



RHI MAGNESITA



A European Green Deal that works for medium-sized energy-intensive industries operating in remote areas

RHI Magnesita White Paper for the next Commission

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RHI Magnesita is a global, Austria headquartered medium-sized, energy-intensive industrial company and the market leader in refractory solutions and heat management. 20.000 employees around the globe (with 5.000 based in Europe) are mining key raw materials and are producing specialty industrial ceramics out of magnesite, dolomite, and other minerals that are essential for enabling the development of our modern civilization. The company operates over 50 plants globally, of which 21 plants and mines in Austria, Germany, France, Czech Republic, Slovenia, and Sweden. RHI Magnesita is committed to deliver on the EU's Green Deal Agenda to achieve a Net Zero economy by 2050 at the latest — a goal we will extend worldwide. This White Paper discusses achieved progress, remaining challenges, and fresh ideas for the next Commission in the year of European elections that should serve as a basis for private-public exchange and cooperation.

Refractories are critical for industrial value chains in Europe.

Refractories are the backbone of all of civilisation's building blocks such as steel, copper, cement, aluminium, chemicals, glass, and others all of which are produced at very high temperatures. These highly technical ceramics materials protect plants and people from extreme heat and chemical attack that occur during their manufacturing, which means that without refractories no such building block is possible. They represent a small cost (0.5% to 1.5% of their building blocks cost) and therefore constitute a critical/strategic part of industrial value chains in Europe. For example, to produce 1 tonne of steel, 10-15kg of refractories are consumed. To produce 1 tonne of copper ~3kg of refractories are needed. Steel plants, and with it the whole construction, manufacturing, and energy industries, would stand still within a few weeks only, if RHI Magnesita stops its production. Refractories are also needed for recycling of metals and materials as those processes are equally heat-intensive. In this sense, refractories are also essential for a circular industrial economy and will be crucial for the green transition of the EU's industry.

Magnesia — crucial for the EU's green technology.

Globally over 65% of refractory raw materials are mined in China and supplied to all continents. As a backward integrated company, RHI Magnesita operates its own mines, four in the EU, producing magnesite and dolomite. After

the process of sintering the magnesite, the refractory value product is Magnesia — a globally traded good, mostly exported by China. The European steel, aluminium, copper, recycling, and other industry's demand for refractory-magnesia is high and irreplaceable. Currently it cannot be met by European production alone, even though the EU has one of the highest independence quotas in Magnesia compared to other regions outside of China. With the Critical Raw Materials Act, the EU is now setting the right focus on strategically important raw materials that are necessary to achieve the EU's Green Deal. It is crucial to declare magnesia as part of the next revision of EU's list of strategic and critical raw materials. This will ensure the sustainable self-control of the entire industrial value chain in Europe.

RHI Magnesita is committed to achieving Net Zero by 2050.

RHI Magnesita is at the forefront of the sector's testing and deployment of technological innovations to reach Net Zero by 2050 at the latest. Refractory production is an energy intensive process with a high CO₂ intensity. The production of 1 ton of refractories at RHI Magnesita typically emits 1.7 tons of CO₂ (Scope 1, 2 and 3), mostly coming from raw material production. RHI Magnesita's overall CO₂ emissions have already gone down from 6.2 million tonnes to 4.6 million tonnes in 2022 driven by aggressive increase of recycling and by optimised energy use.



RHI Magnesita currently focusses on developing novel recycling technologies to avoid the generation of emissions coming from raw material mining (active program within Horizon Europe) and intensively researches new technologies to abate all other emissions. RHI Magnesita has stepped up efforts to increase secondary material production and usage, reaching a recycling rate of 15% in Europe, with a potential to go up to 20-25% in the future. Tackling remaining process emissions is currently not possible due to lacking technologies: therefore, RHI Magnesita works with international industrial partners, universities, and green-tech start-ups to capture and utilize CO₂ to develop new renewable solutions as well as hydrogen energy networks. Currently the company invests €50 Mio in research and development of such technologies. The subsequent capital investment in Europe is estimated at >€500 Mio over several years to achieve zero CO₂ emissions.

Carbon Capture Utilisation and (intermediate) Storage

RHI Magnesita is collaborating with the Australian Green Tech Start-Up MCI Carbon to produce carbon negative products by chemically binding widely available minerals with CO₂ from emissions: these novel materials can be used, for example, in concrete or paper production without ever releasing CO₂ again. With a high two-digit million investment, the company aims to build an industrial scale plant at Hochfilzen, Austria, to demonstrate this technology for an estimated investment of approx. €100 Mio. By this RHI Magnesita intends to convert its process emissions into commercial products by 2030, hence also reducing its customers carbon footprint. If successful, the idea is to license this technology to other refractory raw material producers, other industries in Europe and globally, including China and making this a blueprint for "Green-Tech" made in Europe.

CURRENT POLICY CHALLENGES

Carbon pricing: RHI Magnesita considers carbon pricing as a key enabler. We strongly believe that it leads to

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behavioural change in industries. Nevertheless, as an energy-intensive company that falls under the EU ETS scheme, rising carbon prices and the gradual phase out of free allowances for process emissions at the same time will inevitably lead to additional financial burden for companies like RHI Magnesita. For European companies that operate globally, carbon leakage is a serious threat that needs to be avoided. To incentivise CO₂ emission reduction, artificial price increases in EU will promote carbon exports. Emission reduction incentives can better be achieved by introducing targeted financial incentives (for R&D spending, for investments and for operating cost) that defend European value addition via R&D and sustainable production methods. Additionally, support via early seed funding for new industrial-scale CCU(I)S technologies can help to bridge the gap while carbon costs are rising and maintain global competitiveness for EU based companies.

Carbon Border Adjustment Mechanism (CBAM): The refractories sector is currently not fully covered by CBAM, while its most important customers such as steel and cement producers are. Europe is a powerhouse for refractory exports, with about 40% of mostly higher-value products being exported outside of the EU. The potential inclusion of refractories into the CBAM scope will lead to a significant competitive disadvantage on the world market as European products will become significantly more expensive. CBAM for refractories needs to consider Scope 3 emissions from refractory raw materials ('precursor materials'), its biggest CO₂ source. Otherwise, the European industry is challenged with an arbitrage opportunity between mostly China-sourced raw materials and finished refractories. Ideally the CBAM scheme should be avoided in its entirety for the refractory industry.

Carbon Capture Utilisation and (Intermediate) Storage: Producing refractories results in (currently) unavoidable process emissions stemming from the CO₂ present in raw materials, e.g. magnesite rocks, rendering CC(I)S and CCU essential options of future low-emission production in Europe. Yet, the lack of CO₂ transport, injection and storage infrastructure in the EU, and the outright ban of the technology as such in some member states like Austria, poses serious challenges to develop and make use of these technological solutions. In other regions (e.g. USA) large scale CC(I)US is already in use; Europe is in danger to lag behind.

Biofuels: Between fossil fuels and hydrogen fuels a transitional period of alternative fuels must be developed



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(synthetic- or fully bio). With these fuels (charcoal, biomass, CxHy-fuels) it is also possible to reduce the fossil CO₂-footprint. However, the availability of these biofuels is currently very limited (Austria: biogas: 0,6 permille available) and more expensive vs fossil fuels by a factor of 5-6x.

Hydrogen: Refractories production is energy and emission intensive. It requires extremely high temperatures that cannot be achieved by the direct use of electricity but only by the direct combustion of a few fuels. Green hydrogen is a viable option to replace fossil fuels. As of now, many industries, especially those operating outside of large industrial clusters in decentralised operations (such as RHI Magnesita), struggle to access hydrogen infrastructure and large volumes at the required price level.

POLICY RECOMMENDATIONS

■ CARBON BORDER ADJUSTMENT MECHANISM:

While RHI Magnesita welcomes the EU's efforts to address carbon leakage, it urges policymakers to ensure that EU products are not replaced by more carbon-intensive products produced elsewhere. The probability of losing a significant share of EU exports (with subsequent plant

closures) is almost certain as carbon cost related increases are almost equal to the total margin of the product. RHI Magnesita exports 40% of its products outside the EU comparable to other competitors. RHI Magnesita calls for the future inclusion of refractory raw materials as precursor materials for finished refractories like the current policy proposal for steel. Additionally, we urge policymakers to include the sizable finished refractory exports in their consideration that add significantly to the industry's output, employment, and tax generation.

■ RECOGNIZE MAGNESIA (SINTERED MAGNESITE) AS CRITICAL:

Magnesia (sintered magnesite) is an essential material to enable the production of steel, aluminium, copper, glass i.e., the building blocks of Europe's green technology in all the EU's industrial ecosystems. As one of the few magnesita producers in the EU, we urge the Commission to review the list of strategic and critical raw materials bearing in mind the criticality of magnesita in terms of economic importance in the value chain for EU industry. Today Europe already depends on the import of Chinese Magnesita to cover European industry's demand, increase of this dependence should be avoided.

■ **MATERIALS RECYCLING:** As a global company that exports 40% of its products outside the EU, recovering exported materials from third countries poses a challenge. To increase recycling a harmonization of legislatives for "waste transport for products in the B2B industrial value chain" is highly needed within the EU. The EU shall also consider cooperation around global minerals and metals waste trade especially in view of the EU's 25% recycling target for critical raw materials.

■ **CCU(I)S:** Carbon Capture Utilisation and Storage technologies are part of the decarbonisation solutions RHI Magnesita is investing in. The EU should facilitate and incentivise research and innovation partnerships, especially with countries that are also advanced in R&D and deployment of these technologies. Such partnerships will help European industries enhance their knowledge base on their technical and economic feasibility of deploying those technologies.

Financial support: The EU might consider supporting pre-investment feasibility studies for pilot projects to encourage businesses to generate technological knowledge and foresight on the cost effects of adopting alternative, low-emission technological solutions like CCU(I)S. Feasibility

Introducing a dedicated call for medium-sized companies operating in remote areas of Europe will help to address some of the challenges companies like RHI Magnesita have been facing,

studies can provide an important basis for companies to ask for low-cost funding as they would provide evidence on expected economic and environmental outcomes, strengthening the bankability aspect of projects.

Infrastructure: building the necessary CO₂ transport and storage infrastructure is of utmost importance for energy intensive companies to tackle their unavoidable process emissions on the short-term. The EU needs to mobilise and incentivise investments and establish a monitoring system to track the development of CO₂ pipelines. In this context, it will be crucial to ensure infrastructure access to energy intensive companies that operate outside of big industrial clusters, in remote areas.

■ **HYDROGEN:** Companies like RHI Magnesita will need large volumes of affordable hydrogen (competitive to natural gas) to make the transition to net zero possible. Investments in non-CO₂ emitting hydrogen production within and outside the EU will help to achieve the production of large volumes at economically attractive cost levels. The EU needs to accelerate investments in hydrogen production, streamlining and aligning multiple, parallel, and overlapping efforts across the EU.

CAPEX and/or OPEX support: RHI Magnesita is mapping out all known decarbonization options across plants and processes. However, CAPEX support for industrial conversion will be needed as well as access to vast amounts of hydrogen at affordable prices through accessible infrastructure. For example, converting a furnace to be fired with hydrogen instead of natural gas leads to a considerable increase in OPEX costs at current conditions.

Infrastructure: For companies like RHI Magnesita, which will be a major offtaker of green hydrogen, access to infrastructure is key. The public sector needs to ensure that also medium-sized energy intensive companies operating in remote areas can access green hydrogen.

■ **ACCESS TO FUNDING:** As a sector that falls under the EU ETS and pays for its carbon emissions, being able to access funding provided from the Innovation Fund is essential. Yet, small and medium-sized, landlocked plants like RHI Magnesita's 21 plants in Europe often cannot compete with the cost efficiency of large-scale projects. RHI Magnesita plans to build CCU aggregates at the raw material plants in Europe. From today's perspective, the first CCU pilot plant will be able to process around 50,000 tons of CO₂, which is very ambitious in terms of industrial upscaling. However, this volume is classified as "too low" in the parameters of current national Austrian funds, which makes a participation impossible. If RHI Magnesita has access to funds and a pilot plant is successful, further CCU plants can be installed eliminating a large part of process emissions. Introducing a dedicated call for medium-sized companies operating in rural areas of Europe will help to address some of the challenges medium sized companies like RHI Magnesita have been facing, granting them fair access to these schemes and allowing them to de-risk investments in deploying innovative and environmentally friendly technologies.

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