CIMdata

DATASHEET

CIMdata Sustainability and Green Energy Practice

Enabling the Transition to Green Energy

Rising concerns over climate change have brought about a major focus on sustainability and a shift in the energy ecosystem, moving away from the use of fossil fuels and toward green, renewable, and clean energy with a goal of "net-zero" carbon emissions by 2050. This has become the major issue of our time.

Companies are under intense pressure to transition to sustainable operations and move away from producing products that contribute to greenhouse gas (GHG) emissions. Thousands of companies have "net-zero" emissions goals with an increasing number including their value chain. In the race to go green, companies are also reporting on their environmental, safety, and governance (ESG) compliance. Many provide life cycle assessments (LCAs) that provide a systematic analysis of the potential environmental impacts of products from raw material extraction and processing through the product's manufacture, distribution, and use to the recycling, reuse, repurpose, and ultimately final disposition of the materials. However, LCAs, do not enable companies to reduce their product carbon footprint (PCF) because their sustainability data is not embedded in PLM. To reduce their PCF, product design, sourcing, and manufacturing need visibility to all parts and materials that make up their products along with their carbon dioxide equivalents (CO_2e) and other sustainability metadata.

While the energy sector is leading the way in this transition to green energy, almost every industry is involved. The automotive industry has taken the lead in transitioning toward electric vehicles (EV). Transformations in aviation, rail, heavy-duty trucking, shipping, chemical companies, agriculture, smart buildings, smart infrastructure, logistics, steel, cement, and others are all undergoing a transition to green.

Renewable Energy, including synfuels and hydrogen, is projected to account for 32% of the global energy mix by 2035 and 50% by 2050 (McKinsey & Company, 2022). Despite the tremendous growth in wind and solar, the shift toward renewable energy is presently not happening fast enough to reach the interim goal of reducing greenhouse gas emissions by 45% by 2030 and to limit global warming to no more than 1.5°C as called for in the Paris Agreement. According to the UN, based on national climate plans we are on track to hit 2.8°C.

As a result, 87% of executive leaders are increasing their investment in sustainability initiatives over the next two years. This combines with explosive growth in green energy innovation in many areas with over 5,000 startups and trillions of dollars in investments.

The combination of consumer sentiment, public policy, and advancements in science and technology are causing companies to rethink their product lifecycle management (PLM) strategies related to meeting this demand.

Why PLM?

PLM is the strategic business approach directly linked to your business strategy. PLM solves the problem of managing the complete set of product definition information from concept through life, including recycling for a product or a plant while supporting the extended enterprise (i.e., customers,

design and supply partners, etc.) and integrating people, processes, business systems, and information. PLM is not just a technology but is concerned with "how a business works" as much as with "what is being created."

Why CIMdata

CIMdata's Green Energy Practice focuses on the strategic aspects of PLM providing companies with actionable insights, assessments, and a roadmap to transform their businesses to design, produce, and maintain more sustainable products with reduced carbon footprints and environmental impact while building business value.

The transition to Green Energy and sustainability starts with the recognition that we no longer design solely for manufacturability, but instead for circularity. This is consistent with CIMdata's belief that industrial sustainability and the circular economy are critical to a company's success as we transition to a decarbonized economy.

From a business perspective, we must consider the entire lifecycle, embedding the end of a product's useful life through reuse and innovation to serve people, our planet, and profits.

Green Energy & PLM

The ability to use PLM data to manage sustainability across the lifecycle will be a driving force in the transition to Green Energy. A well-implemented strategy is critical as organizations transform to reduce the environmental impact of their more sustainable products and services.

It is estimated that 80% of all product-related environmental impacts are determined during the design phase. Sustainable product design strives to eliminate negative impacts to the environment and the reduction of waste while enabling continuance—reuse and recycling.

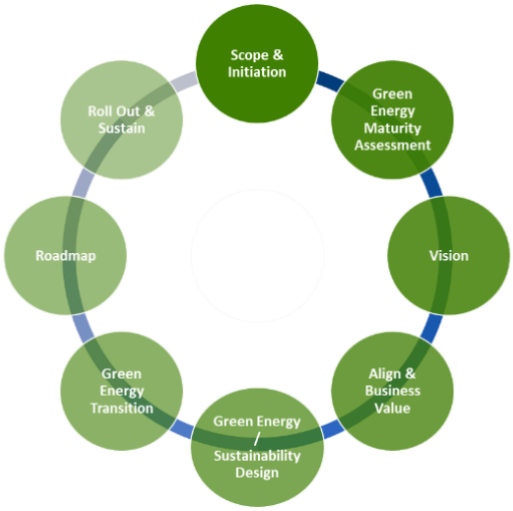
CIMdata believes PLM can improve sustainable design of products by embedding sustainability in all aspects of the product lifecycle following some common principles:

- Use low-impact, non-toxic, sustainably-produced, or recycled materials that require little energy to produce.
- Design for total PCF, including enabling designers' visibility to the PCF aspects of their product within their supply chain and lifecycle assessment (LCA) for any resources used.
- Design products and manufacturing processes that require less energy (i.e., additive versus subtractive).
- Maximize the value of a product across its lifecycle while keeping materiality in the value flow with circular systems design.
- Add durability, reducing consumption and waste.
- Design for End-of-Life (EoL), reuse, and recycling from the outset.
- Enable biomimicry—redesign industrial systems, enabling constant reuse of materials in continuous closed loop cycles.
- Shift to service business models such as platform-as-a-service (PaaS).
- Design products that utilize renewable resources.
- Make use of digital threads for increased collaboration and efficiency across disciplines, the products' lifecycle, and the supply chain with traceability.
- Enable digital twins—virtual replicas of the physical assets in the field, providing visibility with in-depth insights needed to make decisions to increase efficiency, improve sustainability, and enable greater collaboration with a connected digital thread.
- Connect operational data with the Internet of Things (IoT) to inform decisions that improve performance, predict failures, and increase the efficiency of assets in the field.

- Design products using multiphysics simulation to develop clean energy innovations.
- Use Model-Based Systems Engineering and closed loop validation to create sustainable solutions
- Apply Artificial Intelligence (AI) to many aspects of Green Energy.
- Support Systems Thinking to understand that a green energy product or system of systems relates to many other systems that must be holistically considered.

CIMdata's Approach

CIMdata's Sustainability and Green Energy Practice recognizes that successful planning, selection, and implementation of new business strategies and solutions involves an ongoing and cyclical process comprised of eight phases that successfully define and implement a data governance strategy and supporting structures. This applies to every organization—whatever the industry, whatever the requirements or applications, and whatever the desired end result. Each of the eight phases (as illustrated below) is separate and unique. Each is equally important, and for the outcome to be successful, each requires a separate list of targeted activities and deliverables. CIMdata is ready to provide support during each phase.



Phases of Green Energy Consulting Practice

CIMdata's Green Energy Consulting Practice provides end-to-end consulting guidance and strategic support in the following areas:

- Vision, strategy, and goals definition
- Requirements definition
- Embedded sustainability definition
- Implementation roadmaps
- Implementation ROI models
- Evaluation & selection of sustainability and green energy supporting solutions
- Education of staff
- Organizational change management

To learn more about CIMdata consulting services provided in the area of Green Energy, please contact CIMdata at +1.734.668.9922.

About CIMdata

CIMdata, an independent worldwide firm, provides strategic management consulting to maximize an enterprise's ability to design, deliver, and support innovative products and services by identifying and implementing appropriate digital initiatives. For forty years, CIMdata has provided industrial organizations and providers of technologies and services with world-class knowledge, expertise, and best-practice methods on a broad set of product lifecycle management (PLM) solutions 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.