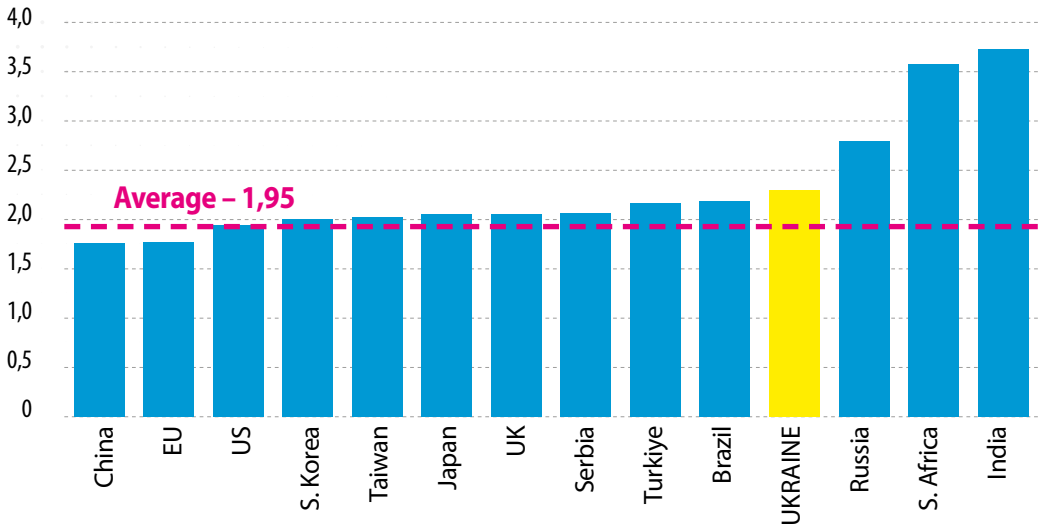
Assessment of the competitiveness of Ukrainian steel based on the CO_2 emissions

Carbon intensity became a factor of competitiveness for steel producers. This issue is especially relevant for Ukrainian iron & steel companies seeing the accelerated European integration of Ukraine.

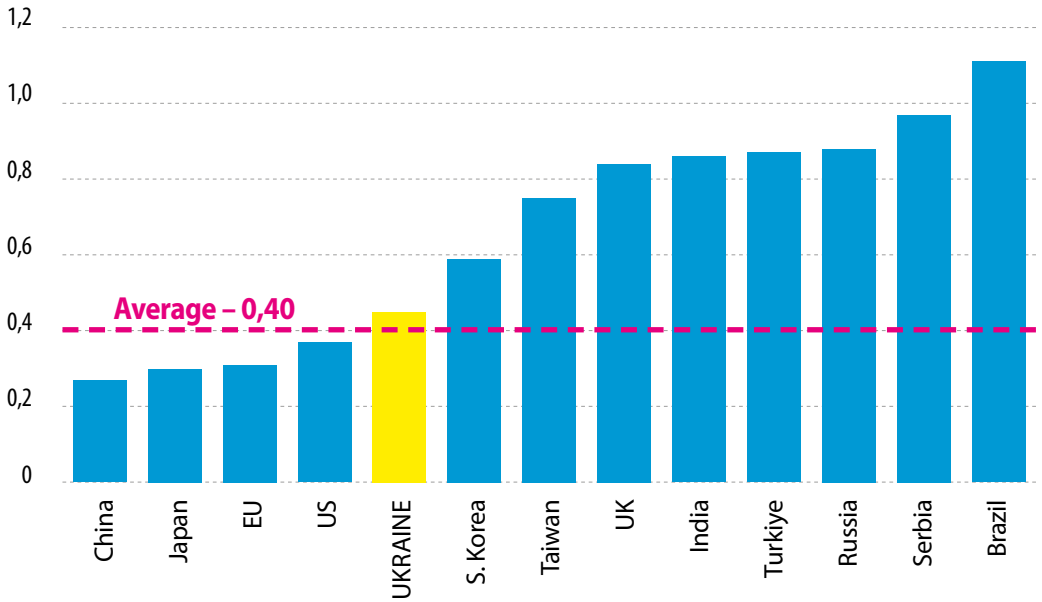
A direct comparison of carbon intensities by company isn`t correct given the different structure of capacities. For example, in Ukraine, integrated steelmakers have the following structure: production of coke, sinter production, hot metal – in blast furnaces, crude steel – in basic oxygen furnaces, rolling production. In the EU, an enterprise may not have one or more of these stages, buying raw materials from third parties. This difference distorts the results of the comparison, artificially inflating emissions volumes of integrated companies.

The correct assessment has become possible with the release of the «Greenhouse gas intensities of the EU steel industry and its trading partners» report, prepared by the Joint Research Center, the European Comission`s science and knowledge service. This report contains calculations of CO_2 emissions per each production stages. GMK Center analyzes the results of the report, without verifying the input data or results, assuming the source is reliable.

CO_2 emissions intensity for BF-BOF route, tonne CO_2 per tonne steel, Scope 1 & Upstream



CO_2 emissions intensity for hot metal production, tonne CO_2 per tonne of product



According to the results of the study, global average Scope 1 and Upstream emissions for integrated route is up to 1.95 tonnes of CO_2 per tonne of product.

China has the lowest average emissions – 1.76 t/t. It affects the calculation of global averages, as China accounted for 67% of global integrated steel production (BF-BOF) in 1Q 2022. China's leadership can be explained by the fact that the country's steelmaking capacities are the newest globally.

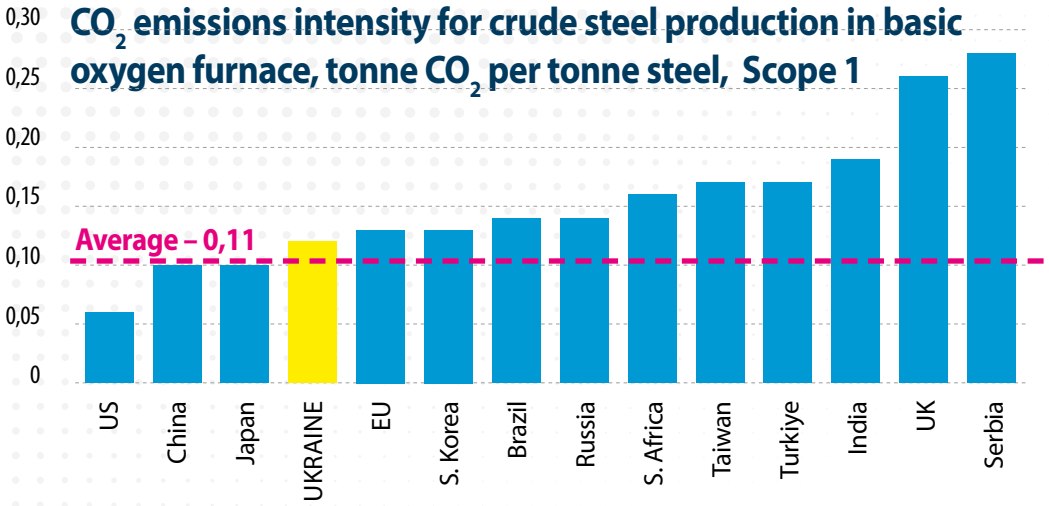
It should be noted that a number of countries have very close values of CO_2 intensity - from 2.0 to 2.2 t/t. These are the USA, South Korea, Taiwan, Japan, Great Britain, Serbia, Turkiye and Brazil.

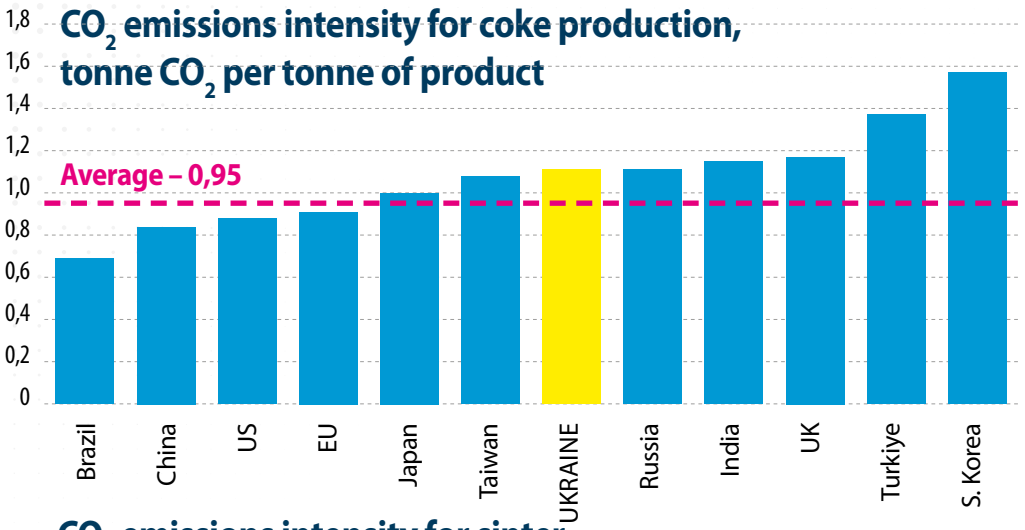
The high density could be explained by the fact that there are still no technological breakthroughs that would make a difference in the production of steel by integrated route.

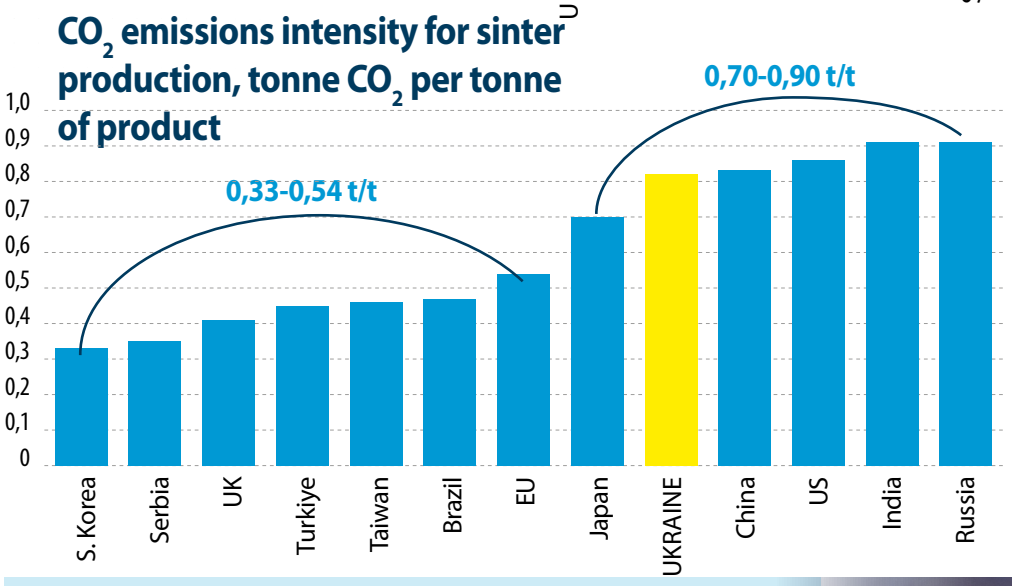
The same group of countries includes Ukraine with average intensity of 2.3 t/t, as other countries have significantly higher values.

So, Ukrainian steelmakers are competitive on the global market in terms of CO_2 emissions. Moreover, they have advantages in some production stages.

For example, Ukraine is among the TOP-5 globally in terms of the carbon intensity of hot metal







production. Emissions at this stage amounted to 0.46 t/t. It`s the result of large investment programs of local steelmakers. There were 13 projects worth $450 million during 2015-2021, aimed at the modernization of BFs.

Ukrainian producers have achieved good results at the stage of crude steel production, where emissions at the level of 0.12 t/t are at the level of the best global practices.

But at the stage of coke production, Ukraine occupies a median position, slightly lagging behind the EU indicator - 1.1 vs 0.9 t/t. The projects planned before the war at Zaporizhkoks, Azovstal, and Dnipro metallurgical plant were supposed to change the situation for the better.

Reducing emissions on coke production stage is the most capital-intensive. According to GMK Center calculations, the introduction of the best available techniques (BAT) at the stage of coke production in Ukraine requires about $4 billion of CAPEX.*

In terms of emissions at the sinter production stage, Ukraine belongs to the second group of countries with higher emissions. Two projects at Kametstal and ArcelorMittal Kryvyi Rih were in the process of implementation. For the implementation of BAT at sinter plants, Ukrainian enterprises should invest about $100 million.*

** including capacities, located on the territories, occupied or damaged after 24/02/2022*

So, Ukrainian steelmakers are not inferior to other steel exporters to the EU in terms of CO_2 intensity.

Ukrainian steelmakers have advantages at the stages of hot metal and crude steel production, but there is room for improvement at the stages of production of raw materials - coke and sinter.

The EU is a net importer of coke, and emissions for coke production aren`t included to the reported (verified) CO_2 emissions by number of companies. Therefore, a special mechanism for accounting for emissions during the production of imported raw materials (coke and iron ore) should be implemented for a fair accounting of emissions of integrated enterprises.

To eliminate the gap in emission intensity with EU producers, Ukrainian steelmakers need access to investment resources in the amount of $6.5 billion* for the implementation of BAT.