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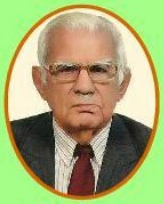

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CHAPTER ACTIVITIES

Meeting of the Executive Committee of IIM DC was held on 26.2 2022. It was decided to sign MOU of MMMM 2022 with HYVE. Issues relating to contents of the Brochure of the Conference, sponsorship fee, delegate fee and advertisement charges were decided in this meeting. Issues relating to fire safety measures to be introduced at our Chapter's premises were also discussed.

MOU with HYVE for MMMM 2022 was signed on 10.3.2022.

Subsequent to the MOU with HYVE, we have requested Ministry of Steel, Ministry of Mines, Ministry **of Coal, Ministry of Environment & Forest, Ministry of Electronics & Information Technology, Ministry of External Affairs, NITI Aayog and Council of Scientific & Industrial Research (CSIR),** for Logo support of the MMMM 2022 event.

SAIL HIGHLIGHTS: FY 2021-22

❖ Financial :

- SAIL is poised to post its best ever performance for the annual profitability during FY'22
- Total dividend paid to Govt. in FY 21-22: Rs.2229 crore (Rs. 483 crore – final dividend of 20-21; Rs 1746 crore – interim dividend 21-22)

Performance Highlights of SAIL – 2021-22

PARAMETER	UNIT	21-22	20-21	Improvement over 20-21	19-20	Improvement over 19-20
Production						
Hot Metal	MT	18.7*	16.6	13%	17.4	7%
Crude Steel	MT	17.4*	15.2	14%	16.2	8%
Saleable Steel	MT	16.9*	14.6	15%	15.1	12%
Iron Ore	MT	34.1*	30.1	13%	29.3	16%
Techno Economics						
Coke Rate	Kg/THM	445*	448	1%	456	2%
CDI Rate	Kg/THM	85*	78	9%	76	12%
BF Productivity	(t/m3/day)	1.79	1.81	-1%	1.80	-1%
Specific Energy Consumption	Gcal/TCS	6.37*	6.48	2%	6.46	1%
Sales						
Saleable Steel	MT	16.2*	14.9	9%	14.2	14%
Iron Ore (Booked)	MT	2.5	4.5	-45%	0.16	-
Iron Ore (Despatch)	MT	2.5	3.2	-22%	0.03	-
Financials						
Turnover	Rs. crore	1 Lac*	68452	46%	61025	64%
Borrowings (as on 31st March)	Rs. crore	13400*	35350	62%	51480	74%
CAPEX	Rs. crore	6002	4283	40%	4112	46%
Human Resource						
Manpower (as on 31st March)	Number	62276	65564	5%	69379	10%
Labor Productivity	TCS/M/Yr	474	396	18%	400	17%

***Best ever performance**
Note : 2021-22 figures are Provisional

❖ Production :

- All 5 Integrated Steel Plants registered best ever yearly production of Hot Metal, Crude Steel and Saleable Steel
- 5 Iron Ore mines (Gua, Bolani, Barsua, Kalta and Taldih) registered best ever yearly production
- Ramping up of production from new Mills – Bar & Rod Mill (BRM) at BSP; Medium Structural Mill (MSM) at DSP; Cold Rolling Mill (CRM-III) at BSL,

registered a growth in production of 87%, 49% and 36% respectively as compared to CPLY

❖ Domestic Sales :

- Highest ever Domestic Sales during 2021-22
- Retail sales increased by 21% over CPLY
- Supplied steel for various projects of national importance like Central Vista Delhi, Mumbai-Ahmedabad High Speed Rail, Delhi-Meerut RRTS, Polavaram Irrigation Project, Kaleshwaram Irrigation Project, Purvanchal Expressway, several Metro Rail Projects across the Country, etc.

❖ Exports :

- 21% growth in exports of Finished Products over CPLY
- New markets serviced: BSL HRC to Egypt, ISP WRC to Egypt and USA, BSL CRC to Portugal, DSP Billets to Egypt, DSP Structural to UAE, BSL GPC to Nepal and Bangladesh, RSP Chequered Coils to Bangladesh

❖ New Product Development for Strategic Sectors & Import Substitution:

- BSP - Commercial production of Rails for Indian railways in R-260 Grade and new profile - 60E1, started at both the rails mills (URM and RSM). Trial rolling of Head Hardened rails (1175 HT) has also been started at URM
- DSP-ASP-VISL - LHB Axles for Indian Railways, which is an import substitution
- ISP and BSP -Cable Armour Quality (CAQ) Wire Rods
- ISP - High Carbon Wire Rod in HC82B, used for railway sleepers and concrete electric poles
- BSL – High Silicon Cold rolled Coils with core loss properties, used in Cold Stampings for electrical motors and cheaper substitute of imported Cold Rolled Non-Oriented (CRNO) Electrical Steel Coils for low end application
- BSL - High Strength Galvanized Sheets with Higher Zinc Coating, have application in manufacturing of Agriculture Silos and Solar pPanels and is an import substitution
- RSP - First time successful rolling of highly critical grade DMR301 meant for sub-zero application in submarine. Commercial order received from Indian Navy

❖ Modernization & Expansion :

- Commissioning test of New state of the art Hot Strip Mill of 3 MTPA capacity at Rourkela Steel Plant held on 29th - 31st March'22, paving the way for regular commercial production in FY'23
- Commissioning of 1x250 MW Thermal Power Plant at RSP by NSPCL, a 50:50 JV of SAIL and NTPC in March'22

- New Slab Caster installed in SMS-I of Bokaro Steel Plant was successfully commissioned during April, 2021

❖ Logistics :

- Commenced Export to Bangladesh through Inland Water Transport Route (Indo Bangladesh Protocol) on regular basis, resulting in avoiding congestion at Petrapole border and average saving of around US$ 14 per Metric Ton compared to the traditional route
- Loading of 66.7 rakes per day which is about 12% more than the last year

❖ Procurement through GeM :

- SAIL emerged as the top most buyer on GeM (Government e-Marketplace) amongst all CPSEs in FY 2021-22 (Rs. 4,612 crore)

❖ Contribution in fight against Pandemic :

- Supplied around 94 thousand tons of Liquid Medical Oxygen (LMO) to various States during the year, out of which around 70% was supplied during Apr-June'21(crucial period of 2nd wave of COVID19)
- SAIL Plants setup separate Jumbo CoVID Care facilities equipped with gaseous oxygen directly from Plants through dedicated pipelines in a very short span. This was in addition to dedicated CoVID19 beds, ventilators, ICU beds, CoVID19 testing facilities, Vaccination centres, etc. in SAIL Hospitals

❖ Personnel :

- Implemented the wage revision for the employees with effect from 01.04.2020 along with the settlement of arrears during FY'22
- Contribution of Rs. 50 crore made to PM Cares Fund

❖ Awards :

- 31 SAIL employees awarded with Prime Minister's Shram Awards for the performance year 2018 in 6 out of a total of 33 categories
- 52 SAIL employees were awarded with Vishwakarma Rashtriya Puraskar for the performance year 2018 in 11 out of a total of 28 categories
- 5-star rated awards for sustainable mining practices and all round performance in the Iron Ore category to Kiriburu Iron Ore Mines (KIOM) for the year 2017-18 and 2018-19 and Meghataburu Iron Ore Mines (MIOM) for the year 2018-19 and 2019-20 at the 5th National Conclave on Mines & Minerals
- Energy Conservation Award to Rourkela Steel Plant in the Eastern region ENCON Award 2021 competition held by the Confederation of Indian Industry (CII) in September 2021

- Golden Peacock Environment Management Award for the year 2021 to SAIL in the Steel Sector by the Institute of Directors for sustainable and environmentally responsible steel making
- "Engineering Personalities Award" to Chairman, SAIL at the 36th Indian Engineering Congress and Centenary Celebrations of The Institute of Engineers (India) in December, 2021
- 'Brands of Odisha, Pride of India Corporate Excellence award' in Platinum category to Rourkela Steel Plant

TATA STEEL WILL DOUBLE INDIA CAPACITY TO 40 MILLION TONNE

Tata Steel has had it's best-ever performance in terms of output and financial performance this fiscal.

Tata Steel will double its current steel production capacity in India from 20 million tonne to 40 million tonne in the next 10 years. There will be expansions in Jamshedpur. Already, Tata Steel is making investments in downstream businesses, Company has had it's best-ever performance in terms of output and financial performance this fiscal.

Tata Steel reported a 139% year-on-year increase in its consolidated net profit to Rs 9,598 crore during the third quarter ended December 31, 2021. The company also reported a sharp 45% y-o-y surge in consolidated revenues from operations to Rs 60,783 crore. Tata Steel's India operations reported a 4% y-o-y increase in crude steel production to 4.81 million tonne during the quarter. The company has also done well on its debt reduction, as it repaid Rs 17,376 crore of debt in the first nine months on the financial year, and net debt as at the end of December was Rs 62,869 crore.

Source: www.financialexpress.com

JSW STEEL'S NEW STEEL MELT SHOP

JSW Steel Ltd. will add 5 million metric tons per year at Vijayanagar, Toranagallu site.

JSW Vijayanagar Metallics Limited, a wholly owned subsidiary of JSW Steel Ltd., has placed an order with Primetals Technologies to supply equipment for its new Steel Melt Shop No. 4 in Vijayanagar, Toranagallu. The order includes two BOF (LD) -converters, two ladle furnaces, gas cleaning and dedusting systems, two slab casters as well as level 1 and level 2 automation systems. The new melt shop has a design capacity of 5 million metric tons per year and will mainly produce high-quality carbon steel. It is part of a major project to expand JSW Steel Vijayanagar Works facility's production capacity. Primetals Technologies will be responsible for engineering, supply of equipment, and advisory services for erection and commissioning.

The two 350-ton-BOF(LD)-converters feature the maintenance free Vaicon Lamella suspension system, water cone and barrel air cooling and will be equipped with slag stoppers, including the thermographic automatic slag identification system SlagMon, quick exchange type oxygen blowing lances and the Lomas converter off-gas analyzing system. A dry type gas cleaning system will reduce dust content to 10 mg/Nm³ at the stack. A steam type heat recovery system will improve energy efficiency, the secondary dedusting system will provide low work zone and roof top emissions. The two 350-ton-ladle furnaces will be equipped with copper-plated electrode arms and the Melt Expert electrode control systems.

The two-strand continuous slab casters are designed to produce slabs in a width range of 900 to 1,650 millimeters at thicknesses of 220 and 260 millimeters. The metallurgical length amounts to 34.5 meters. A wide variety of steel grades can be processed, including the complete range of ultra-low to high carbon steels, deep drawing, structural, peritectic and HSLA grades, micro and low alloy steels, strip grades and high silicon electrical steels.

The casters are fully equipped with advanced technology packages, including LevCon mold level control, DynaFlex mold oscillation, Mold Expert breakout prevention and DynaPhase phase transformation modelling for maximum possible slab quality. Latest design DynaGap Soft Reduction 3D in all segments, Dynacs 3D cooling model, and Quality Expert for on-line slab quality assessment are also provided. The melt shop and the casters are also equipped with features to make them ready for Industry 4.0.

JSW Steel, over the last three decades, has grown to become India's leading integrated steel company with capacity of 28 MTPA in India and USA (including capacities under joint control). It's roadmap for the next phase of growth includes a target of achieving 37.5 million tons per year steel capacity by financial year 2025. The Company's manufacturing unit in Vijayanagar, Karnataka is the largest single location steel-producing facility in India with a capacity of 12 million tons per year. It has a strategic collaboration with global leader JFE Steel of Japan, enabling JSW to access new and state-of-the-art technologies to produce and offer high-value special steel products to its customers. These products are extensively used across industries and applications including construction, infrastructure, automobile, electrical applications, appliances etc. JSW Steel is widely recognized for its sustainability practises. Some of these recognitions include World Steel Association's Steel Sustainability Champion (consecutively 2019 to 2021), Leadership Rating (A-) in CDP (2020), Deming Prize for TQM for its facilities at Vijayanagar (2018) and Salem (2019). It is part of the Dow Jones Sustainability Index (DJSI) for Emerging Markets (2021) and S&P Global Sustainability Yearbook (consecutively for 2020 and 2021). JSW Steel is the only Indian company to be ranked among the top 15 global steel producers by World Steel Dynamics for 13 consecutive years since 2008. As a responsible corporate citizen, JSW Steel's carbon reduction goals are aligned to India's Climate Change commitments under the Paris Accord.

STEEL-MAKERS STEP UP EXPORTS TO EUROPE

Indian steel majors are tapping the export market, primarily Europe, as supply shortage from Russia, Ukraine and China led to a jump in spot steel prices there. Indian steel majors, according to market sources, have seen at least 5 percentage point jump in exports to Europe which now stand at between 30 and 35 per cent of total production.

Spot price variation is close to ₹15,000 per tonne (between Europe and India) or around $2,000 per tonne, thereby making exports an attractive proposition.

Indian steel majors normally export close to 20-25 per cent of their production, with Europe being a major buyer. JSW, Tata Steel, Jindal Steel and Power Ltd. (JSPL) and ArcelorMittal Nippon Steel (AMNS) continue to be the major exporters. Around 81 per cent of the country's steel production comes from private players while 19 per cent comes from PSUs.

Ministry data

According to data available with the Ministry of Steel, exports (of finished steel) rose 30 per cent y-o-y, to 12.29 million in the 11-month-period of FY22 (April-February). In the corresponding period last fiscal, finished steel exports stood at 9.5 million tonnes.

Exports are moving up and it accounts for around 35 per cent of our production, up from the 25-30 per cent levels during normal times. Considering some of the booking trends, exports could be up to around 40 per cent in April.

AMNS's exports account for "approximately 10-15 per cent" of the company's annual production of 7.5 million tonnes. The focus continues to be on catering to domestic demand.

"There has been some increase in prices primarily because of input cost rise like that of Australian coking coal. But, in terms of volume growth there has not been much jump for us. Moreover, there is good domestic demand. Russia's invasion of Ukraine has severely hit supplies in Europe.

Both Russia and Ukraine were major suppliers, with close to 3-4 million tonnes of steel supplies per month from each of these countries. With the war, there is now a shortage of "at least 4-5 million tonnes per month", which is being met through Indian and Chinese imports.

Steel production in China has been lower on y-o-y basis impacting supplies, which has further accelerated the price situation in Europe.

New Covid cases in China

Market sources say an impending lockdown in Tangshan in China — known as the steel city— has led to further volatility in prices. Global Times in a report mentioned that the largest steel-producing city in North China's Hebei Province, had strict traffic controls and other curbs after new Covid-19 cases were reported there, resulting in many steelmakers and related businesses halting production and evaluating impact.

"Even if the war were to stop today, we do not see a situation where high prices of steel would come down in six to eight months. For one, Ukraine would look to rebuild itself and there are high chances of it becoming a net importer of steel; rather than being an exporter, at least for a period of time".

Source: The Hindu Business Line

STEEL SOLAR PROJECT

Turkish green steel producer Tosyali Holding Company has announced plans to deploy 140 MW of solar power generating capacity on top of its facilities, costing $71 million (64.8 million euro). The company is working with Huawei and local installation services provider SolarApex to implement the project in stages.

This is the world's largest rooftop solar project and it will be executed on an area of 632 square metres (6,803 sq. ft.). The first phase of the project will involve the installation of 85 MW of solar panels and is expected to be finalised within seven months. Once the rest of the planned capacity is deployed, the solar arrays will be able to generate a total of 250 million kWh of electricity per year.

Tosyali Holding's goal is to bring fossil fuel use to the lowest possible level. In line with this strategy, they will start to use hydrogen as a substitute for fossil fuels in iron and steel production for the first time in Turkey. They will use some of the electricity from the solar power plant for the hydrogen- oriented operations.

Source: Steel News, Steel Times International

'GREEN STEEL' IS HAILED AS THE NEXT BIG THING IN AUSTRALIAN INDUSTRY

Steel is a major building block of our modern world, used to make everything from cutlery to bridges and wind turbines. But the way it's made – using coal – is making climate change worse. On average, almost two tonnes of carbon dioxide (CO_2) are emitted for every tonne of steel produced. This accounts for about 7% of global greenhouse gas emissions. Cleaning up steel production is clearly key to Earth's low-carbon future. Fortunately, a new path is emerging. So-called "green steel", made using hydrogen rather than coal, represents a huge opportunity for Australia. It would boost ~~our~~

exports, help offset inevitable job losses in the fossil fuel industry and go a long way to tackling climate change. Australia's abundant and cheap wind and solar resources mean it is well placed to produce the hydrogen a green steel industry needs.

Steeling for change

Steel-making requires stripping oxygen from iron ore to produce pure iron metal. In traditional steel-making, this is done using coal or natural gas in a process that releases CO_2. In green steel production, hydrogen made from renewable energy replaces fossil fuels. Australia exports almost 900 million tonnes of iron ore each year, but only makes 5.5 million tonnes of steel. This means we have great capacity to ramp up steel production. A Grattan Institute report last year found if Australia captured about 6.5% of the global steel market, this could generate about A$65 billion in annual export revenue and create 25,000 manufacturing jobs in Queensland and New South Wales. Steel-making is a complex process and is primarily achieved via one of three processes. Each of them, in theory, can be adapted to produce green steel. We examine each process below.

1. Blast furnace

Globally, about 70% of steel is produced using the blast furnace method. As part of this process, processed coal (also known as coke) is used in the main body of the furnace. It acts as a physical support structure for materials entering and leaving the furnace, among other functions. It's also partially burnt at the bottom of the furnace to both produce heat and make carbon monoxide, which strips oxygen from iron ore leaving metallic iron. This coal-driven process leads to CO_2 emissions. It's feasible to replace a portion of the carbon monoxide with hydrogen. The hydrogen can strip oxygen away from the ore, generating water instead of CO_2. This requires renewable electricity to produce green hydrogen. And hydrogen cannot replace carbon monoxide at a ratio of 1:1. If hydrogen is used, the blast furnace needs more externally added heat to keep the temperature high, compared with the coal method. More importantly, solid coke in the main body of the furnace cannot be replaced with hydrogen. Some alternatives have been developed, involving biomass – a fuel developed from living organisms – blended with coal. But sourcing biomass sustainably and at scale would be a challenge. And this process would still likely to create some fossil-fuel derived emissions. So to ensure the process is "green", these emissions would have to be captured and stored – a technology which is currently expensive and unproven at scale.

2. Recycled steel

Around 30% of the world's steel is made from recycled steel. Steel has one of the highest recycling rates of any material. Steel recycling is mainly done in arc furnaces, driven by electricity. Each tonne of steel produced using this method produces about 0.4

tonnes of CO_2 – mostly due to emissions produced by burning fossil fuels for electricity generation. If the electricity was produced from renewable sources, the CO_2 output would be greatly reduced. But steel cannot continuously be recycled. After a while, unwanted elements such as copper, nickel and tin begin to accumulate in the steel, reducing its quality. Also, steel has a long lifetime and low turnover rate. This means recycled steel cannot meet all steel demand, and some new steel must be produced.

3. Direct reduced iron

"Direct reduced iron" (DRI) technology often uses methane gas to produce hydrogen and carbon monoxide, which are then used to turn iron ore into iron. This method still creates CO_2 emissions, and requires more electricity than the blast furnace method. However its overall emission intensity can be substantially lower. The method currently accounts for less than 5% of production, and offers the greatest opportunity for using green hydrogen. Up to 70% of the hydrogen derived from methane could be replaced with green hydrogen without having to modify the production process too much. However work on using 100% green hydrogen in this method is ongoing.

Becoing a green steel superpower

The green steel transition won't happen overnight and significant challenges remain. Cheap, large-scale green hydrogen and renewable electricity will be required. And even if green hydrogen is used, to achieve net-zero emissions the blast furnace method will still require carbon-capture and storage technologies – and so too will DRI, for the time being. Private sector investment is needed to create a global-scale export industry. Australian governments also have a big role to play, in building skills and capability, helping workers retrain, funding research and coordinating land-use planning. Revolutionising Australia's steel industry is a daunting task. But, Australia can be a major player in the green manufacturing revolution.

Source: www.theconversation.com

H2STAHL PROJECT AT THYSSENKRUPP STEEL

H2Stahl project, funded by Germany's Federal Ministry for Economic Affairs and Climate Action, is to start at thyssenkrupp Steel's Duisburg site. It is planned to expand the use of hydrogen in all 28 tuyeres of the blast furnace. The "objective of the research is — amongst others - investigating the influence of the industrial use of hydrogen on the metallurgical processes in the blast furnace and determining parameters for the efficient use of reducing agents. The overall aim is to establish the use of hydrogen as bridging technology for the technical CO_2 reduction in existing blast furnaces. Funding in the amount of 37 million euros has been granted. By launching the H2Stahl project in Duisburg, the consortium members thyssenkrupp Steel, Air Liquide Deutschland and VDEh Betriebsforschungsinstitut (BFI, project coordinator) have now

set the course for the first steps. The tasks at hand are the expansion of the use of hydrogen to the entire blast furnace, including the construction of a pipeline for testing the large-scale industrial use of hydrogen in steelmaking, as well as the construction and trial operation of a direct reduction pilot plant which will mark the technological leap to hydrogen-based climate-neutral hot metal production. The entire project is to be implemented within a five-year.

In addition to the expansion of hydrogen in the blast furnace operations at Duisburg, to ensure the continuous supply of hydrogen, the plant's internal infrastructure will be prepared for a large-scale industrial supply of hydrogen. thyssenkrupp's partner in the project, Air Liquide, will build a pipeline which will be about 6 km long and will link the steel plant in Duisburg with Air Liquide's production network. Plant infrastructure is being built for the large-scale industrial use of hydrogen. With the pipeline link to the existing hydrogen infrastructure of Air Liquide, another impetus for ramping up the production of green hydrogen as quickly as possible is being given. With H2Stahl, two phases of climate strategy is combined : on the one hand the industrialization of hydrogen use in existing blast furnace-based technology routes already involving significant CO_2 reductions in the production process, and on the other hand the preparation of the direct reduction process by building up the infrastructure.

As part of the H2Stahl project, a direct reduction pilot plant will also be built in order to prepare the technology changeover from the conventional blast furnace route to the hydrogen-based direct reduction process. The use of hydrogen-containing process gases in combination with natural gas and pure hydrogen is to be tested in the new plant to be designed, which will be scientifically supervised. Aside from the commonly used feedstock for direct reduction plants, other materials containing iron oxide, including potentially suitable waste materials, will be used. The direct reduction pilot plant will be equipped with additional measurement equipment enabling scientific evaluation. The tests in the direct reduction pilot plant will be accompanied by modelling and special studies in the Technical Center of BFI. The planned research work will focus on the investigation into the reduction processes and process parameters in order to ensure the smooth transition to the future large-scale plants.

The flexible use of hydrogenous gases as well as various feedstock containing iron oxide in a direct reduction process is quite a challenge. The scientific investigations will provide essential information on the safe and efficient operation of the processes as well as the appropriate operating parameters. The facilities created in the H2Stahl laboratory will enable urgently required investigations with a view to the climate-friendly transformation of the steel industry. thyssenkrupp plans to complete the first industrial direct reduction plant including melting unit by 2025.
H2Stahl does not only permit to gain important information on the changeover to direct reduction: The use of hydrogen in the blast furnace permits to significantly reduce CO_2 emissions – depending on the availability of green hydrogen.

GERMAN STEEL PRODUCER ENTERS GREEN STEEL AGREEMENT

Uniper has entered into an agreement to supply German steel producer Salzgitter with green hydrogen to produce low carbon steel.

Salzgitter, one of Europe's largest steel producers, will use green hydrogen from Uniper's site in Wilhelmshaven where it is developing two projects in parallel for the supply of the gas.

The first project is a planned import terminal capable of converting green ammonia back into hydrogen, and the second is a planned electrolysis plant, with the potential for a direct connection to an offshore wind farm which will be built in the North Sea.

The electrolysis plant and the entire downstream hydrogen infrastructure would store energy from wind when output is highest, by conversion into hydrogen which can be transportable.

The aim would be to supply Salzgitter through the evolving German hydrogen pipeline network and for the development of cavern storage facilities. Uniper stated the two companies will 'drive the ambitious vision' of decarbonising Germany's industry in support of the climate targets by contributing to this objective with specific projects.

It is aimed to align Salzgitter AG to low CO_2 production processes and the circular economy. The secure and economically viable sourcing of green hydrogen is a fundamental prerequisite for the journey towards low CO_2 steelmaking. It is is a step on the way to leading technical transformation to success.

The Wilhelmshaven site offers all the necessary preconditions for creating Germany's first major hydrogen hub. Large-scale hydrogen production facilities are to be built here for the purpose of decarbonising steel production in Lower Saxony.''

Uniper is also turning the site of its coal fired power plant in Gelsenkirchen-Scholven into an innovation hub for hydrogen technology, which, according to the company, will be specifically designed to address industry needs.

Source: Steel Times International Weekly News

LARGEST HYDROGEN-BASED DRI FACILITY IN CHINA

Sinosteel Engineering & Technology Co. Ltd., located in Beijing, China, has recently contracted **Tenova** for the design and supply of a hydrogen-based 1,000,000 tonnes/year *ENERGIRON® direct reduction (DR) plant* with the aim to reduce carbon

dioxide emission for a sustainable steel industry. The plant will be installed at **Baosteel Zhanjiang Iron & Steel Co. Ltd.**, located in the Zhanjiang Economic and Technological Zone, Guangdong Province, China. The plant capacity of 1,000,000 ton/year will make it the **largest hydrogen-based DRI facility in China**.

As the effort to lower carbon emissions worldwide continues, the replacement of traditional blast furnace steelmaking technologies - characterized by the intensive use of coal – is currently the new trend for a sustainable steel industry, and the use of gas-based ironmaking technologies is a valuable alternative. The ENERGIRON® technology, jointly developed by Tenova and Danieli, is a flexible DR technology for virgin metallic unit production in terms of makeup gases utilization and is designed to maximize the reduction of CO_2 emissions.

This is reported to be the first direct reduction iron production line integrating hydrogen, natural gas and coke oven gas for industrial production, facilitating Baowu group's journey towards the path of reducing carbon emission and reaching carbon neutrality in 2050.

The new ENERGIRON® plant will use mainly *hydrogen as reducing gas* with the possibility to mix it with Natural Gas (NG) and Coke Oven Gas (COG). The plant will have flexibility to use different reducing gases in any combination or proportion, using the same ENERGIRON® ZR scheme.

The plant will also be designed to have the capability to capture and sell CO_2 on the commercial market; this will further reduce the overall plant CO_2 emissions and provide an additional revenue stream for the plant operations.

The plant will produce cold DRI pellets through an external cooler for potential future hot DRI production and transport (using the proven HYTEMP system) to a new EAF mill to be located next to the ENERGIRON® plant.

ALUMINIUM, THE GREEN METAL

It can fast-track development of India's solar industry

The pressing need for climate action has got countries taking rapid strides to develop, expand and increase output of the renewable energy (RE) industry, with solar energy emerging as the predominant source of green power. Today, India not only stands fourth in the world in terms of installed RE capacity — 5th in solar and 4th in wind — it is now pursuing an ambitious target of 450 GW of RE capacity by 2030.

According to a World Bank report on green energy revolution, aluminium is the only metal that is both high-impact and cross-cutting, in all potential clean power technologies.

For a sun-soaked country like India, solar photovoltaics (PV) is not only a clear energy option, but it comes with two advantages — module manufacturing can be done in large plants, which allows for economies of scale, and being a very modular technology, it also allows for deployments in very small units at a time. This makes the potential of applications limitless, as solar-powered systems can range from personal electronics to utility-scale power generation facilities.

Special Properties

Aluminium is used in most clean energy technologies, especially in solar where it accounts for 85 per cent of most PV components in the form of the frames and mounting structures that hold the PV panels together and support them. Aluminium will also find extensive usage in transmission and distribution of the energy generated, as it is the material of choice for energy transmission over long distances. In such a scenario, Indian aluminium producers like Vedanta Aluminium are well-resourced to fast-track India's journey towards a low-carbon energy future.

Green Metal

Aluminium is heralded as the green metal of the future. Owing to special properties like high strength-to-weight ratio, superlative corrosion resistance, high surface reflectivity, excellent electrical and thermal conductivity, as well as 100 per cent recyclability at the end of life, make aluminium suitable for solar PV applications.

Extruded aluminium sections are easy to machine, transport and assemble, requiring less skilled labour and lesser time to erect the structures. This helps engineers make complex, efficient, and cost-effective structures well in advance. Further, being naturally corrosion resistant, structures made with aluminium don't require high maintenance or additional protective measures to prevent corrosion of the structure. Heat treated aluminium alloys are also capable of withstanding wind speeds of up to 150-170 km/hour easily.

Moreover, aluminium is quick to cool down compared to traditional materials, which is of significant advantage in solar PV, as increase in temperature of PV cells reduces the efficiency of electricity generation. Yet another advantage is aluminium's ability to be endlessly recycled. Aluminium recycling is cost-effective and requires significantly less energy.

Indian Scene

The Indian aluminium Industry, with its 4.1 MTPA aluminium production capacity, can easily cater to the domestic aluminium demand for the RE sector.

Domestic aluminium producers have significantly invested in R&D and innovation to indigenously develop special high-performance alloys for various industries. In fact, Vedanta Aluminium is the world's largest producer of wire rods (excluding-China), and India's largest producer and exporter of billets. The company has also indigenously developed alloys for various industry sectors, which were earlier entirely imported into India.

Given their technical prowess and willingness to partner with extruders and downstream manufacturers catering to the solar industry, opportunities for players in the Indian solar industry are immense. Besides getting raw materials that are at par with global quality standards, they can also access the R&D centres of these large producers for developing new products or product applications specifically customized for solar industry.

The country is already witnessing strong strides in aluminium usage in the RE sector. For example, on the back of 100GW solar capacity addition over the next 2-3 years, the government has confirmed that there will be an anti-dumping duty of 40 per cent w.e.f. April 1 on imports of solar cells and modules from China to encourage domestic manufacturing of solar PV components in India.

However, factors such as lack of financing support, unfavourable policy structures, lack of scale and competition from low-priced Chinese imports have stunted India's domestic module manufacturing growth. As per MNRE data, solar PV cell production capacity in India is only 2.5 GW/year and solar PV modules capacity is around 9-10 GW/year, whereas the annual requirement for the next 10 years is around 10 GW/year.

As a result, the Indian solar industry relies heavily on imports of important components such as solar cells, modules and solar inverters. Aluminium, as the green metal of the future, holds massive economic promise for the evolving global renewable energy sector. This is India's opportunity to strengthen its position in the global RE value chain, by not only producing domestically to meet our RE targets, but also become the global manufacturing hub in aluminium and solar PV components.

Source: The Hindu BusinessLine

ARCELORMITTAL HAS ESTABLISHED A STRATEGIC PARTNERSHIP WITH GREENKO GROUP, INDIA'S LEADING ENERGY TRANSITION COMPANY, TO DEVELOP A 'ROUND THE CLOCK' RENEWABLE ENERGY PROJECT WITH 975 MW OF NOMINAL CAPACITY

The project will be owned and funded by ArcelorMittal. Greenko will design, construct and operate the renewable energy facilities in Andhra Pradesh. Project commissioning is expected by mid-2024.

ArcelorMittal's joint venture company in India, ArcelorMittal Nippon Steel India (AM/NS India), will enter into a 25 year off-take agreement with ArcelorMittal to purchase 250 MW of renewable electricity annually from the project. This will result in over 20% of the electricity requirement at AM/NS India's Hazira plant coming from renewable sources, reducing carbon emissions by approximately 1.5 million tonnes per year.

The project offers AM/NS India the dual benefits of lower electricity costs and lower CO_2 emissions, reducing AM/NS India's carbon emissions by 1.5 million tonnes per annum. Greenko Group is India's leading energy transition company. The project will combine solar and wind power and be supported by Greenko's hydro pumped storage project, which helps to overcome the intermittent nature of wind and solar power generation.

Large amounts of green energy is one of the key foundations for both a net zero economy and a decarbonised steel industry. There is a potential of replicating this model in other regions and it will serve as a blueprint for the adoption of renewable power for large-scale steel manufacturing in India. These efforts will also represent a notable contribution to India's own commitment to build 500 GW of renewable energy capacity by 2030.

Source : Arcelor Mittal website

NIPPON STEEL TO EXPLORE EMISSIONS REDUCTION THROUGH LIQUEFIED CO_2 CAPTURE AND STORAGE

The Japanese steelmaker Nippon Steel Corp. will investigate the potential use of liquefied carbon dioxide capture and transport technology to eliminate up to 5 million metric tons of its emissions per year. They will conduct a joint feasibility study with carbon capture and storage (CCS) company *deepC Store*.
If implemented at full commercial scale, deepC's technology would capture and liquefy 1 to 5 million metric tons of Nippon Steel's CO_2 emissions per year. The liquefied CO_2 would then be transported by ship to deepC's offshore floating CCS hub, *CStore1*, where it would be permanently and safely stored underground.

Nippon Steel is pursuing various initiatives for achieving carbon neutrality by 2050. CCS

is considered one of essential methods for realizing carbon neutrality. By conducting the joint study with deepC Store based on their unique large-scale offshore floating CCS hub technology, it is aimed to enhance knowledge on CCS and enabling a breakthrough for conducting CCS.

deepC Store's existing partners are Add Energy Group, Commonwealth Scientific and Industrial Research Organisation (CSIRO), JX Nippon Oil and Gas Exploration Corporation, Kyushu Electric Power, Mitsui O.S.K. Lines, Osaka Gas and Osaka Gas Australia, Technip Energies and Toho Gas. Through this agreement, deepC Store and its partners will collaborate with NSC to perform the following activities:

- Consider the technical conditions of the liquefied CO_2 to be captured and transported from NSC's steelworks to CStore1; and Negotiate the key commercial terms to capture and transport liquefied CO_2 from NSC's steelworks to CStore1.

deepC Store is a CCS project developer that specialises in developing multiple CCS projects and generating material quantities of carbon credits. deepC Store's flagship CStore1 project consists of capturing between 1.5 (one point five) and 7.5 (seven point five) million tonnes per annum of CO_2 from industrial sources in Australia and the Asia-Pacific region, shipping of liquid CO_2 from capture sites to a CO_2 Floating Storage and Injection (FSI) hub facility in offshore Australia, and injecting CO_2 in a subsurface storage complex near the FSI hub facility, as shown below.