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Primetals Technologies with Strategic Partner Mitsubishi Corporation, voestalpine, and Rio Tinto to Implement Hydrogen-Based Ironmaking Plant

- **Industrial-scale prototype plant to be implemented in Linz, Austria**
- **Production of hot briquetted iron, hot metal, and pig iron via Hydrogen-based Fine-Ore Reduction (HYFOR) and Smelter solutions**
- **First time a hydrogen-based direct reduction plant for iron ore fines is linked to a Smelter**

On April 1, 2025, Primetals Technologies, together with its strategic partner Mitsubishi Corporation, Rio Tinto, a leading mining and materials company, and globally leading steel and technology group voestalpine, signed a cooperation agreement to fast-track the development of fluidized bed and smelter technologies. The participants will implement and operate an industrial-scale prototype plant featuring a new process for potential net-zero-emissions ironmaking at the voestalpine site in Linz, Austria. Startup of the plant is scheduled for mid-2027.

Hydrogen-Based Direct Reduction and Smelting

The new ironmaking process with a projected capacity of three tons of hot metal per hour is based on the HYFOR and Smelter solutions from Primetals Technologies. HYFOR is the world's first direct reduction technology for iron ore fines that does not require any agglomeration steps. Since 2021, Primetals Technologies has operated a pilot plant on voestalpine's premises in Donawitz, Austria, and has run numerous successful test campaigns. The Smelter is a furnace powered by renewable energy used for melting and final reduction of direct reduced iron (DRI). It produces potential net-zero hot metal for the steelmaking plant.

"This project represents a significant advancement in future-proof ironmaking – for the first time, we will implement a continuous production process with hydrogen-based direct reduction," said Alexander Fleischanderl, Chief Technology Officer and Head of Green Steel at Primetals Technologies. "The combination of HYFOR and Smelter is a highly innovative development with the potential to transform the industry, similar to the impact the LD converter (BOF) had on steel production. We are extremely proud to have the support of strong partners in voestalpine, Rio Tinto and Mitsubishi Corporation, and together, we are poised to make a big difference to the future of net-zero ironmaking."

"Mining and trading of ferrous raw materials has been one of our core businesses for many decades and we envision to develop a new supply of low emission metallics to support steel decarbonization. HYFOR and Smelter are new promising technologies to accelerate the decarbonization of the steel industry and Mitsubishi Corporation, as a strategic partner of Primetals Technologies, is excited to participate in the

development of these groundbreaking technologies together with leading partners in the steel supply chain,” said Kenichiro Tauchi, COO, Ferrous Raw Materials Division of Mitsubishi Corporation.

“With greentec steel, voestalpine has a clear phased plan for steel production with net zero CO₂ emissions. In a first step, one green-powered electric arc furnace will be put into operation at each of our sites in Linz and Donawitz starting in 2027. By 2029, we will have reduced our CO₂ emissions by up to 30 percent compared to 2019. That is equivalent to almost 5 percent of Austria’s entire annual CO₂ emissions, making greentec steel the largest climate protection program in Austria. Our long-term strategy is to use green hydrogen to achieve carbon-neutral steel production. Together with Primetals Technologies and Rio Tinto, we are taking an entirely new and promising approach to research into hydrogen-based pig iron production,” said Herbert Eibensteiner, CEO of voestalpine AG.

Rio Tinto, one of the world’s largest iron ore producers, will draw on its extensive expertise in iron ore quality and preparation to provide technical input to the project. Additionally, Rio Tinto will supply 70 percent of the iron ore for the new plant from across its global operations. It will also support Primetals Technologies to accelerate the commercialization of the technology.

Rio Tinto General Manager, Steel Decarbonization Thomas Apffel said, “We are delighted to join a consortium that encompasses the entire iron and steelmaking value chain. By contributing our ironmaking expertise and iron ores from our Pilbara, Iron Ore Company of Canada, and future Simandou operations, we aim to advance the development and adoption of fluidised bed technology. This fines-based ironmaking solution presents a compelling alternative to shaft furnace technology by eliminating the need for pelletization, potentially offering substantial benefits to both steelmakers and miners. Rio Tinto welcomes additional participants to the consortium and looks forward to supporting the widespread implementation of this innovative technology.”

EU and Austrian Government Funding

Funding for the investment and operation of this prototype plant has been provided by the Austrian federal government through its “Transformation of Industry” program managed by Kommunalkredit Public Consulting (KPC) and the “Twin Transition” initiative managed by Austria Wirtschaftsservice (aws). In addition, the European Union supports the venture through the European Union Research Fund for Coal and Steel within the Clean Steel Partnership (CSP) and the European Union Clean Hydrogen Partnership within the Hydrogen Valleys, i.e. areas where hydrogen serves more than one end sector or application in the mobility, industry, and energy sectors.

About voestalpine

voestalpine is a globally leading steel and technology group with a unique combination of materials and processing expertise. voestalpine, which operates globally, has around 500 Group companies and locations in more than 50 countries on all five continents. The voestalpine Group has been listed on the Vienna Stock Exchange since 1995. With its premium products and system solutions, voestalpine is a leading partner to the automotive and consumer goods industries, as well as to the aerospace and energy industries. The company is also the global market leader in railway systems, tool steel, and special sections. voestalpine is committed to the global climate goals and has a clear plan for transforming steel production with its greentec steel program. In the business year 2023/24, the Group generated revenue of EUR 16.7 billion, with an operating result (EBITDA) of EUR 1.7 billion; it has around 51,600 employees worldwide.

About Rio Tinto

Rio Tinto operates in 35 countries where our 60,000 employees are working to find better ways to provide the materials the world needs. Our portfolio includes iron ore, copper, aluminium and a range of other minerals and materials needed for people, communities and nations to grow and prosper, and for the world to cut greenhouse gas emissions to net zero. We have more than 150 years of mining and processing experience guiding our work. We have put climate change at the heart of our strategy, combining investments in commodities that enable the energy transition with actions to decarbonise our operations and value chains.

www.riotinto.com

About Mitsubishi Corporation

Mitsubishi Corporation is a global integrated business enterprise that develops and operates business together with its offices and subsidiaries worldwide. MC has 8 Business Groups that operate across virtually every industry: Environmental Energy, Material Solution, Mineral Resources, Urban Development and Infrastructure, Mobility, Food Industry, Smart-Life Creation, and Power Solution.



Representatives from voestalpine, Rio Tinto, Mitsubishi Corporation, and Primetals Technologies during the signing ceremony held in Vienna, Austria. From left to right: Rafael Azevedo, General Manager Iron Ore Sales Atlantic and Thomas Appfel, Senior Vice President Steel Decarbonization, both with Rio Tinto; Kurt Satzinger, Senior Vice President of R&D and Innovation and Helmut Gruber, CTO and Member of the Board of Directors, both with voestalpine Stahl; Alexander Fleischanderl, CTO and Head of Green Steel and Satoru Iijima, Member of the Board, both with Primetals Technologies; Seitaro Takarabe, Head of Business Development DRI, Iron Ore Department at Mitsubishi Corporation.

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Primetals Technologies, Limited, headquartered in London, United Kingdom, is a pioneer and world leader in the fields of engineering, plant building, and the provision of lifecycle services for the metals industry. The company offers a complete technology, product, and services portfolio that includes integrated electrics and automation, digitalization, and environmental solutions. This covers every step of the iron and steel production chain—from the raw materials to the finished product—and includes the latest rolling solutions for the nonferrous metals sector. Primetals Technologies is a Group Company of Mitsubishi Heavy Industries, with around 7,000 employees worldwide. To learn more about Primetals Technologies, visit the company website primetals.com.