Meeting the Sustainability & Green Energy Transition Objective

CIMdata PLM Educational Webinar—27 April 2023

Sustainability & Green Energy

CIMdata

Practice Overview

Director: Mark Reisig

Mission

- Provide leadership to companies transitioning to sustainable carbon-free products and plants

Areas of Focus

- Provide management consulting services to enable clients to reduce their product carbon footprint
- Assist clients to design more sustainable products
- Enable clients to embed sustainability in PLM business strategies and enabling technologies through end of life, eliminating waste, increasing recyclability, reuse, and repurposing of materials and assets
- Evaluate new technologies and provide strategic management consulting services to help companies transform to meet the demands of a "net-zero" future

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Mark Reisig

CIMdata

Professional background

- Over 40 years of experience in digital transformation, information technology, and engineering
- Led digital initiatives in PLM, plant design, CAD, ERP, SCM, and MDM for global businesses
- Prior to CIMdata, held executive and senior management positions at Aras, General Electric, Federation, Oracle, Auto-trol Technology, and Kraft Heinz
- Has worked with all the major PLM solution providers from both an industrial perspective responsible for large global deployments, as well as deploying those technologies from a solution provider and consulting perspective
- Industry experience includes energy, aerospace, defense, automotive, industrial, high-tech electronics, medical devices, and food & beverage

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Key Takeaways

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Sustainability & the Green Energy Transition is the defining issue of our time

- We are on pace to reach 2.8°C warmer than the pre-industrial period
- 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 reduce a companies product carbon footprint (PCF)
- Embedding sustainability in PLM is fundamental to reducing a PCF
- Climate change is an existential threat and offers significant business opportunities

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Agenda

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- Earth Systems
- Global Warming & Climate Change
- Sustainability
- Green Energy Transition
- The Green Energy Transition & Sustainability 2023 Survey Results
- Concluding Remarks

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Earth – A System of Systems

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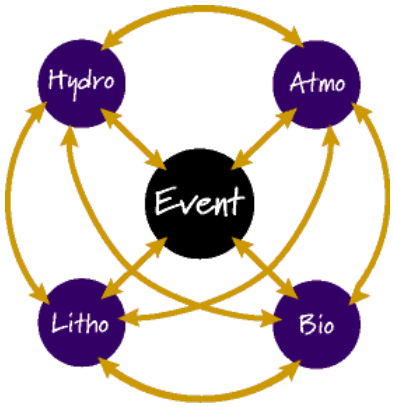
"I realized up there our planet is not infinite. It's fragile…" – Alan Shepard

https://en.wikipedia.org/wiki/The_Blue_Marble



http://www.csun.edu/science/books/sourcebook/chapters/8-organizing/files/earth-systems-interactions.html

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The Keeling Curve

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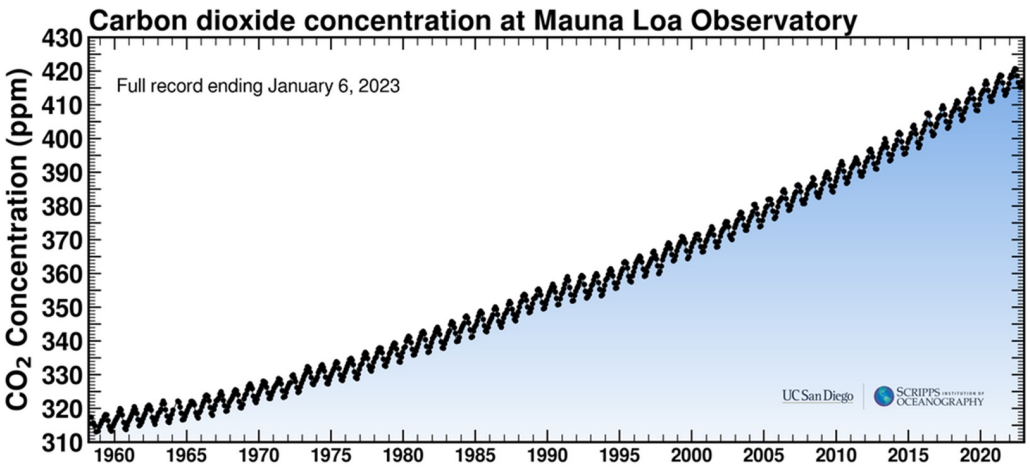
"We're going to race through 400 like we didn't see it go by," – Dr. Charles D. Keeling



https://keelingcurve.ucsd.edu/

Global Warming

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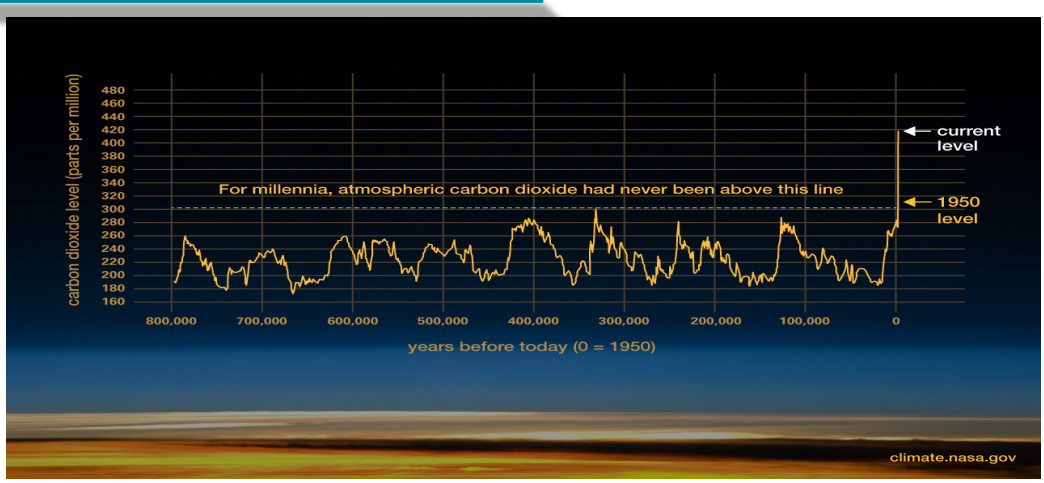
For 800,000 years, the average global CO_2 levels fluctuated between 170 and 220 ppm



https://climate.nasa.gov/evidence/

Climate Change

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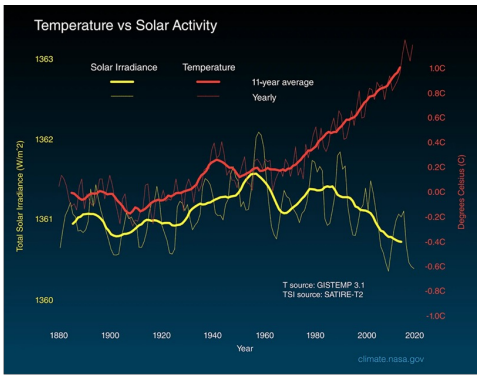
humans are changing Earth's climate, primarily through GHG emissions." - NASA



https://climate.nasa.gov/faq/14/is-the-sun-causing-global-warming/

- There is unequivocal evidence that Earth is warming at an unprecedented rate.
- The earth is receiving the same amount of the sun's energy
- GHGs are trapping energy in the troposphere.
- This is the warmest it's been in 800,000 years.

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Greenhouse Gasses Continue to Rise

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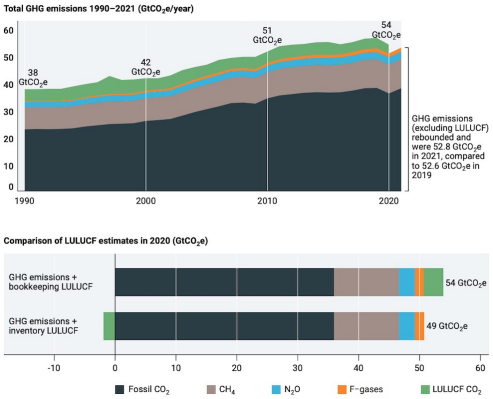
Greenhouse Gasses continue to rise

- GHG 2019 – 54.4 $GtCO_2e$
- GHG 2020 – 54.0 $GtCO_2e$
- GHG 2021 – 52.8 $GtCO_2e$
  - Excludes Land Use Change
- GHG 2030 – Est. 58 $GtCO_2e$



https://www.unep.org/resources/emissions-gap-report-2022
https://www.unep.org/resources/emissions-gap-report-2022

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Greenhouse Gas Emissions by Industry

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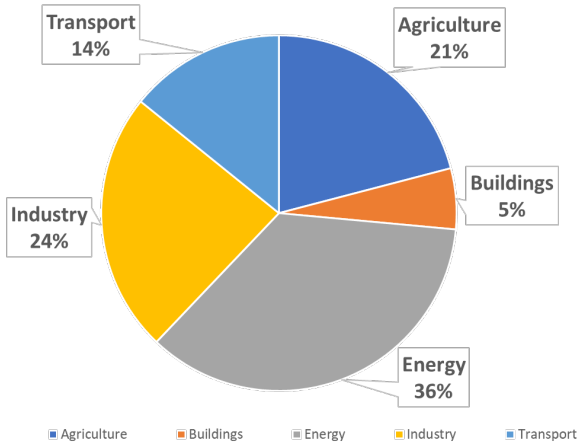
Transport	**8.2Gt**
Cars	3.3Gt
Trucks/Buses	2.8Gt
Rail	730.4Mt
Shipping	652.1Mt
Air	342.0Mt
Ships	157.7Mt
Cooling	128.6Mt
Industry	**13.7Gt**
Other Industries	4.1Gt
Metals	3.0Gt
Waste	2.6Gt
Chemicals	2.6Gt
Cement	1.5Gt

Note: GHG Emissions in CO_2e



Agriculture	**12.1Gt**
Land Use Change	5.6Gt
Livestock	3.6Gt
Crops	2.9Gt
Buildings	**3.2Gt**
Heating Gas	1.0Gt
Coal Gas	867.2Mt
Cooling	703.8Mt
Energy	**20.6Gt**
Elec: Coal	10.3Gt
Other Use	3.9Gt
Elec: Gas	3.0Gt
Fossil Fuel Prod.	2.4Gt
Elec: Oil	538.6Mt

https://worldemissions.io/

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UN Sustainability Goals

"The blueprint to achieve a better and more sustainable future for all"

- The 17 Goals were adopted in 2015 as part of the 2030 Agenda for Sustainable Development
- Sustainability - Development that meets the needs of the present without compromising the ability of future generations to meet their own needs
- Paris Agreement - Strengthen the global response to the threat of climate change by limiting global warming to well below 2°C, preferable to 1.5°C, compared to pre-industrialized levels

https://www.un.org/sustainabledevelopment/blog/2015/12/sustainable-development-goals-kick-off-with-start-of-new-year/

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Not on Track for 2030

"We are in the fight of our lives, and we are losing" – Antonio Guterres

Increase in global greenhouse gas emissions projected by 2030, compared to 2010, based on available national action plans

Source: UNFCCC NDC synthesis report (Oct 2022)

Reduction in global greenhouse gas emissions needed by 2030, from 2010 levels, to keep warming to no more than 1.5 degrees Celsius

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Sustainability Facts

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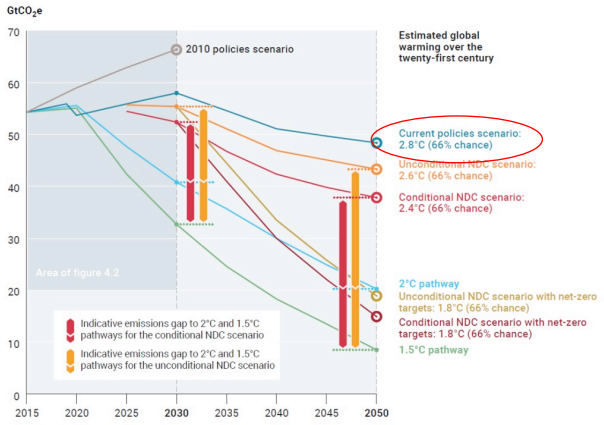
"There's no credible pathway to 1.5 ℃ in place" – UNEP Emissions Gap Report



https://www.unep.org/resources/emissions-gap-report-2022

- Global Warming 2022: 1.11°C
- Projection by 2100: 2.8°C
- CO_2 Concentration: 420.99 ppm
- Ocean Acidification: .01 pH (30%)
- Remaining Wilderness: 23%
- Biodiversity Loss: .01/yr. (200/yr.)
- Population: 8 billion people

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Keys to the Green Energy Transition

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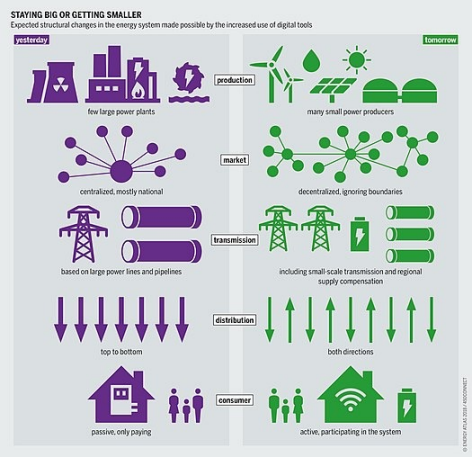
There is no green transition without transmission

- Smart distributed grid and energy storage
- Circular economy and design for sustainability
- Incentives to reduce emissions and invest in cleaner technologies
- Innovation and Technology
- Reducing Product Carbon Footprint
- Race to Net-zero
- EV and sustainable modes of transportation



https://en.wikipedia.org/wiki/Smart_grid

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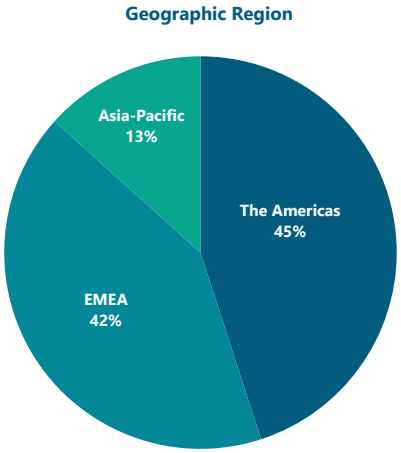
Survey Demographics

The Green Energy Transition Survey Demographics

- Respondents were historically comparable to previous CIMdata surveys in terms of geography, revenue size, industry, role, and work function
- Poll took place between January 5 – February 20, 2023
- Number of Respondents were 101



n = 101

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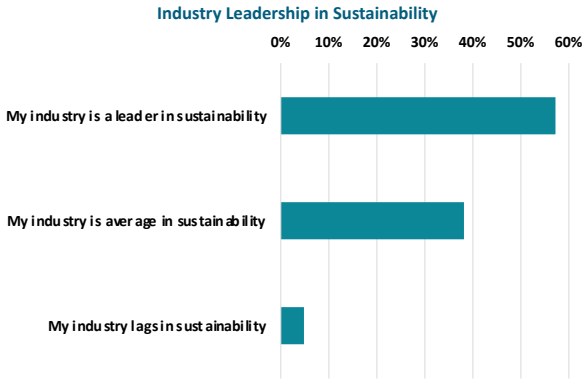
Sustainability Industry Rating

Where does your industry rate, compared to other industries in terms of sustainability?

- Those rating their industry as a leader doubled since 2021, which we believe reflects a growing awareness of the Green Energy Transition



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Sustainability Comparison Rating

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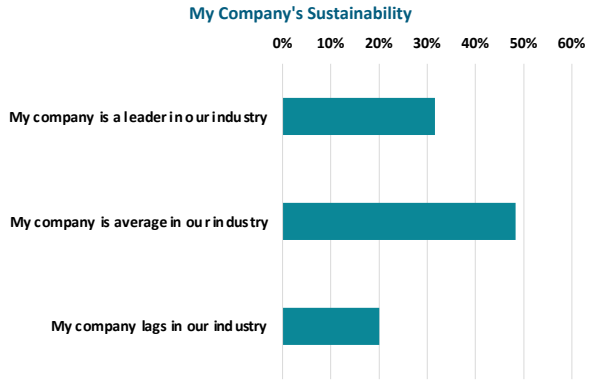
Where does your company rate in comparison with others in your industry?

- Significantly less, think their own company is a leader
- 68% think they're companies are average or lag
- CIMdata believes reality is setting in and most companies realize they need help



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Publish an ESG Report

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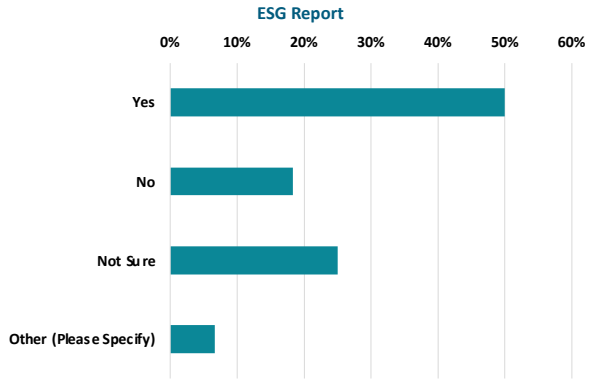
Does your company publish an ESG Report?

- This reflects a growing awareness of the importance of sustainability, the value of transparent reporting to stakeholders, and that climate related disclosures will become mandatory
- ESG reporting will continue to grow in coming years



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Net-zero Pledge

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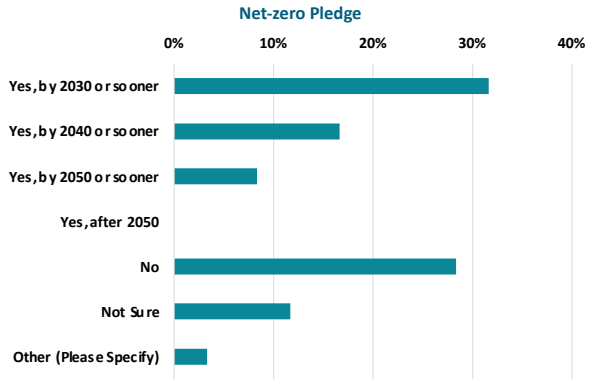
Does your company have a net-zero pledge that includes scope 1,2 and 3 emissions?

- 57% have a net zero target by 2050
- 32% have a net zero target by 2030
- The trend is clear with more companies making zero pledges



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Company Organization for Sustainability

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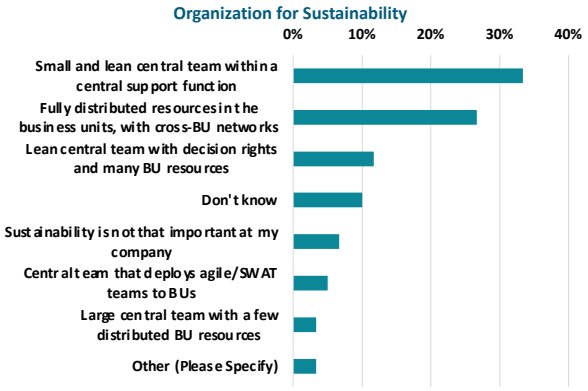
How is your company organized to achieve your sustainability objectives?

- 33% rely on a lean central team.
- This indicates that sustainability hasn't risen to a strategic transformation level yet, which will result in weak adoption.



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Features of Sustainability Program

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What are some of the features of your company's sustainability program?

- The small percentages point to very little action being taken on sustainability.

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Corporate Sustainability Culture

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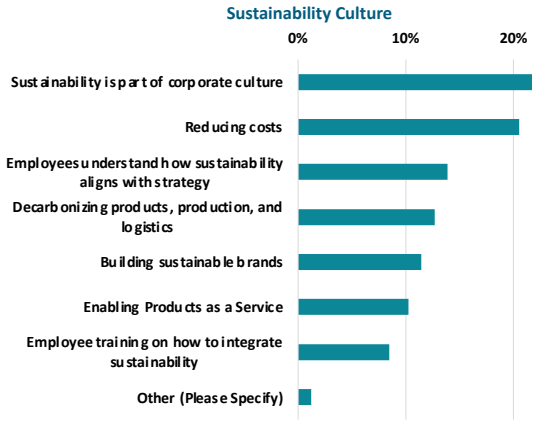
What are the workforce aspects of your corporate sustainability culture?

- All responses rose since the last survey in 2021
- Only 22% consider sustainability to be part of their corporate culture
- Corporate culture lags far behind their net-zero ambitions



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Motivation to Address Sustainability

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Choose all the reasons that reflect why your company is addressing sustainability.

- Diversity of responses indicates a consistent lack of strategy

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Circular Economy

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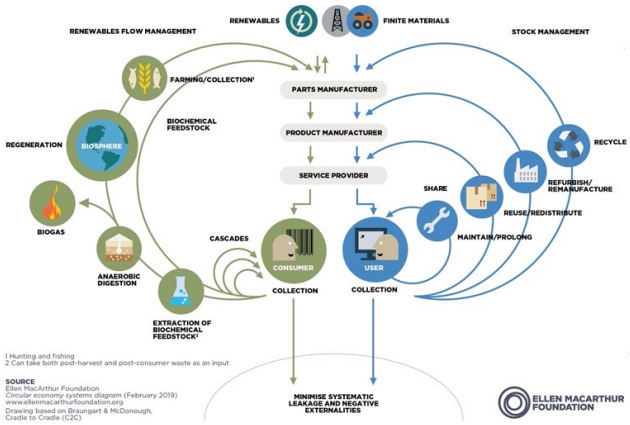
"We must transform every element of our make-take-waste system" – Ellen Macarthur



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Circular Concepts in Company's Strategy

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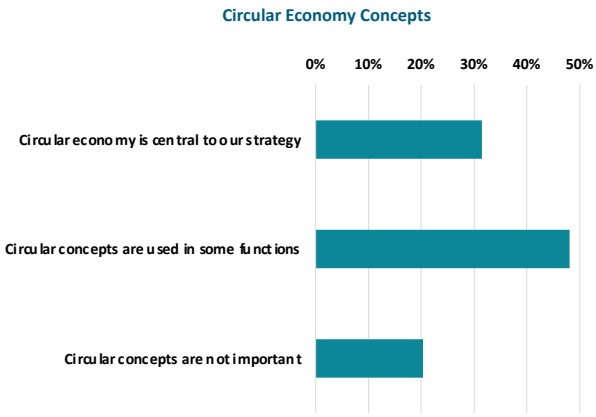
How important are circular economy concepts to your company's strategy?

- The circular economy being central to a company's product development strategy moved from 25% to 32% since the last survey in 2021



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Life Cycle Assessments

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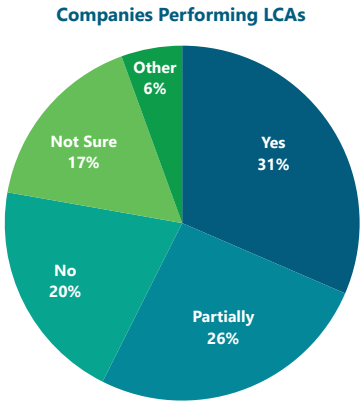
Does your company perform LCAs?

- 57% of companies are performing some form of LCAs
- There is a need to merge the best of PLM with LCAs to accurately report out your environmental impact



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Product Carbon Footprint

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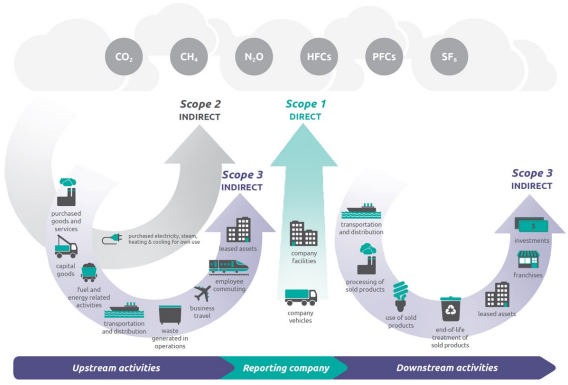
Companies are accounting for the carbon dioxide equivalents in their products



https://www.epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance

- Approximately 80% of the environmental impact of a product is locked in during the design phase
- Connecting product design with the supply chain(~65-90% of PCF) improves decision-making, costs, CO2e, compliance, risk, and sustainability

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Product Carbon Footprint in Design

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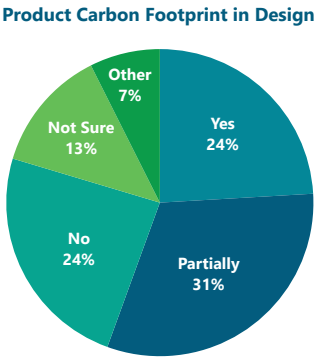
Does your company capture the PCF of your products during the design phase?

- Most companies do not have visibility into their supply chain during design where most of the carbon is embodied in parts and materials
- This a major problem for most companies as most of the carbon is locked-in during the design phase



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Design Engineers Access to Suppliers PCF

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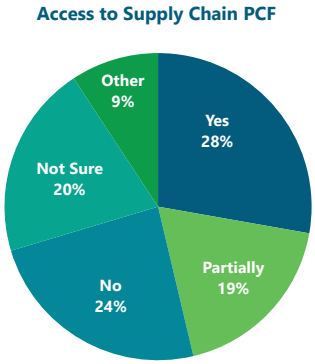
Do your design engineers have access to their supply chain partner's PCF?

- Only 28% have access to their supply chain partner's PCF
- As most of the environmental impact is locked-in during the design phase and most of the carbon is in the supply chain, this is a serious problem for most companies



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Elements Included in Calculating PCF

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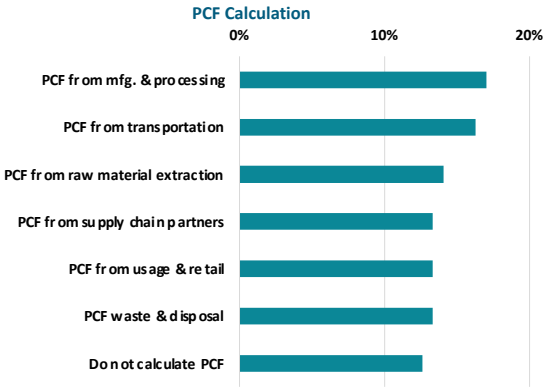
Which elements are included in calculating your product's carbon footprint?

- Most are not calculating the CO_2e contribution
- This is a clear opportunity to improve reducing your PCF



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Design for Sustainability

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Designing for sustainability is designing with the end-of-life in mind

Reusability
Lifecycle Thinking
Supply Chain Risk
End-of-life
Refurbishment
Collaborative
Cost
Modularity
Waste Reduction
Materials
Green Chemistry
Systems Thinking
Disassembly
Renewable Energy
Durability

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Sustainable Design

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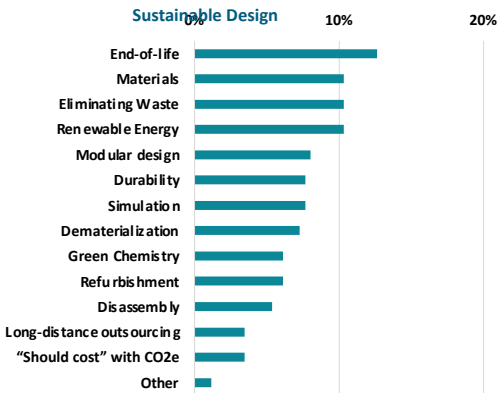
Does your company consider any of the following when designing their products?

- It's clear from the answers, that the vast majority do not practice sustainable design
- If you're not designing with the EoL in mind, you can't design a sustainable product
- CIMdata believes this is an area where much improvement is needed



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Where PLM Can Help Sustainability Goals

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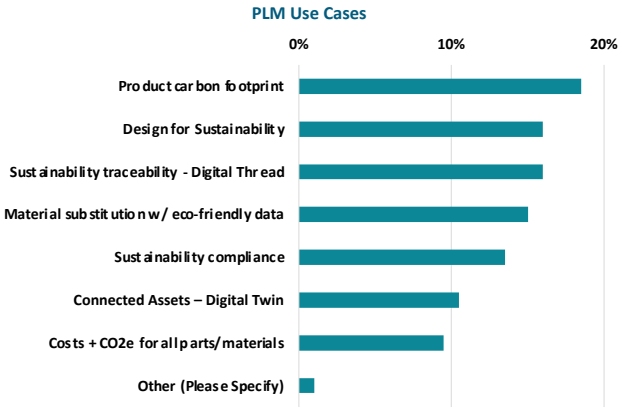
Select uses cases where PLM could help in attaining your company's sustainability goals.

- Reducing PCF is leading, but Design for Sustainability is second and we know that's not happening
- CIMdata believes this is an area where most companies need to improve



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Technologies Critical to Sustainability

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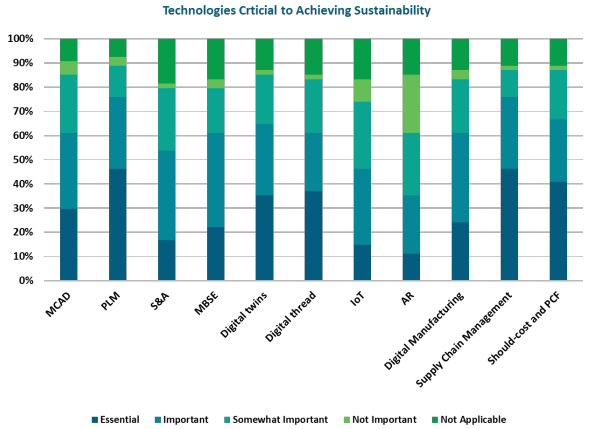
Please select the technologies critical to achieving you're sustainability objectives

- The three most essential are PLM and Supply Chain, both at 46% and Should cost and Carbon Footprint Assessment at 41%
- If you combine Essential and Important, PLM and S/C are at 76% followed by PCF 67% and Digital Twin at 65%



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Bottlenecks to Achieve Sustainability

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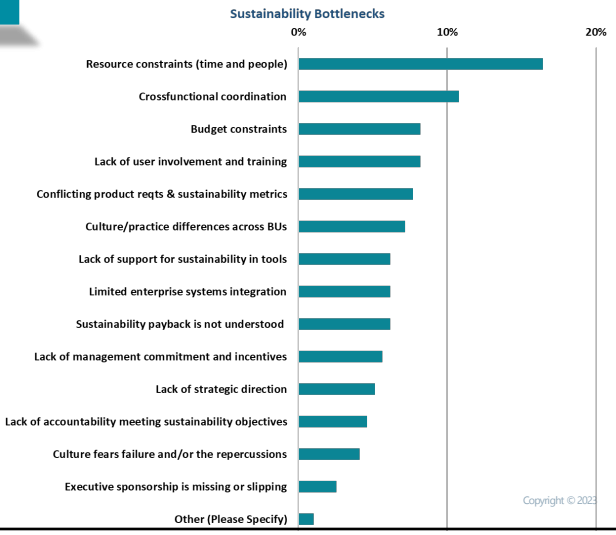
What are the bottlenecks to your company achieving its sustainability objectives?

- There were a wide range of barriers
- PLM can overcome most, presenting companies with a significant opportunity



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The Business Opportunity

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How can PLM providers best support sustainability requirements

- Organizations need sustainability embedded in PLM to reduce their PCF, engage in sustainable design and the circular economy
- Just like PLM, this is a people, process, and technology issue
- ISVs and SIs et al. can help with all three, depending on their expertise and offerings
- Demands a systemic approach and needs to be supported by a business platform with supply chain visibility, a robust digital thread, and in many cases, digital twins
- PLM and SCM must be more symbiotic

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Concluding Remarks

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Climate change is an existential threat that offers significant business challenges

- All life on earth is vulnerable to global warming and climate change
- Sustainability requirements are being driven top-down in companies, but not yet ingrained in the corporate culture
- Industrial organizations have a gap between their ambition and actions required to meet their goals
- Advanced capabilities in PLM, supply chain, reducing PCF, and digital twin are seen as essential
- PLM is central to sustainability; industrials, ISVs, and SI/Reseller/VARs need to succeed together

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To Learn More…

- Mark Reisig, Sustainability & Green Energy Practice Director
- m.reisig@CIMdata.com
- Mobile: +1.864.320.7987
- CIMdata has several useful resources on this topic:
  - Sustainability and Green Energy Consulting Practice on this topic
  - Webinar: The Green Energy Transition and Sustainability January 23, 2023
  - Webinar: Webinar: Meeting Sustainability and the Green Energy Transition Objectives: The industrial Perspective, April 27, 2023
  - Article: Accelerating the Transition to Green Energy with Product Lifecycle Management (www.powermag.com)
  - Article: Climate Change is Transforming PLM Strategies March 10, 2023, (https://industrytoday.com/)

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Questions & Answers

What's on your mind?

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