ENERGY AND UTILITIES WORKSHOP

ROAD MAP TO THE ENERGY-EFFICIENT, SUSTAINABLE AND DECARBONIZED STEEL INDUSTRY

14–17 MARCH 2022
Embassy Suites by Hilton Knoxville West • Oak Ridge, Tenn., USA
Plant Tour: Oak Ridge National Laboratory

ABOUT THE PROGRAM

Energy is the second-largest cost of conversion in the steel industry. Improving energy efficiency will not only drive down costs in the production of steel but it will also reduce greenhouse gas emissions. This comprehensive training, with hands-on activities, has been developed to educate attendees on the key aspects of energy support systems and equipment in the steel production process. The course will cover energy management, process heating, steam, compressed air and other motor-driven systems, along with an introduction to alternative energy options. The course will focus on the energy-efficiency and -saving aspects of each energy support system (utility) along with insights to improving reliability.

WHO SHOULD ATTEND

The tools and programs presented will be beneficial to individuals or plants wanting to implement an energy and carbon optimization plan (long term or short term) in all areas of steel manufacturing. Energy managers and engineers, facility managers, electrical managers, and electrical project engineers and management personnel with oversight responsibility for plant utilities should consider this course. The workshop offers a great overview for new engineers, providing a basic understanding of energy and greenhouse gas emissions-related aspects of utilities in steelmaking and a foundation to recognize and implement energy savings projects.

ORGANIZED BY

AIST's Energy & Utilities Technology Committee.

PROFESSIONAL DEVELOPMENT HOURS

This course may qualify for up to 22.75 Professional Development Hour (PDH) credits. Each attendee will receive a certificate listing the quantity of PDH credits earned for this course. This course is not approved for PDH credit in New York, Florida, North Carolina and Oklahoma.

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REGISTRATION INCLUDES

Registration includes welcome reception Monday, breakfast and lunch Tuesday and Wednesday, breakfast Thursday, and a course workbook or flash drive including presentations. Transportation to and from the hotel and Oak Ridge National Laboratory will be provided Tuesday–Thursday. **Please note that all registrations must be submitted by Monday, 28 February 2022, so that Oak Ridge National Laboratory can complete any security clearances.**

HOTEL ACCOMMODATIONS

A block of rooms has been reserved at the Embassy Suites by Hilton Knoxville West. Please call the hotel at +1.865.246.2309 by 12 February 2022 to secure the AIST discount rate of US$129 per night for single/double occupancy.

ATTENTION NON-MEMBERS

Non-member registration fees include membership in AIST through 31 December 2023. Membership is not automatic. A completed membership application must be returned to AIST.

AIST MEMBERS		NON-MEMBERS	
US$845	US$945	US$1,090	US$1,190
Before 31 January 2022	After 31 January 2022	Before 31 January 2022	After 31 January 2022

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Monday, 14 March 2022

2–4 p.m.
Registration

4 p.m.
Introductions and Opening Remarks
Larry Fabina, Cleveland-Cliffs Burns Harbor, and Xin Sun, Oak Ridge National Laboratory

4:30 p.m.
Industrial Energy Management — Better Plants and ENERGY STAR Resources and Tools
Eli Levine, U.S. Department of Energy (DOE), and Elizabeth Dutrow, U.S. Environmental Protection Agency (EPA)
This presentation showcases the DOE's tools and resources, and the Better Plants program. A decarbonized steel industry will require a variety of approaches. Energy efficiency is a key action. ENERGY STAR tools and resources can assist steel producers to advance energy efficiency and enhance savings.

5:30-6:30 p.m.
Welcome Reception

Tuesday, 15 March 2022

7:45 a.m.
Bus Departs for Oak Ridge National Laboratory

8:15 a.m.
Registration at Oak Ridge National Laboratory

8:45 a.m.
Introductions and Opening Remarks

9 a.m.
Energy Management Systems, Industrial Energy Efficiency Standards ISO 50001 and DOE's 50001 Ready Navigator Tool
Thomas Wenning, Oak Ridge National Laboratory, and Katelyn Dimmer, Charter Steel – Cleveland, Ohio

9:45 a.m.
The MEASUR Tools Suite — DOE's Manufacturing Energy Assessment Software for Utility Reduction
Kristina Armstrong, Oak Ridge National Laboratory
The MEASUR tool suite helps to evaluate the current energy use and potential energy savings opportunities of industrial energy systems based on field measured data. MEASUR includes modules for pumps, fans, process heating, steam, compressed air, motors and energy treasure hunts. There are also more than 65 stand-alone calculators. The tool is open-source, free to download and available online.

10:30 a.m.
Break

10:45 a.m.
Industrial Steam Systems
Thomas Wenning, Oak Ridge National Laboratory

11:30 a.m.
Working Lunch and Understanding Electricity and Natural Gas Bills
Senthil Kumar Sundaramoorthy and Christopher Price, Oak Ridge National Laboratory
The topic will help the audience to understand the various charges of their natural gas bills. In addition, strategies to save on utility costs will also be presented, as well as an overview of the fundamentals of utility billing. For the electricity portion, the presentation will focus on common billing topics including demand charges, power factor correction and rate structures.

12:30 p.m.
Industrial Process Heating — Energy Efficiency Opportunities and DOE's Process Heating Assessment Tools
Sachin Nimbalkar, Oak Ridge National Laboratory and Bethany Worl, Cleveland-Cliff Burns Harbor
Process heating accounts for about 70% of all process energy (energy applied to convert material into manufactured products) used in the U.S. manufacturing sector. During this session, the audience will learn practical tips on process heating maintenance, how to improve the energy efficiency of furnaces and how to use DOE's MEASUR tool (Process Heating Assessment module). MEASUR helps survey furnaces and heaters, identify major energy-using equipment, prioritize improvement opportunities, and assess available methods to improve thermal efficiency in industrial plants.

1:15 p.m.
Lighting Energy Savings and Challenges Within the Iron and Steel Industry
Larry Fabina, Cleveland-Cliffs Burns Harbor
Lighting systems are one of the major energy end users for manufacturing facilities. This session covers various lighting technologies (CFL, HID, LED, etc.), lighting system control strategies (occupancy censors, light level sensors, etc.) and energy savings opportunities. In particular, it will include discussion on installing LED fixtures in challenging steel mill environments to save energy, reduce maintenance and improve safety. Examples of completed lighting projects will be presented.

1:30 p.m.
Smart Manufacturing and Internet of Things for the Iron and Steel Industry
Christopher Price, Oak Ridge National Laboratory and Chenn Zhou, Center for Innovation and Visualization Through Simulation, Purdue University Northwest
U.S. manufacturing is beginning its digital transformation as part of the fourth industrial revolution. Connected devices and the Industrial Internet of Things are allowing new sensors and controls technologies to make manufacturing smarter and more energy efficient. These technologies can be used to create cutting-edge physics-based and data-driven tools for real-time decision-making to address critical issues related to energy efficiency, carbon footprint and other pollutant emissions, productivity, quality, operation efficiency, maintenance, and more. This presentation gives an overview of smart manufacturing opportunities in the iron and steel sector and presents results from case studies analyzing the feasibility of smart projects from an energy standpoint.

2:30 p.m.
Break

2:45 p.m.
Motors and Motor-Driven Systems — DOE's Software Tools for Estimating Energy Efficiency
Daryl Cox, Oak Ridge National Laboratory
This presentation will cover energy optimization considerations and how to apply the MEASUR software tool to quantify potential savings associated with implementing energy saving opportunities.

3:30 p.m.
Compressed Air Systems — DOE's MEASUR Software
Alex Botts, Oak Ridge National Laboratory, and Wendy DiMino, Universal Compressed Air
The presentation will give an overview of compressed air systems and the key components that drive their energy usage. In addition to a topical overview, the common energy efficiency opportunities implemented will be discussed. Finally, a brief demonstration of DOE resources will be given to show how to analyze compressed air systems and estimate possible savings.

4:15 p.m.
Energy System Demonstrations
Alex Botts, Kiran Thirumaran, Thomas Wenning and Daryl Cox, Oak Ridge National Laboratory
The session will review the principle and demonstrate via tabletop units the workings of auxiliary energy systems in the iron and steel industry, compressed air, pump and fan systems, and steam system. Common energy efficiency opportunities associated with these systems will also be discussed.

5 p.m.
Depart From Oak Ridge National Laboratory

Wednesday, 16 March 2022

7:45 a.m.
Bus Departs for Oak Ridge National Laboratory

8 a.m.
Developing Road Maps for Sustainability and Decarbonization,
Sachin Nimbalkar and Thomas Wenning, Oak Ridge National Laboratory
This session will provide an overview on decarbonization technology pillars such as electrification, low-carbon electricity and fuels, and carbon capture, utilization and storage.

9 a.m.
Decarbonizing the Steel Industry — Approaches, Technologies and Economics
Abhijit Sarkar, Dastur International Inc.
With 1.86 tons of CO_2 emitted for every ton of steel produced in 2020, decarbonizing industrial activity and specifically the steel industry, which accounts for 7–9% of the global greenhouse gas emissions (according to the World Steel Association), is a priority for steelmakers, governments and the informed public. This presentation will survey the approaches taken and how they compare in terms of abatement, implementation cost and time, and operating impact. Discussion will focus on capture technologies, the role of hydrogen as a clean reductant and carbon disposition alternatives available to steelmakers.

9:45 a.m.
Electrification Opportunities in the Iron and Steel Industry and the Demand for Low-Carbon Electricity
Kiran Thirumaran, Oak Ridge National Laboratory
The session will discuss opportunities to electrify existing fuel-fired thermal systems in the iron and steel industry. The advantages, barriers and state of adoption will be explored with examples.

10:30 a.m.
Break

10:45 a.m.
Use of Hydrogen in Steelmaking
Anup Sane, Air Products
This presentation will discuss the use of hydrogen in steelmaking for decarbonization.

11:30 a.m.
A Bio-Gas CCUS Option for Steelmakers
Tom Dower, LanzaTech
Discussion of industry-leading microbial gas fermentation, providing an innovative, commercial-scale carbon reduction option for iron- and steelmaking. This biology-based carbon capture and utilization technology can put emissions to productive and efficient use, creating sustainable fuels, chemicals and products in the circular economy.

Noon
Working Lunch

1 p.m.
Energy Efficiency Primer on Water/Wastewater Treatment Operations
Kiran Thirumaran, Oak Ridge National Laboratory
The session will review energy efficiency opportunities associated with wastewater treatment in the iron and steel industry. Common treatment processes and suitable technologies will be discussed with examples.

2 p.m.
Alternative Reductants for the Ironmaking Process
Mitren Sukhram, Hatch
This presentation will discuss the use of alternative reductants for ironmaking processes.

2:30 p.m.
Break

2:45 p.m.
Introduction to the Molten Oxide Electrolysis (MOE) Technology for GHG-Free Production of Iron and Steel
Stephan Broek, Boston Metal
Electrification is a key tool to decarbonize production processes, including iron- and steelmaking. Presented is an MIT discovery that is currently being commercialized to employ an electrolysis process to produce iron from iron ore in one step using only electricity. Combining this with inert anodes made from high-temperature alloys, a breakthrough technology is created that not only eliminates Scope 1 greenhouse gas (GHG) emissions, but also eliminates Scope 2 emissions if renewable electricity is used. The result is a truly GHG-free iron product. The presentation discusses the principles of the process, its flexibility regarding iron ore grades, the quality of the iron product, and ways the technology platform can be deployed by companies to help decarbonize the iron and steel industry.

3:15 p.m.
Industry Executives Address Decarburization in the Steel Industry
- Traci Forrester, Executive Vice President, Environmental and Sustainability, Cleveland-Cliffs Inc.
- David Miracle, Corporate Manager of Sustainability, Nucor Corp.
- Craig A. Blue, Director of Energy Efficiency and Renewable Energy Programs, Oak Ridge National Laboratory
- Jeffrey Hansen, Corporate Director — Human Resources and Safety, Steel Dynamics Inc.

5 p.m.
Depart Oak Ridge National Laboratory

Thursday, 17 March 2022

7:30 a.m.
Bus Departs from Hotel to Oak Ridge National Laboratory's Hardin Valley Campus

8:15 a.m.
Tour of Oak Ridge Manufacturing Demonstration Facility (Hardin Valley Campus)

9:15 a.m.
Tour of Oak Ridge National Laboratory's Grid Research Integration and Deployment Center (GRID-C) (Hardin Valley Campus)

10:15 a.m.
Bus Transfer to Oak Ridge National Laboratory Main Campus

10:45 a.m.
Tour of Oak Ridge National Laboratory's Leadership Computing Facility - Supercomputers (Main Campus)

11:15 a.m.
Bus Transfer to Manhattan Project Nuclear Reactor Museum

11:30 a.m.
Tour of Manhattan Project Nuclear Reactor Museum (Main Campus)

12:15 p.m.
Return to Hotel

12:30 p.m.
Conference Adjourn

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