



# A GUIDE TOWARDS SUSTAINABLE PRODUCTION



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GND guide  
[gndpartners.com](http://gndpartners.com)



## Executive summary

Sustainable Production is the creation of goods and services using processes and systems that are: non-polluting; conserving of energy and natural resources; economically viable; safe and healthful for workers, communities, and consumers; socially and creatively rewarding for all working people. Companies can thrive by investing in well-designed safer products, resource efficient technologies and processes, and trained and empowered employees.

In 2019, production related greenhouse gas emissions accounted for more than 42% of total 33 Gt CO<sub>2</sub>e greenhouse gas (GHG) emissions.<sup>1</sup> By 2030 industrial GHG emissions should fall at least by 45% to be on track to meet 1.5 °C target<sup>2</sup>. With today's public concern about global climate change and efforts to greening environment, the benefits of sustainable production are even clearer. Many challenges in sustainable production can be effectively overcome through applications of advanced manufacturing technologies.

This report is complementary to our *Guide Towards the Factory of the Future*<sup>3</sup>. With GND your journey to full potential begins with a detailed, clear-eyed assessment of where you stand today. GND offers a *Manufacturer Self-Assessment tool*<sup>4</sup> that provides a standardised approach and proprietary benchmarks. Available as either a short (a few hours long) or comprehensive (2-3 weeks) assessment, our diagnostic assesses your current state towards the Factory of the Future with Sustainable Production.

See where you're strong, where you lag, and what the savings potential can be when you improve specific elements of your performance and capability. We benchmark your position against today's most relevant KPIs, allowing you to visualize your current state, spot areas of opportunity and prioritise the actions that will vault you ahead of your competitors. We can help you take an unconstrained view of what's possible. Our approach is highly customised to your specific competitive situation, and augmented by a range of best-in-class tools. Some companies will target a complete transformation, while others will pursue discrete initiatives to achieve excellence in select operational areas. Below you will find four necessary stages towards the sustainable production.

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<sup>1</sup> Sources: IEA; Climate Action Tracker (CAT); BCG Global Sustainability Survey, December 2019.

<sup>2</sup> IPCC; IEA; Climatewatch; GND Analysis.

<sup>3</sup> <https://www.gndpartners.com/technology/Towards-the-Factory-of-the-Future>

<sup>4</sup> <https://www.gndpartners.com/technology/Manufacturer-Self-Assessment>



## Stage 1 – Vision and Objectives

On the basis of the Manufacturer Self-Assessment with a focus on sustainable production, your company will now start further refining the current situation in-defined transformation areas. Next, you will describe your vision of the Factory of the Future with sustainable production and describe objectives for each of the desired or necessary transformations. Our coaches will assist your company in developing the challenge description(s) more precisely, including the construction of specific, measurable, realistic and attainable objectives for each of the desired or necessary company breakthroughs.

Companies usually discuss goals for reducing greenhouse gas emissions in terms of meeting the 1.5°C target derived from the 2015 Paris Agreement, in which more than 190 countries committed to taking steps to limit the global average temperature increase to 1.5°C above pre-industrial levels. To achieve the 1.5°C target, countries would need to reduce their overall net emissions to zero by around 2050, with incremental reductions along the way.

**Sustainable production has net-zero emissions.**

### Common objectives for sustainable production:

- Improving design by building sustainability into products.
- Optimisation of logistics network to minimise traveling distances.
- Optimisation of material handling through intermodal transportation.
- Replacing conventional fossil-energy-based power with renewables.
- Deploying energy monitoring and a management system to reduce consumption.
- Applying operational levers to reduce scrap and other waste.
- Establishing a closed-loop system to recycle and reproduce parts and products.
- Replacing high-emission processes and technology with low-emission processes and technology.
- Producing the equivalent of a new product by reusing parts from used and returned products.
- Optimising the energy efficiency of equipment and buildings (including heat recovery).
- Compensating for carbon emissions through offsetting measures such as reforestation.
- Capturing process-related carbon by-products, and reusing them in chemical processes.
- Using 3D printing to minimise material waste, packaging, and transport emissions.
- Replacing fossil-based fuels with biofuels, biomass, or other fuels.
- Replacing truck transportation with rail or ship transportation.



## Stage 2 – Solutions to Meet Objectives

Once the objectives are known solutions can be identified. The second phase is about closely working together with the team at the company premises or using blended digital tools, like virtual reality and online conferences. The aim of these joint workshops always will be to make sure that the search for potential solutions is well-structured and as complete as possible. The GND coaches will provide support in the search for relevant solution options, including a provision of the needed resources, input from tech or solution suppliers and if relevant finding organisations that can help the company develop its solutions. This will be done, for instance, through brainstorming, the organization of efficient meetings, and implementing idea-harvesting techniques proposed and explained by the coach. The main role of the coach in this stage is to make sure that the search for potential solutions is well-structured and as complete as possible. For every identified solution also a timeline for implementation is being created during this phase.

The Factory of the Future is headed for sustainable production, when a view shifts from traditional production to a more environmentally friendly way and to promote sustainable and innovative manufacturing.

Companies have demonstrated that sustainability measures can simultaneously improve business performance and help the environment.

Basic sustainability solutions target special efforts to create a breakthrough in areas:

- **Social.** For example, integrating diverse workforce into digitally enabled jobs, integrating health and safety requirement, creating an ergonomic working environment, developing ethics and integrity, respecting human rights, strengthening communities.
- **Environmental.** For example, achieving carbon-neutral production, increasing resource efficiency and improving waste management, reducing other negative externalities to the environment.
- **Economic.** For example, contributing to the company's profitability and long-term economic growth.





## Stage 3 – Cost-Benefit Analysis

This stage is about applying a scoring mechanism based on cost-benefit analysis to the list of identified solutions. Economic and technological factors will be assessed. This can be either done through a quick screening or through a detailed calculation. The mechanism however will always be company specific, and can include solution evaluation criteria. The Cost-Benefit Analysis is characterized by the fact that alongside financial returns, it simultaneously seeks to assess the most significant quantitative and qualitative aspects of the economic-social impact and to attribute monetary value to such aspects. To attribute monetary value to cost-benefit analysis, various methods, such as willingness-to-pay, WTP or long-run marginal cost (LRMC), are applied. The GND will support in assessing the identified solutions, making an appropriate selection and creating a timeline for implementation.

It is important to assure that economic and environmental sustainability go hand in hand.

During the cost-benefit analysis stakeholders' metrics should be evaluated:

- **Investors.** Cash flow – sustainable dividends High growth, low volatility, share price Return adjusted for risk; ethics; short-term returns long-term growth; engagement with company/product goals through reinvestment; adaptability/sustainability; loyalty/employee share ownership; production facility (visible tangible investment); lower risk longevity communication and no surprises; well communicated strategy; intellectual property/asset base strong management.
- **Employees.** Pay, wages; retirement fund; pride in working for company; work-life balance; lifelong learning; promotion and personal development; safety conditions at work; Enjoyment being at work, having fun; being hear by management; social interaction; social status; communication with employees; job security; feeling part of a company's success; provision of a sense of belonging; provision of opportunities to grow; good working environment; pride in the product/job; good terms and conditions, flexible working.
- **Other stakeholders.** Recycling and energy efficiency; safety; environmental leadership; reduction of pollution; regeneration higher value/quality of employment; inspiring next generation (training, direction); image in schools and community; positive global impact of activities – ethical trade; advancement in society; end user versus payer; resource utilisation (natural); community waste management; critical mass scale effects; global influence and impact on policy; retention of skills/people.



Photo credit: Getty Images

## Stage 4 – Financing and Implementation

Together with the company, the GND experts will write down what exactly is going to be executed at what timeframe by the employees, tech suppliers and other potential partners involved. Part of this implementation plan should always clearly state against which criteria the follow up to the plan will be measured. The plan can include different types of suggested actions: Implementation actions (When a technology/solution is commercially available and requires solely engineering/customization in order to be introduced into production); Innovation projects (When research and development is necessary, but the outlook is deemed promising); R&D projects (Mainly aimed at developing breakthrough technologies/solutions when little is known about a technology/solution, but first reports come in positive). The GND advisors will identify and provide information on the relevant financial instruments that are available from both public and private sources. GND advisors assist in preparing well-defined financial plans taking into account related risks, their measurement and mitigation.

In view of the multiyear time frame required to successfully implement sustainability measures in complex production systems and supply chains, companies should begin systemically ramping up their activities immediately.

Industrial companies should regard efforts to sustainable production as integral to their strategy for maintaining competitiveness and successful implementation should keep pace with ambition.

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Within the rapid change in the business environment, we will utilise our technology, and know-how to co-operate adaptively with our business partners in fields where our experience is not yet developed.



GND is a global network of Industry-focused capability providers that drive the transformation of companies around the Europe. Offering services ranging from experiential learning and capability building, to financial assistance and piloting new technologies the GND supports companies at every stage of their transformation journey.



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