

AIST Decarbonization strategy plan development; CLEAN DRAFT definition of our work to go into the 2022 Tactical Action Plan

Challenge: The steel industry is a significant contributor to CO₂ emissions and more than 70 percent of greenhouse-gas emissions in the steel industry are directly linked to use of carbon as fuel, reductant, and alloy. Targets are assigned on a national basis, but these levels vary greatly by region & process. The Steel industry transition is looking to reduce atmospheric CO₂ emissions. To achieve net-zero CO₂ by 2050, major emissions reductions will be needed from further advancements in energy and materials efficiency, electrification, and switching to fossil-free steel production; plus, smaller contributions from Carbon Capture Use and Storage (CCUS) and alternate approaches. It will move towards clean, low carbon generation and resilient transmission of energy, decarbonization of the fuel/reductant mix & recycling/improving scrap. For the remaining CO₂, utilize Carbon Capture, treatment, storage and/or use. Regional differences are significant & driven by various factors, but many steelmakers are taking steps to decarbonize, following a disciplined regime for both quick, tactical as well as longer-term, strategic results, whilst protecting/growing production capability and economic viability. There is important impact upstream and downstream throughout the value chain, that steel producers must understand.

Despite the high media & news coverage of this topic, the technologies, plus their technical and operational opportunities and challenges are not all yet fully clear, understood in detail, or cost effective. No neutral platform (free of political & activism forces) exists which collects and provides information and the technologies which will pave the path to decarbonization of iron and steelmaking.

Solutions: AIST will address this problem and leverage its global platform to foster technical and operational exchange & education of its members. For this, we see the following pillars and focal points that will be used in varying combinations to achieve an overall plan for each facility. For AIST, each TC & local chapter will have a unique involvement & pathway in the Decarb process, either alone or jointly with others.

Brief executive summary type definition of Decarbonization as it affects the steel industry.

To support society the entire global steel industry is challenged, in a safe, practical & economically sustainable way, to become Carbon neutral, or "Green", by changing its processes and practices. The Industry must apply circular economy principles and reduce carbon use by energy optimization, reduced reductant use for virgin steel, increased and improved recycling of steel/scrap, and capturing/re-using the remaining carbon used.

Horizon	Identify, report & evaluate status on the following pathways, as they affect the overall steel product lifecycle:	Scope 1	Scope 2	Scope 3
2030	General overview on initiatives for minor and major direct & indirect GHG emission reductions.	x	x	x
2030	Initiatives on (electrical & chemical) energy inefficiency/losses/waste.	x	x	
2030	Re-engineer steel production through a gradual switch to alternate processes (e.g. Direct Reduction of pellets or sinter/pellet feed) & efficient production of long-lasting steel products with lower grade ores. EAF enhancements toward full Direct Reduction (Melter vs. Smelter).	x		
2030+	For some operations, reduce CO ₂ emissions by increasing scrap usage amid ever changing scrap quality and supply trends.	x		
2030+	Increase usage & resilient distribution of low or carbon-free electricity within possible supply challenges.		x	
2030+	Assess and develop new horizon technologies in early stage; Iron Ore Electrolysis	x		
2040	Usage of H ₂ & biomass as a reductant and fuel instead of fossil	x	x	x
2040	Promote circular economy tools: Reduce, Re-use & Recycle. Initiatives and underlying calculation principles on carbon-neutral raw materials (e.g. scrap, biomass, fluxes, iron ore).	x	x	x
2040	Projects that adapt plants and utilities to changing environmental conditions, alongside the Decarbonizing processes.	x	x	x
2050	Implementation of smart carbon usage to capture and mitigate the release of CO ₂ emissions.	x		

(source: Mckinsey & company 2021 May (very, heavily modified))



Decarbonization

Strategic Plan

2022–2024

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Goals

Since its formation in January 2004, AIST has fulfilled its mission to advance the technical development, production, processing and application of iron and steel by continuously pursuing the following goals:

- Build a strong and relevant technical organization with active membership groups, quality publications and superior events, all with global access and appeal.
- Create stability with a conservative and diversified revenue plan while avoiding duplication of services.
- Achieve sustainable growth with continuous improvement through strategic planning, global outreach and a dominant market position.

Principles

In the pursuit of these goals, AIST adheres to the following guiding principles:

- Create value for members and benefit to industry.
- Provide opportunity and access for all members.
- Seek member-identified, quality programming.
- Recruit informed and involved leadership.
- Provide responsible stewardship of assets.

Strategic Process

To ensure the Association remains relevant to the steel industry, it shall create and evolve strategic initiatives to reflect the changing needs of our members. These efforts should complement the following core programs of the association:

- AISTech and MS&T – our major technology forums.
- Technical training programs.
- Technology Committee activities.
- Member and Student Chapter activities.
- *Iron & Steel Technology* – our flagship publication.
- Awards and recognition programs.
- AIST Foundation grant programs.

During the AIST Leadership Conference each November (LC), the member leaders from our Technology Divisions and Member Chapters as well as our Board of Directors meet to identify current challenges, best practices, and opportunities for AIST strategic planning. The LC attendees identify and prioritize tactics associated with the following strategic initiatives for the current period:

- Globalization of Networks and Programs
- Membership Retention and Growth
- Industry Training and Education
- University and Student Engagement

AIST Decarbonization Strategic Plan

Background

Decarbonization, specifically the reduction of CO₂ emissions, has been a topic highlighted by many countries driven by climate action. It is the general belief that AIST should guide the iron and steel industry's effort to collect and communicate information as it relates to the topic of decarbonization.

Since 2018, individual Technology Committees and Member Chapters have been holding regularly functions to educate the iron and steel industry on the topic of decarbonization. This effort has included developing pilot programs and projects for various Technology Committees, as listed in the Appendix.

Our members have demonstrated strong interest in the topic area as AIST's related programming has continued to grow and attract attendees from the international iron and steel community.

Mission

To gather, collate and disseminate decarbonization information that brings together experts from across the industry to educate and aid the journey towards sustainable steelmaking being at the core of a sustainable global economy with short, medium & long-term goals and pathways addressing industrial transformation and education of young professionals.

Vision

To be a leader in understanding, sharing, and discussing technologies related to energy efficiencies, CO₂-reduction, and carbon capture, utilization & storage leading to a sustainable global iron and steel industry.

Priorities

Priority 1: Define decarbonization and create a community passionate to develop a sustainable global steel industry.

Priority 2: Disseminate information & explore technologies and their application based on geographical, raw materials & process differences within the industry.

Priority 3: Collaborate with other organizations and industries in exploring and supporting new technologies.

Priority 4: Promote the steel industry's achievements towards decarbonization economy-wide.

Priority 1: Define decarbonization and create a community passionate to develop a sustainable global steel industry

- ✓ Form a **Decarbonization Core Team** (DCT) that will plan and coordinate the business activities.
- Prepare a definition document that defines how decarbonization will apply to the iron and steel industry as a guiding document for its activities.
- ✓ Establish a **Decarbonization Subcommittee** (DSC) as a repertoire of industry experts and members to provide a platform within AIST for members to organize related events.
- ✓ Host monthly DCT conference calls to actively develop programming
- ✓ Establish a **Decarbonization Liaison Network** with members from interested Technology Committees to act as a communications channel to their TC for disseminating information and participating on quarterly conference calls. To fulfill two functions (1) to act as a group that liaises with the individual technology committees, and (2) to assist bringing forth their technical resources on this topic.
- ✓ Establish a **Decarbonization General Interest Network** with open membership of AIST members and invited guests to provide general periodic email communications of the DSC.
- Plan, prepare & conduct DSC events within existing AIST structure. Sessions, workshops, webinars, & individual presentations during TC meetings are formats to be considered.
- Support the similar activities of the various TC's regarding decarbonization.
- Conduct outreach to recruit the industry to join the new Decarbonization subcommittee.
- Market subcommittee activity within AIST, with outreach to local Member Chapters.

Priority 2: Disseminate information & explore technologies and their application based on geographical, raw materials & process differences within the industry

- Produce a series of webinars and other platforms focused on Decarbonization and its impacts globally on different regions of the world.
- Monitor and Report Industry Press Releases on the topic through the AIST Steel News function
- Gather technology committees for meetings to discuss Decarbonization as a group with common focus topics.
- Provide support projects to various TCs in their own programming and liaise with marketing efforts.
- Create a landing page representing a collection of resources for all things Decarbonization related on aist.org (a repository of AIST content videos, articles, etc.).
- Add Decarbonization terms to the AIST Steel Glossary.
- Consider the creation of a “regular” decarbonization column for information sharing.

Priority 3: Collaborate with other organizations and industries in exploring and supporting new technologies

- Develop additional incentives that encourage the industry, academia, and national laboratories in decarbonization efforts.
- Establish technical recognition of industry projects that excel in decarbonization (an award).
- Conduct outreach to other companies and organizations external to steel for cross-cutting technology applications. (US Department of Energy, Carbon Management Canada, European Steel Technology Platform etc.)
- Collaborate with academia and research institutions to facilitate industry alignment.

Priority 4: Promote the steel industry's achievements towards decarbonization economy-wide

- Develop a marketing plan to brand Decarbonization as an area of expertise for the industry and the Association.
 - Develop materials that promote the industry as a technically advanced, cutting-edge manufacturing sector for processes defined by innovation and challenged by new ideas.
 - Promote the success of our Decarbonization efforts to garner momentum.
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Implementation Schedule for early activities

- Staff to draft strategic plan based on Core Team objectives (Sep-Oct 2021). Present to Leadership Conference – presentation and final commentary (Nov 2021).
 - Formal adoption of Decarb strategic plan by board (May 2022).
 - Decarbonization Core Team, Liaison Network and General Interest Network to review and comment on strategic plan draft update (May – August 2022).
 - Develop Tactical plan for 2022-23 of planned activities & assigned leaders (May-August 2022)
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Organization & governance

The Decarbonization Technology sub-committee (DSC) shall be a sub-committee of the Energy & Utilities Technology Committee (EUTC), with assigned staff engineer & officers similar in title and duty; Chair, (that represents the DSC to the EUTC), Vice-Chair to coordinate Liaison Network and Program & projects support. A separate Papers & grading chair as necessary. In addition, it shall appoint a Membership and Marketing Chair, a Technical Resource Chair (Librarian), a Webinars & workshops leader, plus periodic topic coordinator(s) for any specific subjects to be the sub-committee “go-to person” for that topic.

It will have a 3-level structure; a Decarbonization Core team of 10-20 members, a Decarbonization Liaison Network of 1 or more persons nominated by each invested Technology Committee & Member Chapter and a Decarbonization General Interest Network.

Appendix 1 Background Development work & achievements

Individual technology committees and member chapters have been regularly holding functions to educate the iron and steel industry on the topic of decarbonization or CO₂-free steelmaking for the past year.

- The DRI Technology Committee held a three-part webinar series in summer 2020, Hydrogen and Low-CO₂ Iron- and Steelmaking Webinar Series focusing on Ironmaking with Alternative Reductants; Production, Storage and Safe Handling of Hydrogen; and Steelmaking With Zero Carbon Iron Units.
- The European Steel Forum in October 2020 had a panel discussing CO₂-Free Steelmaking.
- The Middle East North Africa (MENA) Forum held November 2020 had discussions during their event on this topic.
- In October 2021, the Ironmaking Technology Committee (IMTC) along with the Energy & Utilities (EUTC), DRI technology committees (DRITC) and Oxygen Steelmaking Technology Committee (OSTC) developed a Joint Technical Committee meeting featuring a full day of technical presentations, and tour of Cleveland-Cliffs HBI facility (in-person format in Toledo, OH USA)
- In 2021, the Ironmaking Technology Committee (IMTC) along with the Energy & Utilities (EUTC) and DRI technology committees (DRITC) put together a two-part webinar series with topics like Decarbonizing: Background and Current BF Fuel Strategies and H₂ Injection into the Blast Furnace.
- Sourced and briefed a Decarb subject-matter expert and topic for the 2022 Spring EUTC training seminar & workshop held in Oak ridge, TN USA "Energy and Utilities Workshop – Roadmap to the Energy-Efficient, Sustainable and Decarbonized Steel Industry" [from Boston Metals on its new electrolysis process].
- Sourced a presenter for the CMTC fall meeting, [Nippon Steel on coke dry quench (CDQ)].
- Worked with IMTC & CMTC to set up a Decarb session for their winter committee meeting after the Eastern States was cancelled, three technical presentations: Nippon Steel, Torrance, AM Europe.
- For AISTech we developed an Opening Decarb session for Monday AM that will include two presentations from departments of the US government and three company technical sessions.
- For AISTech we also developed a dedicated session and panel discussion "Pathway to upgrading your reheat furnace for increased productivity" on Monday PM with EUTC looking at Decarbonizing reheat furnaces in a phased approach.
- For Decarb SC administration work we have kicked off the work with developing a draft definition paper that will be sent out for review & comment in a dedicated email.
- For Decarb SC administration work we are now developing a work statement of roles & responsibilities that will be sent out for review & comment in a dedicated email.
- The Decarb lead team aims for the subcommittee to become a networking platform for exchange on potential & implemented decarbonization strategies and to make that visual in a dedicated AISTech 2023 master session, based upon an analysis with AIST on the feedback from the various AISTech 2022 sessions & our own Decarb session.
- Over 50 presentations were identified in the AISTech2022 technical program as being related to the topic of Decarbonization with a dozen highlighted in a marketing focus by AIST.