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The planned transition of Ukrainian mills to new steelmaking technologies

Along with other global steel producers, Metinvest has defined its long-term objectives for the reduction of the carbon footprint of its Ukrainian assets, which continue to be the largest contributors to the company's CO2 emissions. Currently, the work on the technological strategy and the decarbonisation roadmap is in progress; however, as Yuriy Ryzhenkov, Metinvest's CEO noted, the focus will be on known and proven technologies, including direct reduced iron (DRI) in combination with electric arc furnaces (EAF), which, by international standards, can generate a rapid positive effect. This step-by-step approach to delivering on its objectives will help the company reduce CO2 emissions by more than 90% by 2050 and completely abolish the sinter-making process.

— Mr Ryzhenkov, why has Metinvest become more active regarding decarbonisation over the past two years?

— The first reason here, of course, is the global trend to reach carbon neutrality by 2050, which is developing rapidly, in the European Union and also worldwide. The recent meeting in Glasgow, the COP26 conference, was representative in the sense that nearly 200 countries adopted a global climate pact.

The second point includes the economic reasons that push companies, including ours, towards decarbonisation. Among them are the CO_2 emissions allowance trading system in the EU and taxes on CO_2 emissions in Ukraine. Moreover, the aspiration of companies is to have access to the European market, which will gradually be closing its doors to carbon-intensive products.

The third reason is operational improvements; when the company becomes more efficient, it automatically reduces its greenhouse gas emissions.

The steel industry is one of the most intensive in terms of CO_2 emissions, both in Ukraine and worldwide.

However, together with related industries, steelmaking accounts for a major contribution to Ukraine's GDP of around 12%. Therefore, the decarbonisation trend inevitably becomes focused on the steel industry.

That said, the steel industry already has well-understood technologies that can have a fairly quick, positive impact by global standards. These are the low-carbon technologies of DRI and EAF, which today are both considered basic, understandable and proven methods.

Therefore, Metinvest's efforts in the area of decarbonisation are not just about the climate, they are also about renewal and entering new markets (from the perspective of efficiency and product quality).

— What objectives does the company have for the reduction of CO_2 emissions?

— Our updated technological strategy, which we are continuing to develop, involves different scenarios, yet each one of them includes the transition to low-carbon operations.

As for CO_2-related objectives, our strategic goal is to reduce greenhouse gas emissions by more than 90% by 2050, using a step-by-step approach with key milestones in 2030 and 2040.

The final phases of the strategy are expected to include the use of hydrogen. In the meantime, today, unfortunately, there is still no method for producing cheap hydrogen in our country or anywhere else in the world. That is why we have set this timeframe, in the hope that a method will be found to produce cost-effective hydrogen.

— How do you plan to achieve the reduction in the first two stages?

— The things we can do right now are to improve the efficiency and automation of our existing processes, reduce the consumption of DRI module and an electric steelmaking facility at one of our plants - either in Zaporizhia or in Mariupol. Since we are not sure that hydrogen will be economically viable by this time, we will be able to run the new complex with natural gas and therefore we will already be able to significantly reduce CO_2 emissions. At the moment, we are still discussing its location, because we are not the only shareholder in Zaporizhstal, and, so far, we don't see the willingness of the other party to participate in the development of the plant. So, there is still a "fork in the road" as to whether Zaporizhstal should be an electric steelmaking plant or a cast-iron mill.

— What is the timeframe for deciding which of the sites will be transformed first?

— In the first stage, whatever the development of the situation, we will have EAFs. For assets in Zaporizhia and Mariupol, we have already sent out requests for technical and commercial offers to major equipment producers and we are waiting for the results. I think we will complete the feasibility study in the first half of 2022, and probably, by the end of the year, we will need to make a decision about the site where we will build the first facility.

— Previously, it had been said that Ilyich Steel would continue to use conventional steelmaking technology until 2030. Has this vision changed?

— Both yes and no. For some time, the plant will continue to operate using conventional technology, but as the useful life of our blast furnaces expires, we will introduce new processes and replace the blast furnaces with DRI modules and EAFs. Both new units will be in operation for some period of time and the sinter plant will continue to operate at Ilyich Steel. And this will be the case for almost all of the sites.

It is unrealistic for anyone to switch to a completely new production cycle and new technologies all at once. Even in Europe, from what we see of the plans of our peers, there is a gradual transition, and conventional technologies will remain in place for quite a long time - until 2040-45. But we should not forget that steelmakers in Europe will receive government support and financial incentives to introduce new technologies, while in Ukraine, we are trying to involve the state in this issue, but we have yet to receive any support. Therefore, it will be more difficult for us to achieve this goal.

— What is the planned capacity of the company's EAF production?

— We are discussing a target capacity of 4-4.5 million tonnes of steel in Zaporizhia, and we would like to keep volumes of about 9 million tonnes of finished products in Mariupol. If Zaporizhstal becomes a mill that only makes pig iron, then we have the opportunity to develop both the Mariupol site and the site in Kamianske, thus compensating for the retiring steelmaking facilities.

— What will Zaporizhstal's carbon footprint be if the plant produces only pig iron?

— If the plant produces only pig iron, then the volume will not be 4 million tonnes, but around 2-2.5 million tonnes per year. Accordingly, in addition to the decommissioning of open-hearth furnaces, we will automatically reduce CO_2emissions by at least 30% across the plant. At the same time, we will continue work aimed at improving the efficiency of the existing blast furnaces. For example, it will be possible to increase the ratio of pellets to sinter in the blast furnace process, which will also lead to a reduction in CO_2 emissions.

— What do you plan to do to achieve efficiency improvements, including for the energy efficiency of existing facilities?

— These are classic projects. We will try, as much as possible, to use waste gases to produce electricity or heat energy. The first thing we are going to do is to restore or build a new fleet of generating facilities at our plants that will use secondary gases to the maximum extent possible in order to generate electricity in-house.

Second, we are working to improve the quality of our raw materials, both iron ore and coke, thereby increasing the efficiency of our blast furnaces and reducing the consumption of high carbon fuel equivalent per tonne of hot metal/pig iron. In 2020 we have reduced the use of fuel equivalent per tonne of hot metal/pig iron by 4% (since 2018), and this is not the limit. We plan to reduce it by another 4% in the near-term future. In addition, by

improving the quality of our iron ore products, we are preparing our raw material base for the next step: DRI.

We have already mastered the production of DR pellets at Central GOK, the current capacity is around 2.3 million tonnes annually. Over the next few years, we plan to build a new pelletising machine at Northern GOK with an expected capacity of about 5 million tonnes of DR pellets per year. And this should provide our first DRI-module with raw materials (DR-pellets for subsequent metallisation) by the time of its commissioning.

— What are the company's current emissions figures?

— In 2021, we recalculated our Scope 1 emissions according to the new Ukrainian methodology, which was recently brought in line with the European approach. In 2020, direct greenhouse gas emissions (Scope 1) within the IFRS perimeter (i.e., excluding associates and joint ventures) amounted to 23.2 million tonnes of CO2 equivalent. In addition, we have calculated indirect greenhouse gas emissions for the first time (Scope 2). For 2020, they amounted to 2.7 million tonnes. The intensity of direct greenhouse gas emissions in 2020 from the Mariupol site was 2.4 tonnes of CO2per tonne of crude steel produced.

— Has the company assessed how the intermediate results of each stage of the decarbonisation roadmap at Metinvest's assets will compare to global indicators?

— Right now, it is difficult to answer, because our peers are also planning decarbonisation measures. At the same time, we use slightly different processes for steel production. For example, today we use pulverised coal injection technology (PCI), and Russian steel producers use natural gas. PCI results in higher CO_2 emissions than natural gas. We focus more on the sintering process, while our European peers, for example, use pellets. Therefore, it is difficult to provide an assessment right now, but I think our indicators will be comparable to international ones.

— How much do you plan to invest in decarbonisation projects?

— If we talk about the short-term outlook, our main investments will be directed at the production of high-quality raw materials at Northern GOK that can, in turn, be used further in green metallurgy, and they are estimated at almost US$1 billion.

One DRI module in combination with an EAF and casting represents at least EUR1 billion. For the construction of a plant with a capacity of 4-4.5 million tonnes of electric steel, at least EUR2 billion will be required. In order to change the technology completely, the estimated costs will be about US$15-20 billion over the next decade. Here we need government support. But, today, there are not decarbonisation programmes, or even any progress on developing them, in Ukraine. We aim to encourage the government to move in this direction.

— Can you count on receiving support from European funds?

— We have some support. Our Trametal plant has even received a number of awards for its achievements in carbon neutrality. As for our Ukrainian assets, which have a much greater impact on the environment, theoretically yes, but there has been no such experience. Ukraine has joined Horizon Europe, which provides support for scientific research in the area of decarbonisation, so at least here we can count on it, but we need to work in order to raise financing.

— When does the company expect to present a detailed roadmap for the decarbonisation of its Ukrainian assets?

— We are now completing the calculations for the decarbonisation roadmap and, I suppose, we will make it public in spring 2022. By the end of 2022, we expect to finalise our technological strategy.

Right now, we understand that, by 2030, the level of detail should be very high, with specific projects and KPIs, since we are accounting, by and large, for conventional technologies - a gradual transition to DRI and replacement with electric steel. For the second decade - by 2040 - the level of detail is lower. It is more based on principles and larger blocks that represent our approach. In terms of time, this part is less strictly regulated, although it is linked to existing equipment and the year-by-year timing of their decommissioning. The period 2040-2050 is more about intentions than specific achievements.

By 2050, we expect that our sinter production will be completely decommissioned, and we will switch to DRI with electric steel. By 2040, we intend, to a large extent, to substitute the "old" capacity with electric steel, but some will still remain in place.

— This year the company signed a number of memoranda of cooperation, what impact do you think they will have?

— We are pursuing our own agenda with each of these companies. For example, Danieli is one of the world leaders in electrometallurgy and one of the owners of the technology for the production of DRI, therefore we are

working with them in these areas.

Through K1-MET, our Metinvest Polytechnic university joined the consortium of companies and institutions that are carrying out research in the field of circular economy and focusing on the recycling of metallurgical waste. Here, we expect results in terms of the efficient management and recycling of our waste. We have signed a memorandum with Primetals aimed at, among other things, improving the efficiency of our existing blast furnaces and reducing CO_2 emissions. We are just starting to work on specific projects with Germany's well-known SMS group, which also includes Paul Wurth.

— How will the EU's Carbon Border Adjustment Mechanism (CBAM) affect the company's operations on this market?

— It will have an impact on everyone, including enterprises located in the EU. Today, emissions quotas are purchased for volumes in excess of the allocation allowance. We estimate that the amount of tax an average European manufacturer paid per tonne of steel in 2020 is about EUR7 per tonne of steel. This is a small burden on a manufacturer, if one looks at their costs, taking into account the allocation allowances.

At the same time, the following should be taken into account: if the CBAM is in force from 2026, it will initially apply only to the importers of rolled steel products into the EU, and we will pay it from the first tonne, while for European manufacturers, allocation allowances will be valid until 2035. While European steelmakers still have time to make decisions about the carbon neutrality of their operations, importers should already be focused on how to reduce their carbon footprint and invest in low-carbon metallurgy now. Therefore, Metinvest is making decisions on investments with the understanding that this tax will be in place, and these investments should be aimed at, among other things, reducing CO_2 emissions.

— Has the company already calculated the potential damage the CBAM could cause it?

— Uncertainty remains about the final terms of the CBAM, how it will be implemented, and how it might eventually impact various steel producers. Additional updates and clarifications are expected to be published in 2022, and we assume there will be a level playing field for all market participants. Therefore, an objective assessment of the impact of such changes can be carried out after the publication of the final document.

— The company's technological strategy includes another important area, the development of production of high-quality products at existing facilities, what key projects could you mention now?

— In addition to the development of the production of DR-pellets, the key project in this area is a cold-rolling mill and new production capacity for colour-coated rolled steel at Ilyich Steel. The total project budget is close to US$1 billion, and we will implement it within the next three years. We plan to produce the first coil by the end of 2024. The project will actually produce more than 1 million tonnes of products, which, in terms of quality, will not be inferior to any other global manufacturer. Our main focus is the domestic market. In addition, we expect that our high-quality, cold-rolled products will stimulate the development of household appliances (white goods) and the automotive industry in Ukraine.

It is noteworthy that the new shop will be equipped with highly efficient gas cleaning equipment that meets the latest environmental standards in Ukraine and the EU. Thanks to gas cleaning systems, the emissions of harmful substances will be 1.5-3 times lower compared to the maximum permissible standards, and fuel consumption will decrease by 20%.

The second project in the near future is the construction of a hot rolling mill in Italy. It will allow us to convert more than 2.5 million tonnes of slab into high-quality, hot-rolled coil within our target market in Europe.

— What is the planned investment programme in this area?

— Today, Metinvest's investment programme is generally planned at the level of US$1.3-1.5 billion per year. I think this level of investment will be maintained for the next three to four years. Further investments will depend on how we progress on our green metallurgy. For now, we expect that this will be sufficient, including the investments in the development of electrometallurgy.