

Embedding Product Sustainability within PLM

Driving Environmental Sustainability with CONTACT Software

Key Takeaways

Embedding sustainability in PLM enables the integration of environmental factors into lifecycle activities, including Product Carbon Footprint (PCF), along with sustainability-related material and supplier data, supporting informed decision-making and ensuring regulatory compliance.

CONTACT Software enables the aggregation of CO₂-equivalent (CO₂eq) emissions using PLM data across development phases while supporting variant management and PCF calculations. It integrates sustainability-related materials data to provide a transparent view of cost and environmental impact.

CONTACT Software enables strategic procurement, resulting in better decision-making by seamlessly integrating supplier data with environmental declarations via PCF data.

CONTACT Software provides a comprehensive energy management solution that helps reduce environmental impact and improve efficiency by monitoring and optimizing energy consumption throughout production processes.

Introduction

Climate change is no longer a distant threat. It is a present reality. In 2024, the average global surface temperature reached a staggering 1.55°C above the pre-industrial baseline (1850–1900), the warmest on record, pushing humanity closer to climate thresholds the Paris Agreement aims to avoid.¹ This agreement seeks to limit global warming to well below 2°C, preferably to 1.5°C, by the end of the century.² Current projections forecast a rise between 2.8°C and 3.1°C, a trajectory that will cause severe and irreversible damage to global ecosystems and societies.³ Corporations can no longer treat sustainability as a side initiative. Companies must rethink the environmental impact of every product decision by embedding sustainability directly into the Product Lifecycle, from concept through end-of-life.⁴

The surge in greenhouse gas (GHG) emissions not only accelerates global warming. It also intensifies ecosystem disruption, biodiversity loss, and resource scarcity. Beyond climate concerns, sustainability today encompasses the responsible use of water, soil, and chemicals along with waste reduction. Inaction

¹ https://wmo.int/media/news/wmo-confirms-2024-warmest-year-record-about-155degc-above-pre-industrial-level?utm_source=chatgpt.com

² https://www.ipcc.ch/sr15/?utm_source=chatgpt.com

³ https://www.unep.org/news-and-stories/statements/emissions-gap-report-2024-press-statement?utm_source=chatgpt.com

⁴ Research for this paper was partially supported by CONTACT Software

today increases the likelihood of intensified climate-related disasters, ecological collapse, food and water insecurity, and economic instability.

Amid growing evidence of environmental harm, sustainability is no longer a fringe concern. It has become central to both consumer and investor behavior. Nearly 80% of investors now prioritize companies that can deliver market-rate returns while having a positive social and environmental impact.⁵ Manufacturers in particular face rising scrutiny. They must adapt to new environmental regulations, including the EU's Corporate Sustainability Reporting Directive (CSRD) and Ecodesign for Sustainable Products Regulation (ESPR), which require transparency around carbon impacts and sustainability practices. Standards like the GHG Protocol and ISO 14067 provide the framework for measuring and reporting these metrics accurately.

As sustainability challenges worsen and the impact of climate change intensifies, this has shaped political and social discourse, presenting companies with a once-in-a-generation challenge to drive more circular and sustainable products. As the political, economic, and environmental stakes rise, the pressure to embed sustainability throughout the product lifecycle has become the defining challenge of our lifetime.

Challenges Abound with the Traditional Product Development Approach

Traditional product development follows a linear "take-make-waste" model. This outdated framework relies heavily on virgin materials, promotes inefficient manufacturing, and lacks accountability for downstream impacts like waste and pollution. As a result, it has contributed significantly to climate and environmental degradation.

One of the most critical oversights is that over 80% of a product's environmental footprint is determined in the design phase.⁶ Yet, product teams historically lacked the tools or data to make sustainability-informed design decisions. This is particularly problematic when dealing with Scope 3 emissions, which include emissions from the value chain, such as raw material extraction, transportation, and supplier activities. These emissions often represent up to 90% of a company's total carbon footprint.⁷

Compounding this issue is a lack of visibility. Traditionally, there was no capability to store PCF data in bills of material (BOMs) or manufacturing plans, nor to select suppliers based on the CO₂eq-intensity of their materials. As a result, companies lacked the insights needed to reduce their PCF and effectively prioritize lower-carbon options or implement eco-design and circular economy strategies. This represents a significant obstacle to sustainability and compliance in a rapidly evolving regulatory landscape.

A PLM-Centric Sustainable Solution

A comprehensive solution to these issues must begin with embedding PCF data directly into the Product Lifecycle Management (PLM) environment. Integrating CO₂eq emissions into BOMs and product structures enables designers and engineers to make environmentally conscious decisions from the earliest stages. The system must accommodate both primary data from suppliers and secondary data from Life Cycle Assessment (LCA) databases to ensure accuracy and completeness.

The solution must also be dynamic and responsive to configuration variants, allowing the understanding of accurate PCF emission factors across diverse product lines. Beyond design, the PLM solution should encompass end-of-life considerations and regulatory compliance, supporting standards such as REACH,

⁵ https://www.morganstanley.com/ideas/sustainable-investing-on-the-rise?mkt_tok=MjExLU5KWS0xNjUAAAGYwmyrGLZ8mpws6GZUUA5-DBs4VKE_hCZJirJtuB0WYnBNbHnUHdj78dTbYI2FoBHP8tSQ6xPOqQ9uFCkqyJ6ebgRWhbSvL8cvDoAB5dKEeEXXU

⁶ https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/733524/EPRS_BRI%282022%29733524_EN.pdf?utm_source=chatgpt.com

⁷ <https://normative.io/insight/upstream-downstream-emissions/>

RoHS, the GHG Protocol, and ISO 14067. To close the loop, it should facilitate data exchange with suppliers, allowing for primary emissions data collection and auditing. These capabilities are required with emerging regulations like CSRD and ESPR, which demand granular, verifiable environmental reporting.

An ideal PCF-integrated PLM solution extends sustainability throughout the entire product lifecycle, from ideation through use and end-of-life management. It empowers organizations to evaluate trade-offs between cost, environmental impact, and regulatory risk—enabling more sustainable and compliant innovation.

CONTACT Software's Sustainable-Driven PLM Capabilities

CONTACT Software provides an advanced PLM platform—CONTACT Elements—built on a modular, service-oriented architecture that supports cloud and on-premises deployment. This open and composable design enables companies to flexibly scale and configure sustainability functions to meet specific business needs. CONTACT Elements embeds sustainability directly into product development by embedding features such as PCF calculations and sustainable product costing within the PLM environment. This empowers companies to systematically assess and reduce their environmental impact throughout the product lifecycle.

CONTACT Software's PCF solution is built upon established standards such as ISO 14067 and the GHG Protocol to support emissions tracking across the entire product lifecycle. The system integrates both primary supplier data and secondary data from established LCA databases such as GaBi and Ecoinvent, enabling top-down and bottom-up analyses. It offers granular visibility into Scope 1, 2, and 3 emissions, as well as other environmental KPIs such as water consumption, waste generation, and others, which is crucial for a compliance and sustainability performance improvement.

CONTACT Software also incorporates product costing into its PCF framework, giving users an integrated view of both the financial and environmental metrics. This dual visibility helps inform strategic decisions that optimize both cost and sustainability. For companies managing complex product configurations, CONTACT supports variant-specific carbon footprint calculations by resolving 150% BOMs to 100% configurations. This functionality is essential for accurate assessments across diverse product lines.

The solution includes strategic supplier integration via CONTACT's Supplier Collaboration Portal. This portal facilitates the import of actual supplier emissions data, factoring in variables such as transport distance and logistics mode. The result is a comprehensive and realistic picture of total environmental impact—far beyond what secondary data alone can provide.

In addition to product design and sourcing, CONTACT Software also addresses energy consumption during manufacturing. Its energy management functionality allows companies to monitor and optimize energy use across production processes, helping to lower operational emissions and increase efficiency. CIMdata is impressed with the comprehensiveness of CONTACT's energy management solution. CONTACT's holistic approach ensures that sustainability is embedded across design, procurement, and manufacturing.

Conclusion

Embedding sustainability within PLM environments is not merely a technological evolution—it is a strategic imperative. By integrating environmental factors such as PCF and other environmental KPIs into PLM, companies gain the visibility and tools required to make informed, compliant, and impactful sustainability decisions. This integration supports everything from eco-design to circularity and regulatory compliance, turning sustainability from a burden into a competitive advantage.

CIMdata is impressed with the maturity of CONTACT Software's PCF offering. We believe it stands out as a leading provider of this new sustainability-driven paradigm. Its open and composable platform offers a scalable, standards-based capability within PLM to track, analyze, and reduce CO₂eq emissions across the product lifecycle. From integrating supplier environmental declarations to providing product costing transparency and comprehensive energy monitoring, CONTACT offers a complete solution that helps companies meet the growing demands of climate-conscious stakeholders.

In a time of escalating environmental urgency and regulatory scrutiny, solutions like CONTACT's represent not just technological progress but a pathway toward a more responsible and sustainable industrial future. CIMdata recommends that companies looking to reduce their product carbon and overall environmental footprint, as well as those looking to monitor and reduce their energy consumption within manufacturing, and those looking to decarbonize their value chain, consider CONTACT Software in their evaluation.

About CIMdata

CIMdata, a global strategic management consulting firm, provides services designed to maximize an enterprise's ability to design, deliver, and support innovative products and services. For more than forty years, CIMdata has provided industrial organizations, providers of digital technologies and services, and investment firms with world-class insight, expertise, and best-practice methods on a broad set of product lifecycle management (PLM) topics and the digital transformation they enable. CIMdata also offers research, subscription services, publications, and education through certificate programs and international conferences. To learn more, visit www.CIMdata.com or email info@CIMdata.com.