



The DNA of business success in the 21st Century.

In 2019, the number one priority for mining companies became gaining and retaining a (social) licence to operate. It was voted as the number one risk in the EYⁱ annual Top 10 Business Risks Opportunities for three consecutive years before being relegated to third in 2022. Today, companies are under increasing pressure to report on their Environmental, Social and Governance (ESG) impacts as it topped the list in 2022, followed by decarbonization ⁽¹⁾.

It is not mandatory, and the terms are rather difficult to define, but everyone's doing it – it is the right thing to do. It bolsters a company's image and the value of its stock ⁽²⁾.

Global mega-trends such as climate change, geopolitical shifts, and the continuous emergence of disruptive technologies, as well as the COVID-19 pandemic have made ESG issues even more pressing for executives, boards, and policymakers ^(3, 4). As it becomes a central pillar of companies' structures, strategies and cultures, it has the potential to generate greater trust - something that is vital in securing a license to operate - as well as wider social acceptance ⁽¹⁾.

Adopting ESG principles means that corporate strategy focuses on three pillars namely the *environment* (taking measures to lower pollution, CO2 output, and reduce waste), *social* (having a diverse and inclusive workforce, improving equity by empowering individuals and communities), and *governance* (improve standards for decisionmakers and policymakers and overall corporate strategy) ^(5, 6).

ESG may be costly and time-consuming to undertake, but can also be rewarding into the future for those that carry it through ⁽⁶⁾.

"...purpose, long-term value and sustainability are no longer add-ons to business as usual — they are business as usual."

- Meghan Harris-Ngae, global ESG mining leader at EY (2022)⁽¹⁾

Since the release of the UN Sustainable Development Goals (SDGs) in 2015 and the adoption of the Paris Agreementⁱⁱ, the baseline was set for collective actions to solve global sustainability challenges. It also served as an impetus for sustainability to enter the mainstream of management discourse.

Interchangeably used with *sustainability* is the term *ESG* - although originated as investor terminology to describe the sustainability risk related to investments.

ESG is about the specific set of criteria denoting *environmental, social, and governance*. It is used as the rating system for companies to measure their environmental and social credentials. It can help to increase the adoption of sustainable investing, encourage responsible corporate behavior, and integrate sector and business specific ESG factors with broader social issues and global environmental goals ⁽⁵⁾. Overall, it is a framework that helps stakeholders understand how an organisation manages risks and opportunities around sustainability issues.

Pioneering technologies and solutions in advanced manufacturing are opening up new opportunities across industries to measure and report accurate and consistent ESG metrics, while enabling both profitability and sustainability in areas such as:

- **Innovation (Economic):** Leveraging innovative technologies and solutions to address business problems while driving growth and keeping track of sustainability impact.

- **Workforce (Social):** Empowering workers with new technology, tools and solutions, enhancing the adoption of new sustainable metrics.
- **Sustainability (Environment):** Providing next generations of technologies and solutions to enable sustainability, helping companies to track and report on the new sustainability metrics.

Solutions range from supply chain sourcing and logistics, product innovation and lifecycle management to net-zero energy and emissions, operations and maintenance, to an empowered workforce (see figure 1 over page).

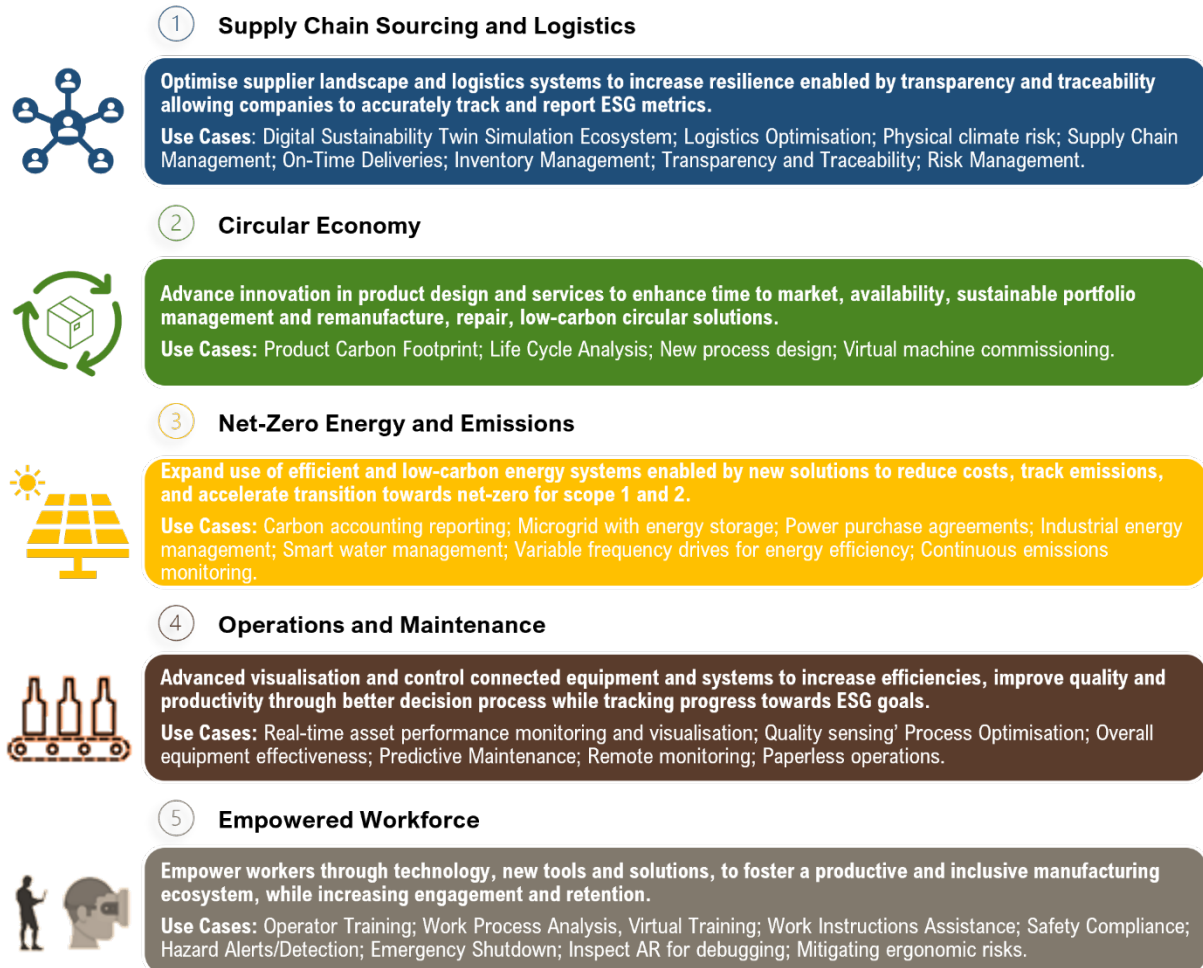


Figure 1. Impact areas where advanced manufacturing is enabling profitability and sustainability goals, while easing the adoption of ESG. Source: The World Economic Forum.

Why is ESG important for employees?

Companies with a strong ESG and labour relations proposition have **better productivity**. Addressing the widening gap between executive and workforce pay is also directly linked to productivity. Fairer incentive structures can help drive an inclusive culture and employee engagement, which in turn, can boost productivity.

Why does ESG matter to companies?

ESG initiatives **can unlock competitive value**. Companies that recognize the importance of adapting to changing socio-economic and environmental conditions are better able to identify strategic opportunities and meet competitive challenges.

I4.0 and ESG

Industry 4.0 has the proven potential to significantly boost a company's productivity, reduce costs and improve the quality of the products and operational efficiency, but what about its socio-environmental impacts?

Essentially, digital technology allows you to check on your production at every step of the process, therefore improving quality. It also helps reduce and even eliminate downtime, because data provides early detection of maintenance requirements and potential break downs.

Industry 4.0 enables the reduction of greenhouse gas emissions by data-centered and traceable carbon footprint analyses. In addition, it aims at reducing waste as well as resource and energy consumption, and the developments in advanced manufacturing offer industries the ability to more accurately measure and report ESG metrics. ^(3, 7)

“In fact, many aspects of ESG appear to have been developed specifically to ensure that the Fourth Industrial Revolution occurs in a sustainable, orderly fashion; and particularly to ensure the social unrest witnessed in former industrial revolutions is not repeated.”

- Sarah Mills, FNArena Financial News, Analysis & Data, ESG Focus (24 February 2020).

The I4.0 technologies is transforming the industrial and manufacturing world in profound ways: ⁽³⁾

- Applying automation, analytics and IoT technologies, a smart system can detect abnormal usage trends for energy, water, and other resources that triggers self-correcting optimization processes or automatically sends SMS alerts to engineers to investigate and resolve the issue.
- Deploying edge-based solutions such as AI-driven sensing for condition-based monitoring tasks, an organization can generate insights into asset performance while removing energy intensive processes that transfer data to be analysed in the cloud.
- Empowering workers through wearable devices and software, paired with clear definition of success metrics – with continuous measurement cycles and taking an iterative approach to training modules – is enabling industry to achieve exponential cost and environmental savings.
- Improving data visibility into machinery performance and energy consumption, an IIoT foundation can be leveraged to enable actionable insights by providing a holistic view into multiple systems. This allows companies to reduce impact and at the same time track and report progress towards ESG metrics: reduce work in progress, unplanned downtime and manufacturing cycle time, as well as reduction in energy consumption against the target baseline.
- Creating standard energy data models in context to production, using Intelligent devices combined with innovative sustainability and energy management software, energy intensity and other key performance metrics can be measured and improved.
- Calculating Product Carbon Footprints (PCF) at scale through new methods for exchange of certified product-level information that addresses requirements on data quality, trustworthiness and confidentiality.
- Automating optimal decision making and incorporating environmental and social factors through Digital twin ecosystems and value chains can optimize supplier landscape, logistics systems, risk management accuracy, as well as answer and trace questions about planning, design and operation phases.

Implementation of I4.0 Technologies in general leads to a holistic approach to manufacturing, environment and business however, companies still face a significant challenge in bringing it to life—i.e. nurturing the culture, employee empowerment, organizational structures, leadership and skills required to capitalize fully on the advances inherent in the new and emerging world of ‘digitized’ industry.

Industry 4.0 has the potential to provide industries the edge in achieving zero environmental impact while increasing efficiency, economic stability and social sustainability. I4.0 is evolving rapidly and will keep on

improving further as technologies mature. 21st Century businesses should take a long term view of how I4.0 can support their journeys towards integrating ESG into their DNA ^(3, 7).

OPINION

No business big or small is an ‘island’, and always part of a bigger eco system of suppliers and consumers. ESG has very little regard for traditional organizational structures, specifically where these create superficial ‘silos’ and hamper collaboration.

With this in mind

- Is one of the opportunities, specifically for BIG business to look at how they can strategise to build the capability of their supply chains in adopting ESG as standard business strategy?
- How can implementation of ESG principles and strategies aide to create more transparency and drive accountability across sometimes disparate business units and functions?
- What opportunities/mechanisms are available for small and medium enterprises to develop their own ESG credentials and to share in and contribute to, the broader ESG aspirations of the industries they operate in?

“I agree with Steve Fiscor⁽²⁾, the Publisher and Editor-in-Chief of E&MJ Engineering and Mining Journal, that most mining companies feel like they have a handle on the ‘G’, and the ‘E’ is a work in progress, but the ‘S’ could be a wildcard.

I sense that going forward assimilating the ‘S’ into an organisation’s DNA will present both the biggest challenge and opportunity given its multi-faceted and evolving nature, internally and externally - the ‘S’ in ESG is the ‘kicker’.”

— Chair in Automation and Future Work Skills, CQUniversity.

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ⁱ EY refers to the global organization, and may refer to one or more, of the member firms of Ernst & Young Global Limited, each of which is a separate legal entity.

ⁱⁱ The [Paris Agreement](#) is a legally binding international treaty on climate change. It was adopted by 196 Parties at COP 21 in Paris, on 12 December 2015 and entered into force on 4 November 2016.