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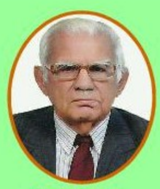

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Chapter's Activities

- ❖ Our Chapter's accounts for 2021-22 were got audited and sent to Head Office in June 2022
- ❖ Notice of AGM was sent to all the IIM DC members on 11.6.2022 inviting them for the AGM held on 2.7.2022
- ❖ Our Chapter is organising an International Conference on **Resource Efficiency and Circular Economy in Mineral & Metal Sectors** to be held at New Delhi from 25th to 27th August 2022.

  In this connection our chapter is taking all preparatory actions. These include:

  - Inviting papers for the Conference
  - Sponsorship request to various Organisations
  - Participation in the Conference
  - Advertisement support for the Conference
  - Follow-up with the concerned agencies on the above activities

RSP Plans Double Expansion as Land Hurdles Remains to be Solved

Rourkela Steel Plant (RSP) of SAIL plans expansion to more than double its production capacity. However, the proposal that envisages capital expenditure of above Rs 30,000 crore to augment its hot metal production capacity from the present 4.5 MTPA to 9.3MTPA is also dependent on early resolution to land hurdles. With the Steel Ministry's vision of augmenting country's crude steel production capacity to 300 MTPA by 2030, the SAIL is devising strategy to further scale up production capacities of its integrated steel plants including RSP. While RSP's economic and technical performances are very high to grab the expansion opportunity, it is worried about land issues as it needs around 2,000 acres of contiguous land parcels beyond its existing boundary. The land parcels acquired decades ago are under encroachment and not in physical possession of RSP. In the financial report of SAIL for 2021-22, the public sector steel major has reported an all-time high net or Profit After Tax (PAT) of Rs 12,015 crore. Incidentally, RSP's net profit contribution was also an all-time high of about Rs 4,760 crore. RSP is the preferential choice of SAIL due to its track record of timely completion of the last modernization and expansion projects between 2008 and 2013 with expenditure of about Rs 14,000 crore. The expansion saw RSP's capacity rise to 4.5 MTPA plant from 2 MTPA. RSP is seriously pursuing the land issue with the Sundargarh district administration for the proposed expansion. About 6,000 families would have to be evicted from 55 slums on RSP land and the administration was planning their rehabilitation with affordable housing scheme on PPP mode for which RSP would provide land. While some of the slums are reportedly located within RSP boundary, it would need about 2,000 acres more towards Barkani, Deogon and Jharbahal.

Source: https://www.newindianexpress.com/states/odisha/

Major Indian Steel Companies : Financial Performance

Year end	Net sales	PBIDT	PAT	Total debt
Tata Steel				
FY19	154,692	30,819	10,218	100,803
FY20	146,106	14,908	1,557	116,328
FY21	154,719	30,684	7,490	88,501
FY22	242,327	64,790	40,154	75,561
SAIL				
FY19	66,974	10,090	2,349	45,170
FY20	61,664	10,544	2,121	54,127
FY21	69,114	14,126	4,148	37,677
FY22	103,477	22,265	12,243	13,678
JSW Steel				
FY19	82,499	19,126	7,639	47,376
FY20	71,116	11,524	4,030	61,399
FY21	78,059	20,651	7,911	62,366
FY22	143,829	40,714	21,187	72,237
Jindal Steel				
FY19	39,372	6,943	-1,645	39,559
FY20	30,560	6,906	-109	36,824
FY21	34,579	11,245	3,634	29,310
FY22	51,166	13,675	5,753	13,502

Rs. In Crores

Source: Business Standard, 01 June 2022

Tata Steel Jamshedpur Plant Earns Recognition from World Economic Forum

Tata Steel's Jamshedpur Plant has been recognised as the World Economic Forum's *Advanced 4th Industrial Revolution Lighthouse*. With this new milestone, Tata Steel is one of the few enterprises with three manufacturing sites in the Global Lighthouse network, with Kalinganagar Plant (India) and IJmuiden (the Netherlands) being the other two sites.

This recognition is a testimony to the effectiveness of the organisation's investments in state-of-the-art equipment and leadership in the use of advanced technology and analytics to drive financial and operational impact, making Tata Steel plants among the most advanced steel plants globally.

The Global Lighthouse Network is a community of production sites and other facilities that are world leaders in the adoption and integration of the cutting-edge technologies of the Fourth Industrial Revolution (4IR). Lighthouses apply 4IR technologies such as artificial intelligence, 3D printing, and big data analytics to maximize efficiency and competitiveness at scale, transform business models and drive economic growth, while augmenting the workforce, protecting the environment, and contributing to a learning journey for all-sized manufacturers across all geographies and industries. The Global Lighthouse Network is a World Economic Forum initiative in collaboration with McKinsey & Company, and the factories are chosen by an independent panel. Tata Steel Jamshedpur's journey from being Asia's first integrated steel plant to be set up in 1907 to receiving this recognition is a testament to the Company's continuous improvement culture, its ability to embrace change and constantly be in sync with technological progress and focus on employee capability building.

During the Covid-19 pandemic, Tata Steel leveraged its past investments in 4th Industrial Revolution technologies to ensure Covid appropriate behaviour in operational areas and business continuity during lockdowns while continuing to adopt new ways of working. Tata Steel has been on a multi-year digital-enabled business transformation journey intending to be the leader in digital steel making by 2025 through the adoption of digital technologies. In the process, the Company intends to generate substantial EBIDTA improvement, and enhance its digital maturity and stakeholder experience while evolving its work practices to be more agile, insightful, and intelligent as an organisation.

Source: https://avenuemail.in/tata-steel-jamshedpur-plant-earns-recognition-from-world-economic-forum News Desk - Friday, 27 May 2022

JSPL to Install Rail Wheels Manufacturing Plant in Chhattisgarh

Jindal Steel & Power Limited (JSPL) plans to install India's first Rail Wheelset manufacturing plant at its Raigarh facility in Chhattisgarh. JSPL has collaborated with Hungary-based GIFLO Steel for this project. The two firms signed an MoU for the project at 'India Hungary Business Forum' organised by the Embassy of Hungary along with FICCI in the national capital on 27th May 2022. The plant will have an initial capacity of 25,000 Wheelsets per year. Jindal Steel will also install a Rail Forging Unit for Asymmetric Rails which are used in Rail track switches, especially for high-speed train tracks. Rail Wheelset manufacturing plant will help Indian Railways to speed up the modernisation of its Rail infrastructure by making available world-class rail wheels to realise the vision of Gati Shakti by the Government of India. Having its competence and understanding of the nuances of rail rolling, JSPL is working to meet country's demand for various grades of Rails while maintaining international quality and safety standards. JSPL's Rail Mill in Raigarh has been supplying superior grades of rails to various Metro and Indian Railway projects under execution. JSPL is the only producer of Head Hardened Rail grades 1080 HH and 1175 HT for a heavy axle load of more than 25 Ton and high-speed application in the country. JSPL also produces Rails in grades R 260 and 880 for 60E1, ZU 1-60 & 60E1A1 profiles. JSPL has also supplied R350 HT Grade Rails for its overseas customers.

Source : https://infra.economictimes.indiatimes.com/news/railways/jindal-steel-to-install-rail-wheels-manufacturing-plant-in-chhattisgarh

Kobe Steels to Launch Japan's First Low CO_2 Blast Furnace Steel

Kobe Steel is launching "Kobenable Steel" and aims to become Japan's first provider of low CO_2 blast furnace steel products with significantly reduced CO_2 emissions during the blast furnace ironmaking process. The Company plans to start selling the new products this fiscal year.

Kobenable Steel is based on the KOBELCO Group's CO_2 Reduction Solution for Blast Furnace Ironmaking. It utilizes a technology that can significantly reduce CO_2 emissions from the blast furnace, which was demonstrated by charging into the blast furnace at the Company's production site Kakogawa Works, a large amount of HBI produced by the MIDREX® Process.

Kobe Steel plans to launch *Kobenable Steel* (low CO_2 blast furnace steel) in two product categories as shown below.

Product Categories of Kobenable Steel (Low CO_2 Blast Furnace Steel)

Product name	Reduction Rate of CO_2 emissions per ton compared with conventional products
Kobenable Premier	100%
Kobenable Half	50%

Kobenable Steel, manufactured in the same process as the conventional blast furnace method, has the following two features.

- ***Available for all types of the Company's steel products***

  Kobenable Steel is available for all types of steel products (steel sheet, steel plate, wire rod and bar products) manufactured at Kakogawa Works and the Kobe Wire Rod & Bar Plant.

- ***Maintaining the same level of high quality as conventional products***

  Customers can continue to use blast furnace steel products that require high quality, such as special steel wire rods and ultra-high-tensile strength steel, which are the Company's strengths.

For commercialization, reduction rates of CO_2 emissions are calculated using the mass balance methodology in which CO_2 reduction effects are allocated to specific steel products, in accordance with ISO 20915. At the time of the sale of the products, Kobe Steel will provide the customer with a third-party certificate and a *low-CO_2 steel product certificate* issued by the Company.

The mass balance methodology is a method to allocate specific characteristics to a certain portion of products according to the input amounts of raw materials with the characteristics when there is a mix of raw materials with and with no such characteristics (e.g., low CO_2) in the manufacturing process. In the ironmaking process, it becomes possible to reduce the amount of coke used and thereby reduce CO_2 emissions by replacing a portion of iron ore with HBI, a raw material for steel that has already been reduced. Kobe steel employs the mass balance methodology to allocate the reduction effects to specific products and add environmental value to them.

Source : AISTech Steel News, May 18,2022

Australian University Forges Partnership to Cut Steel Emissions

The University of Wollongong (UoW) has announced plans to investigate ways to decarbonize the Port Kembla Steel Works, as part of a 13 months research partnership with Bluescope Steel and the Future Fuels Cooperative Research Centre.

According to UoW, the site-specific program aims to find ways to cut energy use and greenhouse gas emissions through new technology and methods at Bluescope's Port Kembla facility, in New South Wales' Illawarra region. The budget for the project is $1.8 million, which includes $924,784 from the Australian Renewable Energy Agency and direct funding from Bluescope, as well as in-kind contributions from each partner.

The research will look at the technical and economic feasibility of a range of smart carbon usage and direct carbon avoidance technologies for the plant. Some of the technologies the project will look at include the potential for substituting fossil fuels with hydrogen, as well as utilizing gases that otherwise would have been flared off to produce biochar.

The project will run in three phases: the first investigating all available technologies, the second evaluating the potential of biochar, and the third covering research and development and next steps.

UOW's multidisciplinary science and engineering capabilities, particularly in sustainable steelmaking and clean energy fields, should help advance a range of innovative solutions for future and lower emissions steelmaking at Port Kembla.

The research is in addition to a low-emission steel pilot plant that Bluescope is building at Port Kembla, in collaboration with mining group Rio Tinto, which is trailing hydrogen at reduced iron technology.

Source: Steel Times International, Weekly News Bulletin, 11 May 2022

Steel Sector's Decarbonization in China

China's ambitions to hit peak carbon emission by 2030 and achieve carbon neutrality by 2060 have pushed major Chinese steelmakers to chart a greener route to production as they increasingly become interested in developing direct reduced iron, or DRI, plants using hydrogen and natural gas. But rising decarbonization costs and the expected dominance of traditional blast furnace-converter route in the Chinese steel industry for the foreseeable future is set to slow the sector's transition to utilizing low-carbon DRI-electric arc furnace production route until at least 2030. Reducing emissions at blast furnace-converter route would also be costly and challenging.

Over 2021-2025, China is likely to have at least 8.2 million t/year of low or zero-carbon DRI capacity coming on stream, with Baosteel and Hebei Iron & Steel Group as the two major trail blazers. Baosteel is part of the Baowu Group, the world's largest steelmaker, while Hebei Iron & Steel ranks third in global steel production. Despite the efforts, hydrogen-run DRI plants remain at a relatively smaller production scale. According to Baosteel, the technology of using pure hydrogen as reducing gas at DRI plant is still on trial or experimental stage in China. The company aims to boost the hydrogen ratio at its DRI plant to 80%-90% in 2030. Reducing gases at the first DRI plants at both Baosteel and Hebei Iron & Steel will be a combination of hydrogen, natural gas and coke oven gas. Baosteel aims to reduce its carbon emissions by 30% from 2020 levels in 2027, while Hebei is targeting the same in 2035. Baosteel further amps up its carbon goals by targeting to produce total carbon-free auto sheet covering the entire process—right from raw material processing to finished steel—in 2030. While the carbon-free auto sheet will be coming from the DRI-EAF route, to reduce carbon emissions effectively, Baosteel and its parent company Baowu Group will have to mainly depend on using decarbonizing blast furnace-converter route as well as the carbon capture, use and storage (CCUS) technology. Baowu Steel production through the traditional blast furnace-converter route at Baowu Group accounted for about 93.5% of its total crude steel output of 115 million t in 2020, while EAF steel output was only 6.5%. It's not just the Baowu Group. This is true for the entire Chinese steel industry as well. China's crude steel capacity of blast furnace-converter route is currently at over 1 billion t/year, while EAF steelmaking capacity is just close to 200 million mt/year

Carbon-free steel refers to the production of one metric ton of steel that emits less than 0.5 t of CO_2, which means steelmaking in blast furnace-converter route will need to cut its carbon emissions by over 80% to meet carbon-free steel standards. Currently, producing 1 t of crude steel in blast furnace-converter route emits about 2 t of CO_2, while consuming pure scrap in EAFs emits 0.8 t of CO_2. Steelmaking in conventional DRI and EAF route produces 1.4- 1.95 t of CO_2, depending on types of reducing materials. Blast furnaces using bio-mass, zero-carbon electricity and CCUS technology could reduce emissions in pig iron production by close to 80%. But there's a catch. Production costs will soar, requiring more than $150/t extra to produce iron, compared to iron that comes from conventional blast furnaces, according to Baosteel data. Bring in hydrogen and even seemingly costlier low-carbon production prices pale in comparison. Hot metal production at DRI plants using green hydrogen as reducing gas could cut CO_2 emission by almost 100%, but the costs will be $425/t higher than conventional iron-making process.

DRI plants, using coal, zero-carbon electricity and CCUS, will also be able to reduce the CO2 emission by close to 100%, but the cost will still be over $400/t higher. Given high decarbonization cost and still immature technologies – either via DRI-EAF or blast-converter route – low- or zero-carbon steel products are unlikely to dominate the market at least before 2030.

Upgrading of China's manufacturing sector will require more high-end and deep-processed steel products, which are more complex to produce and generate higher carbon emissions than ordinary steel products. China last year came out with mandatory output cut measures, a short term but effective solution to control emissions. Steel output cuts will prevent the steel industry's carbon emissions from rebounding while developing high-end steel products. Meanwhile, China's urbanization is seen almost reaching saturation levels, and steel demand has plateaued. This could assist China's efforts to reduce its steel production. China's crude steel output is expected to hover from 900 million t/year to 1 billion t/year for the next few years, before production starts coming down. Before any decarbonization technology reaches a scale at which could drive costs down, China's steel output controls could be the only cost-effective way to rein in carbon emissions.

Source: https://www.spglobal.com/commodityinsights/en/market-insights/blogs/metals/051922-green-steel-china-decarbonization-dri

Green Steel Ironmaking : Sequence Impulse Process

The Sequence Impulse Process enhances blast-furnace-based ironmaking and lowers the associated carbon footprint. The technology superimposes periodic bursts of oxygen on the steady flow of oxygen to the furnace, thereby optimizing the conversion behaviour of coal and coke particles.

The global challenge faced by all steelmakers to eliminate greenhouse gas (GHG) emissions and to reduce raw material and energy consumption in pursuit of carbon neutrality is well known. The route to achieving this is less clear and may be different for different country and different steel producers. With around 7-10 percent of industrial GHG emissions attributed to the steel industry and 70 percent of the total global steel production reliant on thermal reduction via the integrated steelmaking route, replacement of carbon-based fuels will be necessary.

Improvements in the circular economy of steel by increasing the availability of high-quality scrap and to support the transition to electric steelmaking as the primary production route are also underway. Hydrogen-powered ironmaking is seen as the natural successor to the blast furnace, with ferrous units being generated in the form of direct-reduced iron. Alternatively, complimentary processes such as carbon capture and storage or utilization could lower the amount of CO_2 emitted to the atmosphere. The final picture is likely be a complex combination of these options for many steelmakers as this transformation evolves.

In regular BF operation, coal injection results in char deposits accumulation, which restricts penetration of the “dead-man” and limits the gas flow into the furnace centre (Fig.1).

Fig. 1. Carbon injection in BF without SIP

With SIP implemented, the shock waves from the high-pressure oxygen penetrate deep into the raceway, combusting the fine char and improving coke permeability (Fig. 2).

Fig. 2. Carbon injection in BF with SIP

Whilst the fundamental characteristics of the blast furnace have changed little over the last 100 years or so, designers and operators have implemented incremental developments for the main vessel and process equipment. This has continued to push productivity to ever higher levels; at the same time, it has been possible to reduce the cost of the hot metal produced. Lower fuel and energy requirements combined with optimization of raw-material quality have become paramount.

In a mature process such as blast furnace ironmaking, technology step changes come rarely and are often decades apart. Sequence Impulse Process (or SIP for short), a new technology available, is such a step change. As the name suggests, SIP technology involves the pulsing of a medium into the blast furnace. That medium is oxygen. The overall equipment required consists of a pressure-reducing station with ring-distribution lines for nitrogen and oxygen, proprietary SIP boxes (the heart of the pulse generation), pulse lines from the SIP boxes to the tuyeres, and a bespoke plant-control system.

The pulse lines, coming from the SIP boxes, each lead to a dedicated lance, which is inserted into the blowpipe next to the existing coal lance. For cooling, the lance is supplied with a continuous flow of oxygen, the so-called basic load. As it leaves the dedicated lance, the oxygen first meets the carbon stream emerging from the coal lance and is ignited. The pulsed oxygen initially ensures a mixing effect as well as a certain optimization of the conversion behaviour of the injected coal.

Periodically, a pulse is generated by the SIP boxes and then superimposed on the basic oxygen-flow quantity at a pre-determined frequency. A proprietary valve opens and closes very quickly to ensure that a high-energy shock wave reaches the raceway zone of the blast furnace at supersonic speed. This wave front provides a massive increase in turbulence and thus has a positive effect on the conversion behaviour of coal and coke particles—including the uncombusted char that builds up in the lower part of the furnace, forming the "dead-man."

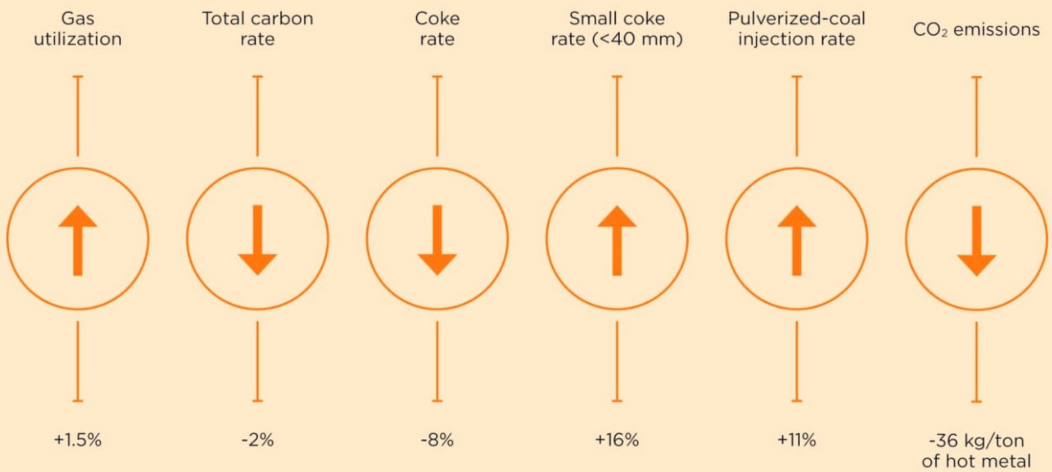
The control of the system with regard to pulse frequency and the admission of individual tuyeres is freely selectable and depends on how the furnace is operated, which is why it will be matched to the respective furnace during initial setup. The expectation is that this initial setup will be adapted through the day-to-day life of the furnace as is the case with controlling the various other input parameters.

Economically, the use of SIP technology at the blast furnace is expected to allow for more cheap injection coal to be used instead of the more expensive coke. In addition, the reduction of less thermally converted coal particles can be expected to improve throughput and drainage, which ultimately leads to increased production.

SIP has been developed by thyssenkrupp AT.PRO tec and has seen success in foundry cupola furnace applications. Following significant research and development, the first full installation has been operational since December 2020 on blast furnace No. 1 at thyssenkrupp's Schwelgern steel plant in Duisburg, Germany. SIP delivered a significant shift in raw-material consumption. The improved gas utilization was demonstrated as expected and resulted in a lower overall fuel rate with the consequential reduction in CO_2 emissions.

As such, SIP offers blast furnace operators a proven and effective tool in support of the journey to carbon neutrality, bringing essential "green" credentials. Not only does the process enhance the overall OPEX, it also makes furnace operation smoother. Primetals Technologies can provide an indicative payback figure to producers based on their specific operational conditions and associated material-utility and carbon costs.

OPERATIONAL RESULTS WITH THE SEQUENCE IMPULSE PROCESS



All figures were obtained at thyssenkrupp Steel's Schwelgern plant in Duisburg; further improvements are expected once the system is fully optimized.

DESIGNED TO ADDRESS REAL-WORLD PROBLEMS

IDEAL OPERATING CONDITIONS	REALITY	WITH SEQUENCE IMPULSE PROCESS TECHNOLOGY
Consistent, high-quality raw materials	High cost; lower availability of high-quality raw materials	Higher rates of pulverized-coal injection achievable with typically available raw materials
Minimal energy and reducing agent consumption	Raw materials of variable quality reduce permeability, increasing total fuel rate	Improved gas flow and utilization reduces total fuel rate and CO_2 emissions
Maximum use of low-cost fuels to replace expensive coke	Inability to achieve high pulverized-coal injection rates	Higher pulverized-coal injection rates and lower coke rates result in lower OPEX
Good "dead-man" perme-ability enabling gases to penetrate the furnace	Char deposits in the "dead-man" reducing the perme-ability of the furnace	Cleans the "dead-man" so gas can pass effectively into the furnace
Continuous and unvarying operation	Tuyere-to-tuyere differences can cause asymmetry of gas flow in the furnace	Stable operation with fewer burden-related "hanging" events and tuyere changes

Coal Imports Declines in FY 22

Coal imports continued to decline in FY22, despite the rise in consumption demand.

Coal imports, which had reached a peak of 248 million tonnes in 2019-20, declined in the last two years to 215 million tonnes in 2020-21 and further to 209 million tonnes in 2021-22. On the other hand, demand for coal grew from 956 million tonnes in 2019-20 to 1027 million tonnes in 2021-22.

The decline in coal import during FY22 was largely due to a decrease in the power sector import, which came down from 45 million tonnes in 2020-21 to 27 million tonnes in 2021-22.

According to the government, coal import grew at a compound annual growth rate (CAGR) of 22.86 percent during the period between 2009-10 and 2013-14. At this CAGR, coal imports would have reached 705 million tonnes in 2020-21 and further to 866 million tonnes in 2021-22.

Higher imports were checked by increased domestic supply, which increased from 716 million tonnes in 2020-21 to 777 million tonnes in 2021-22. According to the data pertaining to April-January of FY22, the share of coal supply by Coal India imported to 64.3 percent from 63.3 in FY21 and 60.8 percent in FY20.

However, import of coking coal, which accounts for a smaller portion of the total coal imports, grew 11.65 percent in FY22 to 57 million tonnes. Coking coal is largely used in the steel sector. High grade thermal coal imported by non-regulated sectors like cement, sponge iron and paper increased to 125 million tonnes in 2021-22 from 119 million tonnes in 2020-21. However, the imports are lesser than pre-Covid times. Supply of both these categories of coal is limited in the country.

Source: Deccan Chronical, 3rd June 2022

Green Hydrogen Standard

Green hydrogen — hydrogen produced through the electrolysis of water with renewable energy — is a proven technology with huge potential to meet energy security and climate change goals. By 2050, up to 25% of the world's energy use can be met with green hydrogen. GH2, *The Green Hydrogen Organisation*, announced the development of the Standard at COP26 in Glasgow. It has been be launched at the Green Hydrogen Global Assembly and Exhibition 17-18 May 2022 in Barcelona.

Key Features of the Standard

Currently, there is no accepted definition of green hydrogen (sometimes called "renewable hydrogen"). National strategies and policies differ widely on the definition of renewable energy, the boundaries of the carbon accounting system, the emission thresholds at which hydrogen is considered green, the production technologies, and the sustainability criteria that should apply. The lack of clarity and standardization is undermining efforts to accelerate the use of green hydrogen. Crucially, the distinction between green hydrogen and fossil fuel-based hydrogen (with much higher greenhouse gas emissions) is often purposefully blurred under the misleading label of "clean hydrogen" or "low carbon hydrogen". A global standard for green hydrogen will support policy and project development, lower costs for producers and consumers, and help build support and confidence in the market for green hydrogen. Agreed standards and definitions are critically important to the rapid acceptance and use of green hydrogen.

The Green Hydrogen Standard establishes a global definition of green hydrogen: "Green hydrogen is hydrogen produced through the electrolysis of water with 100% or near 100% renewable energy with close to zero greenhouse gas emissions". The Standard refers to "near 100% renewable energy", because it allows for some back-up in exceptional circumstances, so long as the maximum emissions threshold is not exceeded. The definition of renewable energy is based on the technologies that are the leading candidates for scaling up green hydrogen production: hydropower, wind, solar, geothermal, tide, wave and other ocean energy sources.

The Standard requires that the environmental, social and governance aspects of green hydrogen production are addressed. It requires that the development opportunities and impacts of green hydrogen production and use are considered. These are vital considerations for investors, customers, consumers and the communities that host green hydrogen projects.

Green hydrogen is sometimes characterised as having zero greenhouse gas emissions. However, the production of renewable electricity can involve some greenhouse gas emissions. In some circumstances, there may be some greenhouse gas emissions associated with electrolysis and associated processes (such as water treatment/desalination). Accordingly, GH2 refers to "close to zero greenhouse gas emissions". The Standard requires that projects operate at <=1 kg CO_2e per kg H_2 (taken as an average over a 12- month period). The GH2 Board will review the performance of GH2 accredited projects on an annual basis, with the expectation that the boundaries of the emissions assessment framework can be widened, and that the emissions thresholds will be lowered in accordance with emerging best practice. The <=1 kg CO_2e per kg H2 threshold is considerably lower than the thresholds proposed by other so called "clean hydrogen" or "low carbon hydrogen" standards, which have significantly higher emissions threshold to accommodate hydrogen production based on fossil fuels.

The European Union has proposed that hydrogen derived from non-renewable sources can be characterized as “low carbon” at 3.4 kgCO_2e/kgH2. In the UK, the threshold for “low carbon” is 2.4 kg CO_2e/kg H2. In the United States, the Bipartisan Infrastructure Law defines “clean hydrogen” at 2 kg CO_2e/kg H2. As noted by the UN Climate Champions ‘guiding principles’ for climate-aligned hydrogen, “green hydrogen” is the only option strictly aligned with a 1.5-degree pathway. GH2’s Standard sets a global benchmark to ensure that the green hydrogen premium is not diluted.

The Standard builds on a wide accepted methodology developed by the International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE) with some refinements. It includes “scope 1” emissions from production, including water treatment and desalination, and “scope 2” emissions from on-site or purchased renewable electricity. It is expected that project operators calculate and report on the emissions associated with the delivery of hydrogen and its derivatives. The standard also encourages project operators to calculate and report on the embodied emissions associated with green hydrogen production. Subject to further refinement and testing, benchmarks addressing these emissions will be reflected in future versions of the Standard.

The Green Hydrogen Standard is a global minimum standard, aimed at providing national governments with a global reference point in further developing national and regional standards with a clear benchmark for green hydrogen. GH2 is working with national governments to encourage alignment with international best practice, including the Standard’s definition of green hydrogen. The Standard acknowledges that the development of natural resources and energy markets is in the domain of sovereign governments to be exercised in the interest of their citizens and national development. To avoid duplication, demonstrating adherence to credible and comprehensive national requirements shall be deemed sufficient to meet GH2’s accreditation and certification requirements.

Project operators seeking GH2 accreditation should undertake the necessary preparatory work to demonstrate their project’s adherence to the Green Hydrogen Standard. Project operators engage an Independent Assurance Provider accredited by GH2 to review the project. The Independent Assurance Provider consults the project operator and other stakeholders and prepares an assessment. A draft report is made available for public comment. The final report from the Independent Assurance Provider is then submitted to GH2’s Accreditation Body. Projects that meet the Standard and have agreements and/or licenses with GH2 will be certified to use the label “GH2 Green Hydrogen” (under license) and will be eligible to obtain and trade GH2 certificates of origin for green hydrogen and derivatives such as green ammonia.

The Standard requires that the environmental, social and governance consequences of green hydrogen production is addressed and requires that the development opportunities and impacts of green hydrogen production and use are considered. Key questions include:

- Are the social and environmental impacts of new projects fully considered?
- Does the project comply with international human rights standards and are human rights promoted where the energy is produced?
- Has a good faith effort to engage key stakeholders and communities actively been made?
- Have key stakeholders and communities been provided with the information and potential opportunities to engage that they see as most relevant and needed?

The Standard seeks to maximise alignment with international best practice, including the IFC's Environmental and Social Performance Standards, the Hydropower Sustainability Council's Hydropower Sustainability Standard and the UN Sustainable Development Goals (SDGs).

GH2 emphasizes the importance of multi-stakeholder dialogue. All stakeholders have important and relevant contributions to make. Governments, industry, consumers, public and private financial institutions, international and non-governmental organisations all have a role to play.

GH2 announced the development of the GH2 Green Hydrogen Standard in November 2021, calling on governments, industry, the financial community, and civil society organizations to support a global effort to establish clear standards and accreditation for green hydrogen. On 1-2 December 2021 GH2 hosted an expert roundtable to discuss priorities and opportunities to leverage existing best practice. GH2 subsequently called on interested stakeholders to join the Green Hydrogen Standard Technical Committee. The Green Hydrogen Standard Technical Committee (TC) was formed in January 2022 and met four times, including an in-person meeting in Geneva in March 2022. The Technical Committee formed three working groups focused on: (a) greenhouse gas emissions measurement and thresholds; (b) ESG and SDG considerations; (c) accreditation and certification. A draft of the Standard was shared for public comment on 16 March. The Technical Committee refined the draft and agreed a recommendation to the GH2 Board on 12 April. The Technical Committee has recommended that the GH2 Board establishes a multi-stakeholder advisory group to further support and advise the GH2 Board on the further development of the Green Hydrogen Standard. GH2 is committed to transparency and accountability, with key documents being made available at www.gh2.org. 10.

The Standard seeks to balance predictability and flexibility in a new and rapidly growing industry. Project proponents have emphasised the need for clear and stable standards to inform long term planning. Stakeholders are also in agreement that GH2 should take into account emerging best practices, particularly as projects are scaled up from pilots to large scale operation. GH2 will review the lessons learned from the accreditation and certification process in consultation with all stakeholders. Any subsequent refinements or modifications to the Standard will include transitional arrangements that will allow project operators to make the necessary adjustments within a reasonable timeframe before coming into force. Subject to GH2 Board approval, the Standard will be launched at the Green Hydrogen Global Assembly and Exhibition in Barcelona. The next steps include:

- Further outreach to green hydrogen producers;
- Further piloting of the Standard on a wide range of green hydrogen projects;
- Development of tools for pre-feasibility stage green hydrogen projects;
- Establishment of GH2's accreditation body, and the accreditation of independent assurance providers
- Further collaboration with national standards bodies so that GH2's standard is recognised and emulated.
- Establishment of a multi-stakeholder advisory group to further support and advise the GH2 Board in the further development of the Standard 12.

How can stakeholders support this work? GH2 invites companies, governments and other stakeholders to become members. GH2 members are invited to participate in all GH2 initiatives, including its advisory and working groups. Members also join the Green Hydrogen Global Assembly, an annual meeting of senior business leaders, government officials, investment professionals, and civil society leaders to consider and agree strategies to accelerate this growth.

GH2, The Green Hydrogen Organisation, is set up as a not profit foundation under Swiss law. GH2 has been established to lead a global effort to promote green hydrogen in collaboration with government, industry and other stakeholders. Climate disaster will only be prevented if the use of oil, gas and coal stops urgently. To do this, the world needs to accelerate the production and use of green hydrogen, made from renewable energy and water. A founding principle of GH2 is that green hydrogen must be prioritized and differentiated from all forms of fossil fuel and fossil fuel-derived hydrogen, including grey and blue hydrogen.

Source: The GH2 Green Hydrogen Standard; https://gh2.org › our-initiatives › gh2-green-hydrogen