EURO ALLIAGES

DECEMBER 2019

2050 VISION

for the European Ferro-alloys and Silicon Sector

EXECUTIVE SUMMARY

EUROALLIAGES is the European association of ferro-alloy and silicon producers and represents almost 100% of European production (EU+EEA). The association has 12 member companies operating 32 plants (90 furnaces) in 10 countries, a global turnover € 2.7 billion, € 480 million of gross added value and a workforce of 4,300.

The EU has targeted the year 2050 for the achievement of long-term strategies in key policy areas, as set out most recently by the "Clean Planet for All" Communication. The present document aims to present the vision of the European ferro-alloy and silicon sectors in the run-up to 2050. EUROALLIAGES' members are fully committed to contributing to the achievement of a sustainable and competitive European economy by 2050.

Ferro-alloys and silicon are a key part of integrated low-carbon value chains, as they are used as alloying elements in aluminium and steel production in order to improve the properties of aluminium and steel, especially casting ability, strength, wear and corrosion resistance. Advanced high strength steels with high manganese content and aluminium, contribute to lowering the weight of vehicles. Silicon is also used in electronics, chemicals and solar panels, as well as in Li-ion batteries, which are currently subject to extensive research to increase their capacity. Metallurgical silicon (also called silicon metal) has been recognized by the European Commission as a Critical Raw Material (CRM) due to its economic importance in a wide range of applications, for many of which there is no substitute. They thus play a strategic role in the reduction of GHG emissions, both in Europe and worldwide. For this reason, the demand for ferro-alloys and silicon is expected to grow in line with the demand for low-carbon technologies.

Silicon and ferro-alloys are key enablers for a low-carbon economy in Europe and for sustainable solutions globally.

In the context of increasing electricity prices, and unprecedented unfair international competition, it is imperative that the ferro-alloy and silicon sectors find ways of maintaining their global competitiveness.

The production of silicon and ferro-alloys is inevitably an electro-intensive process because high temperatures are needed for the reduction of metal oxides and smelting. Factors affecting the energy consumption are, amongst others, the quality of raw materials (such as ores, quartz and reducing agents) and their pre-treatment before smelting, the utilisation of the energy for the reaction process, as well as the heat requirement of the processes. The energy input to the process is mainly electrical and the sector is today fully electrified. By its very nature, production of ferro-alloys and silicon results in process emissions resulting from the carbothermic reduction of metal oxides, which are a major source of carbon dioxide (CO_2) emissions, which cannot be reduced below their chemical (stoichiometric) limits. These CO_2 levels are incompressible and are therefore an inevitable part of the production process.

Nothing is lost, nothing is created, everything is transformed

Law of mass conservation - Antoine-Laurent de Lavoisier, 1743-1794

The goal is to choose the right transformation.

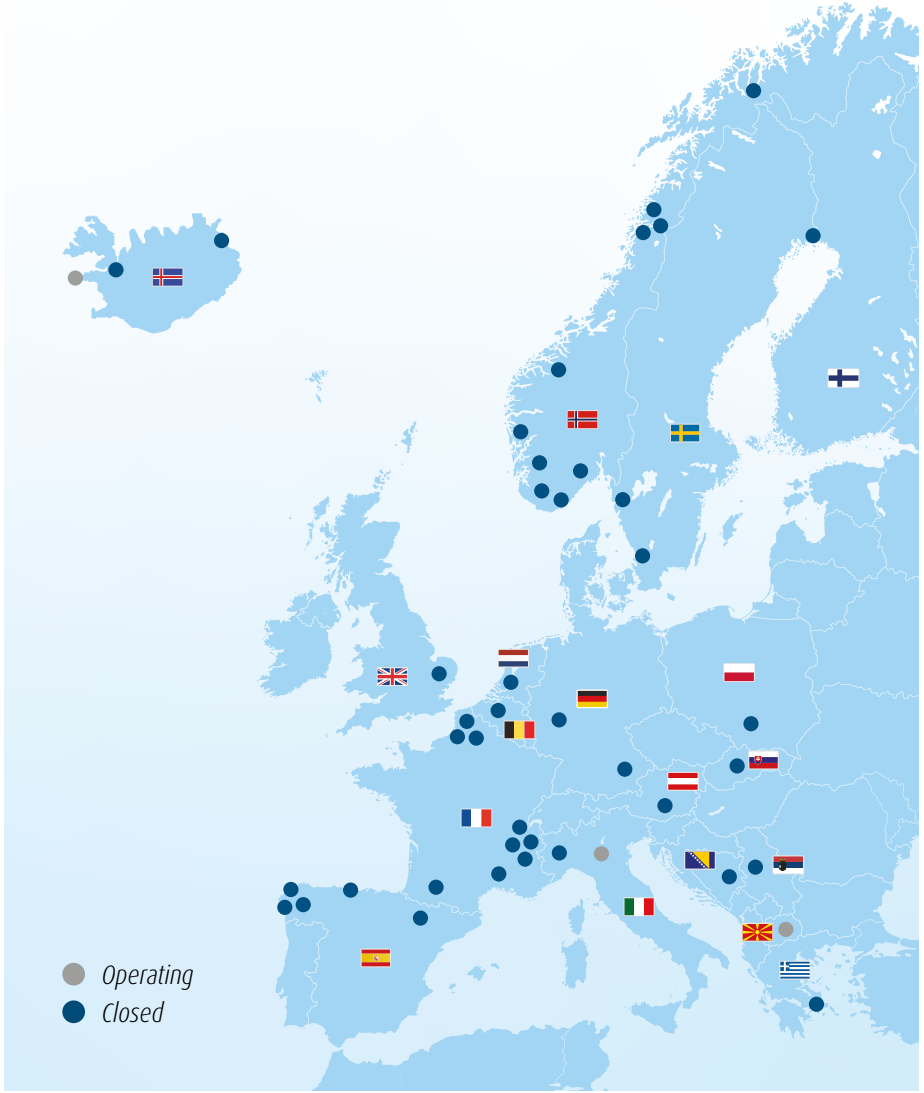


Figure 1: Ferro-alloys/Silicon plants in the EEA

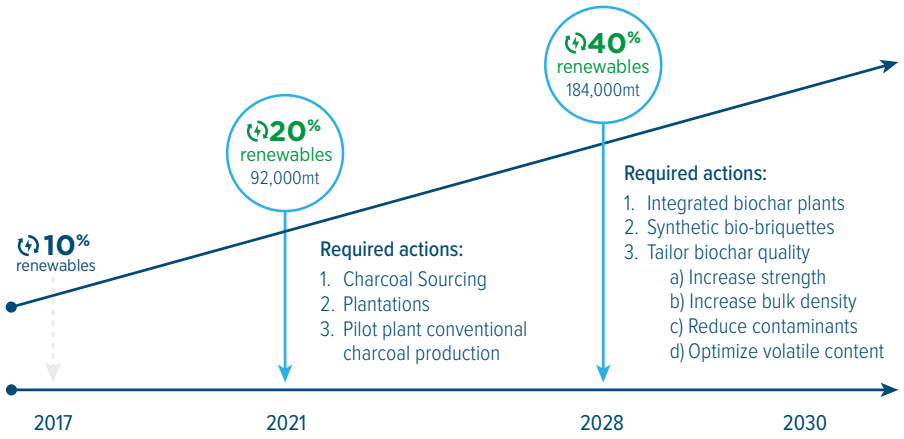


Figure 2: Biocarbon strategy of Elkem

European producers of ferro-alloys and silicon have been working on innovative technologies and techniques (considered Best Available Technique BAT) to reduce emissions for many years. Various technologies have been adopted or considered for the reduction of emissions of CO_2 emissions (both direct and indirect):

- Heat recovery to produce hot water
- Heat recovery to produce steam (with nearby industrial consumption)
- Heat recovery to produce electricity
- Carbon capture and subsequent use as fuel, or in industry parks
- Carbon capture and subsequent use for algae farming to produce biofuels
- Use of energy in off-gas - drying / heating of raw materials
- Improvement of computer and electronic monitoring systems
- Increased use of clean energy.
- Energy Management Systems

Other projects are technically feasible, but imply a high CAPEX, such as:

- Carbon Capture and Usage (CCU) based on gas fermentation – ethanol (one example being the LanzaTech process)
- Carbon Capture and Storage (CCS), separation of CO_2 from other gases (= capture) and ground storage
- Separate pre-reduction of ores in industrial off-gases and solar thermal energy unit, for the production of manganese alloys (EU SPIRE, project PREMA)
- The development of methods to utilise hydrogen in FeSi and Si-production

Ferro-Silicon (2015)	Direct and indirect emissions, $kgCO_2/t$	World share of FeSi-related CO_2 emissions
EU + EEA	4,975 (average)	3.33% (total)
China	12,913	78.18%

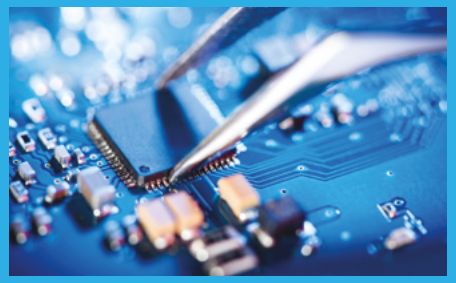
Table 1: EEA (France, Spain, Poland, Slovakia, Norway and Iceland) and China CO_2 emissions of FeSi (Source: AlloysConsult, 2016)

Our policy asks

Today, European producers have the lowest carbon footprint in the world, direct and indirect emissions combined (See Table 1). The sector calls on policymakers to create a supportive regulatory framework enabling its actors to remain in Europe and take part in a sustainable future, by ensuring:

- **Recognition of the fierce international competition, often unfair, and the need for a level playing field;**
- **Legal certainty on the transformation requested by 2050 to be now provided due to long terms investments;**
- **A sound, coherent and integrated European industrial, climate and energy policy for the next decades;**
- **Recognition that the physical and technology limits have been reached;**
- **Need to maintain a global level playing field in terms of climate regulations and their related costs, implying a successful industrial policy;**
- **Correct evaluation of future electricity demand;**
- **Reduction of the administrative hurdles of cross border wastes or by-products;**
- **Recognition of the detrimental impact of third countries' overcapacities on the European Industry competitiveness and the need to have the appropriate legal remedies;**
- **Efficient support investment and innovation development for low carbon solutions.**

Applications of main ferro-alloys and silicon and their supply chains

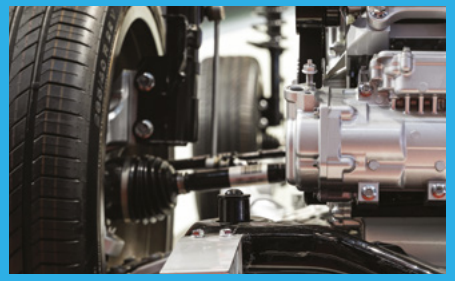





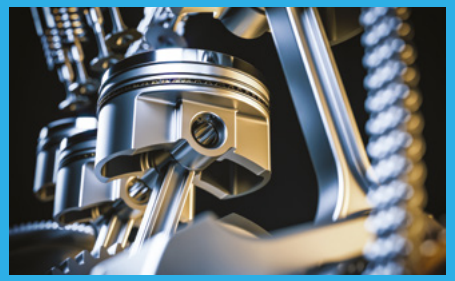












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