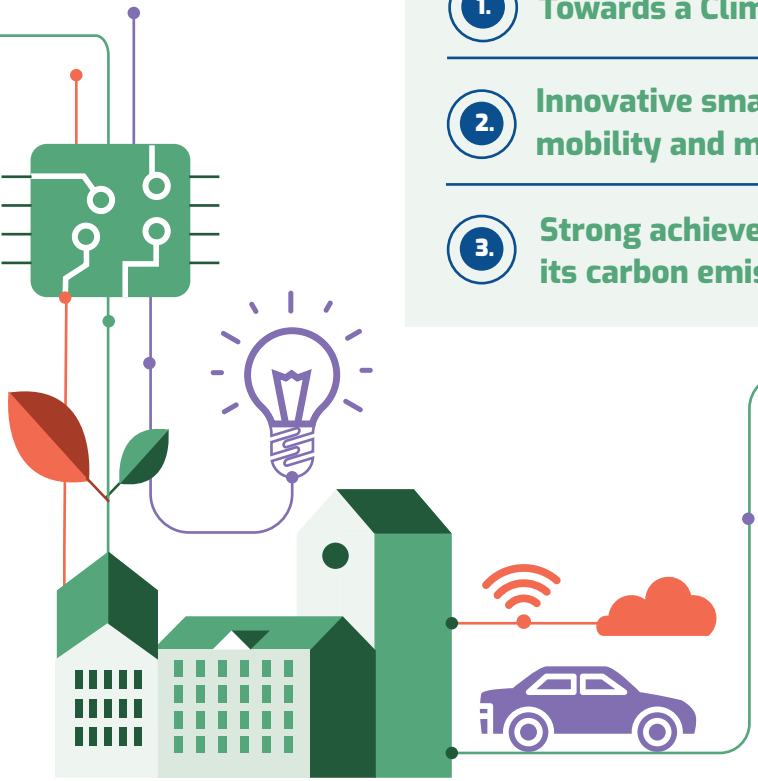
European Semiconductor Industry Association

European Semiconductor Industry: a strong contributor to reducing Carbon Emissions

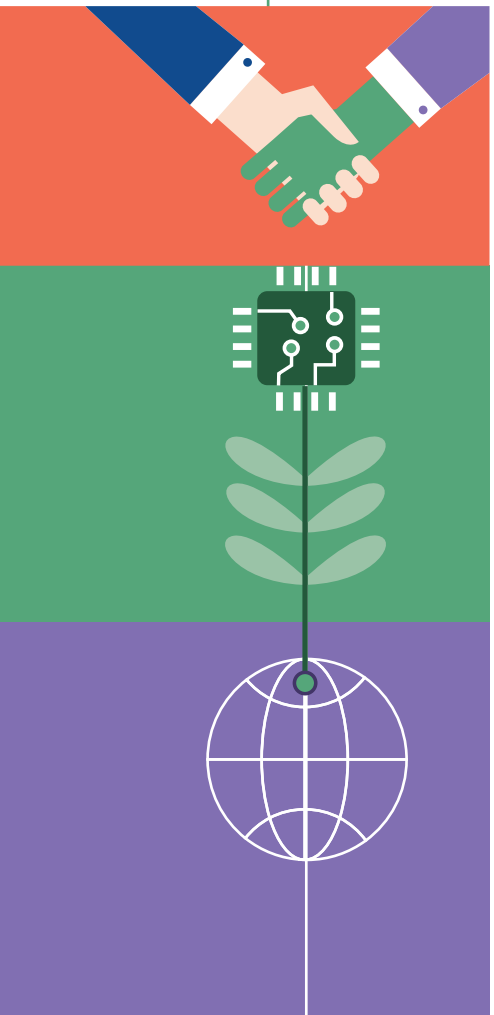
1. Towards a Climate Neutral Europe
2. Innovative smart solutions for greener mobility and more energy efficient products
3. Strong achievement record of reducing its carbon emissions



The COVID-19 pandemic demonstrates the importance of semiconductors to meeting the world's most urgent challenges including their use in enabling technologies, for identifying vaccines and treatments, ventilators and medical equipment in patient care, for working and studying remotely and for accessing online businesses and services.

1. Towards a Climate Neutral Europe

The European Union has pledged to become the first climate-neutral continent by 2050, with a revised 2030 emission reduction goal of 'at least 55%'. The European Green Deal, aims at using technological innovations that are enabled by semiconductors as the main tool for decarbonising economies.



- **The European Semiconductor industry supports the Green Deal and its semiconductor products will continue to be a key enabler of low carbon and energy efficient innovative solutions.**
- **Semiconductors help reduce society's environmental footprint, by optimising energy usage in transportation, manufacturing, consumer products and services.**
- **Semiconductors facilitate the transition towards a decarbonised economy while simultaneously contributing to an innovative and sustainable society.**

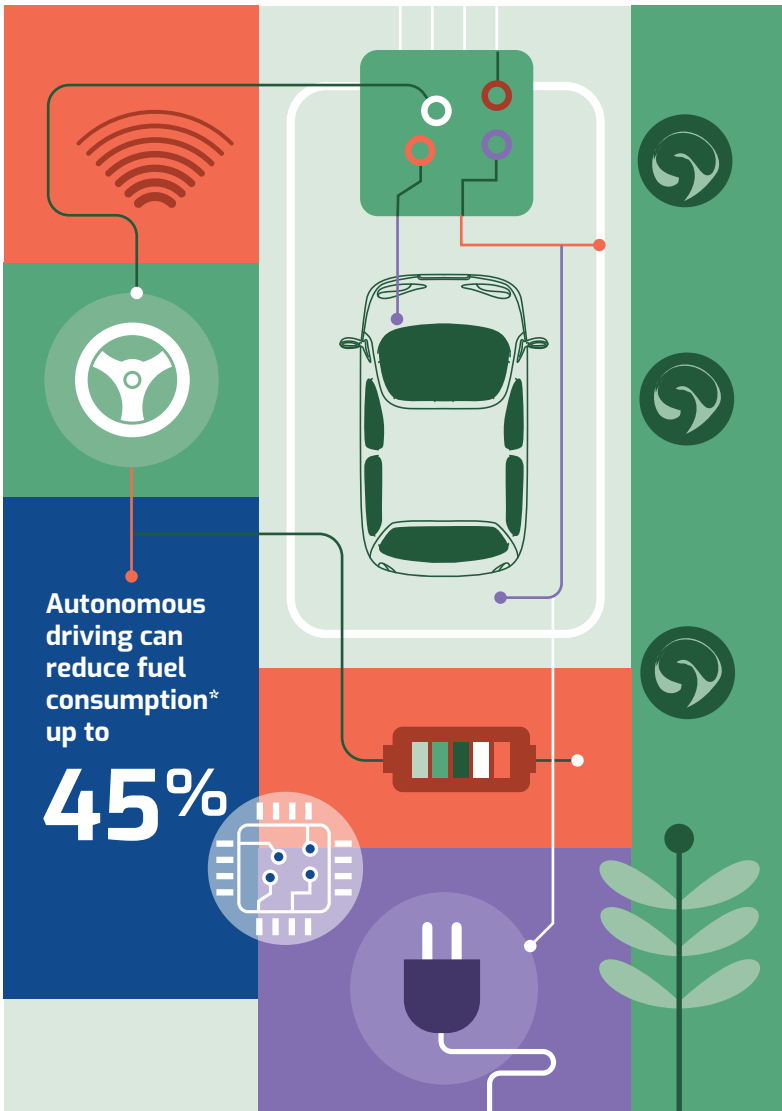
2. Semiconductors provide innovative smart solutions that contribute to greener mobility and more energy efficient products

A. Smarter Mobility

Semiconductors facilitate the ongoing shift from traditional vehicles to mobility solutions: focussing on connectivity, autonomous driving, electrification and low carbon mobility. Semiconductors help redefine mobility, reduce emissions and help alleviate congestion. Semiconductor technology contributes to the realisation of the EU's Sustainable and Smart Mobility Strategy Goals.

Emission reduction in vehicles and in transportation systems is made possible by semiconductor-based in-vehicle networks and sensors that increase fuel efficiency by reducing vehicle weight. Battery control and energy management semiconductor solutions extend the distance range of electric and hybrid transport and improve the predictability of that range: increased distance range is key to mass adoption of Electric vehicles.

Automated and connected Advanced Driver Assistance Systems (ADAS) enabled by semiconductors help prevent emissions. Features ranging from basic functionality like cruise control, all the way up to full self-driving make cars more capable than humans in fuel saving behaviour. Vehicle-to-vehicle communication systems also help reduce traffic congestion, further contributing to reducing fuel consumption. ADAS solutions also make driving safer for drivers and pedestrians alike.



* "Quantifying autonomous vehicles national fuel consumption impacts: A data-rich approach" (2017), https://www.osti.gov/biblio/1409303

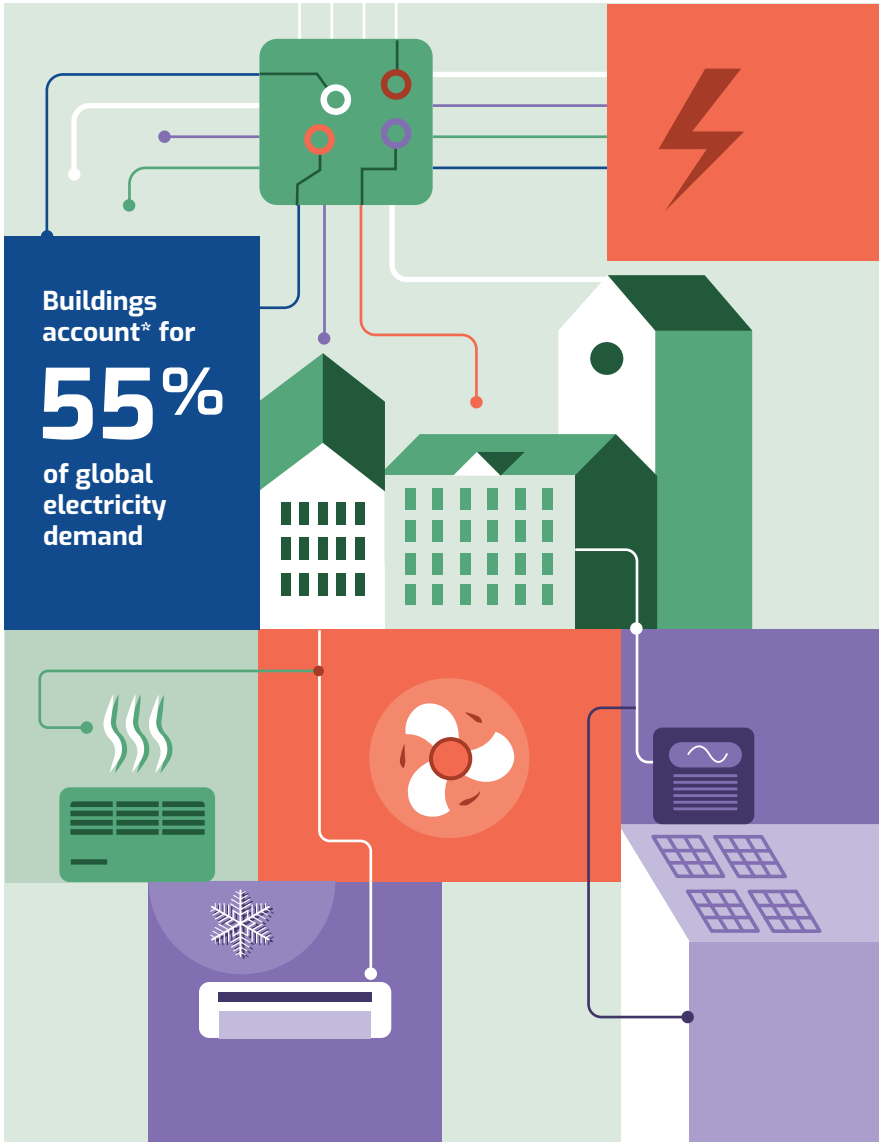
B. Energy efficiency and Climate Change Mitigation

Semiconductors facilitate an expansion of renewable energy use. Smarter electric grids enable reductions of CO_2 emissions in buildings and ultimately shifting towards a low carbon economy.

Power management semiconductors based on innovative materials such as Silicon Carbide and Gallium Nitride help enable the electronic industry to minimise energy losses by converting power more efficiently and allowing society to get more out of the electricity supplied.

Semiconductors enable a more efficient renewable energy generation, transmission and excess storage through energy storage systems that help to deliver power more reliably when and where it is needed whilst eliminating electricity wastage.

Buildings account for nearly one-third of global energy consumption. Semiconductors help improve the operational efficiency of buildings by using real-time data that lowers total energy consumption, by adapting the HVAC (heating, ventilation and air conditioning) equipment's usage to human presence, activity, and preference settings.



* "Digitalisation and energy" (2017), https://www.iea.org/reports/digitalisation-and-energy

C. Energy efficiency in the Internet of Things (IoT)

Semiconductors improve energy efficiency in the IoT such as domestic appliances, smartphones, wearable devices and industrial equipment.

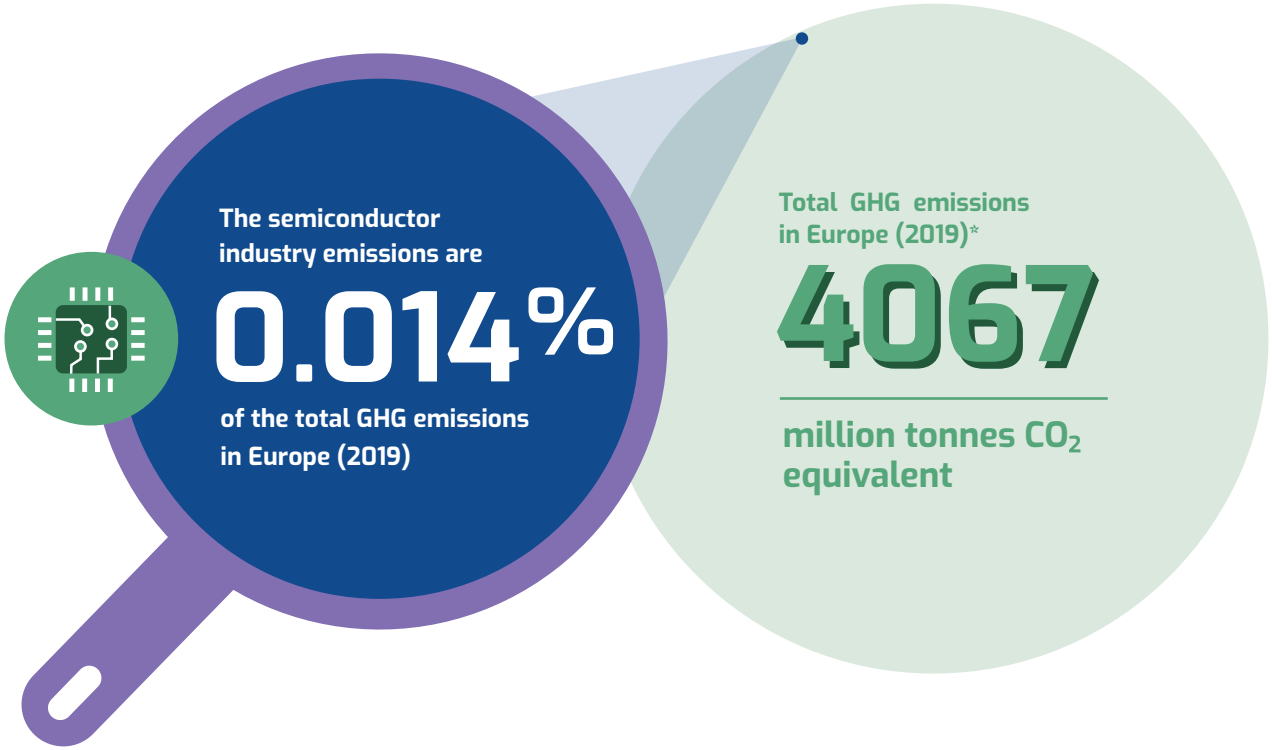
The use of sensors and smart meters to track consumption allows various industries to monitor, identify and optimise energy usage.

Vast amounts of energy can be saved with smart control systems in the billions of IoT devices worldwide used to control lighting, heating and water. Semiconductors enable smart applications and can drive energy efficiency in every area of society; where we live, where we work and how we travel.

Semiconductors facilitate the processing of data at the edge, i.e. directly in the IoT devices. This reduces the energy needed for data transmission and cloud services.

3. The European Semiconductor industry has a strong achievement record of reducing its carbon emissions

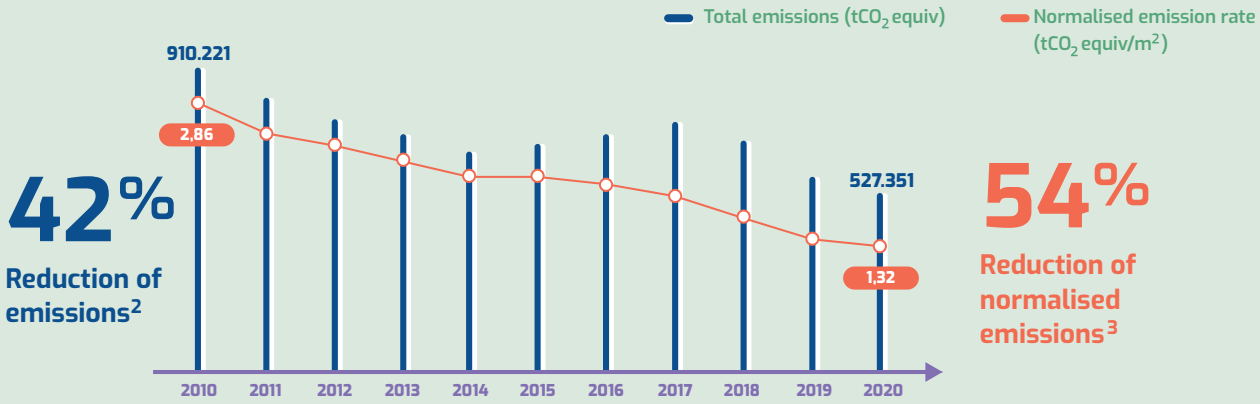
Although the semiconductor industry is a minor contributor to overall greenhouse gas emissions by sector in Europe, it remains very committed to playing its part to reduce these emissions. Many semiconductor companies have also set their own GHG emissions reduction goals.



* Annual EU greenhouse gas inventory 1990–2019 and inventory report (2021), https://www.eea.europa.eu/publications/annual-european-union-greenhouse-gas-inventory-2021

A. Successful reduction of semiconductor manufacturing greenhouse gas emissions

European semiconductor fluorinated GHG emissions (Europe 2010-2020)[1]

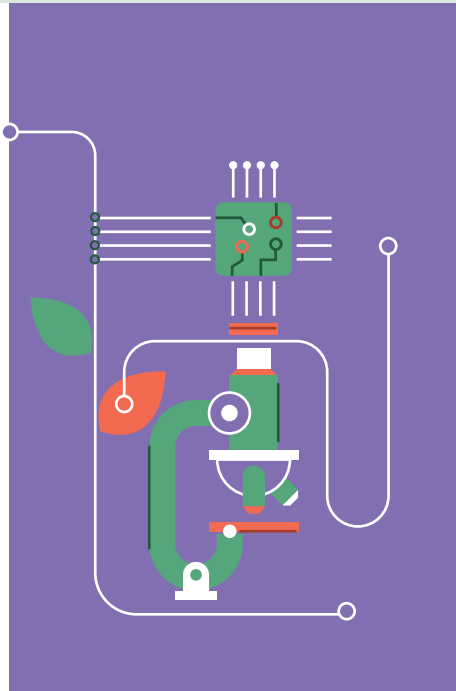


42%
Reduction of emissions[2]

54%
Reduction of normalised emissions[3]

B. Investing in clean industrial processes to reduce emissions

European fluorinated GHG voluntary reduction efforts began in the mid-1990's and have continued through today. From 1995 to 2010 emissions were reduced by 41% from the 1995 baseline. These reductions have been made possible by a commitment to act and through investments to ensure an aggressive implementation of process optimisation, to the use of alternative lower GWP perfluorinated chemistries where possible and to the installation of abatement equipment in European facilities.



[1] ESIA Press Release (2021), https://www.eusemiconductors.eu/esia/news

[2] Perfluorocompounds are greenhouse gases used in the semiconductor manufacturing process. They include all the gases: perfluorocarbons (PFCs),hydrofluorocarbons (HFCs), sulphur hexafluoride (SF_6), and nitrogen trifluoride (NF_3).

[3] Normalised emissions rate (NER): production index unit is per m^2 of silicon wafer.

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