MET-INFO

CONTENTS

1 Zinc-It's Critical Role in Human Health by Shri L Pugazhenthy, Executive Director, ILZDA & Past President, IIM
2 Jindal Stainless to Build Green Hydrogen Plant
3 AM/NS to spend $5 billion to boost capacity
4 Largest industrial hydrogen project in Germany and Europe
5 bp and Thyssenkrupp Steel Work Together to Advance the Decarbonisation of Steel Production
6 EVRAZ north America Completes Testing on Hydrogen Transporting Steel
7 Salzgitter Board Approves Funding for Green Steel Project
8 LEED v4 Certification for New Nucor Steel Plant Mill
9 Stainless Steel, Bulk Alloys and Noble Alloys
10 China Opens World's largest Clean Coal-to-Hydrogen Project
11 Creativity and Innovation in Steel Industry: Utilising New Technology and Artificial Inteligence to Advance Decarbonisation Initiatives
12 Six International Banks to Disclose Carbon Intensity of Steel Portfolios
13 ArcelorMittal and Zeloros Collaborate on Hyperloops
14 India Steel Industry: July-September 2022 Performance

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Zinc - It's Critical Role in Human Health

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Abstract

All individuals should have the required minerals balance for good health and associated functions. Zinc is the most essential micronutrient for adults and children for a sound health.

Zinc is an essential element for good health in individuals. Moreover, it is the mineral in which people are most likely to be deficient. Trace elements are found in body in minute quantities, without them none of the body's vital chemical reactions could take place. The trace element zinc helps to form the enzymes that enable proteins to become the 'building blocks' of new cells. Deficiency can lead to various syndromes with immune disorders, liver problems, disturbances in sexual development, slow wound healing and cause skin diseases. Zinc is, therefore, essential for growth, sexual development and also helps to decrease susceptibility to infection and promotes wound healing. Zinc has been shown to have beneficial effects on muscle strength, endurance and in raising the threshold of fatigue.

Dermatologists in Sweden have successfully treated skin ailments with zinc supplements. In some instances, people who had found that no other treatment had helped, noticed that after taking a special preparation of zinc sulphate their skin condition had improved within 4 weeks and continues to get better.

Owing to the increased public concern about heavy metals such as Lead and Cadmium, commonly found in the atmosphere of most industrial areas, scientists are now showing a greater interest in the trace element zinc which can help the body not to absorb these metals.

The average adult human (body weight of 70kg) contains between 1.4 and 2.3 g of zinc, as compared with 4.2-6.1 g of Iron and 81-230 mg of Copper. Zinc deficiency may result from a number of factors, the most obvious one being an inadequate diet. Even in western countries, food stuffs may often contain only small amounts of zinc. The World Health Organization has recommended a daily intake of 15 mg of zinc for the average individual. Without this intake, the body will contain insufficient zinc. Intake is via food, water and air. Its absorption is equal when taken as oxide, carbonate, sulphate etc, but as sulphide and as mixed Fe-Zn-Mn oxide it is excreted practically unaltered.

Table 1 : Zinc - Recommended Daily Intake

	(mg/day)	
Infants	(0 - 1 yr)	5
Children	(1 - 10 yrs)	10
Men	11 - 51 +)	15
Women	(11 - 51 +)	12
Pregnant		15
Lactating	(1st 6 months)	19
	(2nd 6 months)	16

Table 2 : Foods rich in digestible Zinc

	(mg/100g)
Milk, Yoghurt	0.4
Cheese	2 - 4
Milk Powder	4
Eggs	1.35
Shrimps	2
Beef	4
Liver	6 - 8
Oysters	> 7

Low levels of zinc have been found in patients with heart disease, liver disease, cancer, ulcer and in women who are pregnant, breast-feeding or taking oral contraceptives. Zinc appears to play an important role in regulating hormonal changes in the body that relate to many of the side effects experienced by woman on the contraceptive pill, and during premenstrual and menopausal problems, e.g., depressions, brittle fingernails and thinning hair.

An intake of 15 mg/ day of zinc in suitable form is recommended for adults, with an additional 15 mg/ day during pregnancy and 19 mg /day during lactation (6 months). Benefits attributed to zinc supplements have included such diverse items as reduced body odour, less acne and some relief of persons suffering from chronic prostrate inflammation.

Infertility and impotence together with a lack of sex drive have also been attributed to low levels of zinc with a loss of the sense of taste and smell, lack of growth, night blindness, impaired wound healing, skin disorder and diarrhea.

A suitable alternative may be zinc supplements, although everybody should be careful to check the amount of zinc contained in these preparations. For example, most multivitamins say that they contain zinc, but usually the quantity is very small and under certain circumstances is bound with other substances that prevent much of the zinc being absorbed by the body.

Conclusion

Anyone who feels that he or she could be suffering from zinc deficiency or could benefit from taking zinc supplements should consult a doctor, as formulations containing more zinc are available. There are well known zinc-containing tablets like BECOZINC & ZINCOVIT which are normally prescribed by doctors. During COVID-19, many around the world were taking these tablets for enhancing their immunity levels.

Jindal Stainless to Build Green Hydrogen Plant

Jindal Stainless has announced plans to build a green hydrogen plant with renewables developer Hygenco India. The solar-powered plant will house an alkaline electrolyser that, will have potential to produce up to 250 t/yr, but is targeting initial production of 75 t/yr. This venture is a first for a stainless steel producer in India. It is expected to help reduce Co_2 emissions by 2,700 t/yr.

The hydrogen produced is planned to replace ammonia in its in-house annealing of stainless steel, which is part of the heat treatment process.

The plant will be built at Jindal Stainless' manufacturing site in Hisar and Hygenco will own and operate it for 20 years, before transferring ownership and operations to Jindal Stainless.

The green hydrogen plant will catalyse transition from thermal to clean energy. Jindal Stainless is aiming to increase its stainless steel melting capacity to 2.1mn t/yr from 1.1mn t/yr and its ferro-chrome capacity to 350,000 t/yr from 250,000 t/yr at present. Both projects are now targeted for completion by 31st March 2023.

Source: Steel Times International, Weekly News,
21st Sept. 2022, 19th September, 2022

AM/NS to Spend $5 billion to Boost Capacity

AM/NS will invest 410 billion rupees ($5 billion) to boost crude steel output capacity by 6 million tonnes a year at its Hazira plant. It will build two blast furnaces, along with many other facilities, in its Hazira plant with plans to start operations by mid-2026. The expansion is aimed at meeting growing steel demand in India and winning a bigger slice of the market. The annual steel output capacity of the Hazira plant will increase to around 15 million tonnes after the expansion.

AM/NS India is also considering to build a new steel plant in eastern India while it plans to keep expanding the Hazira plant even beyond 15 million tonnes.

To secure a good presence, AM/NS wants to capture about 15% share in the Indian market where an annual crude steel output is expected to grow to around 200 million tonnes by 2030. AM/NS want to bolster its output capacity to around 30 million tonnes by 2030.

Nippon Steel, the world's fourth-biggest steelmaker, has also its own goal to increase its group steel output capacity to 100 million tonnes in the future, from 66 million tonnes now. After the announced expansion at Hazira, along with planned closures of some mills in Japan, the figure will reach 70 million tonnes. The remaining 30 million tonnes will likely come from further expansions in India, ASEAN and the United States.

Source : AIST Steel News Rewind, 29 Sept. 2022

Largest Industrial Hydrogen Project in Germany and Europe

German energy supplier EWE and utility company SWB are making progress on a project for a 10-MW electrolysis plant in Bremen that will produce green hydrogen for the decarbonization of the steel industry and the mobility sector in the region. The two partners have selected Rostock-based Apex Group to set up an electrolysis plant at SWB's power station, Bremen Mittelsbueren. The electrolyser is expected to come into operation in 2024. Additionally, a contract has been signed with ArcelorMittal, which will offtake the hydrogen from the plant to use it for raw iron production and processing at its site in Bremen in a bid to save tonnes of carbon dioxide emissions. ArcelorMittal will use the first hydrogen in its existing plants and will introduce new production technologies so that it can produce climate-neutral steel in Bremen by the mid-2030s. The project, known as Hydrogen for Bremen's industrial transformation (HyBit), is worth more than $20.35m.

Source: Steel Times International, Weekly News Bulletin, 13th July, 2022

bp and *thyssenkrupp Steel* Work Together to Advance the Decarbonisation of Steel Production

bp and *thyssenkrupp Steel* has formed strategic collaboration to support decarbonisation of steel, including the supply of low carbon hydrogen and renewable power in steel production, helping accelerate the steel industry's wider energy transition. They intend to jointly promote policies to support the development of low carbon hydrogen and green steel in Europe. The companies will explore supply options for both blue and green

hydrogen, as well as power from wind and solar generation through the use of power purchase agreements.

thyssenkrupp Steel accounts for 2.5 percent of CO_2 emissions in Germany, mainly at the Duisburg site where the main emitters, the blast furnaces, are operated. By replacing the coal-fired blast furnaces with direct reduction plants where iron ore can be reduced with low-carbon hydrogen, thyssenkrupp Steel intends to make steel production climate-neutral in the long term.

thyssenkrupp Steel has the ambition to make its steel production climate-neutral by 2045 and low carbon power and hydrogen will play a critical role in achieving that. As part of strategy to provide a range of decarbonisation solutions to corporates, bp is already investing in and working to develop a portfolio of industrial-scale hydrogen projects in Germany, the Netherlands, Spain, the UK and Australia. With aligned ambitions and complementary investments, thyssenkrupp Steel and bp can together help this hard-to-abate sector decarbonise faster.

The steel and energy industries have of course long been closely linked. Energy industry provides fuel and feedstock for steel production while platforms, pipelines, and turbine towers etc. are made from steel.

The decarbonisation of the steel industry will require enormous quantities of low-carbon and, in the long term, green hydrogen. This will increasingly require the use of electricity from renewable sources. All this can only be achieved through a well-developed hydrogen infrastructure.

Steel accounts for 8 to 11% of global CO_2 emissions. It is essential for the automotive and construction industries and for the manufacturing of industrial machinery. It also forms the foundation for a string of decarbonisation technologies, including wind turbines, generators and smart power grids.

thyssenkrupp Steel currently produces 11 million tonnes of crude steel per year and is targeting the production of 400,000 tonnes of CO_2-reduced steel by 2025. thyssenkrupp Steel Europe AG is the largest steel manufacturer in Germany. Within the framework of its integrated transformation strategy, the company aims to switch steel production to direct reduction technology. This is expected to avoid as much as 30 percent of CO_2 emissions by 2030. Steel production is to become climate-neutral by 2045 at the latest.

bp is working to pursue green hydrogen production at its refineries in Lingen in Germany, Rotterdam in the Netherlands, and Castellón in Spain. It is developing both blue and green hydrogen production projects around the world, including in the UK and Australia. bp is focusing on working with corporates in key industrial sectors that have significant carbon

emissions to help them decarbonise. The company's ambition is to be a net zero company by 2050 or sooner, and to help the world to get to net zero.

Source: AIST Steel News Rewind, 14.7.22

EVRAZ North America Completes Testing on Hydrogen Transporting Steel

EVRAZ North America announced that it has successfully completed fracture toughness testing in a 100% gaseous hydrogen environment on its API 5L X65 Sour Service line pipe. After 1,000 hours under 100% hydrogen conditions at 100 bar (1,500 psi), the 20 inch x 0.500 inch X65 SS pipe samples demonstrated good fracture toughness and resistivity to hydrogen embrittlement, with K1H values for fracture toughness meeting ASME B31.12 criteria under Option B. The company also anticipates completion of full qualification testing, under ASME B31.12, of new X65 pipe grades designed for 100% hydrogen and high-impurity CO_2 transmission, at pressures up to 100 bar, by the fourth quarter of this year. If successful, the company will be the first North American line pipe producer qualified for high-pressure, 100% hydrogen pipeline transportation. The testing is being conducted by RINA-CSM S.p.A, an independent European research centre.

AIST Steel News Rewind, 14 July 2022

Salzgitter Board Approves Funding for Green Steel Project

Salzgitter board approved EUR723 million in funding to implement the first stage of its Salzgitter Low CO_2 Steelmaking (SALCOS®) facility. Salzgitter has set ambitious goals under 'Salzgitter AG 2030' corporate strategy, and have prepared the ground well, while also underscoring the role as a pioneer in the decarbonization of the steel industry. In addition to Salzgitter's own funds of around EUR723 million, the company is also banking on public funding for the project. The new facilities will enable the company to produce 1.9 million tons of green steel a year.

SALCOS® is aimed at converting the integrated steelworks into low-carbon crude steel production in three stages over the period up until 2033. As part of the transformation, direct reduction plants and electric arc furnaces will be built and will then replace the blast furnaces and converters in stages. The transformation will enable the process that was formerly based on coking coal to be replaced by a new hydrogen-based route. Emissions savings of around 95 % a year are to be subsequently achieved, thereby avoiding approximately 1 % of Germany's carbon emissions.

The new facilities will enable to produce 1.9 million tons of green steel a year. Customers from a range of industries are already expressing keen interest in green steel. As a result, the Salzgitter Group has already agreed possible deliveries in recent

weeks with customers from various sectors, including household appliance manufacturers, the automotive industry, and re-rollers.

AIST Steel News Rewind, 14 July 2022

LEED v4 Certification for New Nucor Steel Plate Mill

The US Green Building Council created the LEED rating in 1998 as a way to standardize and recognize sustainable construction methods. Since the first release (LEED v1) subsequent versions have pushed the building industry towards higher levels of sustainable design and construction. The current rating system is LEED v4.

Nucor Corporation announced that the new steel plate mill being built in Brandenburg, Kentucky has registered to pursue LEED v4 for Building and Design certification. Nucor Steel Brandenburg is the first steel mill in the world to pursue certification under LEED v4, which is more stringent than previous LEED rating systems and ambitiously aligns each credit category with sustainable performance, climate change, and revolutionizes the manufacturing landscape through third-party transparency and reporting requirements.

Nucor claims that they are one of the cleanest steelmakers in the world. The specific LEED features of Nucor Steel Brandenburg include preservation of a large portion of forested area on the property, lighting reduction strategies, reduced parking footprint, support for green vehicles, and water and energy efficiency measures. In addition, over 75% of the construction waste generated building the steel mill has been diverted from landfills. Sustainable building materials, many directly produced by Nucor divisions, have also been used in the construction of the mill.

Nucor mill makes steel products in a sustainable way and these products, such as steel for offshore wind towers, are going to help build the green economy. Expected to begin production at the end of 2022, the new $1.7 billion Nucor Steel Brandenburg facility will produce 1.2 million tons of steel plate annually. It will be one of only a few mills in the world capable of supplying the critical steel components required to build offshore wind farms.

In addition to pursuing LEED v4 certification, Nucor will continue to be the sustainable leader in the steel industry by further reducing our greenhouse gas (GHG) intensity, which is already among the lowest in the world. Nucor is lowering its GHG intensity by increasing its utilization of renewable energy and supporting the continued growth of clean power generation in the U.S.; investing in new energy efficiency technologies; capturing and storing CO2 emissions; and encouraging GHG reductions throughout the steel supply chain.

Through its use of recycled scrap-based electric arc furnaces, Nucor's steelmaking GHG intensity is less than one-fourth of the global average and one-fifth of the average integrated steel producer. Earlier this year, Nucor began producing Econiq™, the world's first net-zero carbon steel at scale, to help its customers meet their sustainability goals.

Source : AIST Steel News Rewind, 22 Sept. 22

Stainless Steel, Bulk Alloys and Noble Alloys

Steel alloys are used widely in the many industries and applications. Battery and energy storage applications mean they also play an increasingly important role in the energy transition.

Global stainless steel melt production is expected to be about 62 million tonnes in 2022, rising to 90 million tonnes by 2050. China currently accounts for 60% of production and is home to six of the world's top ten producing companies. It is also expected to be the main driver of future growth, supported by Indonesia and India. In contrast, production in Europe, the Americas and Africa will stay almost flat over the next three decades (Fig. 1).

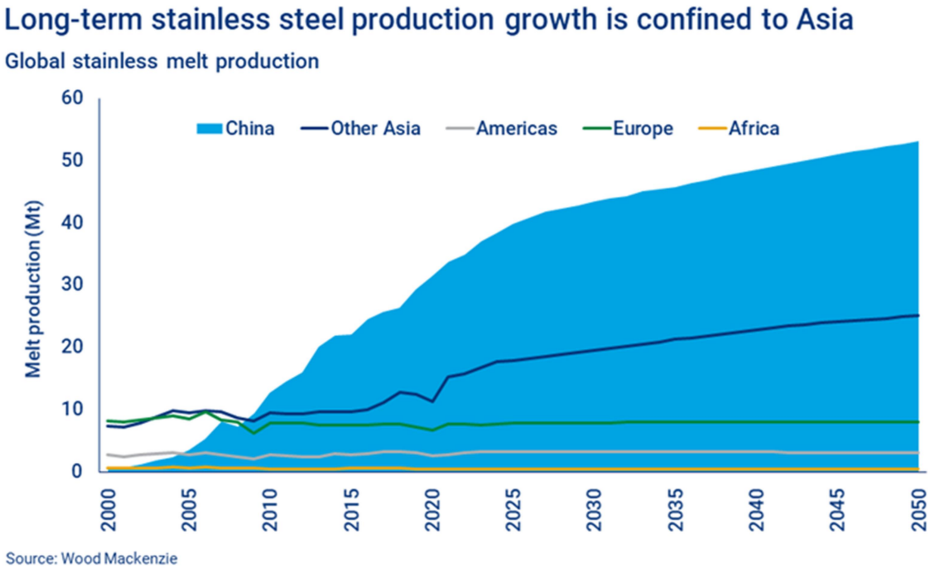
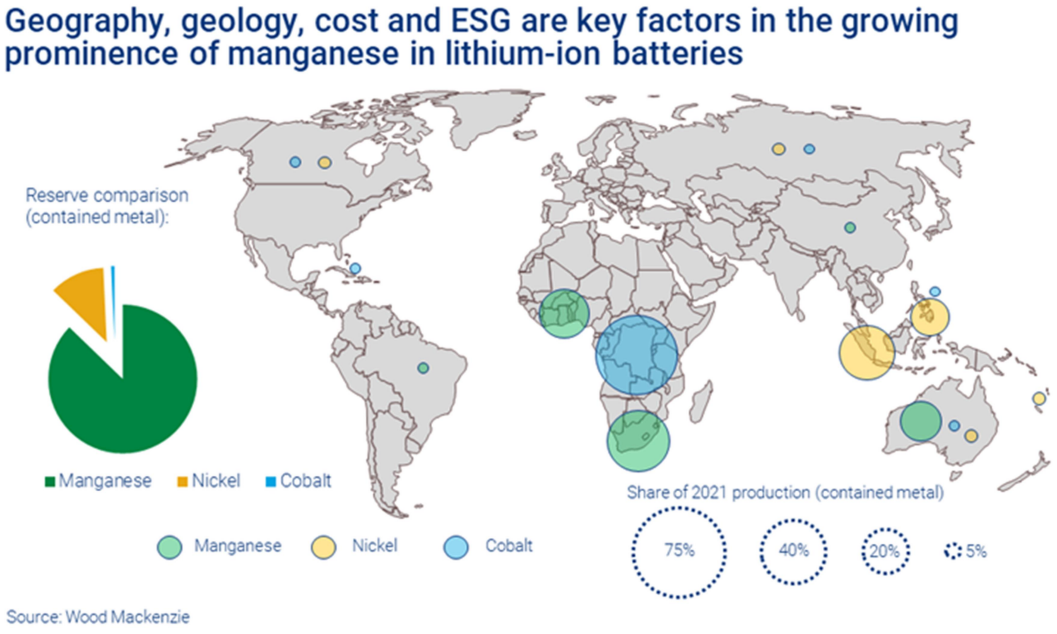


Fig. 1 : Global stainless steel production

Stainless steel accounts for around 80% of world chromium consumption, 65-70% of nickel and 20-25% of molybdenum. All stainless steel contains chromium, while use of nickel depends on the grade. In the mature industries of Europe, the US and Japan, more than 50% of the input material is scrap, which contains nickel and chromium priced at a discount to the pure metal. As a younger industry, China has historically had less access to scrap but will be able to use more in future. This will flatten demand for chromium, nickel and molybdenum over the long term.

The bulk alloys include ferro manganese, ferro chromium and ferrosilicon. Steel dominates their consumption, accounting for more than 90% of ferro manganese and ferro chromium demand and close to 75% for ferrosilicon. Ferro manganese is generally used in typical carbon steels, while ferro chromium and ferrosilicon are used more in stainless and specialty steels. Non-steel uses include non-ferrous alloys and batteries for manganese, foundries, chemicals and refractories for chromium, and iron castings and magnesium for ferrosilicon.

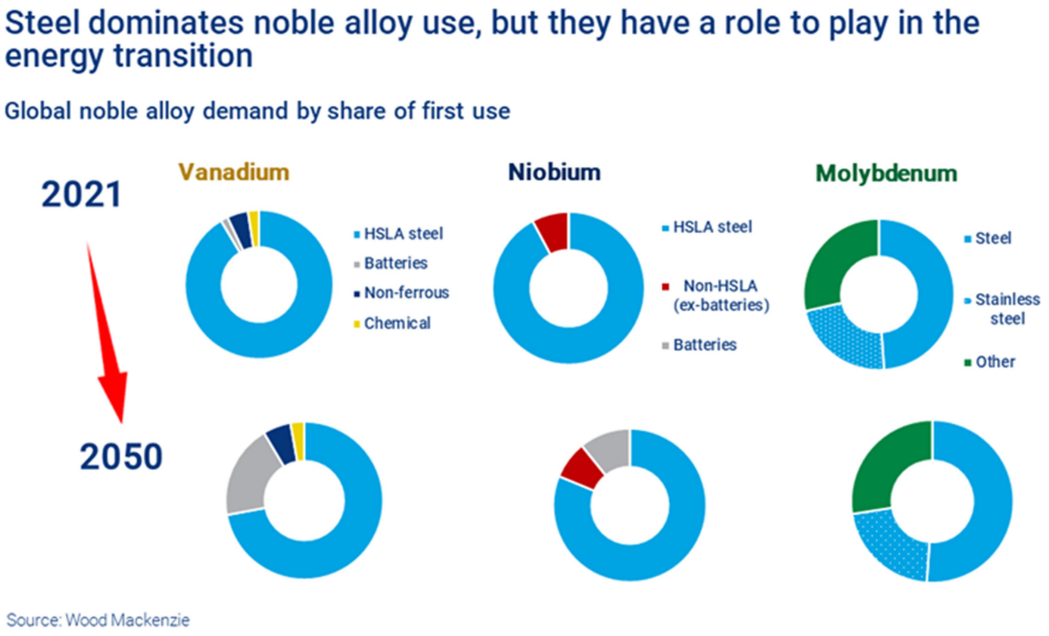
In terms of the outlook for bulk alloy metals, only manganese shows any major shift in demand patterns over the long-term outlook. Several novel cathode chemistries use manganese and this will underpin growth in demand from the batteries segment. When compared to other common cathode metals, wider geographic distribution, greater scale of production and larger reserves offer better security of supply for manganese. Moreover, production costs are an order of magnitude lower than for cobalt and nickel, which also face ESG concerns. As a result, manganese will enjoy a five-fold increase in use for batteries between now and 2040.



Vanadium, niobium and molybdenum: significant potential in energy storage and EV battery use cases. The use of all three is dominated by steel alloy production, which accounts for 90% of vanadium and niobium consumption, and about 70% of molybdenum demand.

Demand for these will grow thanks to more stringent technical requirements for steel, especially in construction – adding very small quantities of these metals can improve

properties such as strength and corrosion resistance. Their potential in light-weighting steels, energy storage and EV batteries will give them a bigbrole in the energy transition.



Most significantly, vanadium and niobium will find uses in battery applications, although the latter is still subject to technological improvements and successful commercialisation. In contrast, vanadium redox batteries (VRBs) are already being installed across the globe as part of energy storage systems (ESSs), particularly in China. VRB uptake faces challenges relating to the cost of the electrolyte and the potential for vanadium price volatility. However, its advantages include long duration, stable chemistry and a longer lifespan than lithium-ion batteries.

Source : Blog - Dale Hazelton, Head of Steel Alloys, Sean Mulshaw, Research Director, Nickel markets, Teboho Sebetlela, Senior Research Analyst, Steel Alloys, Jack Anderson, Senior Research Analyst, Steel Alloys, 24 May 2022

China Opens World's Largest Clean Coal-to-Hydrogen Project

The world's largest coal-to-hydrogen project was put into operation in Yulin, Central Shaanxi, providing a boost to China's green transition. Using coal as a raw material, the plant has a total hydrogen production capacity of 350,000 tonnes per year. This coal-to-hydrogen plant adopts pressure swing adsorption technology developed by Southwest Research and Design Institute of Chemical Industry, a research institute affiliated with Sinochem, a state-owned chemical giant.

As an innovative method to efficiently utilize coal, this technology is of paramount significance to China's energy security, social and economic development and ecological environment improvement. Based on an annual operating time of 8,000 hours, the project will reduce carbon dioxide emissions by about 220,000 tonnes per year.

China has set a goal of peaking carbon dioxide emissions by 2030 and achieving carbon neutrality by 2060. The proportion of coal consumption in the country dropped from 65.8 percent in 2014 to 56 percent in 2021.

Source: Weekly News, International Centre for Sustainable Carbon, 30.9.22

Creativity and Innovation in Steel Industry*: Utilising New Technology and Artificial Intelligence to Advance Decarbonisation Initiatives*

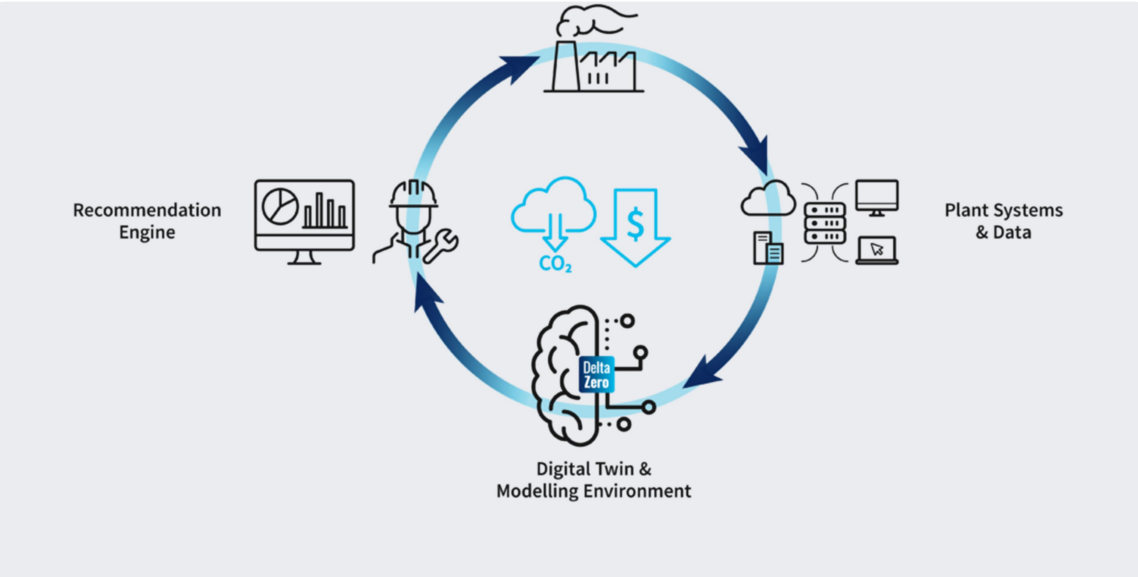
Creativity and innovation are an integral part of the steel industry. **Many people might not immediately think of steel when discussing Creativity and Innovation, but these have played a major role in the development of the industry. It is so important to apply the creative approach to decarbonisation.**

Steel is probably more intertwined with creativity and innovation than any other material, both with regards to its uses and how different steels are made. The invention of steel itself was one of the biggest industrial innovations in human history, taking iron ore and transforming it into an incredibly versatile and reliable alloy. The beauty of steel is that it's at home in everything from building structures to sculptures and spacecraft. The properties of steel allow industrial designers, architects and artists to create an infinite variety of tools, machines, buildings, and also art. Today there are four main types of steel and more than 3,500 grades, each with properties tuned for specific applications. This huge number is only possible because of the talent and continuous innovation in the steel industry.

Steel is a very hard industry to decarbonize. Many companies are focusing on developing solutions that bring financial and climate benefits to steel producers today—solutions that can be scaled rapidly, by leveraging the huge advances in computation and artificial intelligence to help optimize steel production, reducing energy costs and emissions simultaneously.

Steelmaking may seem like a known quantity—in general terms it is, but it is also very complex, with physical and chemical interactions constantly changing as a result of the chemistry of fuels and materials, the state of equipment and the natural variation in the process.

Huge amount of data produced by industrial sensors and IoT can be used to build a digital twin of the production process that reproduces the specific characteristics of a given plant. This digital twin then acts as a virtual training environment for artificial intelligence agents that learn through a method called reinforcement learning, a branch of AI particularly well-suited to complex environments whereby the AI learns by trial and error. The results are AI supported operator decision-making, enabling dynamic adjustments of the production process to produce the desired amount of material, with the required quality at very efficient energy levels.



The world is not moving fast enough to tackle climate change and most technological solutions are 10 years off impact and scale. Multi-pronged collaborative approach is needed to accelerate decarbonization in the steel industry. There are a number of challenges to decarbonization: technical, financial and regulatory. On the technical side, fast innovation and technology demonstration are needed. Financially, right incentives to encourage decarbonization is required — whether these take the form of carbon pricing or tax credits. Finally, on the regulatory side, policies are needed to support the steel industry to reduce its carbon intensity.

It is important to create a level playing field across the industry by ensuring consistency and transparency across measurement and reporting mechanisms. This not only substantiates claims and provides benchmarks for progress but also empowers steel buyers to make the right decisions to fulfil their own decarbonization objectives.

The biggest challenge is almost certainly the substantial costs associated with most decarbonization solutions and dealing with legacy infrastructure. But there are low-cost solutions that can help tackle carbon emissions in the short to medium term.
We have to acknowledge two realities.

The first is that the widespread use of steel is essential to modern societies and that there is no real replacement for it—not just because of its versatility but because iron is one of the most abundant elements in the world. The world produces close to two billion tons of steel every year, second only to cement as the most produced material in the world.

The second reality is that producing steel produces a lot of CO_2 emissions, both due to the types of fuel used—such as coal—and the process CO_2 emissions in blast furnace based steelmaking. Today, these processes are very hard to decarbonize. There are technological solutions such as CCUS and green hydrogen, but they face many challenges for widespread adoption, including costs, energy requirements and storage/reuse requirements (for CCUS). These technologies will evolve and become more affordable with time, but we simply can't wait to start decarbonizing. We need to think of decarbonization in the steel industry in terms of three phases:

1 Optimizing the use of existing assets
2 Improving existing assets, for example by retrofitting CCUS
3 Building a new generation of low-carbon assets

Focus today should be on optimizing the use of existing assets by delivering technology that provides near immediate financial and decarbonization benefits to steelmakers and that can be scaled rapidly.

AI is a foundational technology—it can enable new applications in almost every industry, but it doesn't work alone. When combined with industry-specific expertise and with other scientific fields such as chemistry and material sciences, it can accelerate the development of new solutions and new discoveries. AI can have a very important role in the fight against climate change—from measuring emissions to modelling climate change to improving industrial processes and designing new low-carbon materials.

Source : ResponsibleSteel

Six International Banks to Disclose Carbon Intensity of Steel Portfolios

Six International banks have agreed to measure and publicly disclose the carbon intensity of their steel lending portfolios, in an attempt to push an industry reliant on highly polluting coal towards net-zero emissions.

Citi, Credit Agricole CIB, ING, Societe Generale, Standard Chartered and UniCredit have each pledged to start recording and reporting emissions data from next year, signing up to a set of sustainable steel principles developed in partnership with non-profit research organization RMI. The banks have agreed to disclose the extent to which steel sector

borrowers are on course to reach net zero emissions by 2050 and to help limit the rise in global temperatures to 1.5^0C.

With demand for steel projected to grow 30% by 2050, emissions are set to rise significantly if global steel industry continue with business as usual.

The agreement is based on the Poseidon Principles*, a 2019 agreement between banks and shipping companies to integrate vessel emissions data into financing arrangements. Signatories are now providing more than $1bn per year in sustainability -linked loans under that agreement.

As well as standardising measurement and reporting of in-scope emissions, the sustainable steel principles contain instructions on how to obtain credible data, engage clients on net zero transition plans and use the framework for wider industry advocacy and leadership.

The decarbonization of steel industry will require very significant investments over the next 30 years. Banks will have a large role to play in providing part of the funding required to realise this. This framework is 'the first climate aligned finance agreement for the steel sector'. It "fills a missing link in the efforts to decarbonize the steel industry, by providing a platform for lenders to set clear expectations of their clients and accelerate the flow of funds to near-zero greenhouse gas steel production".

Source: Steel Times International, Weekly News, 5th Oct. 2022

**The Poseidon Principles are a framework for assessing and disclosing the climate alignment of ship finance portfolios. The Poseidon Principles create common global baselines that are consistent with and supportive of society's goals to better enable financial institutions to align their portfolios with responsible environmental impacts.*

The Poseidon Principles are supported by a robust and industry-appropriate climate alignment assessment methodology and carefully considered accountability and enforcement requirements that support practical and robust data collection and analysis practices. The Poseidon Principles also establish transparency requirements for Signatories.

ArcelorMittal and Zeloros Collaborate on Hyperloops

Zeleros, the European company developing the scalable hyperloop, an ultra-high-speed transportation system for both public and goods transport, and ArcelorMittal, the steel

and mining company, have carried out trails to analyse the behaviour of steel grades for optimal use in hyperloops.

A testing facility in the form of a spinning wheel that can reach linear speeds of up to 500 km per hour has been designed and built at ArcelorMittal's Rail Excellence Centre in Spain, to test how certain steels perform in ultra-high-speed conditions, prior to testing on a scaled hyperloop track. The results provide data to further advance the selection of the best steels for hyperloop use, considering safety, energy efficiency, cost and scalability as the main decision criteria.

To reach zeleros' vision of building a scalable hyperloop, including the braking, guiding and levitation technology in the vehicle, this collaboration is key. Thanks to the continuous improvement of steels, it is possible to radically reduce infrastructure costs and assure energy efficiency and infrastructure viability.

The work being doing reflects the importance placed on involvement in innovative projects using steel in infrastructure and transportation, and that contribute to reducing CO_2 emissions.

Source: Steel Times International, Weekly News, 5th Oct. 2022

India Steel Indusutry : July – September 2022 Performance

	July – Sept. 2022	July – Sept. 2022	Growth
Crude Steel, Million tonnes	30.06	29.31	+ 2.56%
Crude Steel – Main Plants *(SAIL, Tata Steel, JSW, JSPL, AMNS and RINL)*	18.29	18.39	- 0.54 %
Crude Steel - Secondary Sector	11.77	10.92	+ 7.32 %
Steel Export	1.41	4.20	- 66.43%
Domestic Consumption	27.52	24.72	+ 11.33 %