



## Green Semiconductor

Sustainability and climate change mitigation in the semiconductor industry

Faster, further, more sophisticated: Such are the demands that underpin the research & development process for technologies that facilitate – and in some instances even dictate – our everyday professional activities and private lives. For many industries, increasing digitalization is one of the major drivers of high-performance-electronics production. The semiconductor industry is profiting massively from this trend, with further growth expected over the coming years. But what does this growth mean for our environment?.

Semiconductor production is incredibly resource-intensive. More than twice as much water and three times as much power is required to manufacture sophisticated, 2-nm microchips than for 28-nm chips. The release of fluorinated greenhouse gases is also an issue.

The semiconductor industry is currently attracting new investment on a global scale, and new fabrication facilities are popping up all over the world. Up to 2030, the demand for semiconductor products is expected to grow by 6 to 8% year on year across all sectors. (Source: McKinsey & Company, semiconductor market analysis 2022). Geopolitically

motivated subsidy programmes like the European Chips Act or the multibillion-dollar investments in this growth market by the USA serve to boost its expansion. But with the uptick in production that this stimulates comes an uptick in emissions. This has created an urgent need to minimize the semiconductor industry's ecological footprint. Below, we will discuss a couple of examples that illustrate the urgency of the situation: Market leader TSMC (Taiwan Semiconductor Manufacturing Company) managed to double its emitted CO2 equivalents in 2020 to 15 million tonnes within the space of a year. Greenpeace estimates that in 2020,



TSMC was responsible for almost 5% of Taiwan's total energy consumption.

To counteract this trend, the EU Chips Act addresses the issue in its report and stipulates that, while its objectives include doubling Europe's share in the global microchip production market to 20%, the manufacturing processes must nevertheless be modified to reduce their impact on the environment.

For companies in the semiconductor industry, sustainability has been working its way up the agenda in recent years. They have committed to stricter measures concerning the use of renewables, improving their energy and water consumption and, above all, reducing their greenhouse gas emissions.



## Net zero – climate change mitigation in the semiconductor market

Greenhouse gases and their elevated concentrations in the atmosphere are responsible for global warming and all the resultant shifts that we collectively refer to as climate change. The Paris Agreement adopted in 2015 aims to limit the mean temperature increase to 1.5 °C above pre-industrial levels. This signals a need to pick up the pace when it comes to decarbonizing industrial enterprises if we are to curb emissions and achieve the ambitious "net zero" objective. If the emissions produced are balanced by removing the same quantity of emissions from the atmosphere, we achieve climate neutrality. "Net zero" means that the amount of CO<sub>2</sub> emissions removed exceeds the amount produced. In this scenario, net emissions are therefore below zero.

Companies in the semiconductor sector have come up with their own reduction targets. Obtaining the raw materials will always be one of the trickiest stages along the value chain. But sophisticated, sustainable semiconductors are needed as part of efforts to mitigate climate change.

In their article "Sustainability at semiconductor fabs," McKinsey mentions, by way of example, that Infineon intends to slash its greenhouse emissions by 70% by 2025, compared with its 2019 output. Many electronic applications are already benefiting from the improved energy efficiency afforded by Infineon's "Tech for Green" semiconductors.

Intel has committed to eliminating its global greenhouse emissions entirely by 2040. By 2030, it aims to be obtaining 100% of its electricity from renewable energy sources.

One of GEMÜ's customers, Merck, has made its goals explicit. The company aims to be climate-neutral by 2040. In the interim, it is targeting a 50% reduction in direct and indirect greenhouse gas emissions by 2030, using its 2020 figures as

the baseline. Additionally, it wants 80% of the electricity that it purchases from external suppliers to be from renewable sources. This information was provided in an article published on LinkedIn by Kai Beckmann, CEO Electronics. End users now have a new set of expectations for the semiconductor market to contend with. Nowadays, it is important to consumers that companies are environmentally responsible and incorporate sustainable practices into their production processes. Energy efficiency has become a top concern in all areas of life.

These issues are crucial to customers wanting to help mitigate climate change. As part of the supply chain, GEMÜ is embracing the transition to "green" semiconductors by continually optimizing its semiconductor range and developing new features, upgrades and product innovations. When it comes to batteries, we are dedicated to continually expanding our expertise and product developments, since the growing demand for energy stores shows no signs of slowing. One benefit of lithium-ion batteries specifically is that they produce zero CO<sub>2</sub> emissions when used for stationary applications.

It is important to GEMÜ's Semiconductors business unit to be part of this positive trend. GEMÜ's products and solutions can be integrated into highly efficient processes, enabling customers from the semiconductor industry to meet modern production requirements while using resources more sparingly.

This is in keeping with GEMÜ's commitment as a company to avoid wasting resources and incorporate sustainable practices wherever possible. This policy manifests itself in a myriad of different measures: The expansion of the company's fleet of electric cars, along with the associated charging points, and the ongoing expansion of the photovoltaic systems at all sites, including the cleanroom manufacturing site in Switzerland, are just a couple of examples. GEMÜ's production facility in Criesbach has switched over to an adiabatic cooling system. Adiabatic cooling is an environmentally friendly process in which cooling is performed through evaporation.

From industrial enterprises to individuals, we all have our own carbon footprint, and we need to be conscious of the fact that our natural resources are finite. But every little helps – even seemingly insignificant efforts by individuals contribute towards creating a more environmentally friendly future for us all.



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