

by Amanda L. Blyth

VIRTUAL

2021

European Steel Forum

RECAP

As part of its effort to provide regional programming to members across the world, AIST created the European Steel Forum. This event has been driven and organized largely by members of AIST's European Member Chapter, and the Forum has been held in Italy, Austria and, as was the case due to the COVID-19 pandemic, virtually.

The 2021 Virtual European Steel Forum was held on 27–29 October. AIST's executive director, Ron Ashburn, opened the program with an overview of the association.



Mazzolari
Arvedi Group;
Associazione
Italiana Di
Metallurgia

He noted that sustainability challenges are only solved through technology advancement, which is the heart of AIST's mission of service for the steel industry. Federico Mazzolari of Arvedi Group and president of Associazione Italiana Di Metallurgia delivered the keynote presentation, "A Green Future for Steel: Challenges and Opportunities."

In any discussion of green technologies for steelmaking, scrap is a key

subject. The U.S., Mazzolari said, was the first country to understand the importance of massive use of scrap for steel production, which greatly reduced specific investments and costs. Today, though, the U.S.'s choice also has proven to be valid from an environmental perspective.

Mazzolari also spent some time discussing carbon leakage and one potential solution: a Carbon Border Adjustment Mechanism (CBAM), which proposes a levy on imports of specific products. A CBAM would essentially replace free Emission Trading System (ETS) allowances, which will be phased out between 2026 and 2030, Mazzolari said. The initial proposal applies to imports of electricity, cement, aluminum, fertilizer, and iron and steel products. A CBAM, he said, could help to create a level playing field for steel producers.

The remainder of the program was broken up into six sessions, each comprised of presentations by experts from around the world, followed by a panel discussion that dove into specific topics and questions from the virtual audience.

CO₂-Free Steelmaking: The Road Map

Dr. Jürgen Cappel of Cappel Stahl Consulting GmbH served as moderator for the Forum's first panel discussion,

in which panelists from steel-producing companies shared their companies' recent investments in decarbonization.

CO₂-Free Steelmaking: The Road Map

Moderator and Panelists



Cappel
(moderator)
Cappel Stahl
Consulting GmbH



Pei
SSAB



Buergler
voestalpine Stahl
GmbH



Notebaert
ArcelorMittal Flat
Europe



Peeters
Tata Steel



Ahrenhold
thyssenkrupp

Dr. Martin Pei, executive vice president and chief technology officer of SSAB, discussed the HYBRIT initiative, which was commissioned in August 2020. In June 2021, a successful pilot trial was conducted on 100% H₂-reduced direct reduced iron (DRI)/hot briquetted iron (HBI). Pei noted SSAB's goal of converting all of its blast furnaces (BFs) to electric arc furnaces (EAFs) by 2045, which aligns directly with the Swedish goal to be climate-neutral by the same year.

Thomas Buergler, head of R&D Ironmaking and chief executive of the Metallurgical Competence Center for voestalpine Stahl GmbH, discussed voestalpine's CO₂-neutral steelmaking road map and projects, which will see the company replacing its small BFs in Linz and Donawitz with EAFs by the end of this decade.

Kristian Notebaert of ArcelorMittal Flat Europe talked about ArcelorMittal's decarbonization road map, which intends to increase the use of scrap and utilize smart carbon and innovative DRI technologies. He said the company

would be able to realize a "fast and deep decarbonization step" by introducing a direct reduction (DR) route based on natural gas that is also ready for hydrogen. The company is set to operate its first full-scale zero-carbon-emissions steel plant in Sestao, Spain, in 2025.

Tim Peeters, department manager, Iron and Steel R&D at Tata Steel, talked about CO₂-free steelmaking at Tata Steel Netherlands. He reported that the facility is now researching and piloting hydrogen-based steelmaking. In his presentation, Peeters talked about the wind farms in the North Sea, which can enable hydrogen production needed to replace natural gas in the formation of DRI.

Dr. Frank Ahrenhold, thyssenkrupp's head of sustainable steel production, discussed decarbonization at thyssenkrupp Steel Europe. The focus of his presentation was the company's first DR plant with a submerged-arc furnace (SAF) melting unit, starting in 2025. The furnace will allow for continuous operation, high Fe yield from DRI and will build a slag that is similar to BF slag.

CO₂-Free Energy: The Evolution of Green Hydrogen

Johannes Schenk, chair of ferrous metallurgy at the University of Leoben, moderated a panel discussion in which energy and gas producers discussed strategies to create a hydrogen value chain.

Martin Schneider of the German National Hydrogen Association (GNHA) introduced the GNHA to the Forum attendees. He said "where to best use green technologies is an important question" and that the backbone of the EU's

decarbonization plan has to include a hydrogen pipeline network with sufficient carbon capture and storage.

Dr. Sebastian Vogel, head of hydrogen strategy at RWE Generation SE, said his company is committed to becoming carbon neutral by 2040. Earlier this year, RWE group became the first major utility to establish a dedicated hydrogen division. He said the discussion now shouldn't be on the "color of the hydrogen; the end game will be on renewables."

CO₂-Free Energy: The Evolution of Green Hydrogen

Moderator and Panelists



Schenk
(moderator)
University of Leoben



Schneider
German National
Hydrogen
Association



Vogel
RWE Generation SE



von Schéele
Linde plc



Grant
Air Liquide



Wolf
Sunfire



Forgnone
Saipem

Joachim von Schéele, director, global commercialization for Linde plc, talked about Linde's efforts to scale up green hydrogen, but he said "full decarbonization requires a new processing route."

Michael Grant, global technology director, international senior expert, steel production, Air Liquide, discussed hydrogen supply and use for a carbon-neutral steel industry. He said the future of steelmaking in Europe will be a hydrogen-based DRI-EAF route and said, "DRI is cleaner than scrap and will replace scrap." Grant added that the only way to produce zero-carbon steel is through zero-carbon hydrogen, which must come from electrolyzers, and that, ultimately, "the availability of hydrogen is dependent on the availability of renewable power."

Hergen Wolf, head of product management at Sunfire, a German industrial electrolyzer producer, highlighted a project with SMS group to build green steel plants. He noted that hydrogen electrolysis yields 13% more output with the same electricity input, and that in some areas, hydrogen is the only viable option for decarbonization. He also discussed the GRINHY 2.0 project, which is the largest

"The availability of hydrogen is dependent on the availability of renewable power."

— Michael Grant, Air Liquide

demonstration of solid oxide electrolyzer in steel works worldwide.

Mario Federico Forgnone, head of technology innovation management at Saipem, discussed the decarbonization of hard-to-abate industries, which include iron and steel, aluminum, petrochemicals, and paper. He noted that the most energy-intensive sectors represent about 25% of global greenhouse gas (GHG) emissions. He gave an overview of the current global carbon capture and storage (CCS) scenario, in which there are 19 large-scale CCS facilities in operation globally, capable of removing 40 million tons CO₂ annually.

Feedstock: The Role of Iron Units in the Green Steel Transition

Jose Noldin, head of technology strategy at Companhia Siderúrgica Nacional, moderated this panel discussion, which featured experts sharing their views on the changing role of iron units in green steel production.

Chris McDonald, chief executive of the Materials Processing Institute, discussed the current situation of supply and demand for scrap and how it might change as we move into a decarbonized economy. He said the new growth in steel production "can almost entirely be based on recycling." A reduction in the availability in globally traded scrap is anticipated, as the world's biggest scrap exporters, such as the U.K., switch their production from relying on imported iron ore to making steel from domestically produced scrap.

Sara Hornby, president, Global Strategic Solutions Inc., gave a presentation that asked, "Is C-Free DRI/HBI a Good Idea in an EAF?" The answer is yes — and no. Compared

to an EAF process with 100% scrap, she said, DRI reduces residuals, off-chemistry heats, electrode wear with continuous feeding, explosions and tap-to-tap time. But, on the other hand, carbon is necessary for the EAF process. It donates 23% of the chemical energy used, reduces consumables, and increases tons per heat and yield. She gave examples from producers and cited CRU as predicting "100% conversion to H₂ DRI-EAF steelmaking is unlikely. Carbon is needed to make steel."

Maurizio Calcinoni, board member and vice president of Arvedi, talked about the company's medium-long-term action plan to achieve carbon neutrality, which involves the reduction of direct and indirect CO₂ emissions. In order to reduce CO₂ emissions, Arvedi has decided to increase the volume of the scrap charge to the melting furnace, consequently lowering the percentage of pig iron and HBI in the

Feedstock: The Role of Iron Units in the Green Steel Transition

Moderator and Panelists



Noldin
(moderator)
Companhia
Siderúrgica Nacional



McDonald
Materials Processing
Institute



Hornby
Global Strategic
Solutions Inc.



Calcinoni
Arvedi



Habermann
voestalpine Stahl
Donawitz GmbH



Potter
Vale

charge. To achieve this, it has a series of plants aimed at improving scrap quality.

Arno Habermann, voestalpine Stahl Donawitz GmbH, discussed the myths and realities involved in the use of HBI in blast furnaces. voestalpine is undergoing a gradual shift from a coal-based BF route to green electricity, whereby it will operate two EAFs at Linz and Donawitz by 2030. It is anticipated that this will reduce CO₂ emissions by 3–4 million tons of CO₂/year. voestalpine started its first trials of HBI in the BF in 2012 and found that, “all in all, it is economically feasible,” according to Habermann.

Steve Potter, metallics director at Vale, discussed raw materials for decarbonization. He described three major challenges for the steel industry in the next 30 years: (1) It will be expensive to remove CO₂ from the supply chain: US\$1–2 trillion to be compliant globally to replace BFs; (2) Only 3% of the world’s seaborne iron ore has a Fe content that can be appropriate for the EAF, so 97% of the iron ore that is traded on the seaborne market cannot go into lower-CO₂ production processes; and (3) Higher fuel costs.

Digitalization: Successful Applications of Artificial Intelligence



Maccani
(moderator)
Polytec USA

Gianluca Maccani, chief technology officer of Polytec USA, served as moderator for a panel discussion that focused on artificial intelligence (AI).

AI applications are used today to save on production costs across all processing steps and improve product quality. Dr. Michael Peintinger, managing director of Smart Steel Technologies,

provided a detailed look at one such platform that is currently in place at ArcelorMittal Eisenhüttenstadt. The facility was able to realize a 50% reduction in surface defects on its automotive exposed steel grades through an AI-based surface defect detection system.

Michael Eder, global chief digital officer for voestalpine High-Performance Metals, gave a few examples of AI applications in use at voestalpine. One example was the optimization of continuous inductive hardening by neural networks. A challenge experienced at the facility was determining which parameter sets should be applied to achieve good quality. By utilizing neural networks to determine the optimal parameter settings, reduction of non-conformities and continuous reliability improvement were achieved.

Antonio Ambra of AIC Capitanio kicked off his presentation with Sandeep Kapur of Rockwell Automation by stating, “Steel companies need to adapt in a constantly changing market.” Ambra went on to highlight industry

trends and impacts and noted that the global steel sector faces uncertain road to recover in the wake of the pandemic. He identified a few strategic options for steelmakers: Maximizing plant performance, investing in process efficiency, implementing flexible steel production and leveraging technology. In the remainder of the presentation, Kapur gave a deep dive into specific examples of AI and machine learning.

Marco Ometto, executive vice president, DIGI&MET, at Danieli Automation R&D, began his presentation with an overview of DIGI&MET. He discussed the Q3-PREMIUM platform for quality management and control, the Danieli Intelligent Plant for plant control and supervision, Danieli Q-MELT for adaptive control, Q-SYM2 for scrap yard management, DAN COUNTER for real-time bar counting through artificial intelligence, Q3-DEMS for energy management, and CYBERMAN 4.0 for smart maintenance management.

Michele Vezzola of BM Group Polytec S.p.A. and Paolo Stagnoli of Tenova partnered on a presentation that gave a focused look at Tenova’s iSYM AI-based intelligent scrap manager and Polytec’s PolySORT for copper element identification and separation.

Digitalization: Successful Applications of Artificial Intelligence Panelists



Peintinger
Smart Steel
Technologies



Eder
voestalpine High-
Performance Metals



Ambra
AIC Capitanio



Kapur
Rockwell Automation



Ometto
Danieli Automation
R&D



Vezzola
BM Group Polytec
S.p.A.



Stagnoli
Tenova

Attract and Retain Talent: Industry Strategies

Moderator and Panelists



Spaghetti
(moderator)
Bekaert



Pamini
Pittini Group



Hermanns
SMS group GmbH



Busolini
ABS Acciai S.p.A.



Rojkova
Bekaert



Stultus
Danieli Academy

Attract and Retain Talent: Industry Strategies

Alessandra Spaghetti, global product strategy and market manager, bead wire, Bekaert, moderated a session that brought together industry leaders to discuss what has worked for them in regard to attracting and retaining talent. Spaghetti noted how buzzwords such as Industry 4.0, circular economy and sustainability are becoming more and more commonplace in the industry. “Sustainability means to make the industry grow in a cleaner way, but we can’t do this without the right people,” she added.

“Talent is a potential that can be developed with skill, creativity, motivation and determination.”

– Sara Busolini, ABS Acciai S.p.A.

Laura Pamini, plant manager at the Pittini Group, talked about her journey with the company and her current role as plant manager. She highlighted major projects she participated in and reflected on the opportunities she’s been given over her career. Pamini then gave an overview of Pittini’s training program, which covers both technical skills and soft skills.

Marion Hermanns, head of professional training at SMS group GmbH, discussed the company’s strategy for future tasks, which is to find the right employees, inspire enthusiasm for the company and its products, make employees part

of the team, and give tasks a deep meaning and sustainability. She talked about how SMS group finds young talent through internships, apprenticeships and scholarships.

“Talent is a potential that can be developed with skill, creativity, motivation and determination,” Sara Busolini, technical account at ABS Acciai S.p.A., said during her presentation. She focused on how to find and retain millennial talents and explained that millennials operate and think differently than previous generations. Recognizing and understanding this reality is the key to management success. Busolini reflected on her own education and career path, starting from the technical institute in her high school, where she was the only female enrolled. She also noted that there is not enough focus on the steel industry in secondary schools.

Vlasta Rojkova, global learning and development manager, Bekaert, said in her presentation, “We believe that culture plays a very important role in retaining people.” Rojkova outlined several megatrends in the market, such as remote working, technology adoption, teams and employee experience, well-being, unleashing people’s potential and building skills, and rethinking human resources. Creating a continuous learning culture is also an important part of retaining people and motivating them, she said.

Irina Stultus, people and organization development director at Danieli Academy, gave the final presentation in the session. She talked about Danieli Academy and the company’s talent acquisition strategy, which includes cross-functional competence and career growth from within. Danieli supports more than 100 internships each year.

Innovation in Plant Design: Outlook for Climate-Neutral Platforms

Mauro Bianchi Ferri, managing director of Acciarium S.r.l. and chair of the AIST European Member Chapter, served as moderator of the final session that brought together leading equipment suppliers.

During his presentation, Paolo Argenta, executive vice president Metals, Tenova, said, “raw materials and energy can compensate for the vast majority of Opex required to produce crude steel.” With that in mind, he gave a deep dive on four topics: scrap, iron ore, energy production

Innovation in Plant Design: Outlook for Climate-Neutral Platforms

Moderator and Panelists



Bianchi Ferri
(moderator)
Acciarium S.r.l.



Argenta
Tenova



Redl
INTECO melting and
casting technologies
GmbH



Aldama
Sarralle



Paolone
Danieli



Wimmer
Primetals
Technologies

and storage, and hydrogen versus electricity. He provided a detailed look at the different raw material “recipes” that are compatible with Tenova’s offerings. He offered that “CO₂-free hydrogen and renewable electricity are two sides of the same coin.”

Christian Redl, deputy CEO of INTECO melting and casting technologies GmbH predicted the EAF as the core melting unit in the future, with many possibilities for tailor-made solutions. He identified challenges for steelmakers and equipment suppliers alike when integrating new facilities into brownfield sites, such as sufficient power, available raw materials, metallurgical requirements and interferences with existing plants.

Fabio Cravino of SMS group introduced the Blue Blast Furnace, a cost-efficient, stepwise CO₂ emission reduction approach for existing BF plants that retains high energy and raw materials flexibility. It is expected that the cost of high-quality iron-bearing materials will increase due to higher demand and that green energies will become cheaper. The Blue Blast Furnace was developed because “steel production green energy requirement will not be available from one day to the next,” Cravino said.

Alberto Aldama, sales director steel melting plant at Sarralle, focused on three steel industry trends and challenges: decarbonization, digitalization and plant efficiency. Aldama said Sarralle is working on green hydrogen generation and consumption technology and presented two products: Blue Efficient Arc® for optimized melting and the Blue Sky Plant® eco-technology for fume exhaust systems. He highlighted a case study of AM/NS Calvert LLC, which

utilizes Sarralle’s technologies to reach a productivity of 225 tons/hour with low environmental impact.

Rolando Paolone, Danieli’s CTO, gave an in-depth look at the state-of-the-art technologies behind the new 500,000-tons-per-year ABS Wire Rod facility. He noted a key concept of the plant, “zero man on the floor,” which means size changes and mill management are performed remotely. The mill utilizes green technologies across the entire production line and Industry 4.0 platforms to collect, track and analyze data.

“CO₂-free hydrogen and
renewable electricity are two
sides of the same coin.”

– Paolo Argenta, Tenova

Primetals Technologies’ vice president converter steel-making Gerald Wimmer noted at the outset that converter steelmaking, while being the predominant steelmaking route, will be impacted by the transition of the steel industry. He shared Primetals Technologies’ road map to a carbon-neutral steel production process, which focuses on optimization of the blast furnace in the short term, reduction of hot metal ratio in the medium term, and direct reduction and hydrogen in the long term. ♦

Thank You to Our Media Partner and Event Sponsors



Media Partner

**ASSOCIAZIONE
ITALIANA
DI METALLURGIA**



falconry

Event Sponsors

sarralle[®]
A Universe of Engineering