

# AIST European Steel Forum 2020

## A Green Transition Gets Underway

Amid this global pandemic, an inescapable question before industry leaders is: What will steel demand look like over the next several months? The inevitable answer, unfortunately, is: they're not sure. How could they be, given the unpredictable trajectory of the situation?

"Uncertainty is leading," says Mario Caldonazzo, chief executive officer for Italian steel producer Arvedi. He boldly articulated what all perhaps were thinking, "Beyond (the end of 2020) nobody has a real clear vision for the future."

Yet even as the pandemic clouds near-term forecasts, a longer-term view is coming into focus for European producers. And the view is decidedly green as European producers begin in earnest a monumental transition to a carbon-neutral future.

And the work done to date was highlighted during AIST's 2020 European Steel Forum. The annual conference, held virtually in October, brought together leaders from major steel producers, plant builders and academia, both from the EU and the U.S.

The conference was organized with the support of the European Member Chapter, and their efforts were rewarded with a record turnout. Over two days of virtual discussions, participants traded views on a number of topics, but Europe's industrial transition to carbon neutrality was never far from mind.

"Less than one year ago, 10% of my time was CO<sub>2</sub>. Now, 200% of my time is on CO<sub>2</sub>," Marc Vereecke, chief operating officer for ArcelorMittal Europe – Flat Products, told participants.

He, however, is not alone. Steelmakers throughout the continent are moving quickly as they look to meet the European Union's carbon neutrality goal. But steelmakers are up to the challenge, said José Noldin Jr., general manager for product development at Companhia Siderúrgica Nacional.

"I truly believe the landscape has never been so right to change the paradigms of our industry. Even more conservative CEOs and decision-makers are all supporting initiatives to transition to a low-carbon industry," said Noldin.

During the conference, steel producers shared updates on their investments in low-carbon and carbon-neutral production. The wide-ranging investments show that producers are approaching the problem from a number of angles.

"We feel it is a multi-horizon transition that we are facing," said Tim Peeters, research and development manager for ironmaking, steelmaking and casting at Tata Steel Europe.

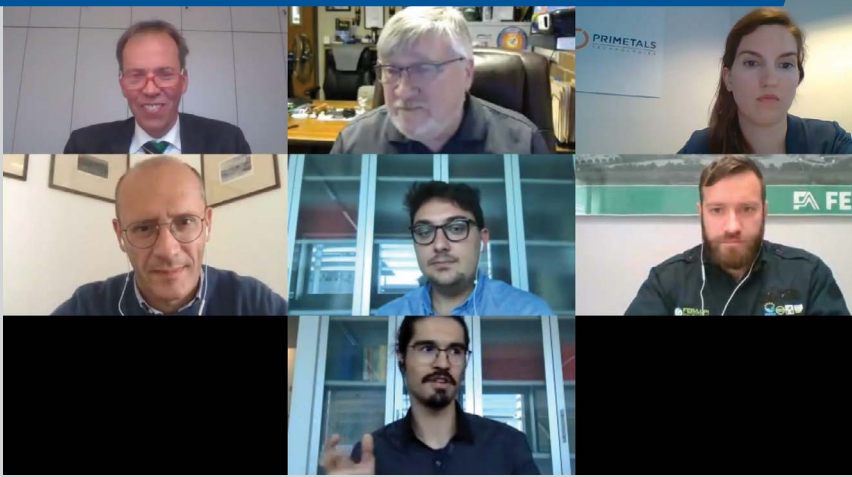
His company is looking to decarbonize by way of a two-step approach that involves carbon capture and storage in the nearer term followed by use of

### Steel Town Hall – Industry Leader Panel



Left to right, top row: James Bruno, President, U. S. Steel Košice S.r.o.; Marc Vereecke, Chief Operating Officer, ArcelorMittal Europe – Flat Products; Barry Schneider, Senior Vice President, Flat Roll Steel Group, Steel Dynamics Inc., and Officer-at-Large, AIST. Left to right, bottom row: Ronald Ashburn, Executive Director, AIST; Dr. Mario Caldonazzo, CEO, Finarvedi and Arvedi Steel plant, and Vice President, EUROFER.

## Keeping Young Talent in Steel



Left to right, top row: Dr. Johannes Schenk, Chair of Ferrous Metallurgy, University of Leoben; Dr. Ronald O'Malley, F. Kenneth Iverson Endowed Chair Professor and PSMRC Director, Missouri University of Science and Technology; Dr. Kerstin Baumgartner, Process Technologist Endless Strip Production, Primetals Technologies Austria GmbH. Left to right, middle row: Prof. Carlo Mapelli, Politecnico di Milano; Giacomo Villa, Ph.D. student, Politecnico di Milano; Cosmo Di Cecca, Steelworks Process Technologist, Feralpi Siderurgica. Bottom row: Gianluca Dall'Osto, Ph.D. student, Politecnico di Milano.

ArcelorMittal's Ghent plant in Belgium, and the first of the facility's two biomass reactors is to open in 2022.

The other project, also at Ghent, is a demonstration-scale plant that will capture carbon offgases and convert them into synthetic fuel by way of a proprietary process. The project is scheduled for completion in 2022.

In terms of carbon avoidance, the company is planning to build a 100,000-metric-ton demonstration sponge iron plant that uses hydrogen as the sole reductant. Basic engineering is completed, and the company aims to start up sometime between 2023 and 2025, depending on funding.

Elsewhere, voestalpine is laying the groundwork for a process route conversion, going from the integrated blast furnace route to a hydrogen-based iron reduction and electric steelmaking route.

Thomas Buegler, head of ironmaking research and development, said the company is now looking to replace some blast furnace capacity at its Linz site with an EAF sometime after 2025.

A key component of that effort is its hot briquetted iron (HBI) plant in Texas, which opened in 2017. The plant is capable of producing approximately 2 million metric tons annually, approximately 60% of which is for voestalpine's internal use.

At the same time, it is continuing to test hydrogen production with its 6-MW proton exchange membrane electrolyzer.

The company, meanwhile, is exploring a number of

hydrogen-based iron reduction and electric arc furnaces (EAFs) in later decades.

Meanwhile, ArcelorMittal, which earlier this year issued its first-ever climate action report, is executing on a multi-pronged strategy. At the strategy's spearpoints are circular carbon, clean electricity, and carbon capture and storage.

Carl De Maré, vice president and head of technology strategy, said that its circular carbon aims to create value from waste products.

To that end, ArcelorMittal has two projects underway. One, its Torero project, will convert waste biomass into biocoal. The facility is being built at

breakthrough technologies, including a direct reduction process for iron ore concentrates from ore beneficiation that does not require any pre-processing of the material like sintering or pelletizing.

However, Buegler said that efforts to replace natural gas with hydrogen in the direct reduction process will require significant upscaling and huge investments in renewable energy generation and storage.

ArcelorMittal, for example, estimates that it alone will need to invest between EUR45 and EUR65 billion in its facilities to reach climate goals. And that doesn't include other necessary public investments in renewable energy and hydrogen infrastructure, things

## CO<sub>2</sub>-Free Steelmaking: Status and Further Developments



Left to right, top row: Jürgen Cappel, Managing Director, Cappel Stahl Consulting GmbH; Dr. Tim Peeters, Department Manager R&D Ironmaking, Steelmaking & Casting, Tata Steel Europe Ltd.; Dr. Frank Ahrenhold, Head of Sustainable Steel Production, thyssenkrupp Steel. Left to right, middle row: Dr. Johannes Schenk, Chair of Ferrous Metallurgy, University of Leoben; Carl De Maré, Vice President Technology Strategy, ArcelorMittal Group; Thomas Buegler, Head of R&D Ironmaking, voestalpine Stahl GmbH. Bottom row: Dr. Martin Pei, Executive Vice President and CTO, SSAB AB.

hydrogen-based iron reduction and electric arc furnaces (EAFs) in later decades.

Meanwhile, ArcelorMittal, which earlier this year issued its first-ever climate action report, is executing on a multi-pronged strategy. At the strategy's spearpoints are circular carbon, clean electricity, and carbon capture and storage.

Carl De Maré, vice president and head of technology strategy, said that its circular carbon aims to create value from waste products.

To that end, ArcelorMittal has two projects underway. One, its Torero project, will convert waste biomass into biocoal. The facility is being built at

breakthrough technologies, including a direct reduction process for iron ore concentrates from ore beneficiation that does not require any pre-processing of the material like sintering or pelletizing.

However, Buegler said that efforts to replace natural gas with hydrogen in the direct reduction process will require significant upscaling and huge investments in renewable energy generation and storage.

ArcelorMittal, for example, estimates that it alone will need to invest between EUR45 and EUR65 billion in its facilities to reach climate goals. And that doesn't include other necessary public investments in renewable energy and hydrogen infrastructure, things

## Steel Industry Transformation in Europe: The Role of Metallics Supply



Left to right, top row: José Noldin, General Manager, Product Development, Companhia Siderúrgica Nacional; Baris Çiftçi, Head, Strategic Innovations and Raw Materials Markets, World Steel Association. Left to right, bottom row: John Atherton, Executive Director, Metal Stewardship Ltd., and Secretary General, International Iron Metallics Association (IIMA); Jeremy Jones, President/Managing Partner, Continuous Improvement Experts. Not pictured: Ludmila Nascimento, CEO, Tecnored Desenvolvimento, Tecnológico S.A.

that will enable the conversion. Those investments will cost another EUR55 billion to EUR230 billion.

“The infrastructure investments will be huge because the scale that we need is also enormous,” said De Maré.

Steelmakers, therefore, cannot undertake the transition without policy support, several participants said during the discussion.

“Global competition will put pressure on our prices and also the availability of raw materials. Without a proper profit margin in the European steel industry, it will be difficult to pay for these investments. So a level playing field is really important for the European governments to consider, but also we should foster the pre-competitive collaboration,” said Peeters.

With that in mind, the European Steel Association (EUROFER) recently called on the European Commission to create a framework that will foster

development of clean electricity and hydrogen infrastructure, as well as the trade policy to ensure a level playing field.

“The success of EU climate leadership does not rely on its level of ambition — already unrivaled by any other major global partner — but mainly on its ability to demonstrate that it is possible to combine environmental sustainability with economic growth and social acceptance,” said Axel Eggert, EUROFER director general.

“This framework consists of support for investment in innovation and rollout, the creation of a market for green materials, the availability of the appropriate renewable energy sources, an international level playing field, and the application of the EU trade defense instruments without inhibition against third-country trade distortions. This framework needs to be established as a matter of urgency.”

Jim Bruno, who leads United States Steel Corporation’s European operations in Slovakia, echoed those sentiments.

“The European Commission really needs to decide whether they want a steel industry in Europe. We have by the far the most ambitious environmental targets, and I think everyone can get behind those. But the steel industry already suffers on account of global players who don’t play by the same rules. Until the EU enacts a cross-border adjustment and ensures that they’re leveraging all available trade regulations to the maximum extent possible, it’s going to continue to be a tough road in the EU.”

Aside from the policy and technology challenges, there is another issue steelmakers will have to contend

## Digitalization, Machine Vision and Robotics



Left to right, top row: Bernhard Steenken, CEO, SMS digital GmbH; Gianluca Maccani, CEO, BMGroupUSA; Christoph Sedivy, Product Manager, Primetals Technologies Austria GmbH. Left to right, bottom row: Chiara Tassin, Chief Digital Transformation Officer, Acciaierie Bertoli Safau S.p.A.; Antonio Lucarelli, Department Process Technologies, Ori Martin S.p.A.; Michele Vezzola, Sales Manager, BM Group S.p.A.





Left to right, top row: Rolando Paolone, CTO, Danieli & C. Officine Meccaniche S.p.A.; Mauro Bianchi Ferri, Managing Director, Acciarium Srl; Dr. Harald Holzgruber, CEO, President and Managing Director, INTECO. Left to right, bottom row: Dr. Thomas Hansmann, Chief Technology and Operations Officer, Paul Wurth; Paolo Argenta, Executive Vice President, Tenova Metals. Not pictured: Thomas Pfatschbacher, Senior Vice President Digital Transformation & Smart Production, Primetals Technologies Austria GmbH.

with as they increasingly adopt EAF steelmaking: their scrap supply.

Scrap looks to become a bigger link in the raw materials supply chain, and the good news is that a wave of obsolete scrap is forecast to enter the scrap reservoir, according to Baris Çiftçi, head of raw materials markets analysis for the World Steel Association. During a session on the role of metallics, he forecast that the reservoir will increase to 390 million metric tons by 2030 and 900 million metric tons by 2050.

Of course, that did little to help EAF-based producers last spring, when the COVID-19 pandemic forced automakers and parts producers to close production lines, shutting off an import scrap source.

Barry Schneider, senior vice president for Steel Dynamics Inc.'s flat-rolled division, told participants that scrap was in short supply.

"Our flat-rolled mills were changing scrap mixes hourly, waiting for truck arrivals," he said.

For two months, the mills worked hand-to-mouth, he said, but they persevered by innovating and re-examining established processes.

"We found a lot of things we could do differently," he said.

Going forward, the scrap industry will have to look to do things differently, too, said AIST president and Missouri University of Science and Technology metallurgy professor Ronald O'Malley.

O'Malley noted that copper levels are rising in obsolete scrap as steelmakers recycle and remelt steel. Much of the copper can be attributed to wiring and electrical components in automobiles, and as the global automotive fleet becomes electrified, the problem likely will increase.

"We need to put much more thought into how we design products, and design them to allow better separation of iron and other metallics."

Another problem, he said, is that the availability of prime scrap is decreasing in line with a general decline in U.S. and European manufacturing and as manufacturers become more efficient with their own raw materials.

"We need to preserve higher-quality scrap. What we have seen over the last 10 years is that lower-grade scrap with higher copper residual levels get blended in the shredder, which results in much higher copper content in the shredded product."

On a related front, Paolo Argenta, executive vice president at Tenova Metals, noted that EAFs are getting bigger, and single-EAF productivity is reaching levels that used to be achievable only by the blast furnace/basic oxygen furnace route.

Case in point, he said, is a 300-metric-ton EAF it commissioned at Arvedi this fall. The furnace is designed to reach a power-on time in 37 minutes and accept a charge mix of up to 30% HBI or other scrap alternatives.

He said the increasing abilities of EAFs at a time when producers are considering new investments in that process route highlights the special role technology suppliers have in the green transition.

"We believe that technology suppliers will play a constructive role by proactively helping to define a clear vision for the future, providing a portfolio of technology solutions and know-how that can be tailored to specific problems," he said. ♦

### Thank you to our Sponsors

Platinum Level



Gold Level



Silver Level

