

ASME CARD 2024

Conference for Advanced Reactor Deployment



## Program

EPRI, Charlotte, NC, USA

https://event.asme.org/CARD

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### **Welcome From The Chairs**



Nicholas McMurray Conference Co-chair

### **Dear Distinguished Attendees:**

Welcome to the 2024 ASME Conference for Advanced Reactor Deployment (CARD) at EPRI headquarters in Charlotte, NC!

Now in its second year, CARD looks to build upon the industry momentum to deploy new nuclear technologies. It's not just private industry interest, but global interest as well proves there is a real demand for new nuclear technology.

Don't take my word for it. Last year, the Potential Energy Coalition polled over 2,000 Americans and found that over 76% were supportive of advanced nuclear energy being a part of the U.S. energy mix. In addition to those in the U.S., globally, they polled additional individuals in South Korea, Japan, France, Germany, the United Kingdom, Poland, and Sweden. There they found that about 64% of people support advanced nuclear.

While the industry is well-positioned to build their order books and build, it hasn't been easy. Over the last year there have been challenges, with project cancellations and cost increases. These challenges aren't unique to the nuclear industry, but developers are going to have to demonstrate the ability to execute their projects in order to attract additional customers, especially those customers who are less familiar with nuclear energy.

This is exactly why ASME CARD was envisioned. Codes and standards are critical when it comes to construction timelines and cost. Therefore, ASME and its volunteer members will play a critical role in the success of the nuclear industry. In addition, entities like EPRI, with their cutting-edge research, seek to remove barriers to deployment.

Just like last year, the CARD program was a true team effort – every member of the Organizing Committee and every ASME staff member played a significant role in setting the event up for success. On behalf of my fellow co-chairs, I want to thank all of you for your efforts. In addition, I especially want to thank EPRI for hosting CARD this year.

Thank you all for your attendance and participation. I look forward to seeing you in Charlotte!

Sincerely,

Nicholas McMurray

Nicholas McMurray Conference Co-chair





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### **THANK YOU!**

Thank you to our volunteers! Without their dedication and time commitment, CARD could not be a successful conference.

### ASME 2024 CARD CONFERENCE ORGANIZERS

Nicholas McMurray, Conference Chair Robert Stakenborghs, Conference Co-Chair Yassin Hassan, Technical Program Chair Guoqiang Wang, Technical Program Co-Chair Asif Arastu, Technical Program Co-Chair

### ASME 2024 CARD SESSION ORGANIZERS

Maury Pressburger, Chair, Reactor Technology
Tom Vogan, Chair, Code Development Panels
Kathryn Hyam, Co-Chair, Code Development Panels
DeLeah Lockridge, Chair, Modularization and Advanced Manufacturing
Matthew Naraine, Chair, Regulatory Modernization Panel
Eli Windsor, Co-Chair, Early Career Engagement
Kelly McGrath, Conference Advisor
Michael Roy, Conference Advisor
Craig Stover, Conference Advisor
Frank Michell, Member

### **General Information**



### REGISTRATION HOURS AND LOCATION

Registration will be located in the lobby of building 3 at EPRI headquarters.

### The hours are as follows:

### TUESDAY

March 26

8:00AM – 5:00PM

### WEDNESDAY

March 27 8:00AM – 4:00PM

### WI-FI

Username: cltguest1300 Password: EPRIguest1300

### **REGISTRATION POLICIES**

- 1. Conference registration fees include admission to all sessions and meals provided at the conference.
- 2. All attendees, including member, non-members, authors, panelists, chairs, and co-chairs, must pay the appropriate registration fee.



### Schedule at a Glance

Timing in EST	Tuesday, March 26
8:30 AM - 9:00 AM	Breakfast
9:00 AM - 10:15 AM	Welcome and Keynote Session Thomas Costabile, Arshad Mansoor & Grace Stanke
10:15 AM - 10:30 AM	Break
10:30 AM - 12:00 PM	Modularization Panel and Updating Standards to Meet Advanced Reactor Design Needs
12:00 PM - 1:00 PM	Networking Lunch
1:00 PM - 2:15 PM	Reactor Technology Deployment Plenary Panel Craig Stover, Chris Goosen & Dr. Mark Nutt
2:15 PM - 2:30 PM	Break
2:30 PM - 3:45PM	Advanced Reactor Technology Readiness Panel (Part 1) and Early Career Panel
3:45PM - 4:00 PM	Break
4:00 PM - 5:15 PM	Transitioning from Advanced Reactor Research to Deployment and Voice of the Customer
5:30 PM - 6:45 PM	Welcome Reception

Wednesday, March 27	
8:30 AM - 9:00 AM	Breakfast
9:15 AM - 10:15 AM	The Importance of Communication to Nuclear Power
10:15 AM - 10:30 AM	Break
10:30 AM - 12:00 PM	Developing Cost Savings Strategies for Advanced Reactors and Digital Twin Technology - Panel 1
12:00 PM - 1:00 PM	Networking Lunch
1:00 PM - 1:45 PM	Round Table on Advanced Reactor Deployment
1:45 PM - 2:00 PM	Break
2:00 PM - 3:30 PM	Digital Twin Technology - Panel 2 and Regulatory Modernization Panel
3:30 PM - 3:45 PM	Break
3:45 PM - 5:00 PM	Advanced Reactor Technology Readiness Panel (Part 2)
5:00 PM - 6:30 PM	Technical Women's Network

	Thursday, March 28
8:30 AM - 9:00 AM	Breakfast- Building 1
9:00 AM - 10:30 AM	EPRI Tour- Building 1

### **Keynote Speakers**

### **Keynotes**

**TUESDAY, MARCH 26** 

### 9:00AM - 10:15AM ROOM 741 BCEF



Arshad Mansoor President and Chief Executive Officer

**Biography:** Arshad Mansoor is EPRI's President and Chief Executive Officer, responsible for the institute's operation and its portfolio of R&D and demonstration programs, spanning all sources of generation, power delivery and utilization, and the environment.

Previously Mansoor served as senior vice president, research and development, responsible for leading the development of the R&D portfolio, effective collaboration in shaping and conducting research, and the effective application of research findings, including technology transfer. Prior to that, as vice president of EPRI's Power Delivery and Utilization sector, he led research, development, demonstration, and application of transmission and distribution and energy utilization technologies. He was vice president then CEO of the former EPRI subsidiary, EPRI Solutions, and vice president and director of engineering of the EPRI Power Electronics Application Center.

Beginning in 2007, he directed EPRI's Energy Efficiency Initiative to facilitate smarter power delivery and enduse. In 2012 Mansoor launched EPRI's Integrated Grid initiative, charting a course for the electricity sector to integrate distributed resources such as rooftop solar and onsite energy storage with utilities' central generation, transmission, and distribution systems.More recently, he has guided and shaped EPRI's Efficient Electrification Initiative, examining the potential for economywide electrification to reduce overall energy demand and emissions while improving economic efficiency and enhancing customer satisfaction.

Today he is driving low-carbon research spanning the evolving energy system, interconnected energy technologies and emerging resources such as hydrogen. Focused on accelerating decarbonization across the economy, this work is identifying effective pathways to double by 2030 the U.S. energy-related CO2 emission reductions achieved since 2005—and to enable a more than 80 percent reduction by 2050. Mansoor holds five U.S. patents in power electronics and distributed energy resources. He is a senior member of the IEEE and served as vice president of the U.S. National Committee of CIGRE, the international council on large electric systems, and as a member of the board for the Energy Production and Infrastructure Center (EPIC) at the University of North Carolina, Charlotte. He has published numerous papers in journals and conference proceedings and has given talks and participated in panels at leading technical forums worldwide.

He earned a Bachelor of Science in electrical engineering from the Bangladesh University of Engineering and Technology. Mansoor earned his Master of Science (1992) and doctorate (1994) in electrical engineering, focusing on power systems engineering from the University of Texas in Austin. He completed the MIT Reactor Technology Course and the Harvard Business School Advanced Management Program.



**Grace Stanke** Constellation Former Miss America

Biography: It's not often that you find an athlete, engineer, musician, and a former Miss America all in one. Grace Stanke breaks misconceptions surrounding nuclear energy through social media, public engagements, and educational workshops. During her year as Miss America 2023, Grace was named the "New Face of Nuclear Energy" by the Wall Street Journal and was on the Forbes 30 under 30 list for Energy. While completing approximately 270,000 miles of travel, she finished her undergraduate degree in Nuclear Engineering from the University of Wisconsin-Madison. Since passing on the title of Miss America, Grace continues to travel to advocate for peaceful purposes of the science of the atom. Encouraging worldwide change for clean, zero-carbon emission energy sources, Stanke emphasizes the benefits of nuclear power and seeks to dispel the myths around nuclear energy while inspiring the next generation of scientists, engineers, and mathematicians. In March 2024 Grace begins work as a Core Design Engineer at Constellation. Outside of the nuclear industry, Grace is an avid waterskier, classical violinist, and a travel enthusiast.

"I'm not looking to change the entire world on my own all I need to do is make the one connection that will start a chain reaction."

### Reactor Technology Deployment Plenary Panel

### **TUESDAY, MARCH 26**

1:00PM - 2:15PM ROOM 741 BCEF



Craig Stover Senior Program Manager, Nuclear Sector EPRI

**Craig Stover** is a Senior Program Manager in the Nuclear Sector at EPRI. Craig leads the Advanced Nuclear Technology (ANT) program which is focused on developing technology and solutions to support the deployment of the next generation of new nuclear power plants. Craig is also responsible for the Nuclear Beyond Electricity (NBE) Initiative.

Over his 10+ years at EPRI, Craig has worked in several different roles. Craig managed the Balance of Plant NDE Innovation program. He led the advanced manufacturing and materials area in the Advanced Nuclear Technology (ANT) program. Craig also worked in EPRI's Balance of Plant Corrosion (BOPC) program leading heat exchanger and thermal performance research.

Craig joined EPRI after spending 6 years with South Carolina Electric & Gas (SCE&G). During his time at SCE&G, Craig worked on the VC Summer Project where he supported licensing and constructing two new AP1000 nuclear power plants.

Craig holds a BS degree in Mechanical Engineering from the University of South Carolina and an MBA from Ohio University.



Chris Goosen Director, AP300 Small Modular Reactor Westinghouse Electric Company

**Christopher Goossen** has held the position of Director, AP300 Small Modular Reactor for Westinghouse Electric Company since May of 2023. Previously, Mr. Goossen has held the role of Director, Advanced Reactors Product Management. Mr. Goossen has held a number of roles with increasing responsibility including Director of mechanical and piping engineering, Director of Project Engineering for AP1000, and Program Manager leading resolution of all emergent issues during construction of six AP1000 reactors in both China and the United States. Mr. Goossen spent 3 years in Sanmen, China directly supporting construction of the first AP1000 units in the world. Mr. Goossen graduated from Pennsylvania State University with a degree in Mechanical engineering and Purdue University with a Masters in Engineering.



**Dr. Mark Nutt** Manager, Nuclear Energy Sector PNNL

**Dr. Mark Nutt** joined PNNL in September 2018 as manager of the Nuclear Energy sector, overseeing programmatic support of the DOE Office of Nuclear Energy (DOE-NE), the U.S. Nuclear Regulatory Commission (NRC), and commercial and international clients.

Dr. Nutt also serves as the U.S. representative and is the chairman of the International Atomic Energy Agency's Technical Working Group for Fuel Cycle Options and Spent Fuel Management. He previously served as the national technical director (NTD) of the Integrated Waste Management program in DOE-NE's Office of Spent Fuel and Waste Disposition Program and was responsible for planning, coordinating, integrating, and managing a team comprised of national laboratories and contractors to support the DOE's efforts to implement an integrated waste management system for spent nuclear fuel and high-level nuclear waste. From 2006 to 2018, Dr. Nutt served as a principal nuclear engineer in the Nuclear Engineering Division at Argonne National Laboratory (ANL). He served as the deputy NTD of the DOE-NE Used Fuel Disposition Research and Development campaign. He was responsible for the management of that program, establishing research and development priorities related to the geologic disposal of nuclear waste, and performing technical work evaluating the performance of geologic disposal systems. He also performed research on the waste management performance attributes of advanced nuclear fuel cycles and investigated alternative disposition pathways and served as the co-chairman of the Waste Management Working Group under the U.S.-Japan Joint Nuclear Energy Action Plan. Prior to joining Argonne National Laboratory in 2006, Dr. Nutt spent over nine years working on the DOE Yucca Mountain Project performing a variety of activities in support of DOE's efforts to develop a license application for submittal to the NRC for authorization to construct a geologic repository. He also has assessed the performance of facility designs for the disposal of lowlevel radioactive waste and spent four years as a reactor support engineer at a nuclear utility.

Dr. Nutt received his BS, MS, and PhD degrees in nuclear engineering from Iowa State University. He has also received management and leadership education and training, including completion of the Strategic Laboratory Leadership Program at the University of Chicago Booth School of Business.

### Schedule

### **TUESDAY, MARCH 26TH**

### BREAKFAST

8:00AM - 9:00AM ROOM: DINING ROOM

### WELCOME AND KEYNOTE PRESENTATIONS

9:00AM - 10:15AM ROOM: 741 BCEF

Welcome by Thomas Costabile, P.E., Executive Director and CEO, ASME.

### **Presenters:**



Thomas Costabile, P.E., Executive Director and CEO, ASME



Arshad Mansoor President and Chief Executive Officer



**Grace Stanke** Constellation Former Miss America

### **REFRESHMENT BREAK**

10:15AM - 10:30AM ROOM: FOYER

### MODULARIZATION AND ADVANCED MANUFACTURING PANEL

10:30AM - 12:00PM ROOM: 741 BCEF

### **Presenters:**



DeLeah Lockridge Moderator



**Richard Howard** ORNL Panelist



**Ryan Dehoff, Ph.D.** ORNL Panelist



**Phil Malone** Core Power Panelist



Matthew Kravec Westinghouse Electric Company Panelist



Marcel Devos Prodigy Clean Energy Panelist

### UPDATING STANDARDS TO MEET ADVANCED REACTOR DESIGN NEEDS

10:30AM - 12:00PM ROOM: 741 AD

The rapid deployment of advanced reactors will require a change towards the international standardization of reactor designs and updates to existing codes and standards to meet the advanced reactor design needs.

### **Presenters:**



Kathryn Hyam ASME Moderator



Tom Ruggiero Panelist



**Timothy Adams** Jensen Hughes Panelist



Yanli Wang Oak Ridge National Laboratory Panelist

### **NETWORKING LUNCH**

12:00PM - 1:00PM ROOM: DINING ROOM

### **REACTOR TECHNOLOGY DEPLOYMENT PLENARY PANEL**

1:00PM – 2:15PM ROOM: 741 BCEF

### **Presenters:**



DeLeah Lockridge Moderator



Craig Stover Senior Program Manager, Nuclear Sector EPRI



Chris Goosen Director, AP300 Small Modular Reactor Westinghouse Electric Company



**Dr. Mark Nutt** Manager, Nuclear Energy Sector PNNL

### **REFRESHMENT BREAK**

2:15PM - 2:30PM ROOM: FOYER



2:30PM - 3:45PM ROOM: 741 BCEF

### Industry strategies and removing roadblocks and developing a path forward (Part-I)

### **Presenters:**



Maury Pressburger Sargent & Lundy Moderator



**Dr. Guoqiang Wang** Pacific Northwest National Laboratory Moderator



Matt Salac NuScale Power Panelist



Craig Stover EPRI Panelist



Chris Goosen Westinghouse Panelist



Matthew Naraine, Canadian Nuclear Safety Commission, Panelist



**Brandon Haugh,** Kairos Power, Panelist



### **EARLY CAREER PANEL**

2:30PM - 3:45PM ROOM: 741 AD

### **Presenters:**



Nicholas McMurray Clearpath Moderator



Haaken Lysne GE-Hitachi Nuclear Energy Panelist



Grace Stanke Constellation Former Miss America Panelist



Kiersten Sundell Generation Atomic Panelist



Joseph Seo Texas A&M University Panelist



Jadyn Reis Texas A&M University Panelist

### **REFRESHMENT BREAK**

3:45PM - 4:00PM ROOM: FOYER

### REACTOR TECHNOLOGY AND INDUSTRY STRATEGIES: REMOVING CHALLENGES AND DEVELOPING A PATH FORWARD (PART II)

4:00PM - 5:15PM ROOM: 741 BCEF

### Industry strategies and removing roadblocks and developing a path forward (Part-II)

### **Presenters:**



Maury Pressburger Sargent & Lundy Moderator



**Dr. Guoqiang Wang** Pacific Northwest National Laboratory Moderator



<mark>Mark Nutt</mark> PNNL Panelist





Kyle Metzroth X-Energy Panelist



Matthew Kravec Westinghouse Electric Company Panelist



Mohamed Shams NRC Panelist

### **VOICE OF THE CUSTOMER**

4:00PM - 5:15PM ROOM: 741 AD

### **Presenters:**



Caleb Tomlin EPRI Moderator



Caleb Brooks University of Illinois Urbana-Champaign Panelist



Josh Coulbeck Ontario Power Generation Panelist

### **OPENING RECEPTION**

5:30PM - 6:45PM ROOM: FOYER

### WEDNESDAY, MARCH 27TH

### BREAKFAST

8:30AM - 9:00AM ROOM: DINING ROOM

### THE IMPORTANCE OF COMMUNICATION TO NUCLEAR POWER

9:15AM - 10:15AM ROOM: 741 BCEF

### **Presenters:**



Grace Stanke Constellation Former Miss America Panelist



Kiersten Sundell Generation Atomic Panelist



Marilyn Delgado BWX Technologies, Inc. Panelist

### **REFRESHMENT BREAK**

10:15AM - 10:30AM ROOM: FOYER

### DEVELOPING COST SAVINGS STRATEGIES FOR ADVANCED REACTORS

10:30AM - 12:00PM ROOM: 741 AD

### **Presenters:**



**Tom Vogan** Moderator



Chris Wax Electric Power Research Institute Panelist



Suzanne-McKillop MPR Associates, Inc. Panelist



Mark Richter Nuclear Energy Institute Panelist

### **DIGITAL TWIN TECHNOLOGY - PANEL 1**

10:30AM - 12:00PM ROOM: 741 BCEF

### ROUND TABLE ON ADVANCED REACTOR DEPLOYMENT

1:00PM – 1:45PM ROOM: 741 BCEF

**Presenters:** 

### Discussion in support of Advanced Reactor Development and Deployment (Part I)

### **Presenters:**



Maury Pressburger Sargent & Lundy Moderator



**Dr. Guoqiang Wang** Pacific Northwest National Laboratory Moderator



Mark Richter

Nuclear Energy Institute

Scott Hunnewell

**Nicholas McMurray** 

Clearpath

Moderator



Frank Michell



### **REFRESHMENT BREAK**

1:45PM – 2:00PM ROOM: FOYER



**Prashant Jain** ORNL Panelist

Panelist

**Christopher Ritter** 

Idaho National Laboratory



Scott Sidener Westinghouse Electric Company Panelist



**Joshua Best** Sargent & Lundy Panelist

### **NETWORKING LUNCH**

12:00PM – 1:00PM ROOM: DINING ROOM

### **REGULATORY MODERNIZATION PANEL**

2:00PM - 3:30PM ROOM: 741 BCEF

### **Presenters:**



Asif Arastu Moderator



**Matthew Naraine** Canadian Nuclear Safety Commission Moderator



**Mohamed Shams** 



**Hasan Charkas** EPRI



**Frederic Grant** Simpson Gumpertz & Heger



Adam Stein Breakthrough Institute



**Jill Baker** Canadian Nuclear Association Panelist

**DIGITAL TWIN TECHNOLOGY - PANEL 2** 2:00PM - 3:30PM **ROOM: 741 AD** 

### **Discussion in support of Advanced Reactor Development and Deployment (Part-II)**

### **Presenters:**



**Maury Pressburger** Sargent & Lundy Moderator



Dr. Guoqiang Wang





**Ryan Stewart** Idaho National Laboratory Panelist



**Michael Muhlheim** Oak Ridge National Laboratory Panelist

### **REFRESHMENT BREAK**

3:30PM - 3:45PM **ROOM: FOYER** 

### REACTOR TECHNOLOGIES: UPDATE FROM NUCLEAR INDUSTRY ON PREPARATION OF TECHNOLOGIES FOR DEPLOYMENT

### 3:45PM - 5:00PM ROOM: 741 BCEF

### **Presenters:**



### NETWORKING RECEPTION WITH EPRI'S TECHNICAL WOMEN'S NETWORK

Please join us on March 27th after conference proceedings conclude for a women's networking reception with EPRI's Technical Women's Network. This casual reception will provide an opportunity for conference attendees and members of the local EPRI Technical Women's Network chapter to meet and connect with each other. All are welcome at this reception. EPRI's Technical Women's Network is one of EPRI's employee resource groups and has a mission to support technical and specialized women in achieving balanced, productive, and successful lives, both professionally and personally. We hope you can join us for this event!

### THURSDAY, MARCH 28TH

### BREAKFAST

8:30AM – 9:00AM ROOM: BUILDING 1, FOYER

### **EPRI TOUR**

9:00AM - 10:30AM EPRI- BUILDING 1

The laboratory facilities at the EPRI Charlotte site are equipped with state-of-the-art capabilities to support a diverse range of research and development activities. Our laboratory facilities boast a comprehensive suite of Non-Destructive Evaluation (NDE) capabilities across various specialized labs, such as, Advanced Ultrasonics, Boiling Water Reactor Vessel & Internals Program (BWRVIP) NDE lab, Fossil Generation NDE, Guided Wave R&D, and the NDE Performance Demonstration (PD) lab. The PD lab has more than 700 mock-ups, including varying metals for piping, bolting, and Reactor Pressure Vessels. These specialized facilities collectively contribute to EPRI's cutting-edge advancements in non-destructive evaluation methodologies.

We also house specialized labs in critical research areas like the Corrosion Lab, Digital I&C Lab for cybersecurity and digital instrumentation, Electronics Lab for remote sensing equipment, and the Flex Lab designed for various ongoing research projects. The Chemistry Lab supports research in water treatment technologies, steam cycle chemistry, and corrosion, with advanced equipment for various applications.

Our machine shop is a crucial part of the facility, fabricating samples that are used across research labs. Materials Characterization Lab supports projects with Scanning Electron Microscope analysis, and multiple Materials Labs offer diverse testing capabilities. The Metallurgy Lab analyzes materials in minute detail, aiding in failure analysis and stress testing. The Welding Research Lab supports welding services and is part of the Nuclear Sector's Welding & Repair Technology Center. Our comprehensive facilities ensure cutting-edge capabilities for a wide array of energy research endeavors.

The lab tour will cover the following EPRI labs: Digital I&C Lab, High Temperature Mechanical Test Lab, Materials Characterization Lab, Welding Research Lab, and Machine Shop.



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### WESTINGHOUSE



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