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Delhi Chapter
Jawahar Dhatu Bhawan
39, Tughlakabad Institutional Area
M B Road, Near Batra Hospital, New Delhi-110062
Tel: 011-21820057, 011-29955084
E-mail:iim.delhi@gmail.com
Website: iim-delhi.com

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Executive Committee : 2020-21

Name	Designation	Mobile	E-mail
Shri K K Mehrotra	Chairman	9868112514 9968653355	kishorekmehrotra@gmail.com
Shri A C R Das	Vice-Chairman	9811330571 7678470803	ajoycrdas@gmail.com
Shri N K Kakkar	Secretary	9871008505	nirmalkakkar@gmail.com
Shri N Vijayan	Treasurer	9818695690	technothermaindia@gmail.com
Dr Ramen Datta	Joint Secretary	9958084110	dattaramen@gmail.com
Shri B D Jethra	Member	9818326878	jethra@yahoo.com
Shri S C Suri	Member	26949167 9650936736	scsuri.iimdc@gmail.com
Shri K L Mehrotra	Member	9810203544	klmehrotra48@gmail.com
Shri G I S Chauhan	Member	9717302437	gisc.delhi@gmail.com
Shri R K Vijayavergia	Member	9650155544	rkv.sail@gmail.com
Shri P N Shali	Member	9810708510	pnshali@gmail.com
Shri Deepak Jain	Member	9868640986	deepakjain@bis.org.in
Shri Manoranjan Ram	Member	9999303008	manoranjanram@yahoo.com manoranjan.ram@paulwurth.com
Dr Mukesh Kumar	Member	9584032329 9650080849	drmukeshkumar@gmail.com
Shri K R Krishnakumar	Member	9818277840	kuduvak059@gmail.com
Shri R K Narang	Member	9899298857	rknarang62@gmail.com
Dr Rajesh Prasad	Member	9818538085	rajesh@iitd.ac.in
Shri B R Thukral	Special Invitee	9818563381	balwantthukral@gmail.com
Shri P K Chatterjee	Special Invitee	9210844819 9958228404	parijat.chatterjee@yahoo.com

A BRIEF OF TECHNICAL TALK ON PRODUCT, PROCESS & APPLICATION - COLD ROLLING MILL, TATA STEEL BSL, SAHIBABAD

A Technical Talk was organized by IIM Delhi Chapter on 3rd May 2021. The topic of the Talk was "Product, Process & Application - Cold Rolling Mill, Tata Steel BSL, Sahibabad"

At the outset Shri K K Mehrotra, Chairman, IIM DC, welcomed the attendees of the Talk. He gave an introductory profile of Shri Jitendra Mathur, Head, QA, Tata Steel BSL Ltd & requested Shri Mathur to start his presentation.

To begin with, Shri Mathur gave a historical background of Bhushan Steel from 1987 onwards. In1987 Bhushan Steel acquired Jawahar Metals at Sahibabad, U.P. In 1990-92, this plant got its first 20 Hi Cold Rolling Mill & its first galvanizing line. In 2000-03, second plant of the company started at Khapoli, Maharashtra with narrow & wider Cold Rolling Mills, Tube & Power Plant. From 2004 -2010 an integrated Steel Plant with 5.6 Mt/yr hot metal capacity was installed at Angul, Orissa. In May,2018 Bhushan Steel Limited was acquired by Tata Steel Limited through its wholly owned subsidiary Bamnipal Steel Limited. In November,2018, the name of the company was changed from Bhushan Steel Limited to Tata Steel BSL.

He mentioned that the bouquet portfolio of downstream products of Tata Steel BSL are

- Galvanised Plain sheets
- Galvasied Corrugated Sheets
- Pre Painted Galvalume (PPGL)
- Pre Painted Galvanised Iron (PPGI)
- Galvalume
- Hardened & Temperd Sheets (H&T)
- Precision Tubes
- Large Dia Pipes
- Cold Rolled Closed Annealed (CRCA)

He described that Sahibabad units has the following major production facilities:

Hot Rolled Slitter
Pickling Line
Wider Cold Rolling Mill
Narrow Cold Rolling Mill
Continuous Galvanizing & Colour coated Lines
Galvalume
Hardening & Tempering Facilities.
Precision Tube plant

Shri Mathur in detail explained the process flow for production of various value added products. He also mentioned that GI sheets have wide range of application such as roofing, auto ancillaries, white goods, solat, PEB, Construction, Domestic Appliances, Panels, equipment etc. The application of colour coated products are in Appliances, structural & General Engineering purposes. The Hardened & Tempered products are used in Band Saw, Gang Saw, Hand Saw, Circular Saw, Putty Knife, Flatner etc. The application of ERW tubes are for various auto components, furnitures etc.

Shri Mathur also highlighted that following achievements were made by Tata BSL Sahibabad during 2020-21.

- 22 new products developed
- 32 out of 49 skin panels got approval from MSIL for production
- First Indian Steel Company to supply skin panel to automotive sector
- H& T products have more than 50% Indian market share
- Accreditation of CRCA-QA by NABL for ISO/IEC17025:2017
- IATF certification for both CRM & Tube plant
- In house automation- Air knife control at CGL, MES & other IT system

He also mentioned that major customers of Tata Steel BSL different products are Automobile producers like Maruti, Tata Motors, Mahindra & white goods manufactures like LG, Whirlpool, IFB, Godrej, Voltas, Daikin, Haier, Taehwa, Neumann etc. This marked the conclusion of presentation of Shri Mathur.

About 50 attendees from various Chapters participated in the presentation. There was a lively interaction after the conclusion of the presentation.

In the end, Chairman presented a vote of thanks for the informative and lucid presentation by Shri Mathur. A mention was made by Chairman that IIM DC extends him a special thanks

that in spite of his being infected with corona positive, he decided to give the presentation, as originally scheduled. Chairman also thanks the attendees for their active participants in deliberations.

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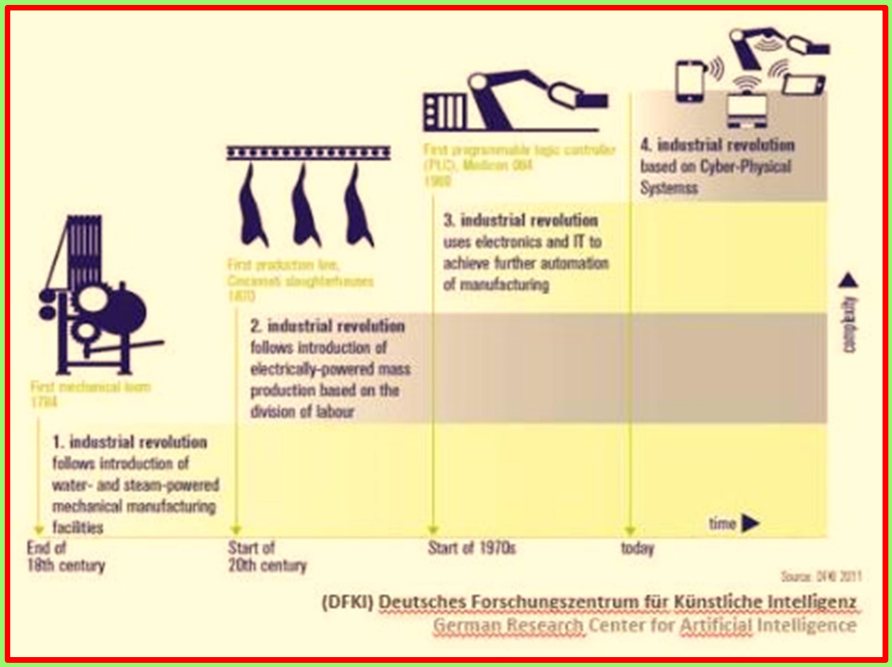
DISRUPTIVE INNOVATIONS IN IRON & STEEL INDUSTRY

MANORANJAN RAM
Carlo MORELLI, Cyril DEOM

In recent years, the term Industry 4.0, initially coined by the German government, has been largely used worldwide to focus on the on-going disruptive transformation of many industrial production processes.

The so-called 4th Industrial Revolution, enabled by state-of-the-art automation as well as Information and Communication technologies, extends to all the industrial sectors, including the iron and steel industry, as well.

The concurrent profitable application of "enabling technologies" (such as Big Data & Analytics, Cloud computing, Internet of Things, Robotics, Advanced Simulation, Augmented and Virtual Reality, Artificial Intelligence, Cybersecurity) to the industrial production processes is going to transform today's factories into smart factories, enabling higher and higher production and quality levels, while overcoming current market and environmental challenges. Based on cyber-physical systems, i.e. the beneficial networking of humans, objects, systems, computers and machines, the Industry 4.0 paradigm is indeed a quantum leap in the production processes.



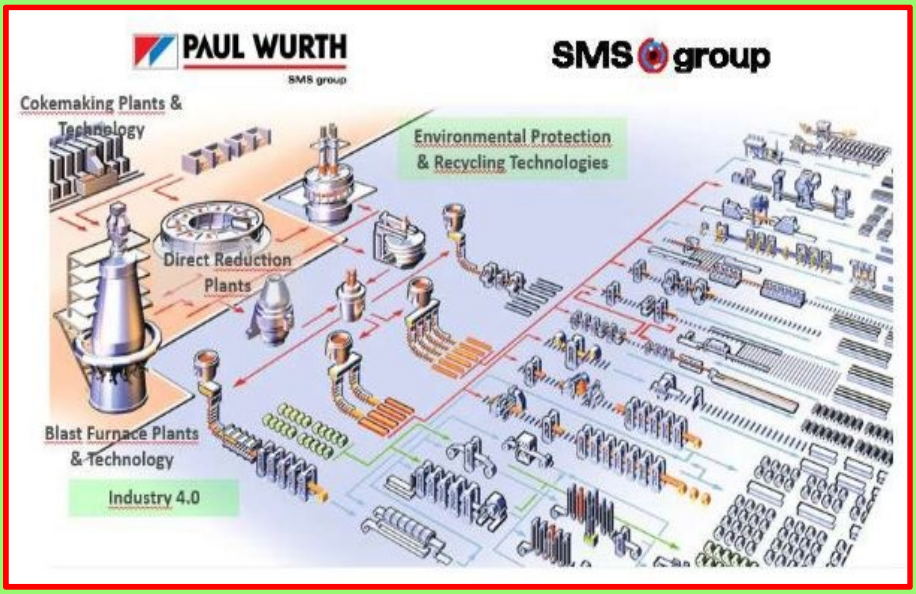
It is the next wave of productivity increase based on data.

Within this frame, Industry 4.0 is nowadays the driving paradigm worldwide.

Governments, academia and industrial actors are leading the 4th Industrial Revolution and enabling state-of-the-art technologies for the future industry.

Paul Wurth, one of the world leaders in the design and supply of a full-range of technological solutions for the primary stage of integrated steelmaking, is highly committed to innovating and developing by means of Industry 4.0.

Paul Wurth has developed an important portfolio of digital solutions for modern and efficient ironmaking. As part of SMS Group and especially in close cooperation with SMS Digital, these digital solutions are conceived to transform the Iron & Steel Industry and support our customers as their leading partner in the world of metals.



Engineers and operators can use AIXpert to intuitively train artificial intelligence models. Afterward, they can be integrated via drag-and-drop into RulesXpert. Running as a black-box, they complement the former white-box approach.

BIXpert: The easy to configure business intelligent visualization tool based on web technology, process engineers and plant operators are able to query, visualize and understand raw data, calculated values or extracted results in a platform-independent way. This includes numerous functions for displaying data, both historical and real-time. All information can be merged into application-specific dashboards.

Figure 1: BIXpert dashboard based on RulesXpert logic

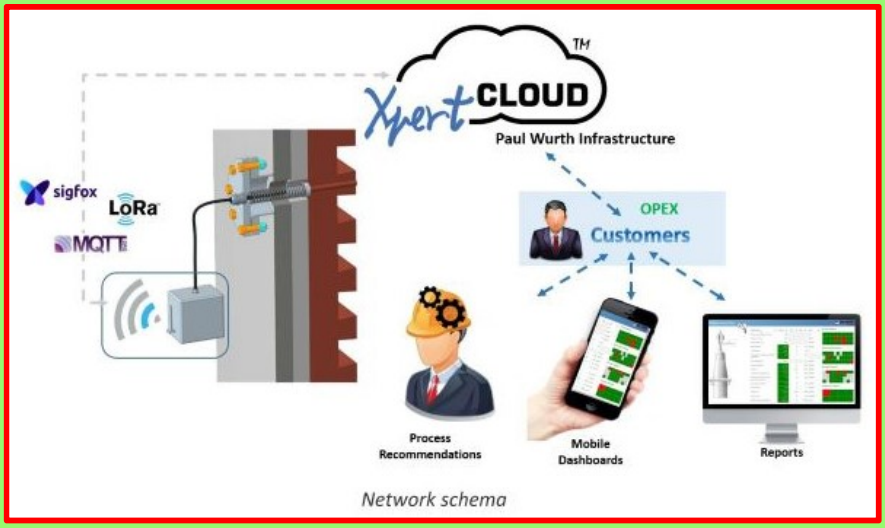
Smart staves

The copper staves are a crucial component of the Blast Furnaces cooling system and they have been providing excellent protection of the shell in high heat loads areas. This has resulted in the Blast Furnace operators achieving high performance in terms of productivity, as well as longer campaigns (more than 15 years). However, in some Blast Furnaces, abrasive wear phenomena can take place on those cooling elements, leading to a reduction of the copper staves lifetime and anticipated relines. Those reline are often unforeseen because the wear is not visible and without accurate sensors, it can only be noticed after the first water leakage, at a time when it is already too late to react. Fortunately, new disruptive innovation might allow a further leap by solving this remaining pain point.

A continuous online system for wear monitoring is then the proposed solution.

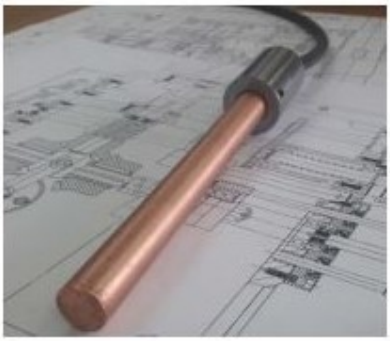
In operation, the status of the hot face is difficult to observe, but early detection of wear would be the key to take necessary countermeasures and also to plan efficiently necessary shutdowns. Furthermore, continuous monitoring can establish a correlation between wear and process para meters. The technologies available today are either limited to a time-consuming measurement during Blast Furnace shutdowns (i.e. transitory) or a continuous measurement with a questionable precision. To solve this issue, Paul Wurth has developed a new sensor to measure and monitor stave wear in a precise and continuous way. This sensor is based on a simple and reliable measurement principle making it an affordable solution.

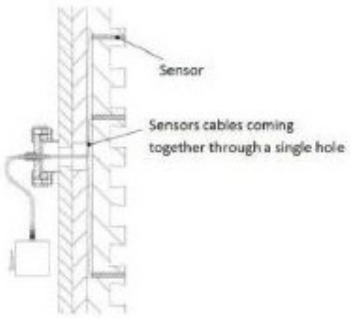
In order to avoid significant cabling costs, all data are transmitted via a wireless network to a cloud. The individual sensors are powered by batteries. The operator then visualizes the wear measurements on a dashboard designed by Paul Wurth. The sensors can be installed on new staves or as a retrofit during a Blast Furnace stoppage.



Network schema

Besides the development of an ultrasonic device mounted on a guiding mechanism, Paul Wurth has developed a new solution for continuous monitoring of the stave thickness. This solution can be installed on new staves or as a retrofit . The "smart stave" solution is composed of a sensor, an electronic unit and data processing. The sensor is measuring the wear, the electronic unit is analyzing the signal and sending the wear status via a wireless network to a cloud from which the data is uploaded and analyze d. The end product of this solution is a visualization of the wear using a dashboard.


Smart stave sensor



Principle of the smart stave sensor "new stave"

The measurement is continuous in time, allowing possible correlation between the process parameters and the wear, increasing thereby the understanding of the wear phenomenon.

This solution can be used as the only wear monitoring solution or as a complement to an extended monitoring during Blast Furnace stoppages done using an ultrasonic device mounted on a guiding mechanism" or by manually extracting the probe and visually

measuring the length of the probe.
In August 2018, 20 "smart stave" instruments have been successfully installed in Dillingen H04 on four stave rows. This installation has been performed in three shifts and could even be done faster by scaling up the manpower. After one year of operation, sensors have been dismantled for a visual inspection . The feedback is positive; the dismantled sensors had worn to the extent corresponding to the signal recorded.

Process Optimization and Expert Systems

The efficient operation of modern iron-making requires a high degree of automation in conjunction with computerized monitoring and control systems. Next to the necessary required level 1 automation, the customer's iron-making process can be precisely monitored and optimized by process control systems BFXpert, CokeXpert and SinterXpert.

The former includes general process models for data analysis and process optimization and supports plant operators in optimizing the stability and costs of hot metal production while being assisted by the knowledge-based system. Treatment of process data further assists in reporting performance indicators and production figures. SinterXpert offers the same functionalities for sintering, such as an integrated mix calculation model, an online mass balance or a burn-through point monitoring model. CokeXpert includes process models and advanced data analytics for thermal control, oven health status, charging and pushing coking process monitoring.

All of these are in constant transformation, in accordance with the latest technologies and new systems under development for other plants. These can also be integrated with other digital solutions, such as RulesXpert or AIXpert.

The above-advanced systems are prone to a "software as a service" (Saas) licensing policy, which can really be seen as a disruptive approach of the business model, made possible by the cloud computing technology. The software package is licensed on a subscription basis and centrally hosted within the Paul Wurth XpertCloud or on customer's premise.

Condition Monitoring and Smart Maintenance

Looking at the life cycle of assets, they do not usually suddenly fail or stop working. More precisely, they will break down gradually , over a period of weeks, months or years. During that time, components will output numerous invisible warning signals (e.g., slight changes in vibration , in functional behavior or in general operation conditions). Maintenance is often based on periodically planned inspections and tasks (preventive maintenance). However, the decision of whether an asset will enter the wear phase has traditionally relied on general estimates and averages rather than on actual statistics on its condition.

Enabled by advances in sensor and communication technologies as well as machine learning methods that are part of the IoT, data-based and dat a-driven strategies embody new innovative approaches in realizing more economical and future-oriented mai ntenance. Data can easily provide insight on the equipment behavior in order to avoid inapprop riate use and, furthermore, to identify required maintenance actions based on the insight obtained (known as condition monitoring).Afterward, present conditions of machines or plants can be continuously compared to a historical baseline or classified to defined thresholds, well-known anomalies and patterns to improve maintenance (known as condition-based and predictive maintenance, or in general so-called smart maintenance). Potential root causes of machine or plant failures can be determined and countermeasures can be taken in a timely manner before problems occur. The equipment lifetime can

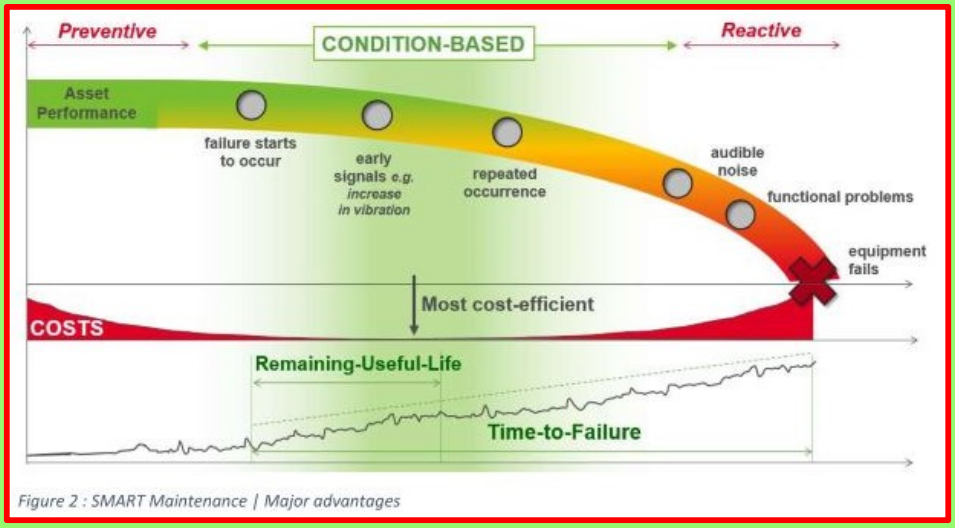


Figure 2 : SMART Maintenance | Major advantages

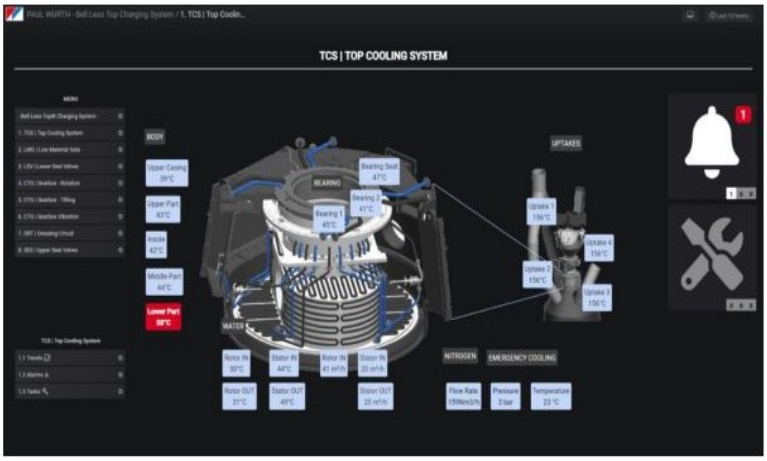


Figure 3: Smart Maintenance screen example BLT

thus be extended and determined in the long term in order to carry out maintenance work at the most cost-efficient time.

The condition monitoring and smart maintenance approach is being applied to the Bell-Less-Top, the casthouse machines, the slag granulation system, the Pulverized Coal Injection system. In order to gather all relevant signal data at the control level, the Paul Wurth Acquisition Box can be installed and provide access to the needed raw signals. Signals can be either directly accessed via the graphical user interface or can be used for pre-calculations in RulesXpert. Following the new maintenance approach, the tool can be used to both calculate general KPIs and runtime parameters, as well as to detect operating conditions changes and trigger appropriate maintenance in a timely manner.

Future perspectives

Digital twin, based on the integration of 3D model from engineering phase, along with online continuous real data acquisition, will allow new production monitoring functionalities, as well as advanced simulation of the production process.

Artificial Intelligence algorithms, including machine learning or data-driven models, also combined with process models or rules-based systems, are expected to make available new process prediction capabilities, such as hot metal temperature, as well as support operators with suitable tools for the prompt detection of anomalies, patterns and faulty behavior of their equipment .

Conclusions

Taking advantage of the concurrent application of the Industry 4.0 enabling technologies, the digital transformation of the Iron & Steel industry started and is currently driving disruptive innovations in the entire value chain.

Some real cases have been presented to show the actual benefits from some already applied digital solutions. Further ongoing developments have also been reported, aimed at suggesting the high potential impact expected from the new forthcoming innovations in the Iron & Steel sector.

Authors:

Manoranjan RAM, Associate Vice President- Paul Wurth India. He has worked for 15 years in Steel Authority of India Limited; 5 years in ArcelorMittal Group and since last 8 years working in Paul Wurth India, SMS group, heading the Sales and Marketing in India.

Carlo MORELLI, Innovation and Digital Transformation Ambassador, Industry 4.0 coordinator at Paul Wurth Italia. He has been working since long in the field of automation and process control for the iron & steel industry, as well as R&D projects supervision. Since 2005 working in Paul Wurth Italy.

Cyril DEOM, Digital Transformation Team, Project Manager, working in Paul Wurth Luxembourg, since last 10 years.

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REQUEST TO MEMBERS

As our esteemed members are aware, IIM is celebrating its Platinum Jubilee Celebrations from 24th February 2021 to 23rd February 2022. On this occasion, IIM will be bringing out a directory of its members containing contact details of all the members, their brief professional profile and photograph.

In this connection, we have sent a mail to all our members to give their contact details, professional profile and photograph. Two three reminders have also been sent in this regard to the members.

While some members have responded by giving their details, majority of the members have yet to give their contact details. All the esteemed members are again requested to give their contact details, professional profile and soft copy of photograph by 20th June 2021 positively.

Members will agree that bringing out such a directory will be helpful to them for interaction amongst themselves.

Request for cooperation of members to enable us to bring out the directory.

Please ignore this message if you have already given the required details.

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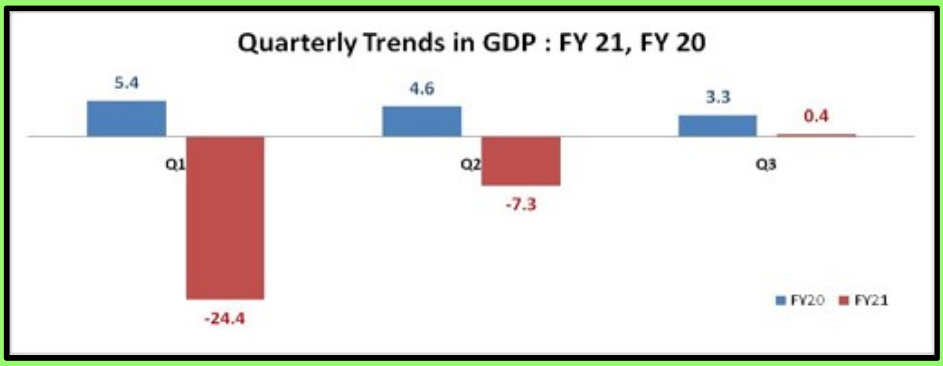
THE ANNUAL PERFORMANCE : INDIAN STEEL IN 2020-21 AT A GLANCE

Faced with the challenge to combat and control the dreaded COVID-19 pandemic, 2020-21 stood out as the year which threw up challenges of mammoth proportions before the Indian economy and the domestic steel industry in view of similar excruciating situations worldwide.

Emanating from the Wuhan industrial belt of China in late 2019, the pandemic was initially considered as largely a local phenomenon. But when it spread beyond China, then there was no stopping it. Affecting millions across continents, COVID-19 made its presence felt in all the major markets around the world in the last quarter of 2019-20. But that was only the beginning of a story that unfolded slowly throughout 2020-21 with the fast spread of the virus in different mutated strains going on to inflict deep cuts in the economic fabric of nations around the world. Further, by paralyzing all-round activities through rigorous lockdown measures along with loss of lives (for it had no immediate cure), COVID-19 led to a global crisis never encountered before. The overall weakening of the economic framework had deep and severe ramifications for the global economy, ramifications of which are bound to

bite in the days to come.

Economic Growth : Needless to say, India's economic growth reflected in the GDP, hit record lows with full year numbers estimated to decline by 8% in 2020-21 compared to a growth of 4% in 2019-20. While the initial blow of the pandemic hit first quarter (23.9% decline: revised to 24.4%) and second quarter (7.5% decline: revised to 7.3%) GDP growth rates hard, some improvement was noted in Q3 FY21 with GDP recovering to report a 0.4% growth. Such a turnaround was due to a mix of factors : a control of the spread through the lockdown measures, a large-scale testing- treatment-tracking system, adoption of COVID-appropriate behavior, pouring in of fiscal stimulus to revive the economy and last but not the least, a planned, phase- wise unlocking of the economy that saw slow revival of activities in different end- use industries. Demand recovered, supply sought to be reinstated as the different grooves and joints of the economic framework started to roll again under conditions of a new normal. This was also reflected in the quarterly trends in GFCF which as percentage of GDP moved north, from 24.5 % in Q1 to 31.8% in Q2 and 33% in Q3, thereby establishing the turnaround story.

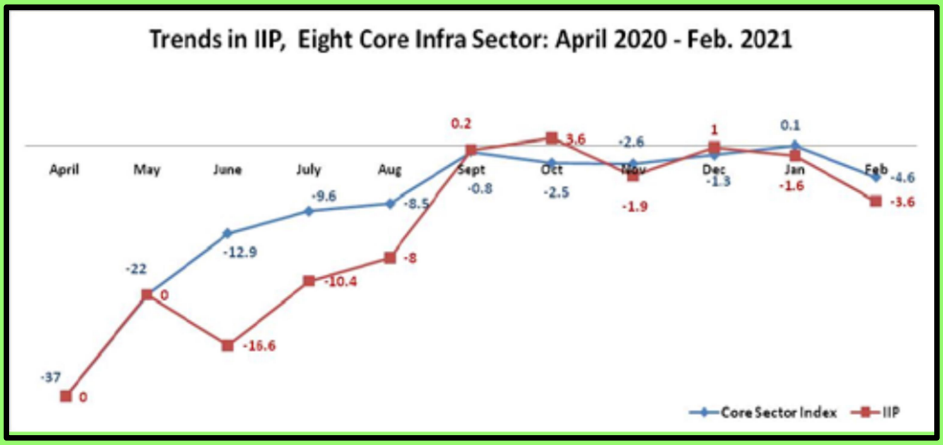


But sustenance was not to be : a new strain of the virus that emerged at the beginning of 2021 led to an even-faster spread and in turn, to a slowly worsening of the situation, in a grim reflection of history (of last quarter of FY20) repeating itself. The emergence of vaccines and adoption of a large scale vaccination program in the country on one hand and government's measures to boost the green shoots of recovery visible earlier, remained the only silver lining at the end of the year.

Sectoral Growth : End-use industries suffered the brunt of the pandemic in a severe way and the lockdown measures initiated to control the pandemic in the earlier part of 2020-21 paralysed activities totally. Demand suffered, supply got throttled, raw material supply got choked off as the entire infra-logistics came to a standstill. Prices hit rock bottom, businesses got busted and the loss of lives meant a supply crunch of crucial manpower where it could have made a difference. 2020-21 thus saw major end-use markets reel under the impact of the pandemic in a never-before way, uncertain and unsure of recovery. Even though, as explained earlier, some preliminary green shoots of recovery did emerge in Q3 supported by adroit policy measures, their sustenance saw serious challenges in the last quarter. Markets did react positively on the vaccination program (PMI numbers remained

strong) and have full faith in the same but the current data set on performance of leading end-use markets paint a dismal picture of the Indian economy. True the Union Budget 2021-22 unveiled further (and strong) measures to revive and sustain the growth momentum, the days ahead are full of challenge to stem the downslide as suggested by official numbers on sectoral growth as available so far.

Global Economy : The January 2020 edition of the World Economic Outlook brought out by the IMF had pointed out that global growth was projected to rise from an estimated 2.9% in 2019 to 3.3% in 2020 and 3.4% for 2021. Such assessments were based on then-prevailing economic developments, including both fiscal and monetary policies, in the major markets around the world. In the span of a year, situations have changed vastly and dramatically.



Country	Projected GDP Growth (%) 2020	2021
India	-8.0	11.5
China	2.3	8.1
Japan	-5.1	3.1
USA	-3.4	5.1
EU 28	-7.2	4.2
Brazil	-4.5	3.6
Russia	-3.6	3.0
Germany	-5.4	3.5
Italy	-9.2	3.0
World	-3.5	5.5

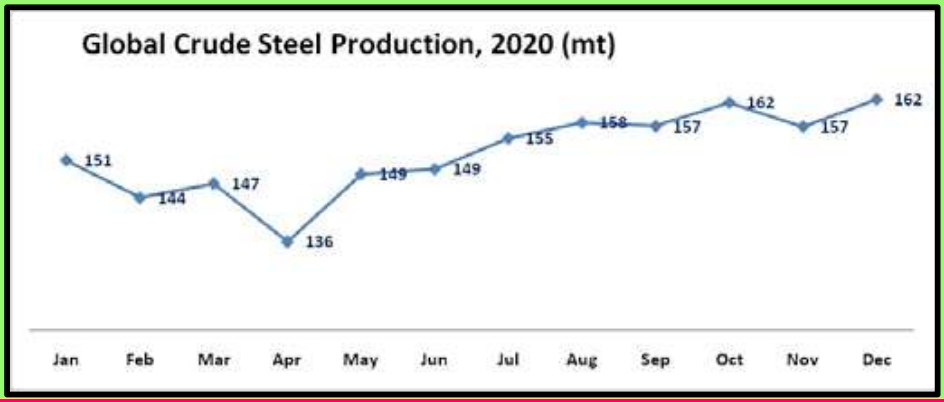
And so, the January 2021 edition of the same report now states that although recent vaccine approvals have raised hopes of a turnaround in the pandemic but the renewed waves and new variants of the virus pose concerns. But overall, the outlook is optimistic reflecting expectations of a vaccine-powered strengthening of activity later on in the year and additional policy support in a few large economies. Thus, as per the January 2021 edition of the World Economic Outlook, the global economy is projected to grow 5.5% in 2021 and 4.2% in 2022 while 2020 would see global growth decline by 3.5%.

The Report, at the same time, points out that the strength of the recovery would vary

significantly across countries, depending on access to medical interventions, effectiveness of policy support, exposure to cross-country spillovers, and structural characteristics entering the crisis. Similar positivity is also echoed by the World Bank in its January 2021 edition of its Global Economic Prospects wherein they have projected global economy to expand by 4% in 2021 (after an estimated 4.3% decline in 2020), assuming that the COVID-19 vaccine rollout becomes widespread throughout the year.

PMI Trends : Global manufacturing output bled in the first half of 2020 following the large-scale disruption caused by the outbreak of COVID-19, as captured in the J.P.Morgan Global Manufacturing PMI which slipped below the 50-mark point in February 2020 and remained stuck in that zone till June 2020. July 2020 PMI was at the same level as January 2020 but thereafter, helped by steadily improving ground conditions, global manufacturing PMI, as reported by Markit Economics, continued to record steady growth, remaining above the 50-mark point and ending December 2020 at a modest 53.8. Dampened by the first half below-50-mark level but helped by the 2nd half performance, overall 2020 global manufacturing PMI was at 49.2, marginally below the 50 mark average noted for 2019. For India, if we look at a fiscal year basis, the situation was similar, with April-July 2020 period reporting PMI below the 50-mark level but a sustained rise since August 2020 (52) and reaching 55.4 in March 2021. Annual average stands at the 50 mark point for the year FY21 as a whole. As the Markit reports point out, that though Manufacturing sector conditions in India continued to improve but more critically, March 2021 reported a slackening in business confidence with hopes of a full-fledged recovery pinned on fast curbing of COVID-19 pandemic.

Global Steel Industry : With the onset of the lockdown measures in the initial phase of spread of the pandemic, steel was declared an essential service

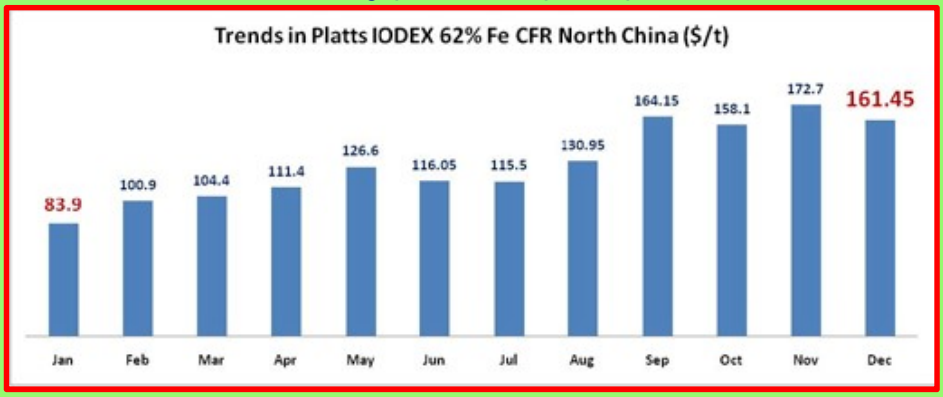


in most markets but due to the severity of the pandemic and ground conditions, steel industry globally faced the brunt as demand evaporated, production lines saw cutback/closures, infrastructure and logistics became increasingly affected due to shutdowns and which in turn, went on to impact the entire supply chain, from procurement of raw material to delivery of finished products and measures to contain the spread of the disease led to total disruption in normal working practices. However, over time, things improved, gradually with small steps taken towards unlocking of economic activities and as operating under a new normal gained steady momentum across nations. Global supply started to gain ground, fuelled by China, which had resurrected itself from the pandemic and aided by government policies, Chinese demand emerged as a motivator/driver for resumption in demand growth in other markets. Global crude steel production which lost momentum midway in the year, saw a recovery of lost grounds, ending 2020 with a marginal decline of 1% over 2019.

Similarly, the improvement in steel demand conditions worldwide is captured in the April 2021 Short Range Outlook (SRO) of the World Steel Association (worldsteel) which projected that global steel demand will grow by 5.8% in 2021 to reach 1,874 mt (after declining by 0.2% in 2020), on the assumption that the ongoing pandemic will stabilize in the second quarter and that steady progress on vaccinations will be made, allowing a gradual return to normalcy in major steel-using countries. For India, the SRO expects a significant rebound in domestic steel consumption to 19.8% in 2021 after a 13.7% decline in 2020, propelled by pent-up demand and growth- oriented government policies.

Indian Steel's Global Rankings : Unfettered by goings-on, India remained the global leader in sponge iron production, the 2nd largest producer of crude steel and the 2nd largest consumer of finished steel in 2020 as per provisional data/rankings released by worldsteel for the said year.

Price Trends : The individual markets for leading raw materials for steel were on fire in end-2020 as the new normal set in, unlocking pockets of pent-up demand that domestic supply struggled to meet. Prices of iron ore, coal, scrap, sponge iron rose across markets along with cost of transportation in a difficult market and along with a demand-supply mismatch, led global steel prices to skyrocket in last quarter of 2020. Government policies across economies sought to stabilize economic and industrial growth. India was no exception and domestic steel prices largely followed global cues. However, conditions moderated in last quarter of 2020-21 and Union Budget 2021 unveiled measures



to cool down / rationalize steel prices through a reduction in import duties and revoking anti-dumping duties.

Indian Steel Industry : 2020-21 posed challenges of mammoth proportions before the steel industry, surpassing even those sparked off by the sub-prime crisis in 2008 and the Asian financial crisis of 1997. The cumulative dampening effect of the twin shocks of slowdown-pandemic hit industry hard, for it led to the numbing and complete shutting down of the system it operates in, the economy in one hand with all its linkages and ancillary avenues and two the global market, providing the overall macro framework of working in a liberalized, de-regulated setup that the industry is so used to. Until the unlocking of the economy started happening, the domestic steel industry was already hit hard, as demand evaporated, supply lines saw cutback/closures, input supply got choked off, infrastructure and logistics became increasingly affected due to shutdowns and which in turn, went on to impact the entire supply chain, from procurement of raw material to delivery of finished products. However, in line with global markets, improvements started trickling into the system and Q3 2020-21 saw GDP numbers bounce back into growth territory. That was the indication of some resurrection of demand at the end-use level like auto, construction, manufacturing which had started to demonstrate some improvements at the monthly level. What aided such developments was, of course, the government's direct efforts through a meticulously prepared package to guide the economy through the unlock period and propel growth thereafter and secondly, the nationwide efforts put in by the healthcare system to test-track-treat affected people and thereby control the spread of the pandemic. The last quarter of the year saw a possible resurgence following a second wave of the pandemic but the year ended much before that with quite a commendable scenario, given all that industry went through.

Overall, 2020-21, going by provisional numbers released by JPC, indicate industry in a hurt-but-not-scathed mode, with the annual numbers showing that domestic finished steel production stood at 95.122 mt (down by 7.3%) and domestic consumption remained muted at 94.14 mt (down by 6%), both missing the 100 mt mark of 2019-20. India was a net exporter of total finished steel with exports (10.784 mt, up by 29.1%) hugely outpacing imports (4.752 mt, down by 29.8%) during this period. It is also observed that with share of imports in domestic consumption at 5% during 2020-21 (6.7% in 2019-20), it implies that domestic requirements were met primarily from domestic supply. Further, domestic crude steel production stood at 103.04 mt and declined by 5.6% over 2019-20. Capacity creation took a backseat and stood provisionally at 143.91 mt, reporting a utilisation level of 72% during 2020-21 as compared to 77% of 2019-20. Domestic steel prices remained stable but north-bound in view of the imbalance in local demand-supply pattern (raw material, finished goods) and influenced by global trends.

The following is a status report on the performance of Indian steel industry during 2020-21 based on provisional data published by Joint Plant Committee (JPC) in its MIS Report

March 2021 It is to be noted that total finished steel includes both non- alloy and alloy (including stainless steel) and all comparisons are made with regard to same period of last year.

Fiscal 2020-21 may have ended but the full and dreaded impact of the second wave of COVID-19 can only be gauged in latter part of the 2021 as the country would seek to find a solution and return to an altogether new normal. For steel industry, operating in a liberalised framework at home and having deep linkages with global economy, the times ahead would be of immensely arduous nature. The silver lining that would aid the growth story in the coming days would include the large-scale vaccination drive already on-way in the country, the policy prescriptions of the government to steer the economy towards growth and out of the pandemic, inherent resilience of the industry to fight odds, the optimistic outlook as reflected specially in the demand projections on India made by worldsteel in its April 2021 Short Run Outlook, among others. As per the Outlook, India's finished steel demand would grow by a significant 19.8% in 2020-21, and moderate thereafter to a growth of 5.9% in 2022-21, after a 13.7% decline in 2020-21.

Source: JPC Bulletin

INDIAN STEEL PRICES LOWEST IN THE WORLD: T V NARENDRAN, TATA STEEL

TV Narendran, MD & CEO, Tata Steel, spoke about the trend of steel prices, deleveraging guidance for FY22 and restructuring plans of the European operations among others during an exclusive interview with Zee Business Executive Editor Swati Khandelwal. *Edited Excerpts:*

Q: **Tata Steel has posted strong numbers with standalone operations reporting the highest-ever EBITDA and PAT. The trends have been positive for the last few months. Do you think that the trend will continue, especially in terms of steel prices, which is showing a good uptrend?**

A: There are a lot of things supporting the sector and it has a reason including there have been some structural changes in it. In the last 10 years, the most prominent thing was that a lot of export was coming from China and Chinese exports were impacting steel prices globally. From the last few years, we are seeing that China's export is not so much, in fact, it is importing steel and we have also exported steel to China from India. Right now, we are seeing that China is actively discouraging exports and they have stopped their export remains from May 1, 2021.

This means the Chinese steel export prices will continue to remain better. The second thing is that due to climate change carbon cost is increasing in many geographies, for instance in Europe the cost has increased, even in Japan, it has been announced that they will shut down the blast furnace production. Due to these

factors, globally we are seeing that cost covers have changed a bit and have impacted the carbon cost. The third thing is that after the COVID, many governments are investing in infrastructure.

If you will see then there are plans to invest in infrastructure in the US. In the case of India, the last budget had a lot of focus on infrastructure. There is a continuous focus on infrastructure even in China. So, the focus on infrastructure improves the steel intensity of growth. This is the third factor and due to these reasons, we expect that in the next 5-10 years the steel cycle or the metal cycle will be slightly different from the last 10 years.

Q: Do you think there is more headroom for price hikes?

A: Undoubtedly, the steel prices have gone up in the last few months but if you will have a look at the domestic prices in India then it is the lowest in the world. Because, if seen international prices then hot-rolled prices in the US is USD 1,500, in Europe it is Euros 1000 and in South India, it has reached $1000. Having an eye on all these, we can say that Indian prices are one of the lowest in the world today. But we are also seeing the demand situation and what impact wave two will have. So, we are watching and will do whatever is right. Indian exporters and Indian producers are selling most of their produce in India, only, and if there is a demand then we will prefer to sell it in India.

Q: Net Debt has improved by 28% YoY, What will be the deleveraging guidance for FY22?

A: Three years ago we said that we would reduce our debt by a minimum of $1 billion every year and we did it in the first year but were not able to do so in the second year because domestic markets were quite weak in that year. Last year, despite COVID was there, we focused on debt therefore we gave a pause to our Kalinganagar expansion for some time and paid attention to cash. As there was a slight improvement in the market, we started seeing improvement and in Q3 and Q4, we were able to deleverage much more. Therefore, we could do much more than what we have planned. In the last three years that target we had, on a consolidated basis we have done more than that. In the coming days, as we have said a minimum of $1 billion per year of deleveraging and we will do it.

Q: Auditors are still sceptical about the European operation. What is the update on the restructuring plans of the European operations?

A: In European operations also you can see that on an underline basis, if seen in the Q4, then we have reached from minus (-) 170 million Euros to plus (+) 170 million. The European spreads that are visible in the bottom line are still quite low than the spot spreads because we have a lot of long term contracts in Europe. In fact, we have more long term contracts there as compared to India and in every quarter, the tenure of some of the other long term contract is completed and we initiate a new

contract. Therefore, hopefully, in the coming quarters also, the European spreads that we have shown in our P&L will continue to grow. And European steel prices are quite strong. So, last year as well, we were cash neutral in Europe and we didn't have to take any cash support from India. It was our first goal that the European business should stand on their own and certainly this year they are standing on their own and going forward we hope that they will stand on their own. Secondly, we will continue the restructuring process and we are splitting Tata Steel Europe between the Netherlands and the UK and expect that we will get efficiency.

Source: www.zeebiz.com

Top Steel Producing Companies 2020
(Million Tonnes, Crude Steel Production)

Rank	Company	Tonnage	Rank	Company	Tonnage	Rank	Company	Tonnage
1	China Baowu Group (1)	115.29	18	IMIDRO (5) (e)	18.90	35	Shenglong Metallurgical	12.06
2	ArcelorMittal (2)	78.46	19	Benxi Steel	17.36	36	Nanjing Steel	11.58
3	HBIS Group (3)	43.76	20	Liuzhou Steel	16.91	37	MMK	11.57
4	Shagang Group	41.59	21	Jingye Steel	16.30	38	US Steel Corp	11.55
5	Nippon Steel Corp	41.58	22	NLMK	15.75	39	Sanming Steel	11.37
6	POSCO	40.58	23	Baotou Steel	15.61	40	Severstal	11.31
7	Ansteel Group	38.19	24	SAIL	14.97	41	Anyang Steel	11.20
8	Jianlong Group	36.47	25	JSW Steel	14.86	42	Donghi Special Steel	10.88
9	Shougang Group	34.00	26	Rizhao Steel	14.40	43	Tsingshan Holding	10.80
10	Shandong Steel Group	31.11	27	Sinogiant Group	14.18	44	Thyssenkrupp	10.73
11	Delong Steel Group	28.26	28	China Steel Corp	14.11	45	Metinvest Holding	10.16
12	Tata Steel Group	28.07	29	CITIC Pacific	14.09	46	Xinyu Steel	9.89
13	Valin Group	26.78	30	EVRAZ	13.63	47	Jiuquan Steel	8.75
14	JFE Steel	24.36	31	Shaanzi Steel	13.18	48	Erdemir Group	8.53
15	Nucor Corporation	22.69	32	Gerdau	13.00	49	Steel Dynamics, Inc	8.40
16	Hyundai Steel	19.81	33	Zenith Steel	12.76	50	Jinxi Steel	8.01
17	Fangda Steel	19.60	34	Techint Group	12.55			

(e) = Estimate

(1) Includes 2020 tonnage of Tiayuan Steel and Kunming steel, and tonnage of Maanshan steel and Chongqing Steel, both part of China Baowu Group from 2019

(2) Includes 60% in AMNS India (former Essar steel)

(3) Includes tonnage of Serbia Iron & Steel d.o.o. Beograd and MAKSTIL A.D. in Macedonia

(4) Incudes Nippon Steel Stainless Steel Corporation, Sanyo Special Steel, Ovako, 40% AMNS India and 31.2% USIMINAS

(5) Estimated combined tonnage of Mobarrakeh Steel, Esfahan Steel, Khuzestan Steel and NISCO

Notes on company ownership and tonnage calculations:
For worldsteel members, the data was sourced from their official tonnage declarations. For Chinese companies, the official CISA tonnage publication was used, unless especially noted. In case of more than 50% ownership, 100% of the subsidiary's tonnage is included, unless specified otherwise. In case of 30%-50% ownership, pro-rata tonnage is included. Unless otherwise specified in the declaration, less than 30% ownership is considered a minority and therefore, not included. Figures represent ownership ending 31 December 2020.

Major Steel Producing Countries 2019 & 2020
(Million Tonnes, Crude Steel Production)

Country	2020		2019	
	Rank	Tonnage	Rank	Tonnage
China	1	1064.8	1	995.4
India	2	100.3	2	111.4
Japan	3	83.2	3	99.3
United States	4	72.7	4	87.8
Russia	5	71.6	5	71.7
South Korea	6	67.1	6	71.4
Turkey	7	35.8	8	33.7
Germany	8	35.7	8	39.6
Brazil	9	31.0	9	32.6
Iran	10	29.0	10	25.6
Taiwan, China	11	21.0	12	22.0
Ukrain	12	20.6	13	20.8
Italy	13	20.4	11	23.3
Vietnam	14	19.5	15	17.5
Mexico	15	15.8	14	18.4
France	16	11.6	16	14.4
Spain	17	11.0	17	13.6
Canada	18	11.0	18	12.9
Indonesia (e)	19	9.3	21	7.8
Egypt	20	8.2	24	7.3
Poland	21	7.9	19	9.0
Saudi Arabia	22	7.8	20	8.2
Malaisia (e)	23	7.1	26	6.8
United Kingdom	24	7.1	25	7.2
Austria	25	6.8	23	7.4

Belgium	26	6.1	22	7.8
Netherland	27	6.1	27	6.7
Bangladesh	28	5.5	30	5.1
Australia	29	5.5	29	5.5
Czechia	30	4.5	33	4.4
Thailand	31	4.5	34	4.2
Sweden	32	4.4	31	4.7
Algeria (e)	33	4.0	43	2.4
Kazakhstan	34	3.9	35	4.1
South Africa	35	3.9	28	6.2
Pakistan	36	3.8	40	3.3
Argentia	37	3.7	32	4.6
Finland	38	3.5	37	3.5
Slovakia	39	3.4	36	3.9
Romania	40	2.8	38	3.4
United Arab Emirates	41	2.7	39	3.3
Belarus	42	2.5	41	2.6
Portugal	43	2.2	45	2.0
Oman (e)	44	2.0	46	2.0
Philippines (e)	45	1.9	48	1.9
Luxembourg	46	1.9	44	2.1
Hungary	47	1.5	49	1.8
Serbia	48	1.5	47	1.9
Greece	49	1.4	50	1.4
Kuwait (e)	50	1.3	53	1.3
Others		16.2		19.2
World		1877.5		1874.4

(e) = Estimate

Crude Steel Production by process, 2020

	Million tonnes	Oxygen %	Electric %	Open hearth %	Other %	Total %
Austria	6.8	90.0	10.0	-	-	100.0
Belgium(e)	6.1	68.2	31.8	-	-	100.0
Bulgaria	0.5	-	100.0	-	-	100.0
Croatia	0.0	-	100.0	-	-	100.0
Czechia	4.5	95.4	4.6	-	-	100.0
Finland(e)	3.5	68.1	31.9	-	-	100.0
France	11.6	67.5	32.5	-	-	100.0
Germany	35.7	67.7	32.3	-	-	100.0
Greece	1.4	-	100.0	-	-	100.0
Hungary	1.5	78.2	21.8	-	-	100.0
Italy	20.4	15.3	84.7	-	-	100.0
Luxembourg	1.9	-	100.0	-	-	100.0
Netherlands	6.1	100.0	-	-	-	100.0
Poland	7.9	50.1	49.9	-	-	100.0
Portugal	2.2	-	100.0	-	-	100.0
Romania(e)	2.8	73.3	26.7	-	-	100.0
Slovakia	3.4	95.8	4.2	-	-	100.0
Slovenia	0.6	-	100.0	-	-	100.0
Spain	11.0	27.5	72.5	-	-	100.0
Sweden	4.4	67.0	33.0	-	-	100.0
United Kingdom	7.1	80.9	19.1	-	-	100.0
European Union (28)	139.2	57.6	42.4	-	-	100.0
Turkey	35.8	30.8	69.2	-	-	100.0
Others	4.2	47.4	52.6	-	-	100.0
Other Europe	40.0	32.5	67.5	-	-	100.0
Russia(e)	71.6	65.9	32.1	2.0	-	100.0
Ukraine	20.6	75.6	5.5	19.0	-	100.0
Other CIS	8.0	47.7	52.3	-	-	100.0
CIS	100.2	66.5	28.2	5.3	-	100.0
Canada (e)	11.0	54.3	45.7	-	-	100.0
Mexico	16.8	17.3	82.7	-	-	100.0
United States	72.7	29.4	70.6	-	-	100.0
USMCA	100.5	30.1	69.9	-	-	100.0
Argentina	3.7	55.0	45.0	-	-	100.0
Brazil	31.0	75.2	23.3	-	1.4	100.0
Chile	1.2	69.2	30.8	-	-	100.0
Venezuela	0.0	-	100.0	-	-	100.0
Others	2.9	6.8	93.2	-	-	100.0
Central and South America	38.8	67.9	31.0	-	1.2	100.0
Egypt(e)	8.2	1.5	98.5	-	-	100.0
South Africa	3.9	52.6	47.4	-	-	100.0
Other Africa(e)	5.3	9.4	90.5	-	0.1	100.0
Africa	17.4	15.3	84.7	-	0.0	100.0
Iran	29.0	8.7	91.3	-	-	100.0
Saudi Arabia	7.8	-	100.0	-	-	100.0
Other Middle East(e)	8.6	-	100.0	-	-	100.0
Middle East	45.4	5.6	94.4	-	-	100.0
China(e)	1064.8	90.8	9.2	-	-	100.0
India	100.3	44.5	55.5	-	-	100.0
Japan	83.2	74.6	25.4	-	-	100.0
South Korea	67.1	69.0	31.0	-	-	100.0
Taiwan, China	21.0	60.6	39.4	-	-	100.0
Other Asia(e)	52.4	28.2	66.0	-	5.7	100.0
Asia	1388.7	82.6	17.2	-	0.2	100.0
Australia	5.5	74.0	26.0	-	-	100.0
New Zealand	0.6	100.0	-	-	-	100.0
Total of above countries	**1876.3**	**73.2**	**26.3**	**0.3**	**0.2**	**100.0**

The countries in this table accounted for approximately 99.9% of world crude steel production in 2019
(e) = estimate

STEEL SECTOR LOOKS BEYOND COKING COAL

Hydrogen may emerge a viable alternative

> **"The cost of steel production through Hydrogen based direct reduction route will become competitive to BF-BOF route if Hydrogen can be produced at $2.5-$3.5/kg." Souvik Bhattacharjya, Associate Director, Centre for Resource Efficiency and Governance, TERI**

The steelmaking industry is heavily dependent on coal based routes (directly and indirectly). CO_2 emission from the steel industry projected to jump to 840 million tons (mt) over the next 3 decades from 242 mt now as India's demand for steel quadruples to 490 mt. "Going forward, low emission primary steelmaking technologies will be required to ensure the steel sector can reduce emissions to meet carbon mitigation goals of the country," says Souvik Bhattacharjya, Associate Director, Centre for Resource Efficiency and Governance, TERI.

As the steel demand is set to increase, new primary steel making capacities are required alongside ambitious steel scrap policies for the secondary steelmaking industry to contribute.

Substantial R&D is currently being undertaken in recent years, cussing on carbon reduction technology which aims to save more than 80 percent of the CO_2 emissions versus conventional technologies. Hydrogen has been actively pursued as the clean fuel for the reduction process in iron making. "The cost of steel production through hydrogen based direct reduction route will become competitive to BF-BOF route if hydrogen can be produced at $2.5-$3.5/kg," he said.

The projections for cost of hydrogen production from renewable route i.e. Green hydrogen will become less than Grey hydrogen (from fossil route) after 2030. The Green hydrogen cost will be $2.3/kg by 2030 making the business and environmental case for H_2 based steel production, the TERI official said. "Demand for hydrogen will rise sharply from 2030, speeding up after 2040 as, as the costs start to make sense based on locations," he said.

Demand for green hydrogen could rise to around 9 mt by 2050 in a low carbon scenario, supported by strong government policies. Smaller-scale demonstration projects will be needed during the 2020s to shore up the technical case for H_2-DR in the Indian context.

"The suite of policy support would be required to accelerate transition. The steel companies need to tap the National hydrogen Mission in scaling up hydrogen production. Choice of the technologies for H_2 production: short, medium and long term," he said.

Speaking at the 3rd Global Renewable Energy Investment Meeting and Expo in November, Prime Minister Narendra Modi had highlighted the importance of niche renewable

technologies like hydrogen in the renewable energy mix. Pursuant to that, launch of the National hydrogen Energy Mission was announced in the Budget 2021-22.

The National hydrogen Energy Mission aims to lay down the Government of India's vision, intent and direction for hydrogen energy, strategies and approaches for realizing the vision.

"There is need for transition towards lower energy and zero carbon as per COP-21 and develop world class products and reduce imports. Investments in R&D activity and innovation could help the steel industry to lower its future capital requirements and operating costs, while also increasing yields and reducing resource and energy use. These investments would ultimately help the industry become more efficient and economically viable," Dr Mukesh Kumar, Director, Steel Research and Technology Mission of India said while addressing the recently held Indian Steel Markets Conference 2021 organised by mjunction services. India's steel demand is expected to grow to 230 mt by 2030-31 and the country needs production capacity of 300 mt.

Around 400 mt of iron ore, 160 mt of coking coal, 90 mt of limestone and 125 mt of non-coking coal would be required every year to produce that quantity.

ArcelorMittal's low-carbon steel

Air Liquide SA and ArcelorMittal have recently signed a MoU to produce low-carbon steel in Dunkirk by supplying carbon capture technology and low-carbon hydrogen to cut yearly CO_2 emissions at its facility by 2.85 mt by 2030.

"There is need for transition towards lower energy and zero carbon as per COP-21 and develop world class products and reduce imports." Dr Mukesh Kumar, Director, Steel Research and Technology Mission of India

"The two companies are joining forces to transform the steel production process through the development of innovative solutions involving low-carbon hydrogen and CO_2 capture technologies," ArcelorMittal said. At its Dunkirk site, ArcelorMittal would be combining two steel production technologies –Direct Reduced Iron unit, and submerged arc furnace.

As a low-carbon technology, the DRI and submerged arc furnace unit will enable the production of steel with lower CO_2 emissions. This initiative was the subject of a preliminary study announced by ArcelorMittal last October.

It comes in addition to the initiatives already implemented by ArcelorMittal on its Dunkirk site to lower its CO_2 emissions. Air Liquide will support this strategic initiative through the massive supply of low-carbon hydrogen and the implementation of CO_2 capture technologies in Dunkirk, one of Air Liquide's historical industrial basins in France.

The Air Liquide group has developed expertise both for hydrogen all along the value chain, from production and storage to distribution, as well as CO_2 capture technologies. This partnership between Air Liquide and ArcelorMittal is a first step towards the creation of an ecosystem at the forefront of low-carbon hydrogen and CO_2 capture solutions that will be a source of competitiveness and attractiveness for various players in the Dunkirk industrial and port basin.

"This project represents a major technological breakthrough and confirms ArcelorMittal's willingness to profoundly and sustainably transform our production technologies, in line with our objectives to reduce our CO_2 emissions by 30 percent by 2030 and achieve carbon neutrality by 2050. We count on the strong support of the French and European authorities in order to decarbonize the steel industry and are hopeful that this project will receive the support it needs to deliver large-scale CO_2 emissions savings.

The partnership with Air Liquide will enable us to further accelerate the decarbonization of our steel production and contribute to the creation of a low carbon industrial and port basin," Geert van Poelvoorde, CEO of ArcelorMittal Europe, said. Air Liquide and ArcelorMittal have jointly applied for large projects funding under the Important Project of Common European Interest scheme for hydrogen. Funding from European or French schemes supporting decarbonization is key to the implementation of the project, the company said.

Tata Steel initiative

Tata Steel has established Energy Efficiency and Carbon Reduction programmes at all its steel plants in the Netherlands, the UK, and India to pursue short-term energy efficiency initiatives and to work on long-term decarbonisation initiatives. The company is collaborating with peers, industry associations and other relevant stakeholders on a number of initiatives to debottleneck the challenges for an effective and speedy climate response.

Study approves thyssenkrupp's coal-free steel making process

Commissioned by thyssenkrupp Steel, the team of Prof. Bernd Friedrich, Director of the renowned Institut IME Metallurgische Prozesstechnik und Metallrecycling of RWTH Aachen University (IME) has analyzed the technical concept of Germany's largest steel producer to integrate the direct reduction process into the existing steel mill with a novel melting unit.

The study is focused on validating the furnace technology (melting unit) as an intelligent approach to prepare the direct reduced iron for further processing in the existing steel mill. The scientists have come to the clear conclusion that the concept pursued by the Duisburg-based steel producer is technologically feasible, scalable and innovative, the company said recently.

"Technologically, we are ready to go. We can make our Duisburg steel site climate-neutral by changing the production chains very specifically and only where CO_2 emissions arise: by replacing the blast furnaces. The downstream value chain and the established processes associated with it remain in place. That's what makes the concept so attractive: we replace the coal, but we don't replace the steel mill and all downstream units," Dr. Arnd Köfler, CTO of thyssenkrupp Steel said.

Source: Coal Insights

URGENT NEED FOR AT LEAST 5% REMISSION RATE FOR ALUMINIUM SECTOR: AAI

The Aluminium Association of India (AAI) recently expressed urgent need for at least 5 per cent remission rate for the sector under the tax refund scheme RoDTEP to ensure global competitiveness.

The Aluminium Association of India (AAI) urgent need for at least 5 per cent remission rate for the sector under the tax refund scheme RoDTEP to ensure global competitiveness. In a statement, the AAI said that it has also requested the government for a separate budget allocation for the aluminium industry, being a strategic sector, to realise the immense potential to double aluminium exports over the next two-three years.

In a letter to the government, the AAI expressed "the urgent need for at least 5% remission rate for the aluminium sector under RoDTEP Scheme to ensure its global competitiveness". Highlighting the urgency of the matter, the AAI said that the government needs to notify the actual remission rates as per actual sectoral data submitted to the RoDTEP Committee. The inordinate delay in notifying the sector-wise remission rates is creating a precarious situation and a high level of uncertainty for the Indian exporters.

"It is adversely impacting exports due to ambiguity w.r.t. pricing of exports goods and absence of any clarity on the mechanism of duty remission/ drawback rates for exports," it said. The situation for exporters further aggravates with the withdrawal of Merchandise Export Incentive Scheme, as to date the exporters are unable to avail the MEIS benefit for exports already made during FY'20 and FY'21 (Apr-Dec) due to the blocking of the online MEIS module for applying claims.

"The Commerce Ministry/DGFT are yet to notify the rates due to government's current situation pertaining to budgetary constraints," it said. The AAI further said that in the Union Budget 2021-22 only Rs 13,000 crore for RoDTEP scheme were allocated against Rs 50,000 crore announced by Finance Minister Nirmala Sitharaman in September 2019. This allocation is just one-third of the Rs 39,097 crore allocated in FY20 for MEIS, the AAI claimed. Earlier, the government had approved the scheme for Remission of Duties and Taxes on Exported Products for reimbursement of taxes and duties to exporters, with a view to give a boost to the country's dwindling outbound shipments.

Source: Business standard

BIGGEST LITHIUM MINER GEARS UP TO TAP MAJOR LODE FROM OLD CARS

The recycling initiative is already underway at the Charlotte, North Carolina-based company, with a joint development agreement in place with a customer and the company looking at making investments with original equipment manufacturers.

The world's biggest lithium miner wants to extract more of the battery metal from old cars as demand surges and aging electric vehicles are traded in.

Albemarle Corp. is making investments and partnering with automotive equipment manufacturers on the recycling effort, which it calls "critical" to its future growth. The miner is part of a growing list of companies looking to grab a share of the market for recovered battery materials as lithium supplies show signs of tightening. Thirteen years after the Tesla Roadster made its debut, a first generation of EVs is nearing retirement, making more battery packs available. Once that happens, recycling is going to "take off," said Christopher Perrella of Bloomberg Intelligence. "It is very early stages, it's something we're investing in now," Eric Norris, Albemarle's head of lithium, said in an interview. "It's a pretty comprehensive effort and a critical one for our growth going forward. We view this as a future resource that we would like to play prominently in."

The recycling initiative is already underway at the Charlotte, North Carolina-based company, with a joint development agreement in place with a customer and the company looking at making investments with original equipment manufacturers, Norris said. Albermarle will help OEMs recycle from end-of-life batteries using its proprietary technology, he said.

Lithium prices have rebounded as the market is recovering from a glut

The commercial activity will be in the second half of the decade, when regulatory mandates stipulate those batteries have to be recycled, Norris said. BloombergNEF estimates 62,000 metric tons of used EV and stationary storage packs reached their end of life in 2020. This will grow to more than 4 million tons by 2035, according to BNEF. In 2030, the world's drivers and fleets are expected to buy almost 26 million electric vehicles a year, and junkyards will take in almost 1.7 million metric tons in scrapped batteries, BNEF said. Cumulative passenger, e-bus and commercial EV sales totaled 7.7 million at the end of 2019, according to the analysts. Albemarle's push may also help burnish its environmental credentials.

Recycling is viewed by environmental groups as one important way to reduce new mining projects. In the future, end-of-life EV lithium-ion batteries will be the major source for secondary metals for cobalt, lithium and nickel, according to an April report commissioned by Earthworks and published by the Institute for Sustainable Futures, University of Technology Sydney.

Recycling is part of the sustainable aspect of electric vehicles, Kent Masters, Albemarle's

Chief Executive Officer, said in the interview. At the end of life of EV batteries, "we have the skill set to help recycle that and to close the loop around EVs and lithium-ion batteries," he said. The recycle processing will be done on a local basis in Europe and North America, according to Masters. Canadian battery-recycling startup Li-Cycle Corp. said recently that it was awarded a multi-year contract with Ultium Cells LLC, a joint venture between General Motors and LG Energy Solution, to recycle critical materials from scrap and manufacturing excess generated by battery cell manufacturing.

Source: www.auto.economictimes.indiatimes.com

OPINION: ROADBLOCKS FOR INDIA'S ELECTRIC VEHICLES MARKET

This article highlights two major hurdles that are giving Indian consumers cold feet and posing a roadblock for the wider adoption of EVs.

The Indian automotive industry is witnessing a paradigm shift courtesy the introduction of e-mobility. Electric vehicles (EVs) offer lower running costs, have cheaper maintenance requirements and are better for the environment than their conventional counterparts – the Internal Combustion Engines (ICEs). Also, the demand incentives provided by the government under Faster Adoption and Manufacturing of (Hybrid) and Electric Vehicles (FAME)-II Scheme along with the various tax exemptions under state EV policies make EVs an attractive option. But is that enough reason for the average Indian consumer to abandon ICEs and make the shift to Battery Operated Vehicles (BOVs)? We think not. In this article, we highlight two major hurdles that are giving Indian consumers cold feet and posing a roadblock to the wider adoption of EVs.

High Upfront Costs

India became the fourth largest global market for automobiles by displacing Germany, in 2019. The domestic Indian auto market is dominated by budget-segment two wheeler and four wheeler passenger vehicles. This demand is largely associated with middle income Indian households who are cautious about the "price tag" of an automobile while making a new purchase. One of the obstacles in the adoption of EVs is this high cost. EVs are no doubt more expensive than ICEs and have significantly higher upfront costs. The price difference between an EV and a comparable ICE vehicle can be approximately three to four times, which makes EVs a less preferred option by the average Indian consumer. The higher upfront cost of EVs can be directly attributed to high development and battery costs, weak raw material supply chain, and low economies of scale. - High development costs: ICEs have been in existence for around a century and a half, and as a result, a lot of time and money has been invested in developing technologies that refine, update and optimise these ICE systems. EVs on the other hand, have only recently become popular and require more investment in research and development at this stage in their life cycle, which indirectly adds to their manufacturing cost.

However, with improvements in technology, components like electric motors, which account for as much as one tenth of an EV car's cost, will get cheaper in the next couple of years. We also believe that the government should shift its focus from subsidising the cost of the end product (for consumers) to subsiding technology development by providing access to R&D labs and facilities, which would benefit all manufacturers in the EV space. - High battery cost: The cost of a battery inside an EV currently accounts for 40–50 per cent of the total manufacturing cost of an EV. An electric vehicle's battery pack, comprised of lithium-ion cells, uses metals such as lithium, cobalt, nickel and manganese. These raw materials are less readily available, and often confined to certain geographical locations, which makes them expensive.

According to CleanTechnica, India imported $1.23 billion worth of lithium-ion batteries in 2018-19. While sourcing these materials is essential, the industry in India could strive to mitigate the high import costs of the remainder of the battery pack, through several measures, including promoting domestic lithium-ion battery cell production plants. Currently, the battery energy storage industry is at a very nascent stage in India, but with the proposed government plans of providing $4.6 billion in incentives for setting up advanced battery manufacturing facilities, battery costs could significantly fall in the coming months and years.

Low economies of scale: Economies of scale are the cost advantages that enterprises obtain due to their scale of operation- i.e. usually, the larger the operation, the higher the savings, on certain fixed costs, for example. As of today, most original equipment manufacturers (OEMs) of EVs do not make a profit on selling EVs. This is largely due to high production and R&D costs, supply constraints for raw materials, and low production capacity. However, with increasing investments in R&D and production capacity, and the number of EV sales ramping up, costs are coming down so this promises a positive shift in the economies of scale for the industry as a whole.

Shortage of Charging Infrastructure

In the context of EVs, charging infrastructure refers to the network of EV charging stations and battery swap stations that is necessary to reliably recharge EVs, on the go. And the lack of an extensive charging infrastructure is an obstacle to the adoption of EVs in India. This challenge is twofold: making sure the system can supply enough energy to quickly charge a great number of EVs and making sure the distribution system is in place to charge the right cars at the right time. Under the current scheme, the Ministry of Power regulates the setting up of charging infrastructure for EVs in India. According to the ministry, the setting up of public charging stations (PCS) is a de-licensed activity, and each PCS is required to have a minimum of three fast chargers: a CCS, a CHAdeMo and a Type-2 AC. This mandatory installation of all charger models requires a heavy capital expenditure of up to INR 20-30 lakh.

This acts as a further deterrent for private investors as they are discouraged from investing in a nascent, unproven and capital intensive industry. As a result, we have learned that the government may have to do most of the heavy-lifting with regards to the establishment of a

framework for EV charging infrastructure across the country. Further, a lack of adequate charging infrastructure directly results in "range anxiety" among prospective EV consumers. The phrase refers to the fear that an EV's charge will not last until the vehicle has reached its destination. Indian consumers are known to be sceptical of the claims made by EV manufacturers on range. Recently, Tata Nexon, an EV manufactured by Tata Motors was delisted from Delhi government's subsidy scheme under the Delhi EV Policy 2020, on account of consumer complaints about the car not meeting the company's minimum specified range of 312 kilometres. The primary strategies to alleviate range anxiety include the deployment of an extensive network of charging infrastructure, the development of higher battery capacity – but at a cost-effective price, and the development of time-saving battery swapping technologies.

Recently, the government has announced that it will set up 69,000 EV charging stations across India, and has further invited proposals for the development of EV charging infrastructure along the country's major highways. It intends to support the development of EV charging infrastructure by extending capital grants under FAME-II, for these crucial "ecosystem development" costs. The two measures together will significantly help in addressing the issue of scarcity of charging infrastructure consequently boosting consumer confidence in EVs.

Conclusion

Interest in the adoption of EVs is growing steadily amongst consumers, but the actual adoption seems to be moving along quite slowly. We think that upfront costs and lack of confidence in EVs will have to be brought down by a combination of measures and programmes, and by a range of stake-holders – the industry must promote domestic manufacturing of EV batteries and work with the government to ensure this is implemented where possible, the government must step up and take responsibility for laying out a web of charging infrastructure across the country, and consumer participation will be needed in order to boost the adoption of EVs on a widespread scale. Further, with EV giants like Tesla and Triton announcing their entry in India, it will be exciting to see how the Indian EV market will react. The competition in the Indian EV space has just begun and we wonder whether the existing EV players of the likes of Tata Motors, Mahindra & Mahindra, and Morrison Garages are ready to bring on their A game. There are some interesting times ahead for the Indian EV market.

Source: www. auto.economictimes.indiatimes.com

BETTERCOAL

Bettercoal is a not-for-profit organization that works towards a global responsible coal supply chain. Its purpose is to promote the continuous improvement in the mining and sourcing of coal for the benefit of all people impacted by the industry, workers and coal mining communities.

Bettercoal Code, launched in 2013, is an internationally recognised standard for assessing, assuring and sustaining stringent ethical, environmental and social performance in the coal mining supply chain.

Bettercoal Suppliers are coal mining companies that have committed to improving their Environmental, Social, and Governance (ESG) performance by assessing their operations against the principles of the ***Bettercoal Code***.

Bettercoal Supplier undergoes an independent Assessment to see how closely they meet the requirements of *Bettercoal Code*, and commits to improving their operations in line with the custom built Continuous Improvement Plan for that supplier based on the findings of the Assessment.

Bettercoal Values

Continuous Improvement

Bettercoal promotes the continuous improvement of coal mining by assessing its Suppliers and of coal sourcing by working with its Members to improve their sustainability practices. Their Approved Lead Assessors engage with *Bettercoal Suppliers* from the outset of the Supplier Assessment Process and impart their knowledge of best practice throughout the entire process.

Transparency

Bettercoal commits to high levels of transparency by reporting on Members' obligations and performance, sharing the high-level outcomes of their Supplier Assessments and publishing all the relevant documentation on the *Bettercoal* website.

Stakeholder Engagement

Bettercoal engages with a wide variety of stakeholders through their Technical & Advisory Committee (TAC), actively participating in industry initiatives, in-country workshops, meetings and sector related events. Their Complaints Mechanism is used as a tool for constructive feedback and exchange of information.

Risk-Based Approach

Bettercoal follows a risk-based approach in its assurance to increase the efficiency of the Supplier Assessment Process and provides pertinent information to *Bettercoal* Members on responsible mining practices, while reducing the assurance burden for mining companies.

Bettercoal Governance

The *Bettercoal* Board of Directors is the key governing body whilst the Secretariat manages the day-to-day operations with the support of the Members Working Group and the Technical & Advisory Committee

Board of Directors

The *Bettercoal* Board of Directors provides strategic oversight and works closely with the Secretariat to deliver *Bettercoal's* long-term aspirations.

Secretariat

The *Bettercoal* Secretariat carries out daily management of *Bettercoal* operations and focus on the implementation of the *Bettercoal Code*, the Supplier Assessment Process and Assurance System Review, *Bettercoal* Members' Implementation and Reporting Obligations, communications and engaging with stakeholders.

The Technical & Advisory Committee (TAC)

TAC is a multi-stakeholder committee composed of members from civil society, *Bettercoal* Suppliers and individual representatives from *Bettercoal* Member companies. The TAC supports and advances *Bettercoal's* purpose and values by reviewing, developing and ensuring the quality of the standards, assurance processes, impact assessment and reporting. In the area of standards development and review, the TAC supports the *Bettercoal* Board by providing expert judgement, analysis and peer review of both *Bettercoal* standards and stakeholder comments on those standards.

Members' Working Group

The Members' Working Group leads the implementation of *Bettercoal* Member commitments and any other matters related to Regular Members.

Bettercoal is financed exclusively through the contributions of Members and Associate Members who pay an annual fee for the running of the Secretariat and the entirety of costs linked to the *Bettercoal* Assessments.

Bettercoal Assurance System

Towards a global responsible supply chain, *Bettercoal* independently assesses the performance of coal mining operations against the ten principles of the *Bettercoal Code* through the Supplier Assessment Process.

Bettercoal Code has been formed by ten principles divided in four categories:

1. **General implementation Expectations**
{Legal Compliance, Policies and System}

Principle 1. Companies shall comply with the law of the land and accepted international ethical, social, and environmental standards.

Principle 2. Adopt necessary operational multiple policies, which cover the ethical, Human Rights, social, and environmental performance expectation areas of the *Bettercoal code* collectively, integrating sustainability performance throughout the operational life cycle.

1. **Business Ethics**
{Disclosure, Bribery and Facilitation Payments}

Principle 3. Companies shall commit to ethical, social, and environmental performance disclosure and transparency.

Principle 4. Companies shall work against corruption in all its forms, including extortion and bribery, and prohibit bribery in any direct or indirect form.

2. **Human Rights and Social Performance**
{Human Rights, Workers' Rights and Community Engagement}

Principle 5. Companies shall respect and promote Human Rights understood at a minimum as those in the International Bill of Human Rights and international humanitarian law.

Principle 6. Companies shall respect and recognize the rights of Workers, in particular the rights included in the International Labour Organization's (ILO) Declaration or Fundamental Principles and Rights at Work, as they derive from
the ILO's eight fundamental conventions.

Principle 7. Companies shall contribute to the long term social, cultural, environmental, economic, and institutional development of communities in which they operate.

3. **Environment**
{Environment, Pollution Prevention and Biodiversity}

Principle 8. Companies shall implement practices that promote the Sustainable and efficient use of Natural Resources in their operations.

Principle 9. Companies shall commit to pollution prevention in their operations by avoidance, abatement, and emission controls and Rehabilitation of polluted sites.

Principle 10. Companies shall integrate practices that protect and support Biodiversity and

Ecosystem Services impacted by their operations, throughout the life cycle of the mine.

Independent Assessors assess the performance of coal mining producers against the principles of the ***Bettercoal Code***. Coal producers who commit to continuous improvement by signing the Letter of Commitment become *Bettercoal* Suppliers.

Each *Bettercoal* Supplier undergoes an independent Assessment to see how closely they meet the requirements of the international best practice code and commits to improving their operations in line with the custom-built Continuous Improvement Plan (CIP) for that supplier based on the findings of the Assessment. *Bettercoal* does not provide a certification of performance but instead drives a model of continuous improvement. Every CIP is followed up and updated quarterly by the assessors.