



Energy Economics – Global Trends in Technology and Policy

March 30 - April 1, 2023

St. Louis, Missouri

MISSOURI
S&T

New Energy Technology and Energy Economics

The 2023 Laufer Energy Symposium will bring together world-class thought leaders focused on developing resilient energy systems to optimize surety, survivability, supply, sufficiency and sustainability with a focus on energy economics. The first Laufer Energy Symposium focused on transformational energy systems for a secure energy future. The second Laufer Energy Symposium focused on resilient energy, defined as the ability to prepare for and adapt to changing conditions, and to withstand and recover from disruptions, including deliberate attacks, accidents and natural incidents. This year's symposium, the third, will focus on new energy technology and energy economics.

In 2014, the kingdom of Saudi Arabia committed to generating half of its energy by 2032 from renewable sources. Achieving this goal requires the integration of more solar, wind and other renewable energy sources into resilient systems to increase efficiency while also decreasing costs. The 2023 Laufer Energy Symposium will bring together international experts from industry, government research labs and academia, focused on developing and applying next-generation fusion power and hybrid nuclear systems. The symposium will be co-hosted by Missouri University of Science and Technology, Mazoon College, Gulf University for Science and Technology, Washington University,

University of Illinois-Urbana/Champaign and the University of Missouri-Columbia.

This symposium series honors Wayne Laufer, who established the Wayne and Gayle Laufer Endowed Energy Chair at Missouri S&T. Dr. Joseph D. Smith, the founding Laufer Chair of Energy, will co-chair this symposium with Dr. Muthanna Al-Dahhan, the current Laufer Chair of Energy. The goal of this symposia is to establish collaborations among key researchers, industrial companies and governmental agencies from around the world to meet the challenge of providing clean energy that minimizes impact on the climate while also increasing economic performance to improve quality of life.



Thursday, March 30, 2023

7:30–8:30 a.m.

Registration and Breakfast

8:30–8:40 a.m.

Opening remarks: **Wayne Laufer**, retired CEO, Bois d'Arc Energy Corporation and founder, Laufer Energy Symposium

8:45–9:30 a.m.

Keynote presentation: **U.S. Energy Security and Nuclear Energy**, by **Dr. John Wagner**, laboratory director, Idaho National Laboratory, U.S. Department of Energy

9:45 a.m.–Noon

Session 1: Integrated Energy Systems

Hybrid energy systems have become more common in today's energy-informed society. This session focuses on the current designs that enhance economics.

Chair and moderator: **Dr. Joseph Smith**, professor and founding Laufer Endowed Energy Chair, Chemical and Biochemical Engineering, Missouri S&T, CTO and founder, Elevated Analytics Consulting.

9:45–10:30 a.m.

Session keynote speaker:
Dr. Bassam Alameddine, acting president and vice president for academic affairs, Gulf University of Science and Technology

10:30–10:50 a.m.

Dr. Khaled Kiswani, chair, sustainable energy and economic development, Gulf University of Science and Technology

10:50–11:10 a.m.

Dr. Haider Al-Rubaye, visiting scholar, Missouri S&T, senior engineer, Elevated Analytics Consulting

11:10–11:30 a.m.

Dr. Shoaib Usman, professor, nuclear engineering and radiation science, Missouri S&T

11:30–11:50 a.m.

Dr. Rizwan Uddin, professor and department head, plasma and radiological engineering, University of Illinois Urbana-Champaign

Noon–1:45 p.m.

Networking lunch

2–4:30 p.m.

Session 2: Unconventional Fuels

Biofuels, syncrude and other non-conventional fuels can reduce climate impact by providing increased resilience to the energy supply. This session introduces the newest approaches to augmenting our current energy supply with non-conventional resources.

Chair and moderator: **Dr. Joseph Smith**, professor and founding Laufer Endowed Energy Chair, Chemical and Biochemical Engineering, Missouri S&T, CTO and founder, Elevated Analytics Consulting.

2–2:45 p.m.

Session keynote speaker:
Wayne McFarland, CEO, Syntech Bioenergy, LLC

2:45–3:05 p.m.

Dr. Vivek Rao, nuclear CFD development engineer, Oak Ridge National Laboratory

3:05–3:25 p.m.

Dr. Kyle L. Buchheit, senior engineer, KeyLogic

3:25–3:45 p.m.

Dr. Jeremy Hartvigsen, research engineer, Idaho National Laboratory

3:45–4:30 p.m.

Panel Discussion

5–7:30 p.m.

Poster session and reception with light dinner

Friday, March 31, 2023

7:30–8:30 a.m.

Breakfast

8:30–8:40 a.m.

Opening remarks: **Dr. David Borrok**, vice provost and dean, College of Computing and Engineering, Missouri S&T

8:45–9:30 a.m.

Keynote presentation: **Fossil Future: Why Global Human Flourishing Requires More Oil, Coal, and Natural Gas—Not Less**, **Alex Epstein**, founder and president for the Center for Industrial Progress and author of *Fossil Future: Why Global Human Flourishing Requires More Oil, Coal, and Natural Gas—Not Less*

9:45 a.m.–12:15 p.m.

Session 3: Renewable Energy

We only have one planet, Earth, so we must use our limited resources wisely. Renewable energy resources are by definition infinite because they renew themselves. Traditional renewable energy systems use wind, solar and hydropower. The cost to use these resources has been driven down but are still high. This session will focus on novel ways to improve the economic performance of renewable energy.

Chair and moderator: **Dr. Vijay Ramani**, professor, Energy, Environmental and Chemical Engineering, Washington University in St. Louis

9:45–10:30 a.m.

Session Keynote Speaker:
John Warmack, U.S. Department of Energy

10:30–11 a.m.

Dr. Richard Axelbaum, professor, energy, environmental and chemical engineering, Washington University in St. Louis

11–11:30 a.m.

Matt Belcher, COO, Enhanced Building Systems LLC, and principal, Verdatek Solutions LLC Consulting

11:30 a.m.–Noon

Dr. Vijay Ramani, professor, Energy, Environmental and Chemical Engineering, Washington University in St. Louis

12:15–1:45 p.m.

Networking lunch

2–4:30 p.m.

Session 4: Energy Economics and Policy

This session will focus on key policy affecting energy production and utilization, including carbon markets and pricing.

Chair and moderator: **Dr. Greg Gelles** — emeritus professor of economics, Missouri S&T

2–2:45 p.m.

Session keynote speaker:
Gale Hauck, senior advisor, Office of Nuclear Energy

2:45–3:05 p.m.

Dr. John W. Rogers, professor of economics, American International College

3:05–3:25 p.m.

Col. (retired) Paul Roeger, senior advisor, energy programs, U.S. Army Materiel Command

3:25–3:45 p.m.

Josh Campbell, executive director, Missouri Energy Initiative

3:45–4:30 p.m.

Panel Discussion, moderated by **Dr. Vijay Ramani**, professor, Energy, Environmental and Chemical Engineering, Washington University in St. Louis

5–7:30 p.m.

Poster session and reception with light dinner

Saturday, April 1, 2023

7:30–8:30 a.m.

Breakfast

8:30–8:40 a.m.

Opening remarks: **Dr. Joseph Smith**, professor and founding Laufer Endowed Energy Chair, Chemical and Biochemical Engineering, Missouri S&T, and CTO and founder, Elevated Analytics Consulting

8:45–9:30 a.m.

Keynote presentation: **Z-Pinch Fusion for Commercial Applications**, by **Dr. Ryan Umstattd**, vice president of product and partnerships of Zap Energy

9:30–11:35 a.m.

Session 5: Sustainable, Renewable, and Resilient Systems

Fusion power with hybrid nuclear systems represents the future of energy technology. This session will present the latest in these systems with a focus on economic performance.

Chair and moderator: **Dr. Muthanna Al-Dahhan**, Laufer Endowed Energy Chair and Curators Distinguished Professor of Chemical and Biochemical Engineering, Missouri S&T

9:30–10:15 a.m.

Session keynote speaker: **Dr. Fatih Dogan**, professor of materials science and director of Center for Research in Energy and Environment (CREE), Missouri S&T

10:15–10:35 a.m.

Dr. Joe Newkirk, chair and professor, nuclear engineering and radiation science, Missouri S&T

10:35–10:55 a.m.

Dr. Jamal Chaouki, professor, Polytechnic de Montreal

10:55–11:15 a.m.

Dr. Youssef Belmabkhout, professor of chemistry and chemical engineering, Mohammed VI Polytechnic University

11:15–11:35 a.m.

Dr. Rusi Taleyarkhan, professor of nuclear engineering, Purdue University

11:35 a.m.–Noon

Closing remarks: **Dr. Muthanna Al-Dahhan**, Laufer Endowed Energy Chair and Curators' Distinguished Professor of Chemical and Biochemical engineering, Missouri S&T



