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Public

Biocarbon is a key enabler of clean transition and decarbonization

EU policies should recognize the strategic role of biomass in industrial decarbonization. Biomass is an important raw material for various industries, and we need clear regulation and public support as otherwise access to sufficient biocarbon could become a bottleneck.

Stainless steel producer Outokumpu's business is based on the circular economy, and we use more than 90% recycled steel in our production. Our carbon footprint[1] is up to 75 % smaller compared to the industry average and we help our customers to reduce their carbon footprint. Key reasons for the low carbon footprint are having our own ferrochrome, high recycled material content, and low-carbon electricity.

Outokumpu has the only chromium mine in the EU, a critical raw material needed to produce stainless steel. This unique position offers a competitive advantage and strengthens Europe's self-sufficiency in low-emission raw materials.

The carbon footprint of Outokumpu ferrochrome is already 67% smaller compared to the industry average. We work to reduce this further by switching from the use of fossil coke and LNG to biocoke and biogases respectively.

We welcome the Commission’s plan to present a new Bioeconomy Strategy, to advance innovation and maintain the EU's leadership in the bioeconomy. We support its aim to reinforce circularity and sustainability and make the best and most sustainable use of biomass while contributing to the decarbonization of the EU economy.

The future of fossil-free steel relies on multiple pathways, and we have a unique opportunity to lead in biocarbon-driven solutions.

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[1] *Outokumpu’ 1.6 kg CO_2e per kg of stainless steel based on lifecycle assessment. Global average carbon footprint of stainless steel: (2024): 7 kg CO_2e per kg of stainless steel. Outokumpu’s calculation based on data provided by CRU, worldstainless and Kobolde & Partners AB.*

Biocoke can replace fossil coke

Biocoke, a biomass-based alternative, is currently the best available technology for replacing fossil coke in the production process of ferrochrome. We are also continuously researching new innovations to further replace fossil coke. Using hydrogen as the reductant is not technologically possible as it would require extremely high temperatures.

The steel industry offers a new, more efficient use for forest industry side streams and waste in accordance with the cascade principle where woody biomass should be used according to its highest economic and environmental added value. Currently, biomass is mainly burned for energy production, but the steel industry offers up to three times the potential for use of the carbon bound in biomass. Assuming that in the future, biomass is directed to a more valuable use in accordance with the cascade principle instead of being burned, it supports local material flows and the local circular economy and creates a new income stream.

Biocarbon is a raw material produced by carbonizing woody biomass originating as a by-product from the forest and wood industry (such as saw dust or wood chips) that are otherwise mainly used for energy production and burned to a large degree. We use biomasses certified in accordance with the Finnish Sustainability Act and in compliance with EU ETS and RED III, which are accepted by the EU Voluntary Scheme.

Biocarbon is turned into biocoke when it undergoes an agglomeration process which changes the material properties to withstand the harsh environment in our furnaces such as increased cold and hot strength, higher density and resistance against abrasion.

Biocarbon has multiple applications. At Outokumpu, it can be used as an additive in the electric arc furnaces (EAF) for the melting of stainless steel, as source for energy in the sintering plant or further processed into biocoke (densified biocarbon) and used as a reduction agent in our ferrochrome production in submerged arc furnace (SAF).

Approximately 50% of Outokumpu's direct emissions can be reduced with biocoke. Biocoke offers a near-term, scalable solution to reduce our direct emissions and Outokumpu is actively advancing and investing in its biocoke supply strategy through own production, external sourcing and strategic partnerships.

We have invested in biocoke pelletizing plant in Tornio, Finland that started operations in 2025, and we have invested in biocarbon production plant in Sassnitz, Germany where the production will start in 2026.

Certification ensures that the management and processing of forests is ecologically, economically and socially sustainable, and that the livelihoods of future generations are not compromised.

Biomass needs to be directed to higher value use with legislative support

While there is increasing regulation to direct biomass toward "higher-value" use and not just energy production according to the cascade principle, it is crucial to ensure that industrial applications -

such as replacing fossil coke in metal production - remain a priority use case for sustainable biomass.

The challenge remains that wood-based energy is subsidized which is driving the demand and consequently price of biomass to a level which does not support the industry transition. On top of legislative support, we need also an evenly subsidized environment or no subsidy in the energy sector.

Biomass can be used to replace fossil raw materials, particularly coke, in our case. This production route enables more efficient use of natural carbon as it can be utilized multiple times. Additionally, the biogenic CO2 that can be potentially captured is a valuable raw material for other companies (for example to produce biofuels or chemicals), supporting the circular economy.

Scaling up biocoke requires regulatory incentives, funding, and industry collaboration to ensure competitiveness. We need to be able to utilize the biogenic portion of carbon monoxide.

The development of process side stream utilization is key for reducing reliance on fossil energy sources such as fossil LNG.

Utilization of biomass-based raw materials release biogenic carbon that forms part of the natural carbon cycle and therefore support us in lowering emission.

Our aim is to develop possibilities to utilize process side stream gases from the pyrolysis process of biocarbon production more efficiently for renewable and low-emission electricity and fuels, for example.

The speciality of stainless steel

Stainless steel can replace other materials – for example, carbon steel, traditionally used in bridges, requires regular maintenance, while bridges made of stainless steel have a service life of at least 100 years. In electric car battery housings stainless steel is a good option and when durable but thin steel grades are used, it is also lightweight.

The role of carbon in stainless steel is very different from that in carbon steel. In carbon steel production, which traditionally uses a blast furnace, fossil carbon (coke) acts as both an energy source and a reducing agent in metal production.

Outokumpu has two different production processes in Kemi-Tornio: ferrochrome production and steel production. We use fossil coke as a reducing agent in the ferrochrome production process, while stainless steel production is based on the use of recycled steel/scrap and our own ferrochrome, and carbon does not play a significant role here.

The steel industry offers a higher use value for biomass according to the cascade principle – carbon bound to biomass can be utilized up to three times:

1. Carbon as a reducing agent in ferrochrome production
2. Secondary use of coal (utilization of carbon dioxide)

3. Utilization of green carbon dioxide (we are investigating opportunities for the utilization of side streams, such as green carbon dioxide)

The carbon released in the process is of biogenic origin, meaning that it is part of the natural carbon cycle. The use of biomass-based raw materials does not increase the amount of carbon present in nature in the long term.

The EU bioeconomy could boost European competitiveness by increasing the use of sustainable biomass in high-value applications. We need:

1. Stronger carbon pricing mechanisms to prevent carbon leakage
2. Promotion of the circular economy where nothing goes to waste
3. EU regulation that values the climate and circular benefits of bio-based materials
4. Public procurement rules that prioritize circular and renewable materials to drive demand and market confidence
5. Consistent legislation and implementation across the EU

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About Outokumpu

Outokumpu is the European market leader in stainless steel and the second largest in the Americas. Our turnover in 2024 stood at EUR 5.9 billion and our European production is in Finland, Germany and Sweden. We also have the only chromium mine in the EU, which is a critical raw material for producing stainless steel. Our business is based on the circular economy with over 90% recycled material content – enabling up to 75% lower carbon footprint[1] compared to the industry average. Outokumpu also brought to the market the first towards-zero stainless steel which has up to 93% lower carbon footprint.

1) *Outokumpu's average product carbon footprint (2024): 1.6 kg CO_2e per kg of stainless steel based on lifecycle assessment. Global average carbon footprint of stainless steel: (2024): 7 kg CO_2e per kg of stainless steel. (Outokumpu's calculation based on data provided by CRU, worldstainless, and Kobolde & Partners AB)*