# Call For Papers

# Power For Tomorrow

# The 46th International Technical Conference on Clean Energy

## August 1 to 4, 2022

## Clearwater, Florida, USA

**If You Want To Learn More About Innovations That Are Meeting The Challenges to Energy Utilization From The World's Key Planners, Leading Experts and "Super Scientists" In The Most Comprehensive Program on Energy Technologies With Representatives From Six Continents, Then You Must Attend**

# The Clearwater Clean Energy Conference

## CONFERENCE HIGHLIGHTS

**The Panels, Short Courses and Technical Sessions cover all the critical technological issues of the day as we explore Power For Tomorrow.** Our goal is to have an in-person conference. However, if international speakers need to participate virtually, we will accommodate them.

**MISSION STATEMENT –** Increased demand – coupled with energy security issues, and uncertainty in the oil sector **– make this conference a must for those involved in all aspects of power generation** who must meet the competitive pressures and environmental concerns in the 21$^{st}$ century.

The current Administration continues to bring in many more opportunities for the energy sector. We plan to cover all the proposed programs and policies. As changes and additions occur, we will cover them.

## CONFERENCE HIGHLIGHTS

**Domestic Keynote Speaker:** *Brian Anderson, Laboratory Director, National Energy Technology Laboratory, U.S. Department of Energy,* will speak on Monday morning, August 1, 2022.

**International Keynote Speaker: *Invited:*** *Professor Fangqin Cheng, Vice President – Research, Shanxi University, CHINA,* will address utilization of low-grade coal and coal combustion by-products on Tuesday morning August 2, 2022.

**International Programs – Technical Developments – Policy Issues**

Papers from the international community are strongly encouraged. At the 2021 conference nine countries were represented at the conference. In addition, one-third of all attendees were from the international community. The international papers were related to energy/environmental developments throughout the world.

The Committee also encourages papers that deal specifically with the topics covered in the Keynote Session, Panels, Short Courses and Plenary Sessions.

**PANELS –** To provide our attendees with the most comprehensive and up-to-date information from the world's energy leaders, we offer panel presentations covering an overview of emerging, evolving, and innovative technologies, fuels, policy and/or equipment in the power generation industry.

## WORKSHOP: MSW COMBUSTION

**Chair: Prof. Lunbo Duan, and**
**Co-Chair: Prof. Yueming Wang, Ph.D.,**
**Southeast University, China**

The Southeast University in China (SEU) has conducted extensive research on solid waste combustion in fluidized beds. They have built the first circulating fluidized bed that purely burns MSW in China. SEU and representative from all those involved in the project from China and other countries will offer an extensive Workshop about the project and its results. Complete details will be available shortly.

**SHORT COURSES** On Sunday, July 31st, we will offer Short Courses on a wide variety of topics important to the energy community. Participation is optional and is included in the registration fee.

- **Introduction to Natural Gas Processing**
  *Dr. Evan Granite, Fossil Energy & Carbon Management, U.S. Dept. of Energy*

- **Combustion Tuning: Why and How –** Just like your automobile a steam generator needs to be kept in tune to provide the best performance and the lowest emissions. We will discuss the whys and hows of boiler tuning.
  *J.J. Letcavits, AEP, and Alan Paschedag, Covanta*

**THEMED LUNCHEON** – A conference favorite is the Themed Luncheon. Industry leaders host tables of 8 where a specific topic is chosen by the host for discussion during lunch.

- **Low $NO_x$ Burners**, *J.J. Letcavits, AEP*
- **Point Source and Direct Air Carbon Capture,** *Dr. Ronald Breault, National Energy Technology Laboratory, U.S. Department of Energy*
- **Gasification,** *Prof. Ashwani Gupta, University of Maryland*
- **Oxy-fuel Combustion in a Carbon Constrained World,** *Dr. Lawrence E. Bool, Linde*

**FIELD TRIP – Friday, August 5th to TECO's Clean Energy Demonstration Center** that includes solar power, at the Florida Conservation & Technology Center adjacent to the Big Bend Power Station.

**BACKGROUND –** At the direction of the Conference Committee, it was decided to broaden the scope of the conference to include some new and exciting technologies currently on the horizon. Industry professionals representing nearly all the major players in the electric utility industry participated virtually in the **45th Clearwater Clean Energy Conference.**

This conference has earned a reputation for excellence as one of the premiere conferences on energy technologies as it grows in size and scope since its inception in 1975.

Through the Technical Sessions, Short Courses, and Panels, cutting-edge developments dealing **with technical solutions to problems; specific strategies; projects; innovations; industry trends; and/or regulatory compliance** will be offered. The program presents an extensive overview of emerging, evolving, and innovative technologies, fuels and/or equipment in the power generation industry. We seek papers from all countries worldwide.

The **Clearwater Clean Energy Conference** will offer participants more than 150 technical presentations in four days along with luncheons and Continental breakfasts.

# TECHNICAL SESSIONS

Industry experts are taking the lead in organizing sessions on topics of the greatest interest to the industry.

## PC FIRED UNITS

*Looking for papers related to PC fired power plant performance ranging from feed systems to emissions to water side issues, etc.*

*J.J. Letcavits, AEP, and*
*Alan Paschedag, Covanta*

## BIOMASS ENERGY

*Les Marshall, Canada and Josh Stanislowski, Energy & Environmental Research Center*

- **With Carbon Capture and Storage (BECCS)**

## HYDROGEN TO POWER CONCEPTS

*Howard Meyer, Gas Technology Institute*

- **Hydrogen production sources and their role and use in energy production systems - scale and economy**
- **Power-to-x methods for converting electrical energy into liquid or gaseous chemical energy sources through electrolysis and further synthesis processes to produce e-fuels covering electrolysis and the downstream conversion**
  *Dr. Ronald J. Stanis, Gas Technology Institute*

## CASE STUDIES IN PLANT CONVERSIONS

*Brian Vitalis, Babcock Power; and*
*Thomas Flynn, Babcock & Wilcox*

## PYROLYSIS & VALUE-ADDED PRODUCTS

*Prof. Gerri Botte, Texas Tech University*

## UPGRADING NATURAL GAS TO CHEMICAL FEEDSTOCK

*Evan Granite, National Energy Technology Laboratory, U.S. Department of Energy*

## FLUIDIZED BEDS

*James DeSellem, Babcock & Wilcox*

## COMBUSTION & GASIFICATION

*Looking for modeling and experimental papers related to fundamentals, kinetics, heat and mass transfer, reactor design, device performance and other related topics. More specifically in the following areas.*

- **Oxy-Combustion**
  *Dr. Klas Andersson, Chalmers University of Technology, Sweden, and Dr. Andrew Fry, Brigham Young University*
- **Pressurized Oxy-Combustion**
  *Dr. Rich Axelbaum, Washington University in St. Louis and*
  *Dr. Lawrence E. Bool, Linde*
- **$H_2$ Combustion & $NH_3$ Combustion**
  *Marc Cremer, Reaction Engineering International*
- **Other Fuel Combustion**
  *Dr. Edmundo Vasquez, Clean Energy Technologies and Dr. Ronald Breault, National Energy Technology Laboratory, U.S. Department of Energy*
- **Low Grade Fuel Utilization**
  *Prof. Dongke Zhang, The University of Western Australia*
- **Gasification (Coal, Waste, Biomass and Plastic)**
  *Dr. Ashwani Gupta, University of Maryland; and Weihong Yang, KTH Royal Institute of Technology, Sweden*

## 21ST CENTURY POWER PLANT

*David Lyons, National Energy Technology Laboratory, U.S. Department of Energy*

## $sCO_2$

*Prof. Subith Vasu, CATER, University of Central Florida; and*
*Bhupesh Dhungel, Air Liquide*

- **$sCO_2$ Cycles**
- **Indirect**
- **Coal Direct (Coal and other fuels)**
- **Combustion System**
- **Heat Transfer**
- **High Temperature/Low Temperature Cycles**
- **Hybrid Systems**

## COAL PREPARATION/HANDLING/-BENEFICIATION

*Dr. Dave Osborne, Somerset International, Australia*

## GASIFICATION FOR POWER AND CHEMICALS (COMMERCIAL AND PILOT OPERATIONS)

*Looking for papers from pilot and commercial gasification plants focused on production of power and various chemicals. Also, incudes papers on other aspects of the gasification plant, such as acid gas removal, water gas shift. etc.*
*Massood Ramezan, KeyLogic Systems, and Kunlei Liu, University of Kentucky*

## DIGITAL TWINS AND OTHER STRATEGIES DATA ANALYTICS/MACHINE LEARNING INTEGRATED ENERGY SYSTEMS AND ADVANCED CONTROLS

*Larry Shadle, National, Energy Technology Laboratory, U.S. Department of Energy;*
*Rick Kephart, Emerson; Dr. Robert Hovsapian, National Renewable Energy Laboratory, U.S. Department of Energy (NREL)*

## CHEMICAL LOOPING

*Andrew Tong, Susteon; and Robert Stevens, National Energy Technology Laboratory, U.S. Department of Energy*

- **Carrier Development**
- **Component Development**
- **Systems Analysis**
- **Chemical Production**

## $CO_2$ CAPTURE & UTILIZATION

- **$CO_2$ Chemistry & Catalysts –** *the conversion of $CO_2$ into higher carbon-number, higher-value products – Prof. James Spivey, Louisiana State University and Dushyant Shekawahat, National Energy Technology Laboratory, U.S. Department of Energy*
- **Point Source Capture**
  *David Hopkinson and Fangming Xiang, National Energy Technology Laboratory, U.S. Department of Energy*
- **Direct Air Capture**
  *Brian Higgins, The Babcock & Wilcox Company; and Dr. Ronald Breault, National Energy Technology Laboratory, U.S. Department of Energy*
- **Impact on Soils and Ecosystems**
  *Dr. Edmundo Vasquez*
  *Clean Energy Technologies*
- **$CO_2$ Pricing**
  *Dr. Janusz Lichota, Wrocław University of Technology, Poland*

## NET ZERO EMISSIONS

*Massood Ramezan, KeyLogic*

## ECOENERGY UTILIZATION

*Dr. Edmundo Vasquez, Clean Energy Technologies and*
*Prof. Jaroslaw Zuwala, Institute for Chemical Processing of Coal, Poland*

- **Fundamentals**
- **Integration**
- **Storage**

## ENERGY FROM WASTE

*Alan Paschedag, Covanta*

- **Low Grade Fuel Utilization**

## MODELING & SIMULATION

*Dr. Edmundo Vasquez*
*Clean Energy Technologies*

- **Fundamentals and Applications**

## EMISSIONS ($SO_2$/$NO_X$/$CO_2$/HG/-PARTICULATES)

*Dr. Edmundo Vasquez, Clean Energy Technologies, and Byron Burrows, TECO*

## TRANSPORTATION FUELS

*Jonathan Lekse and Dushyant Shekhawat, National Energy Technology Laboratory, U.S. Department of Energy*

## INNOVATIVE AND LOW CARBON FUELS

*Prof. Dongke Zhang*
*The University of Western Australia*

- **Ultra Low Carbon Footprint**

## ADVANCES IN ANALYTICAL AND TESTING TECHNIQUES

*Dr. Dave Osborne*
*Somerset International, Australia*

## RECOVERY OF RARE EARTH METALS and DERIVING MORE VALUE FROM WASTE

*Including developing various new building materials, such as road base pellets, and soil additives derived from mine and power plant wastes; and recovering REEs and other metal elements from coal mine wastes.*
*Evan Granite and Thomas Tarka, National Energy Technology Laboratory, U.S. Department of Energy; Dave Osborne and Jim Fisher, Somerset International.*

## RADIATION

*TBD*

**We lost a very dear colleague with the death of Kevin Davis of Reaction Engineering International. To honor Kevin's memory, we are organizing a special session devoted to the work to which he dedicated his professional life. If you were a colleague of Kevin and wish to participate, please let us know.**

# CALL FOR PAPERS
# 2022 Clearwater Clean Energy Conference
# Power For Tomorrow
# The 46th International Technical Conference on Clean Energy
# August 1 to 4, 2022
# Sheraton Sand Key, Clearwater, Florida, USA

## ABSTRACT REQUIREMENTS

The **ONE PAGE ABSTRACT,** required by **April 15, 2022,** must be submitted via email and include:

- The Proposed Paper with Exact Title and one page of information (no equations and no figures) must summarize the objective and current status of the work; and provide the committee with an accurate scope of the paper. **Please indicate under which Technical Topics this paper falls.**

- Principal Presenter Listing (name, title, company, address, phone, and email). Email addresses are required since this will be the primary mode of communication. Please include Complete Listings for all Co-Authors (name, title, company, address, phone, FAX and email).

The Clearwater Clean Energy Conference does not provide financial support to authors. The registration fee covers one technical paper; authors submitting more than one paper must include an additional $100 per paper.

Notification of acceptance will be made immediately. A manuscript for inclusion in the Proceedings and for distribution on thumb drive (not to exceed 12 pages in length, with illustrative material) is required by **June 15, 2022.**

Instructions for preparation of manuscripts will be sent with letters of acceptance. Presentations will be scheduled in Panels and Technical Sessions, as determined by the Conference Committee. The **ONE-PAGE** abstract should be sent via email to BarbaraSak@aol.com.

**Best Student Paper Award** – Over the years the conference has benefitted from the many excellent papers given by students. To give these exceptional

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| The Principal Presenter is the person to whom all correspondence will be sent and who must meet the deadlines and obligations of the conference: making a presentation at the 2022 conference; submitting a manuscript; and paying a conference fee.<br><br>The non-refundable registration fee of $795 is due immediately upon acceptance. There is no reimbursement for time spent or expenses incurred in preparing manuscripts or illustrations, or for transportation to, and expenses at the conference. | students well-deserved recognition, the Conference Committee awards the best paper from a student with the **Clearwater Clean Energy Conference Best Student Paper Award.** The student will be evaluated in the quality of the paper, grasp of the topic presented and quality of the presentation at the conference. The student must be present to win. |

**THE CONFERENCE COMMITTEE** The dedicated efforts and expertise of each Committee member result in the excellent Technical Program offered each year. They reach out to all segments of the energy industry so that the state-of-the-art (and beyond) is presented. Through their hard work, we offer a world-renowned conference each year. This year's Conference Committee members are:

**Adelhi University**
Dr. John Dooher
**AEP**, J.J. Letcavits
**AECOM,** Dr. Guisu Liu
**Air Liquide**, Bhupesh Dhungel
**Arizona State University**
Dr. Klaus S. Lackner
**The Babcock & Wilcox Company**, Thomas Flynn
**Babcock Power Inc.**
Brian Vitalis
**Boise State University**
Prof. JoAnn Lighty
**Brigham Young University**
Prof. Bradley Adams and
Prof. Andrew Fry
**CANMET Natural Resources Canada**
Dr. Ligang Zheng
**Chalmers University of Technology**
Prof. Klas Andersson (Adjunct Professor, Department of Chemical Engineering, **University of Utah**), and Fredrik Lind
**Clean Energy Technologies**
Dr. Edmundo R. Vasquez
**Covanta,** Alan Paschedag
**CSIRO**
Dr. Louis Wibberley and
Dr. David Harris
**Electric Power Research Institute,** Horst Hack
**Energy & Environment**
Prof. Dr.-Ing. Klaus R. G. Hein (Chairman Emeritus)
**Energy & Environmental Research Center, University of North Dakota**
Christopher J. Zygarlicke and
Josh Stanislowski
**EverSource**
Bonnie Courtemanche
**Gas Technology Institute**
Howard Meyer
**Huazhong University of Science**
Prof. Chuguang Zheng
**Institute for Chemical Processing of Coal**
Dr. Jaroslaw Zuwala
**ION Engineering**
Dr. Erik Meuleman
**Jiangnan Environmental Technology, Inc. (JET)**
Robert Nicolo
**KeyLogic Systems Inc.**, Massood Ramezan
**Korea Advanced Institute of Science and Technology,** Assoc. Prof. Jeong Ik Lee
**Lehigh University**
Dr. Edward K. Levy
**Linde,** Dr. Lawrence E. Bool III (Co-chair)
**Mitsubishi Hitachi Power Systems Europe GmbH,** Gosia Stein-Brzozowska
**Monash University**
Dr. Sankar Bhattacharya
**National Energy Technology Laboratory, U.S. Department of Energy,** Dr. Ronald W. Breault (Co-Chair)
**Northeastern University**
Dr. Yiannis A. Levendis
**Ontario Power Generation**, Les Marshall
**Pennsylvania State University**
Bruce G. Miller

**Reaction Engineering Int'l**
Marc Cremer
**Ruhr-University Bochum, Department of Energy Plant Technology**, Prof. Viktor Scherer
**Somerset International,** Dr. Dave Osborne
**Tampa Electric Company**
Yogesh M. Patel and Byron Burrows
**Texas Tech University**, Dr. Gerardine G. Botte
**Tsinghua University**
Prof. Yuxin Wu
**U.S. Department of Energy**
Andrew M. Hlasko
**University of Alberta**
Dr. Rajender Gupta
**University of Kentucky**
Dr. Kunlei Liu
**University of Maryland**
Dr. Ashwani Gupta (Co-Chair)
**University of Newcastle**
Prof. Terry Wall
**University of North Carolina at Charlotte**
Dr. Nenad Sarunac
**University of South Carolina**
Prof. Jochen Lauterbach
**University of Utah**
Prof. Eric Eddings, and Kevin Whittey
**Wrocław University of Technology**, **Poland**
Halina Pawlak-Kruczek Ph.D., D.Sc., and Dr. Janusz Lichota

# 46th International Technical Conference on Clean Energy
# August 1 to 4, 2022
# Clearwater, Florida, USA

*Endorsing Organizations:*

- **American Institute of Chemical Engineers**
- **American Public Power Association**
- **CANMET Natural Resources, Canada**
- **China Coal Research Institute**
  **Ministry of Coal, People's Republic of China**
- **Edison Electric Institute**
- **Export Assistance Center, U.S. Commercial Service**
- **International Energy Agency: Coal Research**
- **Japan Coal Energy Center (JCOAL)**
- **National Mining Association**
- **National Rural Electric Cooperative Association**
- **Ohio Coal Development Office**
- **U. S. Geological Survey**

The Clearwater Clean Energy Conference

## Deadline for Abstracts:

## April 15, 2022

*Clearwater Clean Energy Conference*
*Post Office Box 1130*
*Louisa, VA 23093*
*240-751-0900*

www.ClearwaterCleanEnergyConference.com

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