste and Pollution Prevention
- Sustainable Design Strategies
  - Lightweighting
  - Circularity
  - Longevity & Durability
  - Modular Design
  - Disassembly
  - Serviceability (repair and maintenance)
  - Reuse and Repurposing
  - Refurbishment and Remanufacturing
  - Recycling & Secondary Use

11

Lifecycle Assessments

CIMdata

PLM-powered LCAs turn environmental impact from guesswork into measurable insights

- Holistic Lifecycle Analysis
  - Evaluates energy use, emissions, water, and materials throughout the product lifecycle
- Optimizing Sustainability
  - Identifies eco-friendly materials, reduces waste, and enhances recyclability
- Regulatory Compliance
  - Adherence to ISO 14040, EU CSRD, and Scope 1-3 reporting

12 https://www.sdcexec.com/sustainability/clean-energy

Sustainability Trends Within PLM

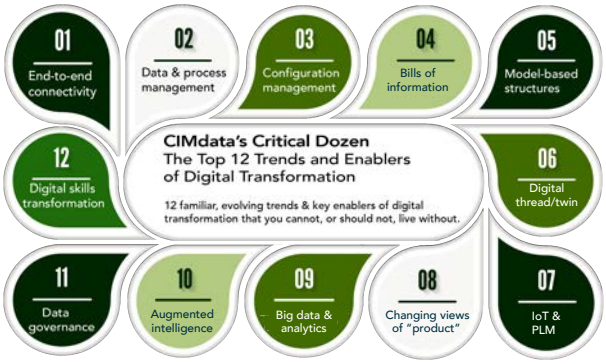
2025 Market & Industry Forum—27 March 2025

Digital Threads & Digital Twins

CIMdata

Sustainability requires visibility—from concept through life—enabled by a digital thread

- Enable real-time tracking of PCF, materials, compliance, and traceability across the product lifecycle and supply chain
- PaaS & Circular Economy concepts require both
- Digital Twins of assets and Digital Threads across the extended enterprise & supply chain improve resource efficiency, reduce waste & environmental impact



13

Why Companies Should Care

CIMdata

80% of respondents worldwide want their governments to take stronger action against the climate crisis. – The People's Vote 2024

- Stakeholder Capitalism
- Benefit of aligning with customers
- Competitive advantage
- Trend toward Circular Economy
- Financial risk
  - Climate Risk Assessment
  - Stranded Assets
  - Reputation
- Evolving Regulations (e.g., Omnibus)

14

Concluding Remarks

Embedding Sustainability in PLM offers business opportunities

- Climate change & other sustainability topics discussed are an existential threat and offer significant business opportunities
- Embedding sustainability through PLM is an opportunity for growth and differentiation and aligns with a growing circular economy
- CIMdata upcoming:
  - CIMdata Educational Webinar - April: "Embedding Sustainability in PLM"
  - Sustainability Assessments
  - Sustainability Research
  - Sustainability Training

15

Questions & Answers

What's on your mind?

16

Sustainability Trends Within PLM

2025 Market & Industry Forum—27 March 2025