



Programme



FOR GREEN STEEL

3rd INTERNATIONAL CONFERENCE

meets

**A CIRCULAR ECONOMY DRIVEN
BY THE EUROPEAN STEEL**



**Tue 29 – Thu 31 October 2024
voestalpine Stahl, Linz, Austria**

Hosted by

voestalpine

ONE STEP AHEAD.



ESTEP Annual Event 2024

The Scope

Estep 2024 Event aims at bringing together the European steel community to discuss two pillars of the Clean Steel Partnership towards C-lean processes: the hydrogen exploitation and the circular economy application. Achievements, challenges and future expectations will be analysed thanks to contributions from different European steelmaking actors and to the presentations of current CSP projects. The event will allow the steel sector to meet other industrial sectors involved in the European Green Deal which are active actors in industrial symbiosis (e.g. cement, water and aluminium)

The Event will include a tour of voestalpine Linz steelmaking plant and a celebration of 20th year of ESTEP foundation.

The Topics

- Hydrogen based steelmaking
 - Opportunity and limits
 - Operating conditions challenges and optimization
- Hydrogen heating technologies in downstream metal processes
- Hydrogen exploitation safety and permitting
- Renewable energy and hydrogen integration
- The new challenges for the circular economy due to the transition from traditional to C-lean production processes
- Industrial Symbiosis and sector coupling
- Residue management and valorization
- Circular economy regulations
- Digitalization, upskilling and social innovation

Duration, venue and facility visit

The three-day event (29-31 Oct) will take place in person at voestalpine Stahl Linz, first floor, voestalpine-Straße 3 4020 Linz, Austria. The morning of the first day (29 Oct) will be dedicated to a plant tour.

Scientific Committee

Agnieszka Morillon (FEhS)
Bernhard Voraberger (Primetals)
Enrico Malfa (Tenova)
Ismael Matino (Scuola Superiore Sant'Anna)
Marten Sprecher (HKM)
Thomas Buergler (voestalpine)
Thomas Echterhof (RWTH Aachen University)
Valentina Colla (Scuola Superiore Sant'Anna)

Organising Committee

Akhilesh Swarnakar (ESTEP)
Claudia Leimhofer (voestalpine)
Delphine Snaet (ESTEP)
Ismael Matino (Scuola Superiore Sant'Anna)
Karin Aussersdorfer (voestalpine)
Klaus Peters (ESTEP)
Ulrike Redl (voestalpine)

Dedicated special issue

A dedicated **Special Issue of Matériaux Techniques** (EDP Sciences, **2023 Impact Factor: 1.3**) will be published covering the aspects related to hydrogen exploitation in steelmaking. More details on paper submissions will be provided soon.

The **Special Issue of Metals** (2023 Impact Factor: 2.6) entitled “Recent Advances in the Recycling and Reuse of Metallurgical Wastes and By-Products” (Special Issue Editors: Valentina Colla and Ismael Matino) is pleased to accept contributions from the Conference concerning topics covered in the Special Issue. For more information on the Special Issue and submission: https://www.mdpi.com/journal/metals/special_issues/30ISYL8J2D

In both Special Issues, the submitted paper will be peer-reviewed and, if accepted, published. Authors intending to publish their work on it are invited to indicate their wish to the ESTEP Secretariat via e-mail: D.Snaet@estep.eu

Sponsorship Opportunities

Sponsorship is always welcome. Members of ESTEP interested in sponsoring the event (cost 1,200 € and above) are invited to contact the ESTEP Secretariat via e-mail: D.Snaet@estep.eu

Participation Fee and Registration

Plant tour: 50 € (Students 25 €)

-Two options: blast furnace + automotive components or automotive components and H₂ electrolyzer

For organizational reasons only first 100 (50 per option) registered people will be admitted to the Plant tour

All in one – conference+catering+dinner+sightseeing: 310 € (Students 150 €)

Speakers/Invited people: Free (only one speaker/invited person per contribution is free)

For students a short motivation email - half a page – has to be produced and sent to Ms. Delphine Snaet, D.Snaet@estep.eu. In addition, the student status (i.e. bachelor, master and PhD) must be certified.

Fee is used by ESTEP for conference/visit organization as well as generation, provision of the abstract booklet and related publications.

Key Dates & Deadlines

Sponsorship	4 October 2024
Program publication	4 October 2024
Registration	16 September - 21 October 2024
Presentation and short speaker CV submission	25 October 2024
Plant tour + Conference + ESTEP Celebration 20 th anniversary	29 October 2024
Conference + Sightseeing + Dinner	30 October 2024
Conference (including HyInHeat clustering session) + Farewell Greetings	31 October 2024

Information and contact

For information, contact the ESTEP Secretariat, Ms. Delphine Snaet - D.Snaet@estep.eu

Travel information

Arrival by plane

- Train directly from Vienna Airport to Linz/Donau central station
- Approx. travel time 1:45 h

Transportation from train station to event location

- Tram line 1 (in direction Auwiesen) or 2 (in direction SolarCity) from Linz Hbf. to station Turmstraße
- Change to bus line 25 (in direction Karlhof) to station Betriebsgebäude 41
- Approx. travel time 0:20 h

Info for the last day of the Conference

- Ensured transportation for the train station the last day after the conference
- Departure times of the direct trains from Linz central station to Vienna airport for October 31st, 2024:
 - Departure 15:17, arrival 16:57
 - Departure 15:32, arrival 17:27
 - Departure 16:17, arrival 17:57
 - Departure 16:32, arrival 18:27 (change of trains at Vienna central station necessary)
 - Departure 17:17, arrival 18:57
 - Departure 17:32, arrival 19:27
 - as November 1st is a national holiday in Austria, the Austrian federal railways (ÖBB) expect a lot of travel on October 31st. Therefore, they state on their homepage that travelling on that day is only guaranteed with a valid seat reservation.

Hotel suggestions

If still available, some rooms have been pre-booked (Keyword for booking: ESTEP 2024)

- **Courtyard by Marriott Linz**
 - 100 single rooms ranging from € 152,00 – € 172,00 per night
 - Parking: € 25,00 per 24 h
 - Approx. 3,2 km to event location
 - Booking via provided link: <https://www.marriott.com/events/start.mi?id=1718344291746&key=GRP>
 - Booking via mail to: reservierung.linz@courtyard.com
 - Booking by phone: +43 732 6959 14
- **Park Inn by Radisson Linz**
 - 50 single rooms for € 159,00 per night
 - Parking: € 18,00 per 24 h (public parking garage)
 - Approx. 4,4 km to event location
 - Booking via mail to: reservations.linz@parkinn.com
 - Booking by phone: +43 732 7771000

Visit to voestalpine plant facilities – Tue 29 October (morning)

Two options (selection during the registration)



1st - blast furnace + automotive components; for organizational reason only first 50 registered people will be admitted. No personal protective equipment is necessary.

2nd - automotive components and H₂ electrolyzer; for organizational reason only first 48 registered people will be admitted; for safety reasons no access is granted to people with pacemakers, implants that can couple in the magnetic field or pregnant persons. No personal protective equipment is necessary

Further Safety information

- It is absolutely necessary that you wear sturdy shoes during the works tour.
- We also recommend that you wear dirt-resistant clothing.
- You must be physically fit to participate in the works tour. You will be climbing several flights of stairs with up to 90 steps.
- You must also be able to see and hear optical and acoustic warning signals.

Info and Agenda of the visit

09:30-11:00 1st group visit
10:00-11:30 2nd group visit
12:00-13:00 Lunch

Waiting visit: Zeitgeschichtemuseum (museum for contemporary history related to voestalpine)

Scientific Programme – First Day

1st Conference Day – Tuesday 29 October 2024

Time	Speaker	Speaker Organization	Title
13:00	Registration		
13:30	Ismael Matino (<i>Conference chairman</i>)	Scuola Superiore Sant'Anna	Introduction to the Conference
13:40	Klaus Peters	ESTEP SG	Welcome and Opening of the First Day
13:55	Alessandra Colli	European Commission – DG RTD	Opening Lecture
14:25	Thomas Bürgler	voestalpine	Session 1 - Green Steel production by Hydrogen
14:30	Hanspeter Ofner	Primetals	Hy4smelt - Hydrogen-based direct reduction and smelting of ultra-fine iron ores to green hot metal
14:50	Christine Gruber	K1-MET	Simulation, Modelling, and Monitoring of Plasma and Arc-Based Processes for Green Metal Production
15:10	Erwin Reichel	K1-MET	Model-Based Control of Electric Arc Plasma in the HPSR Process for Zero-Emission Iron Ore Reduction
15:30	Filippo Cirilli	RINA - CSM	Mechanism of iron ore pellets direct reduction: new insights of factors affecting the kinetic of the process with low quality materials
15:50	Philippe Blostein (<i>to be confirmed</i>)	AirLiquide	Decarbonization solutions for the steel industry: an update
16:10	Hans van der Weijde	Tata Steel	Growing with Green Steel, how regional funding can play an important role in the development of decarbonisation know how
16:30	Coffee Break		
16:55	Ismael Matino (<i>Session Chairman</i>)	Scuola Superiore Sant'Anna	Session 2 - Smart, efficient and circular resource management paving the way to Decarbonization
17:00	Balan Ramani	Tata Steel	Gas processing for syngas makeup and carbon monoxide valorization at integrated steelwork
17:20	Valentina Colla	Scuola Superiore Sant'Anna	Methodologies and Tools for designing a Decision Support System for energy management
17:40	Christa Muehlegger	K1-MET	Simulation and analysis of energy networks in the transition to sustainable steelmaking
18:00	Lorenzo Vannini	Scuola Superiore Sant'Anna	Exploring and Optimizing Process Off-Gas Management in Steelworks During Their Transitions Towards C-Lean Processes
18:20	Ilchat Sabirov	IMDEA Materials	Digital transformation and sustainable innovation in steel manufacturing: The AID4GREENEST project
18:40	Closure of First Conference Day		
19:00	ESTEP Celebration 20^o Anniversary at voestalpine Stahl Linz, first floor (voestalpine-Straße 3 4020 Linz, Austria)		

Scientific Programme – Second Day

2nd Conference Day – Wednesday 30 October 2024

Time	Speaker	Speaker Organization	Title
08:00	Registration		
08:45	Herbert Eibensteiner	voestalpine - CEO	Welcome and Opening of the Second Day
09:15	High-Level Panel Discussion		
	Moderator: Matthew Moggridge (Steel Times International, chief editor) Speakers: Axel Eggert (EUROFER, Director General), Maria Cristina Russo (DG Research & Innovation, Director for Global Approach & International Cooperation in R&I) – Online, Kurt Satzinger (voestalpine, Head of R&D), Jürgen Schneider (Austrian Ministry Representative - Director of the Directorate General VI Climate action & Energy), Alexander Fleischanderl (Primetals, CTO), Christian Weinberger (Hydrogen Europe – <i>to be confirmed</i>)		
10:15	Coffee Break		
10:35	Morillon Agnieszka (<i>session chairwoman</i>)	FEhS	Session 3 - Resource efficiency and Industrial Symbiosis
10:40	Martin Hubrich	BFI	TransZeroWaste – Upgrading of low-quality iron ores and mill scale with low carbon technologies
11:00	Elisa Marchesan (<i>to be confirmed</i>)	I.Blu	Decarbonization through industrial symbiosis : The use of recycled carbon raw materials in the steelmaking
11:20	Alexander Halwax	K1-MET	Utilization of recovered refractory material as slag additive and experimental determination of liquid slag properties
11:40	Thomas Reiche	FEhS	EUROSLAG – Core activities and challenges for the slag value chain
12:00	<i>To be confirmed</i>	<i>To be confirmed</i>	Zincval project (<i>title to be confirmed</i>)
12:40	Christoph Thaler	voestalpine	Decarbonization in the Steel Industry and Future Production Routes (e.g., SuSteel) and Future Utilization Paths for the By-products Generated (e.g., Slags and Dusts)
13:00	Lunch		
14:15	Valentina Colla (<i>session chairwoman</i>)	Scuola Superiore Sant'Anna	Session 4 - Circularity in the European steel sector
14:20	Enrico Malfa & Filippo Cirilli	TENOVA & RINA-CSM	Development of a Pyrometallurgical Approach for Iron and Zinc Recovery: Design and Modeling of a Plasma Reactor within the ReMFRa Project
14:40	Johannes Rieger	K1-MET	Improved analysis of post-consumer scrap to further push a circular steel industry
15:00	Filippo Cirilli	RINA-CSM	Valorization and characterization of hydrochar for coke replacement in steelmaking: a circular economy approach
15:20	Paul Trunner	Primetals	Green solutions for by-product utilization from process gas cleaning plants
15:40	Bernhard Voraberger	Primetals	Challenges and Solution for Steelmaking Dust Valorization in the Green Steel Transition
16:00	Barbara Fernandez	CELSA	DRASTIC: Demonstrating Real & Affordable Sustainable Building Solutions with Top-level whole life cycle performance and Improved Circularity
16:20	Frederic Van Loo	CRM Group	COACH - Cold-bonded agglomerates for blast furnace ironmaking with chemically engineered binders
16:40	Nella Janakova	Progress Ekotech	Gaining value with Ecolbriq : Two possible applications of Ecolbriq®: Reducing CO2 emissions and/or recycling of byproducts minimizing landfill
17:00	Harmen Oterdoom	Butterbridge	Steel: from main to co-product in a circular economy?
17:20	Closure of the Second Conference Day		
19:00	Sightseeing – more information to come		
20:00	Conference Dinner at Herberstein (Altstadt 10, 4020 Linz, Austria)		

Scientific Programme – Third Day - First Parallel Session

3rd Conference Day – Thursday 31 October 2024

Time	Speaker	Speaker Organization	Title
08:00	Registration		
Session 5 - Clustering special session on Hydrogen in heating technologies			
Co-organized by the HyInHeat project			
<p>The morning part of the special session aims at jointly presenting EU projects addressing hydrogen in heating technologies (steel downstream and other sectors) with a clear focus on demonstrators and NO_x emissions, Digital Tools and KPIs topics. The following projects contribute:</p> <ul style="list-style-type: none"> • HyInHeat – Thomas Echterhof and Nico Schmitz (RWTH Aachen) • HyDreams – Martin Demuth (Messer Austria) • H2AL - Marco Lubrano Lavadera and Alessandro Parente (The Université libre de Bruxelles) • H2GLASS – Antonio Tuzio (Stam Tech) • HyTecHeat – Filippo Cirilli (RINA-CSM) • TWINGHY – <i>speaker to be confirmed</i> • GreenHeatEAF – Oliver Hatzfeld (BFI) and Marianne Magnelöv (SWERIM) • H2Reuse – <i>to be confirmed</i> <p>The afternoon part of the special session includes standard scientific presentations.</p>			
08:10	Thomas Echterhof (session chairman)	RWTH Aachen University	Welcome and Introduction to the Special Session and presentation of involved speakers for each included project
08:20	Demonstrators subsession – introducing the demonstrators of the included projects		
10:05	Coffee Break		
10:20	Panel Discussion on NO _x Emissions and emission limits, Digital Tools, and KPIs of the included projects		
11:50	Thomas Echterhof (session chairman)	RWTH Aachen University	Concluding remarks
12:00	Lunch		
13:00	Tommaso Bortolussi & Irene Luzzo	SMS Group & RINA-CSM	Development and testing of Low-NO _x Roof Burner SMS-RADFlameHY2 for the Steel Industry
13:20	Irene Luzzo	RINA-CSM	Results from the Experimental Campaign with H ₂ Oxyfuel Burner for Electric Arc Furnaces (EAF)
13:40	Mattia Bissoli	TENOVA	CFD modelling of flameless combustion: from NG to H ₂
14:00	Ismael Matino	Scuola Superiore Sant'Anna	Scenario analyses to evaluate the effects of hydrogen exploitation in EAF burners
14:20	Nico Schmitz	RWTH Aachen	Fuel Flexible Self-Recuperative Burners for Radiant Tube Heating Systems
14:40	Ismael Matino (conference chairman)	Scuola Superiore Sant'Anna	Greetings and next steps
14:45	Klaus Peters	ESTEP SG	Closure of the ESTEP Annual Event 2024

Scientific Programme – Third Day - Second Parallel Session

3rd Conference Day – Thursday 31 October 2024

Time	Speaker	Speaker Organization	Title
08:00	Registration		
08:20	Hans van der Weijde (<i>session chairman</i>)	Tata Steel	Session 6 - Renewable Energy and Hydrogen Availability in Europe
08:25	Robert Emler	University of Leoben	Hydrogen production by methane pyrolysis
08:45	Joke Bauwens	ArcelorMittal	RecHycle - Recycling hydrogen for climate neutrality
09:05	Eileen Torres	Stockholm Environment Institute	Plan ahead for the transition: estimating the renewable electricity demand for a green steel future
09:25	Antonius Schröder	TU Dortmund	Hydrogen Online Training (steelHub)
10:45	Karina Maldonado	TU Dortmund	Towards a Skills Intelligence Framework. Mapping of Hydrogen Skills Initiatives in Germany and Austria
10:05	Coffee Break		

Scientific Programme – Poster Session

Posters will be available for all the Conference duration

Corresponding Author	Corresponding Author Organization	Title
Ekinsu Akdoğan (<i>to be confirmed</i>)	KULeuven (<i>to be confirmed</i>)	A Framework Proposal for the Environmental and Techno Economic Analysis of Steel Production via Hydrogen Plasma Smelting Reduction (HPSR) Reaction Route
Alexander Schlemminger (<i>to be confirmed</i>)	Quantolux (<i>to be confirmed</i>)	Accelerating Slag Analysis with Laser OES: A Key to Sustainable Steelmaking
Gabor Szabo	University of Miskolc	Converting an Existing Integrated Steel Plant to Electric Steel Production with 80% CO ₂ Emission Reduction
Peter Raninger	Materials Center Leoben	Getting ready for EAFs – Data-driven modelling of mechanical properties of steel sheets from chemical analysis and process parameters
Peter Raninger	Materials Center Leoben	Physics-based modelling of tramp element effects on microstructure evolution during downstream processing
<i>To be confirmed</i>	<i>To be confirmed</i>	Zincval (<i>title to be confirmed</i>)