# ASME 2018 POWER & ENERGY

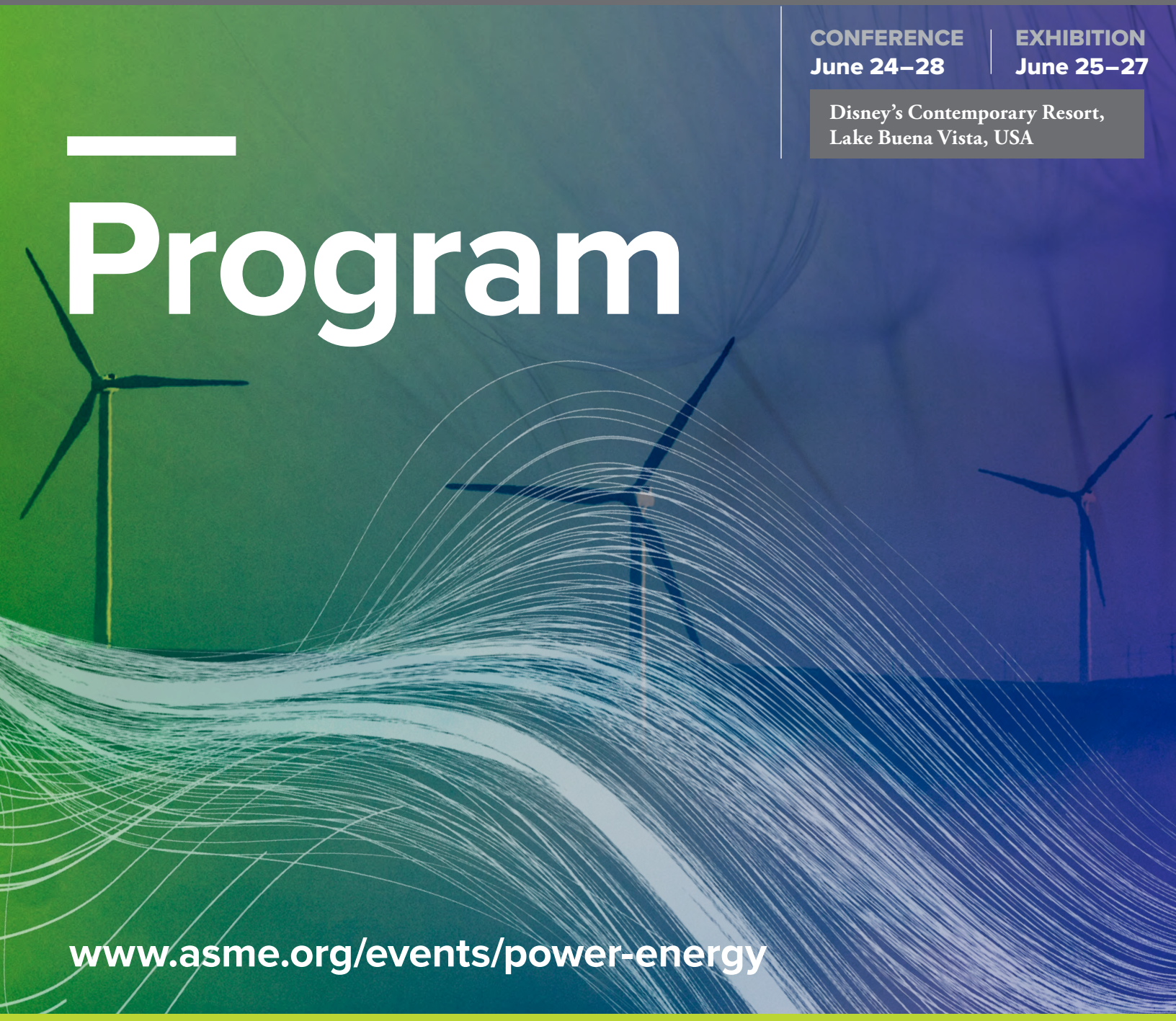
## Conference & Exhibition

**CONFERENCE**
**June 24–28**

**EXHIBITION**
**June 25–27**

Disney's Contemporary Resort,
Lake Buena Vista, USA

# Program



www.asme.org/events/power-energy

*The American Society of Mechanical Engineers®*
*ASME®*

ASME
SETTING THE STANDARD

CITY OF ORLANDO

OFFICE OF MAYOR BUDDY DYER

June 24, 2018

Welcome! On behalf of the City of Orlando, it is my pleasure to welcome members, presenters, authors, exhibitors and attendees to "The City Beautiful" and the American Society of Mechanical Engineers Power & Energy Conference.

Your conference is set in the heart and soul of Central Florida. From a bustling center of commerce boasting a diverse set of industries, to its fine restaurants, first-rate hotels, awe-inspiring art galleries, museums and more; Orlando has so much to offer everyone who lives, works, plays, learns or raises a family in Central Florida.

Since I took office in 2003, reshaping Orlando into a modern, metropolitan city has been a shared priority for our entire Central Florida community. I challenged our residents to imagine a great city, reborn and revitalized. We have made incredible progress in just a few, short years.

I invite you to explore Downtown Orlando during your visit. Our Downtown is currently experiencing a cultural arts-and-entertainment renaissance through the development of three state-of-the-art community venues, the new Amway Center, a world - class performing arts center and an upgraded Camping World Stadium. Downtown is also home to a new Major League Soccer stadium for our Orlando City Lions. These modern arts, entertainment and sports venues will serve as the cornerstone for our region for generations to come.

Orlando offers a winning combination of economic, cultural, educational opportunities and an incredibly high quality of life for residents and visitors. Again, welcome to Orlando and best wishes for a successful conference.

Sincerely,

Buddy Dyer

**Buddy Dyer**
**Mayor**

Orlando City Hall · 400 South Orange Avenue · PO Box 4990 · Orlando, FL 32802-4990
P 407.246.2221 · F 407.246.2842 · cityoforlando.net

# Welcome

## ASME 2018 POWER CONFERENCE

**Conference Chair**
Greg Hall
*POWER Engineers Inc.*

**Technical Program Chair**
Tina Toburen
*T2E3 Inc.*

**Technical Program Co-Chair**
Brian Wodka
*RMF Engineering*

**Technical Program Co-Chair**
Steve Greco

## ASME 2018 ENERGY SUSTAINABILITY CONFERENCE

**Conference Chair**
Sophia Haussener Ecole
*Polytechnique Federale de Lausanne*

**Conference Chair**
Hohyun Lee
*Santa Clara University*

**Technical Program Co-Chair**
Heejin Cho
*Mississippi State University*

**Technical Program Co-Chair**
Erik Koepf
*ETH Zurich*

**Technical Program Co-Chair**
Reza Baghaei Lakeh
*Cal Poly Pomona*

**Technical Program Co-Chair**
Keith Sharp
*University of Louisville*

**Technical Program Co- Chair:**
Guangdong Zhu
Nationa*l Renewable Energy Lab*

## ASME 2018 NUCLEAR FORUM

**Conference Chair**
Jovina Riznic
*Canadian Nuclear Safety Commission*

**Conference Co-Chair**
Guoqiang Wang
*Westinghouse*

## EXECUTIVE ADVISORY COMMITTEE

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*Siemens Energy*

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*University of Alabama Huntsville*

Paul Cleri
*ASME*

## FROM THE CONFERENCE CHAIRS & THE EXECUTIVE ADVISORY COMMITTEE

Dear Colleagues:

Welcome to the ASME 2018 Power & Energy Conference and to Orlando, Florida!

In 2018 we bring together three of ASME's premier energy events under one roof, including the Energy Sustainability Conference, the Nuclear Forum, and the Power Conference.

We are excited and proud to announce that we have a packed schedule and much for you to engage in and learn about while you're here. From expert technical presentations to industry tours and quality networking events you will have many options to choose from for how to spend your week. Additionally there are numerous Standards & Certification meetings (including Performance Test Code Week) as well as multiple ASME Division Technical Committee Meetings. Be sure to visit our table top sponsors and learn about the newest technological advancements in the power and energy fields.

A special thank you to our volunteer leadership and executive Advisory Committee who have spent countless hours putting together a top notch technical program. We would also like to thank all of our sponsors and exhibitors for their support of the program. We would like to thank you, our attendees, for joining us. We look forward to meeting many of you.

Lastly we hope everyone will take some time and enjoy sunny Orlando FL. Have a great conference and thank you again for attending.

# Contents



*In 2018 we bring together three of ASME's premier energy events under one roof, including the Energy Sustainability Conference, the Nuclear Forum, and the Power Conference.*

# General Information

## REGISTRATION HOURS AND LOCATION

**Registration will be located at the West Registration Counter on the main level of the hotel.**

| | |
|---|---|
| **Sunday** | |
| June 24, 2018 | 12:00PM - 6:00PM |
| **Monday** | |
| June 25, 2018 | 7:00AM - 7:00PM |
| **Tuesday** | |
| June 26, 2018 | 7:00AM - 7:00PM |
| **Wednesday** | |
| June 27, 2018 | 7:00AM - 6:30PM |
| **Thursday** | |
| June 28, 2018 | 7:00AM - 4:00PM |

## ON-SITE REGISTRATION FEES

| Registration Type | On-site Registration |
|---|---|
| ASME Member | $895.00 |
| Track Chair/Session Chair | $895.00 |
| Author | $895.00 |
| Non-Member | $1045.00 |
| ASME Student Member | $400.00 |
| Student Non-Member | $450.00 |
| One-day Member | $450.00 |
| One-day Non-Member | $500.00 |
| ASME Life Member Author | $895.00 |
| ASME Life Member | $350.00 |
| Guest (Ticket to Opening Reception) | $75.00 |
| Extra Exhibitor Staff | $400.00 |

## REGISTRATION POLICIES

1. Full registration fees include admission to all technical sessions, exhibits, receptions, refreshment breaks, lunch, and electronic access to technical presentations.
2. Student and life member fees include admission to technical sessions, exhibits, receptions, refreshment breaks, lunch, and electronic access to technical presentations.
3. All attendees, including members, non-members, authors, panelists, chairs, and co-chairs must pay the appropriate registration fee.
4. One- day registration allows access to the conference activities on that particular day.
5. All attendees, including members, non-members, authors, panelists, chairs & co chairs must pay the appropriate registration fee. No one will be allowed to attend the technical sessions or exhibits without first registering and obtaining the official ASME 2018 Power and Energy Conference badge.

## ASME COMPLIMENTARY MEMBERSHIP

Any attendee that pays a non-member conference registration fee will receive a one year ASME membership free of charge. ASME will activate this complimentary membership for qualified attendees approximately four weeks after the conclusion of the conference

## NAME BADGES

Please wear your name badge at ALL times during the conference. Your name badge is required in order for you to attend the sessions and/or the exhibition. If you misplaced your badge, please go to the ASME registration desk and ask for a replacement.

## HOTEL INFORMATION: DISNEY'S CONTEMPORARY RESORT HOTEL

This ultra-modern Disney Resort hotel features award-winning dining, spectacular views and dazzling pools. Whether you're staying in the iconic A-frame Contemporary tower or the nearby Garden Wing, you can walk to Magic Kingdom main gate or catch the Resort Monorail as it breezes through the tower. Meeting space for the conference is located on the main level and second level of the property. For those staying in the **Coronado Springs** you may take the Disney shuttle to the Magic Kingdom and from there it is a short walk to the **Contemporary.**

## SPEAKER READY ROOM:

The speaker ready room is located in the Olympus A room of the hotel.

The room will be equipped with an LCD projector, computer, and screen, Sunday through Thursday. Authors are encouraged to use this facility to meet with their co-authors and review presentations.

It will be available as follows:

**Sunday**
June 24, 2018 1:00PM - 5:00PM

**Monday**
June 25, 2018 7:30AM - 5:30PM

**Tuesday**
June 26, 2018 7:30AM - 5:30PM

**Wednesday**
June 27, 2018 7:30AM - 5:00PM

**Thursday**
June 28, 2018 7:30AM - 5:00PM

## SESSION ROOM EQUIPMENT

Each session room is equipped with a screen and an LCD projector. There will also be a laptop computer in each room. Speakers should have a copy of their presentation to load onto this computer on a memory stick. IT is recommended that authors/speakers bring all visual aids with them.

## EXHIBIT HOURS

**Sunday**
June 24, 2018 Move In: 8:00AM - 4:30PM

**Monday**
June 25, 2018 5:30PM - 7:30PM

**Tuesday**
June 26, 2018 10:30AM - 4:00PM

**Wednesday**
June 27, 2018 10:30AM - 4:00PM; Move Out: 4:00PM - 8:00PM

Nobody will be permitted into the exhibit hall without a badge

If you have any questions or need assistance, an ASME representative will be located in the registration area.

## CONFERENCE PAPERS ELECTRONIC ACCESS

All Full Conference Registrants will receive online access to papers and presentations made at the 2018 Power & Energy Conference. Access will be granted using your registration email address. Papers that were not presented on site in Orlando will not be published in the conference proceedings and cannot be cited or indexed.

## SPECIAL NEEDS & HANDICAPPED ATTENDEES

Whenever possible we are pleased to make arrangements for special needs or handicapped registrants. Advance notice may be required for certain requests. For on-site assistance please visit the ASME registration area at the hotel and ask to speak to a staff member.

ASME POWER CONFERENCE

ASME NUCLEAR FORUM

ASME ENERGY SUSTAINABILITY CONFERENCE

# Schedule at a Glance

ASME POWER CONFERENCE

## MONDAY, JUNE 25

| TIME | SESSION # | EVENT | LOCATION |
|---|---|---|---|
| 8:30am-12:30pm | Special Events | Magic Kingdom Tour | |
| 12:30-5:30pm | Special Events | Power Plant Cycling Workshop *(additional registration required)* | |
| 4:00-5:30pm | Special Events | FutureME Mini Talks & Social Meetup | Sorcerers Apprentice Ballroom 3 |
| 5:30-7:30pm | Special Events | Welcome Reception in Exhibit Hall | Fanatasia GH |

## TUESDAY, JUNE 26

| TIME | SESSION # | EVENT | LOCATION |
|---|---|---|---|
| 11:00am-12:30pm | | Technical Sessions | |
| | 1-2-1 | Combined & Simple Cycle Plant Performance | Fanatasia A |
| | 1-6-2 | Marine & Hydrokinetic Energy 1 | Fanatasia M |
| | 1-7-1 | Steam Surface Condensers & Cooling Systems | Fanatasia P |
| | 1-8-1 | Session 1-8-1 Tutorial Inside the Generator | Fanatasia D |
| | 1-9-1 | Modeling & Analysis 1 | Fanatasia Q |
| | 1-10-1 | Thermal Hydraulics & Computational Fluid Dynamics 1 | Pastoral 2 |
| | 1-12-1 | Student Competition | Pastoral 3 |
| 2:00-3:30pm | | Technical Sessions | |
| | 1-1-1 | Advanced Combustion Systems & Issues 1 | Fantasia N |
| | 1-2-3 | Manufacturing & Advances in Combined Cycle Efficiency | Fantasia A |
| | 1-4-1 | Cyber-Physical Approach for Energy System Design & Development | Pastoral 2 |
| | 1-6-5 | Marine & Hydrokinetic Energy 2 | Fantasia M |
| | 1-6-1 | Advanced Technologies for Wind Energy | Fantasia F |
| | 1-7-2 | Heat Exchanger Technologies: Heat Exchanger Design & Improvements | Fantasia P |
| | 1-9-2 | Modeling & Analysis 2 | Fantasia Q |
| | 1-11-1 | Cooling, Efficiency and Water Management | Fantasia D |
| | 1-12-2 | Student Competition | Pastoral 3 |
| 3:45-5:15pm | | Technical Sessions | |
| | 1-1-3 | Advanced Combustion Systems & Issues 2 | Fantasia N |
| | 1-2-4 | Non Traditional Gas Turbine Applications | Fantasia A |
| | 1-6-11 | Renewable Energy Systems: Advanced Renewable Technologies 2 | Fantasia K |
| | 1-6-10 | Renewable Energy Systems: Advanced Renewable Technologies 1 | Fantasia F |
| | 1-6-7 | Renewable Energy Systems: Biomass, Distributed, and Small Scale Generation | Fantasia M |
| | 1-7-5 | Heat Exchanger NDE Methods & Applications Panel | Fantasia P |
| | 1-9-3 | Modeling & Analysis 3 | Fantasia Q |
| | 1-10-2 | Thermal Hydraulics & Computational Fluid Dynamics 2 | Pastoral 2 |
| | 1-11-3 | Water Treatment | Fantasia D |
| | 1-12-3 | Student Competition | Pastoral 3 |

# Schedule at a Glance - Power Conference

ASME POWER CONFERENCE

## WEDNESDAY, JUNE 27

| TIME | SESSION # | EVENT | LOCATION |
|---|---|---|---|
| **9:00-10:30am** | | **Technical Sessions** | |
| | 1-7-6 | Tube to Tubesheet Joints Panel | Fantasia P |
| | 1-5-1 | Economics Associated with Gas Turbines & Status of Coal Fired Projects Globally | Fantasia A |
| | 1-8-3 | Repairs, Retrofits and Upgrades | Fantasia D |
| | 1-9-4 | Modeling & Analysis 4 | Fantasia Q |
| | 1-10-3 | Thermal Hydraulics and Computational Fluid Dynamics 3 | Pastoral 2 |
| | 1-12-4 | Student Competition | Pastoral 3 |
| **2:00-3:30pm** | | **Technical Sessions** | |
| | 1-3-1 | Steam Generator Design | Fantasia A |
| | 1-4-2 | Cyber Physical Approach to Accelerate Energy Technology Development | Pastoral 2 |
| | 1-6-3 | Advanced Technologies for Solar Energy 1 | Fantasia K |
| | 1-6-8 | Energy Storage and Grid Connected Distributed Energy Systems | Fantasia M |
| | 1-7-7 | Tutorial PTC 12.1- Closed Feedwater Heaters | Fantasia N |
| | 1-8-2 | Inside the Steam Turbine Tutorial | Fantasia D |
| | 1-9-5 | Plant Performance: Concepts & Case Studies | Fantasia Q |
| | 1-12-5 | Student Competition | Pastoral 3 |
| **3:45-5:15pm** | | **Technical Sessions** | |
| | 1-1-7 | Advanced Internal Combustion Engines-1 | Fantasia N |
| | 1-4-3 | Open Discussion About Cyber-Physical Systems | Pastoral 2 |
| | 1-5-2 | New Maintenance Techniques & Improved Efficiency Concepts | Fantasia A |
| | 1-6-4 | Advanced Technologies for Solar Energy 2 | Fantasia K |
| | 1-6-6 | Energy Storage and Hybrid Electric Vehicles | Fantasia M |
| | 1-9-7 | PTC-46 Tutorial | Fantasia Q |

## THURSDAY, JUNE 28

| TIME | SESSION # | EVENT | LOCATION |
|---|---|---|---|
| **9:00-10:30am** | | **Technical Sessions** | |
| | 1-1-6 | Advanced & Alternative Fuels | Fantasia N |
| | 1-6-9 | Other Advanced Energy Systems | Fantasia M |
| | 1-10-4 | Thermal Hydraulics and Computational Fluid Dynamics 4 | Pastoral 2 |
| **11:00am-12:30pm** | | **Technical Sessions** | |
| | 1-9-6 | Concepts & Case Studies 2 | Fantasia Q |
| **8:30am-12:30pm** | **Special Events** | **OUC Staunton Tour** | |

## MONDAY, JUNE 25

| TIME | SESSION # | EVENT | LOCATION |
|---|---|---|---|
| 9:00-12:30pm | Special Events | Magic Kingdom Tour | |
| 5:30-7:30pm | Special Events | Welcome Reception in Exhibit Hall | |
| 12:30pm-5:30pm | Special Events | Power Plant Cycling Workshop *(additional registration required)* | |
| 4:00-5:30pm | Special Events | FutureME Mini Talks & Social Meetup | Sorcerers Apprentice Ballroom 3 |

## TUESDAY, JUNE 26

| TIME | SESSION # | EVENT | LOCATION |
|---|---|---|---|
| 11:00am-12:30pm | | Technical Sessions | |
| | 3-2-1 | Plant Construction Issues and Supply Chain Mangement & Licensing 1 | Fantasia K |
| 2:00-3:30pm | | Technical Sessions | |
| | 3-2-2 | Plant Construction Issues and Supply Chain Mangement & Licensing 2 | Fantasia K |

## WEDNESDAY, JUNE 27

| TIME | SESSION # | EVENT | LOCATION |
|---|---|---|---|
| 11:00am-12:30pm | | Technical Sessions | |
| | 3-6-1 | Thermal Hydraulics and Computation Fluid Dynamics | Fantasia P |
| 2:00-3:30pm | | Technical Sessions | |
| | 3-6-2 | Thermal Hydraulics & Analysis of High Temperature Reactors | Fantasia P |

# Schedule at a Glance - Energy Sustainability Conference

ASME ENERGY SUSTAINABILITY CONFERENCE

## MONDAY, JUNE 25

| TIME | SESSION # | EVENT | LOCATION |
|---|---|---|---|
| 9:00-12:30pm | Special Events | **Magic Kingdom Tour** | |
| 12:30pm-5:30pm | Special Events | **Power Plant Cycling Workshop *(additional registration required)*** | |
| **2:00-3:30pm** | | **Technical Sessions** | |
| | 2-9-1 | Panel on Integrated Mechanical Systems for Sustainable Buildings | Fantasia F |
| | 2-11-5 | System Design & Analysis | Fantasia B |
| **3:45-5:15pm** | | | |
| | 2-11-1 | Energy Policy & Markets | Fantasia B |
| | 2-12-1 | Solar Photovoltaics: Materials, Systems, Manufacturing and Reliability | Fantasia F |
| 4:00-5:30pm | Special Events | **FutureME Mini Talks & Social Meetup** | **Sorcerers Apprentice Ballroom 3** |
| 5:30-7:30pm | Special Events | **Welcome Reception in Exhibit Hall** | |

## TUESDAY, JUNE 26

| TIME | SESSION # | EVENT | LOCATION |
|---|---|---|---|
| **11:00am-12:30pm** | | **Technical Sessions** | |
| | 2-5-1 | Distributed Energy Systems 1 | Pastoral 1 |
| | 2-6-1 | Sustainable Energy Recourse | Fantasia C |
| | 2-7-5 | Manufacturing Methods for Electrochemical Energy Conversion & Storage | Fantasia L |
| | 2-9-3 | Solar Resource, Climate & Human Comfort | Fantasia F |
| | 2-10-2 | Solar Hydrogen 1 | Fantasia E |
| | 2-11-3 | Panel Discussion: Key CSP Research Facillites | Fantasia B |
| **2:00-3:30pm** | | **Technical Sessions** | |
| | 2-5-2 | Distributed Energy Systems 2 | Pastoral 1 |
| | 2-6-2 | Energy Sustainability in Buildings | Fantasia C |
| | 2-7-3 | Electrochemical Energy Storage 1 | Fantasia L |
| | 2-10-3 | Solar Hydrogen 2 | Fantasia E |
| | 2-11-4 | Component On Sun Test | Fantasia B |
| **3:45-5:15pm** | | **Technical Sessions** | |
| | 2-2-1 | Power Applications | Pastoral 1 |
| | 2-6-3 | Sustainability & Society | Fantasia C |
| | 2-7-4 | Electrochemical Energy Storage 2 | Fantasia L |
| | 2-10-5 | Thermochemical Analysis | Fantasia E |
| | 2-11-8 | Component Concept Tests | Fantasia B |

# Schedule at a Glance - Energy Sustainability Conference

## WEDNESDAY, JUNE 27

| TIME | SESSION # | EVENT | LOCATION |
|---|---|---|---|
| 9:00-10:30am | | Technical Sessions | |
| | 2-2-2 | Power Applications | Fantasia C |
| | 2-3-1 | Power Conversion, Absorption Chillers and Ground Source Heat Pumps | Pastoral 1 |
| | 2-7-1 | Low Temperature Fuel Cells and Electrolysis | Fantasia L |
| | 2-11-12 | Panel Discussion: 3rd Generation of CSP | Fantasia F |
| | 2-11-10 | Concentrators & Optics 2 | Fantasia B |
| 11:00am-12:30pm | | Technical Sessions | |
| | 2-1-1 | Sustainable Energy | Fantasia C |
| | 2-4-1 | Conversion and Processing of Biofuel and Alternative Fuel 1 | Pastoral 1 |
| | 2-7-2 | High Temperature Fuel Cells and Electrolysis | Fantasia L |
| | 2-9-2 | Sustaianable Heating & Cooling Systems | Fantasia F |
| | 2-10-1 | Solar Thermochemical Processes | Fantasia E |
| | 2-11-11 | Heat & Mass Transfer Analysis 2 | Fantasia B |
| 2:00-3:30pm | | Technical Sessions | |
| | 2-1-2 | Water Management | Fantasia C |
| | 2-4-2 | Conversion and Processing of Biofuel and Alternative Fuel 2 | Pastoral 1 |
| | 2-8-1 | Phase Change Materials 1 | Fantasia L |
| | 2-10-6 | Solar Thermochemical Reactors 1 | Fantasia E |
| | 2-11-2 | Concentrators & Optics 1 | Fantasia B |
| | 2-13-1 | Wind Energy Systems 1 | Fantasia F |
| 3:45-5:15pm | | Technical Sessions | |
| | 2-1-3 | Sustainable Energy | Fantasia C |
| | 2-4-3 | Conversion and Processing of Biofuel and Alternative Fuel 3 | Pastoral 1 |
| | 2-8-3 | Thermochemical Energy Storage | Fantasia L |
| | 2-10-7 | Solar Thermochemical Reactors 2 | Fantasia E |
| | 2-11-6 | Heat & Mass Transfer Modeling and Analysis 1 | Fantasia B |
| | 2-13-2 | Wind Energy Systems 2 | Fantasia F |

## THURSDAY, JUNE 28

| TIME | SESSION # | EVENT | LOCATION |
|---|---|---|---|
| 9:00-10:30am | | Technical Sessions | |
| | 2-8-4 | Thermal Energy Storage Applications | Fantasia L |
| | 2-9-4 | Demand Side Management, Efficiency & Passive Heating & Cooling | Pastoral 1 |
| | 2-10-4 | Materials Chemistry | Fantasia E |
| | 2-11-7 | High Temperature Materials | Fantasia F |
| 8:00am-12:30pm | Special Events | OUC Staunton Tour | |
| 2:00-3:30pm | | Technical Sessions | |
| | 2-8-6 | Compressed and Liquid Air Energy Storage | Fantasia L |
| | 2-11-9 | Advanced Power Systems | Fantasia F |

# ASME Standards & Certification Committee Meetings

## PERFORMANCE TEST CODE WEEK

### MONDAY, JUNE 25

8:00AM- 5:00PM
**PTC4 Fired Steam Generators**
Room: Atlantic A

9:00AM - 5:00PM
**PTC 19.3 Temperature Measurement**
Room: Grand Republic C

9:00AM – 5:00PM
**RAM Reliability, Availability, Maintainability**
Room: Pacific

1:00 PM – 6:00PM
**TWDP Turbine Water Damage Prevention**
Room: Atlantic B

### TUESDAY, JUNE 26

8:00AM- 12:00PM
**PTC 19.3 Temperature Measurement**
Room: Grand Republic C

8:00AM-5:00PM
**PTC 53 Energy Storage**
Room: Atlantic B

8:00AM-5:00PM
**PTC 19.5 Flow Measurement**
Room: Pacific

9:00AM-5:00PM
**TES Safety Standards Committee for Thermal Energy Storage Systems**
Room: Grand Republic B

8:00AM-5:00PM
**PTC 46 Overall Plant Performance**
Room: Grand Republic A

### WEDNESDAY, JUNE 27

8:00AM-12:00PM
**PTC 46 Overall Plant Performance**
Room: Grand Republic A

8:00AM-12:00PM
**PTC 19.5 Flow Measurement**
Room: Pacific

1:00PM-5:00PM
**PTC 6.2 Steam Turbines in Combined Cycle**
Room: Atlantic A

1:00PM- 5:00PM
**PTC 22 Gas Turbines**
Room: Atlantic B

### THURSDAY, JUNE 28

8:00AM-3:00PM
**PTC Standards Committee**
Room: Grand Republic A

## DISNEY'S "KEYS TO THE KINGDOM" TOUR

Monday June 25th
8:30AM-12:30PM
(Please meet in hotel Lobby by 7:45 to take monorail to Magic Kingdom Guest Relations Window for start of tour)
$95 per person

Unlock the fascinating history of Magic Kingdom Park and gain backstage access to legendary hidden areas.

This 5-hour walking tour explores the creation and remarkable growth of one of the most beloved parks at Walt Disney World Resort! Explore secret locations you've always wondered about and get the inside scoop on some of your favorite attractions.

**During your tour:**

- Uncover the hidden secrets of classic attractions at Magic Kingdom Park.
- Access the famed underground "Utilidor" tunnels that allow people and supplies to travel beneath the park unseen.
- Discover little-known facts, trivia and other exciting tidbits about the park.

**Experience an urban legend:**

Enter the underground service tunnels to uncover a mystery that's absolutely, almost unbelievably, true!

The Guest-accessible areas of Magic Kingdom Park are actually on the second floor of a massive structure. The "tunnel" below, known as the Utilidor, allows Cast Members, deliveries and even rubbish to be unknowingly transported below Guests' feet as they wait in line for their favorite attractions. You've got to see the Utilidor for yourself!

**Learn About the Man behind the Mouse**

Hear the intriguing story of Walt Disney and how his vision, innovation and creativity brought the theme park to life. You'll gain insight on Walt's thought process as he was designing the park, learn fun trivia and little-known facts, discover hidden Mickeys and other often-overlooked details, and more.

**Know Before You Go**

View important information including recommended attire, Guest restrictions and cancellation policies.

- Guests under 18 years of age must have parent or guardian permission to call.
- No cameras, video equipment or cellphones may be used throughout the duration of the tour. Photography is strictly prohibited.
- Locations and attractions visited on your tour are subject to change without notice.
- Guests must be 16 years of age or older and have a valid photo I.D.

## STANTON ENERGY CENTER & GTE FACILITY

Thursday June 28th
8:00AM-12:45PM*
$25 per person

Quite literally the heart of OUC, the Curtis H. Stanton Energy Center is a clean, modern, fuel-diverse, environmentally sound power-generation facility. The energy center with its iconic cooling towers in East Orange County is the most diverse generation site in Florida featuring natural gas, landfill gas and coal generation, as well as a nearly 6 Megawatt solar farm. With a generation capacity of 1,850 MWs, it is also one of the most reliable and environmentally responsible power stations in the nation. Almost two-thirds of the 3,280-acre site is dedicated to conservation – providing an undeveloped, protected wildlife refuge and habitat for nearly 40 different species of animals.

Join us for a tour of this facility during the 2018 Power and Energy Conference. Cost is $25 and can be added to your conference registration.

**Tentative Schedule***

| | |
|---|---|
| 8:00AM – 9:00PM | Bus Leaves Walt Disney to Stanton Plant |
| 9:00AM | Arrive at Stanton Plant |
| 9:00AM – 9:30AM | Welcome/Overview of Stanton Energy Center<br>Generation (Steam Plant/Landfill Gas Co-firing, Gas Turbines, Solar) – OUC Representative |
| 9:30AM – 10:15AM | Presentation on Steam Turbine-Generator Upgrades; OUC and Siemens<br>Turbine Deck and Control Room Tour - Showcase Contrast between Analog and Digital Control Rooms (Stanton 1 and 2) |
| 10:15AM – 10:30AM | Question and Answers/Wrap-Up/Adjourn<br>Siemens Sponsored Cookies and coffee/soft drinks |
| 10:30AM – 11:00AM | Travel to GTE Facility |
| 11:00am – 12:00pm | GTE Facility Tour |
| 12:00PM | Buses Return to hotel |
| 12:45PM | Arrive Walt Disney World Contemporary resort |

# Keynote

**TUESDAY, JUNE 26 • 8:30AM**
**BALLROOM OF THE AMERICAS**

**Dr. David Tew**
Advanced Research Projects Agency – Energy

**Accelerating Transformational Change**

ARPA-E's mission is to enhance the economic and energy security of the United States through the development of energy technologies that result in reductions of energy imports, reductions of energy-related emissions, and the improvement in the energy efficiency of all economic sectors. It seeks to accomplish these objectives by fostering the development of transformational energy technologies.

However, a persistent, and arguably growing, challenge in the pursuit of this mission is the attainment of continued thermodynamic performance advancement at an economically attractive cost. This challenge arises for many reasons--some of which may include diminishing returns on our R&D investments and the enhanced (e.g. manufacturing) complexity of many higher-performing energy systems. Fortunately, rapidly advancing machine learning/artificial intelligence techniques offer us tremendous opportunity to enhance our R&D productivity, better manage complexity, and thereby accelerate the rate at which we advance our economic and energy security.

Dr. David Tew currently serves as a Program Director at the Advanced Research Projects Agency – Energy (ARPA-E). His focus at ARPA-E includes combined heat and power systems, industrial processes, and transportation energy efficiency.

Prior to joining ARPA-E, he spent 19 years working for United Technologies Corporation (UTC)—in roles at the Research Center, Pratt and Whitney, and UTC Power. His responsibilities included developing advanced power generation and aircraft and rocket propulsion system technologies as well as leading a number of solid oxide fuel cell system and stack development efforts at the Research Center. He also led a combustor technology group and portfolio at Pratt and Whitney and helped manage a microturbine-based combined heat and power product line at UTC Power. Dr. Tew also served as an Adjunct Professor of Mechanical Engineering at Rensselaer Polytechnic Institute's Hartford campus for over ten years and worked as a Post-Doctoral Associate in the M.I.T. Gas Turbine Laboratory.

He earned a MBA from Columbia Business School, a Ph.D. and S.M. in Aeronautics and Astronautics from M.I.T., and a B.S. in Aerospace Engineering from the University of Michigan

**Adrienne Little**
Google X Malta Project

**Stop Searching and Start Implementing - A Call to Action for Long Duration Energy Storage**

Dr. Adrienne Little previously worked at X (formerly known as Google [X]), Alphabet's "Moonshot Factory," where she was the Thermal Systems Technical Lead on project Malta and various other hardware-based challenges in the energy space. Before starting at X, Adrienne was a Fellow at the Advanced Research Projects Agency for Energy (ARPA-E) at the U.S. Department of Energy where she pursued concepts in advanced manufacturing, performed technical due diligence on the ARID portfolio (Advanced Research in Dry Cooling), and investigated opportunities for modular nuclear reactor concepts. Adrienne graduated from the Georgia Institute of Technology with both her M.S. and PhD degrees in Mechanical Engineering, and received her Bachelor's degree from the University of California at Berkeley. Her PhD work at Georgia Tech focused on the development of waste heat recovery technologies and analysis of supersonic internal flows for passive compression devices. She performed additional research activities at the Thermal Fluids Laboratory at the Université catholique de Louvain in Louvain-la-Neuve, Belgium, as well as in the Renewable Energy Systems Laboratory at General Electric Global Research Headquarters near Munich, Germany. She is the recipient of both the Sam Nunn and Callahan Memorial Fund Fellowships from the Sam Nunn School of International Affairs at Georgia Tech, studying the nexus between science, technology, and policy. She completed the European Union Center of Excellence Program on trans-Atlantic energy activities and initiatives.

**MONDAY, JUNE 25 • 12:30PM – 5:30PM**
**TBD**

**Resolving the Challenges of Power Plant Cycling Workshop**
*Attendance is Complimentary but separate Registration is Required*

Factors such as the increased use of intermittent power generation sources (e.g. renewables) create challenges for baseload power plants resulting from flexible operations. ASME is convening experts from Siemens Energy, Vogt Engineering, Sargent and Lundy, Copperleaf Technologies American Electric Power, Riley Power, Intertek, and Thielsch Engineering for an executive workshop to discuss strategies and solutions to mitigate the detrimental effects of plant cycling and flexible operations.

**Who Should Attend?**

Asset owners, long-term service providers and original equipment manufacturers of power plant equipment, specifically executive leadership and individuals responsible for plant operations, engineering and financial management.

**What Will You Learn?**

Resolving the Challenges of Power Plant Cycling will address three critical themes and assist companies in planning for the future:

*Economics*

Cycling and flexible operations can have a significant impact on plant economics. How do operators keep their assets profitable in a rapidly changing energy market? The degree to which plants are affected varies by technology and age of the station. Get your questions answered by a panel of experts.

*Maintenance*

Additional wear on plant components results in increased maintenance costs, which presents a challenge with limited revenue streams and budgets. Speakers will discuss impacts on equipment and best practices for how to mitigate it.

*Operations*

Operational impacts of plant cycling and flexible operations include: increased load-following operation, higher unit turndown during low demand, lower minimum load operating, frequent unit shutdowns and startups, increased ramp rates, and plant layup considerations. Learn from real-world examples from a panel representing a variety of perspectives.

**MONDAY, JUNE 25 • 4:00PM-5:30PM**
**ROOM: SORCERER'S APPRENTICE BALLROOM 3**

**ASME FutureME Mini-Talks & Social Meetup**

*Presented by the ASME ECE Programming Committee*

Join the FutureME community for a 90-minute social experience! You will have the opportunity to hear four short, relevant, and inspirational Mini-Talks given in an informal setting by experienced early career engineers. They will share their stories and experiences in career development and the game-changing decisions they've made throughout their careers to become the engineers they are today.

In addition to the Mini-Talks, you will have the opportunity to engage in a networking activity which will allow you to experience in real time the power of social relationships. Come meet up with other early career engineers that have similar interests, to network professionally, and make new connections with ASME leadership and/or renew past friendships.

Bring plenty of business cards for networking!

*Event Highlights*

- Opportunity to get connected with fellow early career engineers
- Mini-Talks covering diverse topics relevant for early career engineer career development
- Ice Cream will be served to create an informal setting for networking

# Conference Special Sessions

## PLENARY SPEAKER ENERGY SUSTAINABILITY CONFERENCE

**MONDAY, JUNE 28 • 9:00–10:30 AM**
**SORCERERS APPRENTICE BALLROOM**

**David L Wood III, Ph.D,**
Oak Ridge National Lab

**Advanced Energy System Division (AESD) Electrochemistry Energy Conversion and Storage Plenary Session**

As the need for higher energy-density lithium-ion batteries (LIBs) and higher power-density polymer electrolyte fuel cells (PEFCs) continues to accelerate to meet public demand of increased BEV and FCEV driving range, the need for novel electrode structures with better engineering design is becoming increasingly important. Lithium-ion and polymer electrolyte fuel cell electrodes share many common features, and manufacturing approaches that are beneficial for one application may be leveraged for the other. Oak Ridge National Laboratory is developing the next-generation manufacturing methods that will enable lower-cost, higher energy density, and higher power density for both LIBs and PEFCs.

For lithium-ion batteries, these electrodes must be thicker to assist in meeting the EERE VTO ultimate requirement of 500 Wh/kg, ranging from 4-8 mAh/cm2 (or 2-3× the current industry state-of-the-art), and must be able to handle high discharge rates (for high power density) and high charge rates (for 10-15 min extreme fast charging requirements). To meet the simultaneous requirements of high energy and power density with thick electrodes, advanced electrode structuring, or electrode architecture design, must be implemented to avoid liquid-phase, lithium-ion mass-transport losses. These structures must also be able to accommodate the next generation cathode and anode active materials that are currently under development. Oak Ridge National Laboratory (ORNL) is developing multiple techniques to mitigate these mass-transport limitations with partners such as Argonne National Laboratory, Palo Alto Research Center, and Karlsruhe Institute of Technology. This presentation will focus on methodologies such as particle-size and pore-size grading of multilayer thick electrodes, laser ablation structuring and patterning of electrodes, and co-extrusion of interdigitated structures with high and low porosity. Perspectives on full-scale manufacturing methods for these structures and how they may be integrated with next-generation lithium-ion technologies and active materials will also be given.

For PEFCs, the cathode electrocatalyst layer must contain limited precious metal content to meet the ultimate EERE FCTO cost reduction target of $30/kW, but still perform well at high current densities (>>1.5 A/cm2). This layer must also be able to handle stringent liquid water management requirements to avoid oxygen mass-transport losses. ORNL has partnered with the National Renewable Energy Laboratory to investigate the effects of ink formulation on final electrode properties and performance of cathode gas diffusion electrodes (GDEs). The manufacturing issues of these GDEs will be discussed holistically from a process-property-performance viewpoint based on both the slot-die and gravure coating approaches.

**Biography:** David Wood is a Senior Staff Scientist, Fuel Cell Technologies Program Manager, and UT Bredesen Center Faculty Member at Oak Ridge National Laboratory (ORNL) researching novel electrode architectures, advanced processing methods, manufacturing science, and materials characterization for lithium ion batteries and low-temperature fuel cells, and has been employed there since 2009. He is a well-known energy conversion and storage researcher with an industrial and academic career that began in 1995. Dr. Wood received his B.S. in Chemical Engineering from North Carolina State University in 1994, his M.S. in Chemical Engineering from the University of Kansas in 1998, and his Ph.D. in Electrochemical Engineering from the University of New Mexico in 2007. He has received 17 patents, authored 68 refereed journal articles and transactions papers, and authored 2 book chapters. Dr. Wood manages an average annual ORNL budget of $9-10M related to hydrogen infrastructure issues, polymer electrolyte fuel cells, lithium ion batteries, and roll-to-roll manufacturing science.

## SPECIAL EVENTS:

**MONDAY, JUNE 25 • 5:30PM – 7:30PM**
**EXHIBIT HALL: FANTASIA G&H**

**Conference Welcome Reception**

Kick off the conference with light hors d'oeuvres and cocktails as you mingle with old friends and create new connections in the exhibit hall.

**TUESDAY, JUNE 26 • 5:30PM – 7:30PM**
**EXHIBIT HALL: FANTASIA G&H**

**Event Wide Poster Competition & Reception**

Posters will be presented at the Tuesday evening reception and remain up throughout the conference. Presenters should have their posters set up by 4:00pm on Monday June 2th and removed by 5:00pm Wednesday.

**WEDNESDAY, JUNE 27 • 7:00PM – 10:00PM**
**GREAT HALL OF CHINA, EPCOT CENTER**

**Power Division Awards Gala**

Bus departs Contemporary Hotel at 6:45 meet in lobby.

**THURSDAY, JUNE 28 • 11:00AM–1:30PM**
**SORCERERS APPRENTICE BALLROOM**

**Energy Sustainability Conference Plenary Session and Awards Luncheon- supported by AESD/SED**

Chuck Kutscher

*"The Race to Zero Carbon"*

Chuck Kutscher will summarize some of the latest scientific findings on climate change and discuss the worldwide race to achieve a carbon-free energy system. He will discuss the rapid energy transition that is now underway, including the rise of wind and solar power and the emergence of electric vehicles. He will also explain why decarbonizing the building sector is so important and describe various research projects that the National Renewable Energy Laboratory has been pursuing to address this, including both zero carbon buildings and districts.

BIO: Dr. Charles (Chuck) Kutscher is Director of the Buildings and Thermal Sciences Center at the National Renewable Energy Laboratory in Golden, Colorado. He has led research programs in solar heating and cooling, building energy efficiency, solar industrial process heat, geothermal power, and concentrating solar power. He is a Fellow of the American Solar Energy Society (ASES) and served as the Society's Chair in 2000 and 2001. He was the Chair of two major conferences: the SOLAR 2006 National Solar Energy Conference and the 2012 World Renewable Energy Forum. He led the ASES study, Tackling Climate Change in the U.S., which detailed how energy efficiency and six renewable energy technologies could greatly reduce U.S carbon emissions by 2030. He is also the lead author of the forthcoming third edition of the college textbook, Principles of Sustainable Energy Systems. He has served as an adjunct professor at the University of Colorado at Boulder and the Colorado School of Mines. He obtained a B.S. in physics from the State University of New York at Albany, an M.S. in nuclear engineering from the University of Illinois at Urbana-Champaign, and a Ph.D. in mechanical engineering from the University of Colorado at Boulder.

**Yellott Award Lecture: Solar Thermochemical Pathways for Energy Conversion**

Peter Loutzenhiser
Georgia Institute of Technology

Sunlight is by far the most abundant energy resource available on earth. However, solar irradiation is relatively dilute, intermittent, and unequally distributed. These obstacles can be overcome by concentrating and storing solar energy in a chemical form to produce solar fuels or on-demand electricity. Solar fuels and electricity can be utilized to greatly alleviate worldwide dependency on fossil fuels and can be produced in uninhabited desert regions with optimal solar irradiation. Solar facilities like power towers with secondary concentrators coupled to arrays of heliostat fields and parabolic dishes are capable of concentrating solar irradiation in excess of 1000 suns, optimal for driving solar thermochemical processes and cycles. The lecture will outline the history and several thermochemical pathways for solar fuels and electricity production and explore the multidisciplinary aspects of the research. The lecture will conclude with a look towards the future with an emphasis on hybrid solar processes and cycles.

BIO:Dr. Peter G. Loutzenhiser is an Associate Professor in the Woodruff School of Mechanical Engineering at the Georgia Institute of Technology. He is pursuing research in the areas of Solar Thermochemistry and the development of related Solar Concentrating Technologies. Dr. Loutzenhiser received his PhD in Mechanical Engineering from Iowa State University in May 2006. The research for his PhD was performed at the Swiss Federal Laboratories for Materials Testing and Research (EMPA) in conjunction with the International Energy Agency Solar Heat and Cooling Programme Task 34/Energy Conservation in Buildings & Community Systems Annex 43. Dr. Loutzenhiser was a post-doctoral researcher at the Paul Scherrer Institute, applying his extensive solar experience to the field of Solar Thermochemistry. He continued his research at the ETH Zurich in Solar Thermochemistry where he was a Lecturer and Research Associate prior to joining the faculty of the Georgia Institute of Technology. Dr. Loutzenhiser has been actively engaged in the ASME's Solar Energy Division since 2009 and has been active on the Executive Committee and very active within the ASME International Conference on Energy Sustainability.

# Exhibitors

## BROADLEAF

**Booth # 13**

Broadleaf creates business value through end-to-end human capital solutions that drive results! Our concierge-level total talent management services strategically align contract labor, direct employees and indirect services procurement through integrated or standalone offerings including Managed Service Programs (MSP), Recruitment Process Outsourcing (RPO), Services Procurement (SOW), Payroll Services and others. Each program is customized to meet customers' unique needs, based on a comprehensive, consultative approach that we have refined over more than 50 years in business.

## ALLOY STAINLESS PRODUCTS CO

**Booth # 11**

Broadleaf creates business value through end-to-end human capital solutions that drive results! Our concierge-level total talent management services strategically align contract labor, direct employees and indirect services procurement through integrated or standalone offerings including Managed Service Programs (MSP), Recruitment Process Outsourcing (RPO), Services Procurement (SOW), Payroll Services and others. Each program is customized to meet customers' unique needs, based on a comprehensive, consultative approach that we have refined over more than 50 years in business.

## COOLING TECHNOLOGY INSTITUTE

**Booth # 15**

As a broad-based industry association, our mission is to advocate and promote, for the benefit of the public, the use of all environmentally responsible, cooling technologies, such as wet cooling towers, air-cooled condensers, dry coolers, indirect cooling, and hybrid systems, by encouraging:

•Education on these technologies

• Development of codes, standards, and guidelines

• Development, use, and oversight of independent performance verification and certification programs

• Research to improve these technologies

• Advocacy and dialog on the benefits of cooling technologies with Government Agencies and other organizations with shared interests

• Technical information exchange

## ETC – POWER GEN DESCRIPTION

**Booth # 7**

Located in Johnstown, PA, ETC Power Gen is ASME and ISO 9001:2015 certified and includes an experienced team of professionals dedicated to providing the highest level of quality and on time delivery at competitive prices. As part of the JWF Industries family of businesses, ETC Power Gen has the ability to fabricate large and complex components within our 1,000,000 square feet of manufacturing space. We also provide support design for manufacturability and have thermal engineering capabilities.

## HILCO CO

**Booth # 17**

The HILCO Division of the Hillard Corporation has provided industrial filtration solutions to the Power and Gas industry for over 80 years. Products include lube oil filtration systems, varnish removal systems, oil mist eliminators and filter cartridges.

## LECTRODRYER

**Booth # 3**

To provide engineered and manufactured gas and liquid process solutions through knowledge and expertise of drying technology, purification, process control and equipment through safety, operational improvement, and cost-reduction strategies. Lectrodryer partners with customers to add value to the power generation, refinery, chemical, government, heat-treating and compressed-air markets.

## MICROTRAC CO

**Booth # 4**

Microtrac strives to provide the materials characterization world with innovative, reliable, and repeatable particle analysis instrumentation.

Our product portfolio contains instruments that can provide the following measurements:

*Particle sizing
*Zeta Potential
*3-D Image Analysis
*Molecular Weight
*Dust Characterization

Our particle analysis instruments are used in virtually every industry, from pharmaceutical to food processing, even extending to such novel. applications as analysis of interplanetary materials like moon rock.

## MODELON

**Booth # 12**

Modelon provides software solutions and expert services to organizations worldwide that use model-based simulation tools to design and develop technical systems The Modelon Library Suite, Creator Suite, and Deployment Suite deliver a unified picture of product system interaction and performance – from product concept to operation. Headquartered in Lund, Sweden, and with global reach, Modelon is an industry leader in model-based systems engineering with a focus on leveraging open standard technologies.

## MORETRENCH

**Booth # 1**

Moretrench has recently become part of the Keller group of companies. Moretrench has been serving the power industry for decades providing earthwork, concrete, mechanical, dewatering, geotechnical and other services.  Now that we are part of Keller our offerings have expanded.

## THE NEW YORK BLOWER COMPANY

**Booth # 19**

The New York Blower Company and SSM Industries have teamed together to provide filtration decommissioning skids to the nuclear industry. New York Blower is an industry leader in manufacturing premium-quality, engineered fans and blowers.  SSM Industries, Inc. is the largest Safety Related HVAC Designer-Fabricator-Installer in the United States. Fully customizable ventilation systems can be designed to accommodate a wide variety of application needs. For more information, visit www.nyb.com or www.ssmi.biz.

## INSERT NETL CO

**Booth # 16**

The National Energy Technology Laboratory (NETL) is part of the U.S. Department of Energy national laboratory system. NETL implements a broad spectrum of energy and environmental research and development programs, enabling domestic coal, natural gas, and oil to economically power our Nation's homes, industries, businesses, and transportation. NETL has expertise in coal, natural gas, and oil technologies; contract and project management; analysis of energy systems; and international energy issues.

## PW POWER SYSTEMS CO

**Booth # 5**

PW Power Systems LLC (PWPS), formerly Pratt & Whitney® Power Systems and now a subsidiary of Mitsubishi Hitachi Power Systems, Ltd., has leveraged the proven, advanced technology of Pratt & Whitney® aircraft engines and uniquely applied it to complex, power-system solutions to become a leader in the power generation industry. The PWPS gas turbine engine portfolio offers competitive, efficient, and flexible products from 30 to 140 megawatts of power.

## RENTECH BOILER SYSYTEMS INC.

**Booth # 22**

Rentech Boiler Systems designs and manufactures high quality custom boilers in a variety of categories including fired packaged boilers, waste heat boilers, heat recovery steam generators (HRSG's) and specialty boilers. Rentech is located in Abilene, Texas and is in its third decade of manufacturing steam generation systems for customers around the world

## SIEMENS

**Booth # 23/24**

Siemens is a global powerhouse that has stood for engineering excellence, innovation, quality, and reliability for over 170 years. The company has a presence in more than 200 countries/regions, focusing on the areas of electrification, automation and digitalization. One of the world's largest producers of energy-efficient, resource-saving technologies, Siemens is a leading supplier of systems for power generation and transmission as well as medical diagnosis. Further information is available on the Internet at www.siemens.com.

## STRUCTURAL GROUP CO

**Booth # 18**

Structural Group is firmly committed to its ongoing mission of making new and existing structures stronger and last longer. As a recognized leader in the specialty construction industry, Structural Group delivers turnkey solutions that integrate technology, engineering, and construction. We provide specialty contracting services through our construction companies, and state-of-the-art proprietary products and engineering support services through STRUCTURAL TECHNOLOGIES.

# Sponsors

## VAPORSTREAM CO

**Booth # 6**

In an era of complex and aggressive security threats the Vaporstream Platform ensures that internal and external text communications remain secure, confidential and compliant. When operations are disrupted, Vaporstream protects and secures your information from surveillance and leaks while improving response times. Find out more at vaporstream.com.

## VERSA INTEGRITY GROUP CO

**Booth # 9**

Maximize uptime. For over 50 years, Versa Integrity Group experts have been dedicated to delivering quality technical, reliability, mechanical integrity and non-destructive inspection devices. Comprehensive solutions designed to keep your facility running optimally year-round. Let's get you there. Reach out today. Toll-free 877.703.3235 / versaintegrity.com

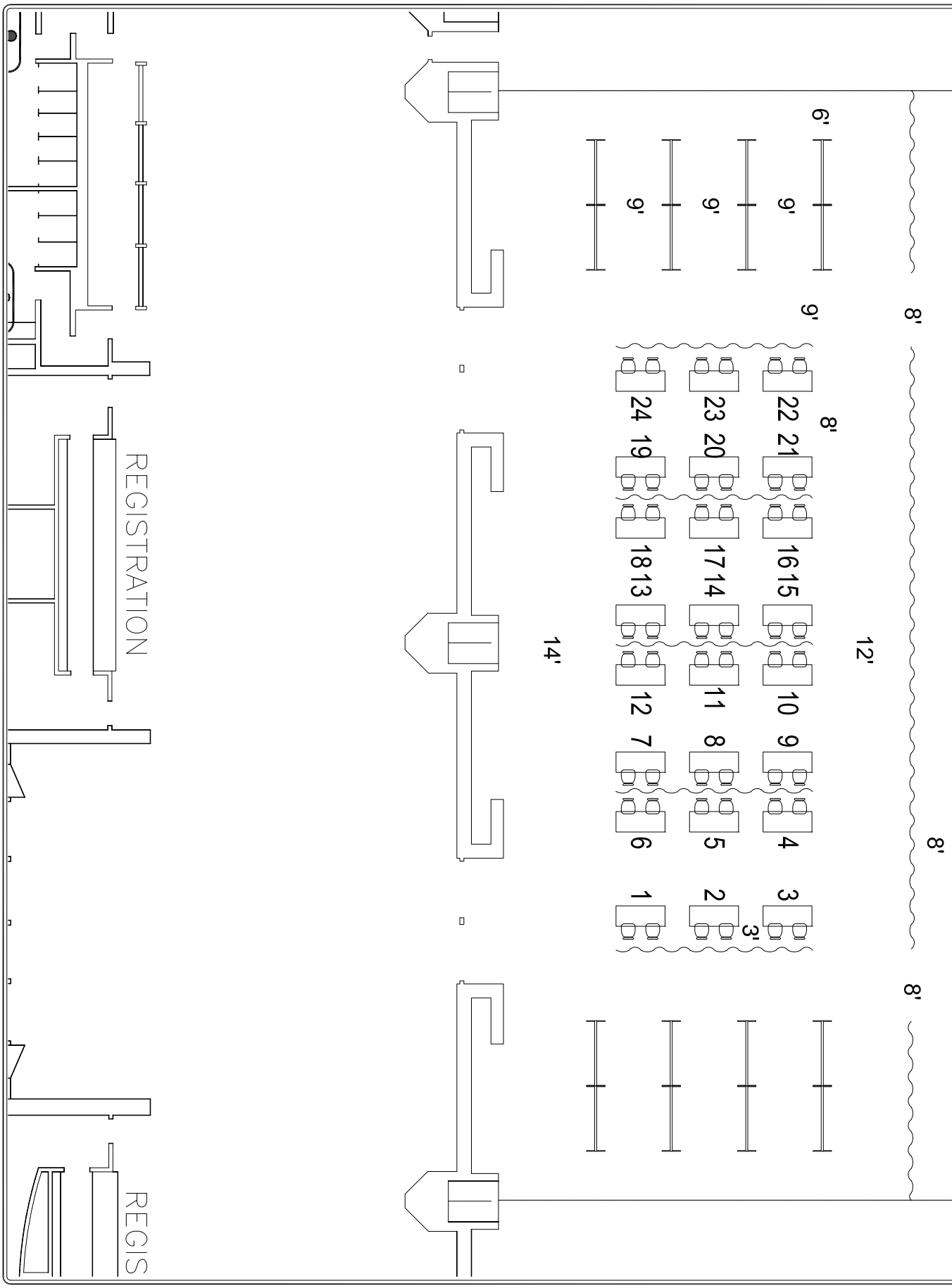
## ELSEVIER

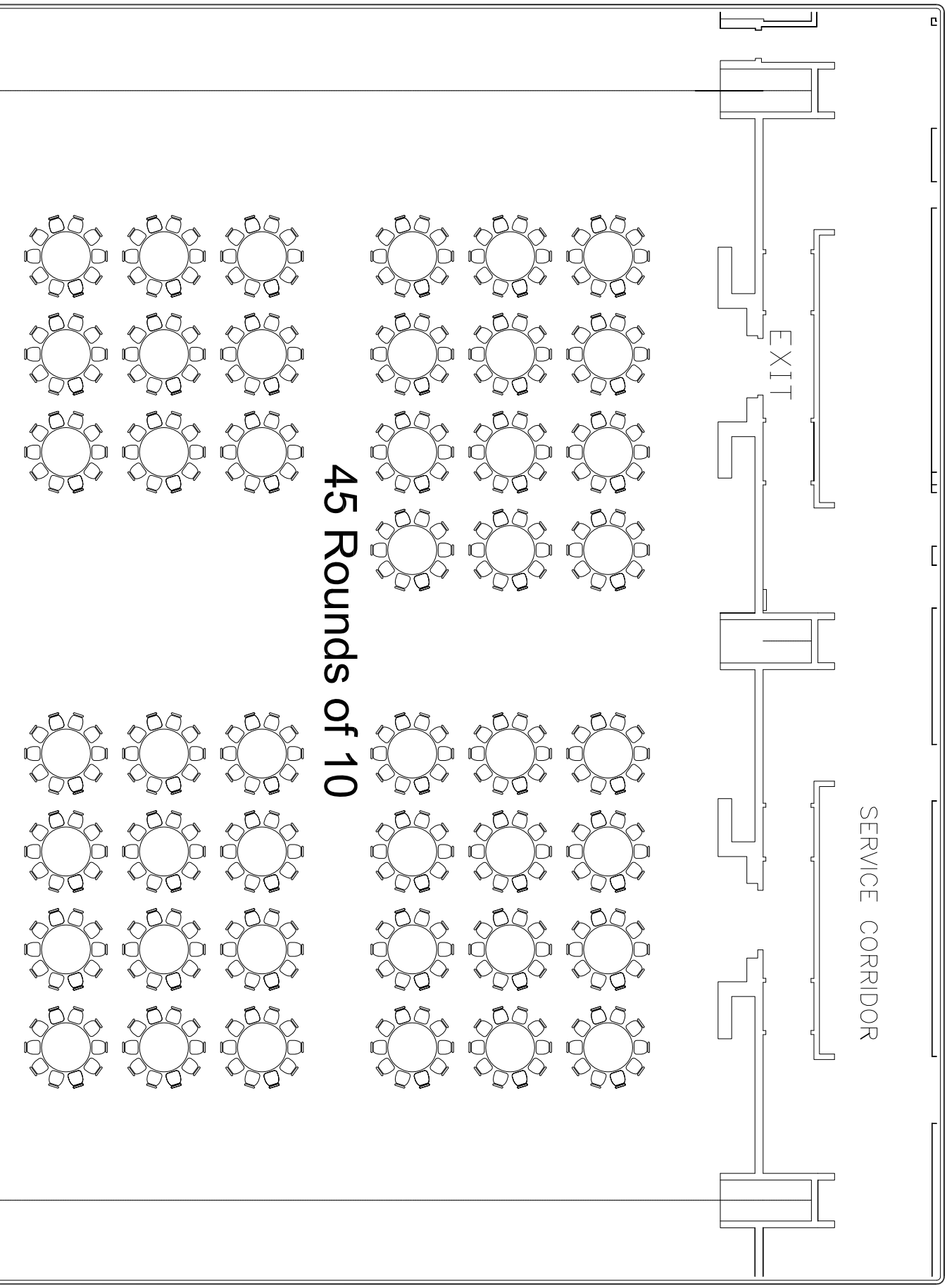
**Coffee Sponsorship**

Elsevier is a global information analytics business that helps institutions and professionals advance healthcare, open science and improve performance for the benefit of humanity.

# Notes

# Exhibitor Floorplan

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45 Rounds of 10

# ASME Division Technical Committee Meetings

## POWER DIVISION TECHNICAL COMMITTEE MEETINGS

### SUNDAY, JUNE 24

2:00PM – 5:00 PM
**Power Division Executive Committee & Committee Chairs Meeting**
*(Invite only)*
Room: Fantasia E

### WEDNESDAY, JUNE 27

11:00AM – 12:30PM
**Power Division Technical Committees**
*(Open to all Attendees)*

**Combined Cycle Power Plant**
Pastoral 3

**Fuels & Combustion Technology**
Fantasia N

**Heat Exchangers**
Pastoral 2

**Plant Operations & Maintenance**
Fantasia Q

**Reliability, Availability & Maintainability**
Fantasia M

**Renewables and Advanced Energy Systems**
Fantasia K

**Turbines Generator & Auxiliaries**
Fantasia D

**Steam Generators & Auxiliaries**
Fantasia A

### TUESDAY, JUNE 26

12:30PM – 2:00PM
**ICOPE & Power Division Meeting**
*By Invitation Only*
Grand Republic C

### WEDNESDAY, JUNE 27

12:00PM – 1:30PM
**Lunch**

**Power Division Administrative Committee Meetings**
*(open to all attendees)*

**Honors & Awards**
*Reserved Table at Lunch*

### THURSDAY, JUNE 28

1:00PM – 2:30PM
**2019 Conference Program Coordination Meeting**
Grand Republic C

## ADVANCED ENERGY SYSTEMS DIVISION TECHNICAL COMMITTEE MEETINGS

### WEDNESDAY, JUNE 27

5:50PM – 6:50PM
**Advanced Energy Systems Division Systems Analysis**
Fantasia B

5:50PM – 6:50PM
**Advanced Energy Systems Division Renewable Energy and Energy Efficiency**
Fantasia C

5:50PM – 6:50PM
**Advanced Energy Systems Division Electrochemical Energy Conversion and Storage**
Fantasia F

7:30PM – 8:00PM
**Advanced Energy Systems Division & Solar Energy Division Executive Committee**
Fantasia A

## SOLAR ENERGY DIVISION TECHNICAL COMMITTEE MEETINGS

### WEDNESDAY, JUNE 27

6:00PM – 6:30 PM
**Solar Energy Division Solar Chemistry & Bio Conversion Committee**
Fantasia E

6:00PM – 6:30PM
**Solar Energy Division Conservation and Solar Buildings Committee**
Fantasia K

6:00PM – 6:30PM
**Solar Energy Division Heating & Cooling Applications and Analysis Committee**
Fantasia D

6:00PM – 6:30PM
**Solar Energy Division Solar Thermal Power Committee**
Fantasia L

6:00PM – 6:30PM
**Solar Energy Division Photovoltaics Committee**
Fantasia M

6:00PM – 6:30PM
**Solar Energy Division Wind Energy Committee**
Fantasia N

6:30PM – 7:30PM
**Solar Energy Division Executive Committee Meeting**
Fantasia A

7:30PM – 8:00PM
**Solar Energy Division & Advanced Energy Systems Division Joint Executive Committee Meeting**
Fantasia A

# Poster Presentations

## ENERGY SUSTAINABILITY CONFERENCE

**Numerical Study on Thermo-electric Performance of Cross-flow Planar Solid Oxide Fuel Cell**

PowerEnergy 2018-7351

**Xiongwen Zhang**

**Deactivation Characteristics of SCR Catalyst at Different Stages in Coal-Fired Flue Gas**

PowerEnergy 2018-7352

**Zhiwen Xu**

**Research on Combustion Characteristics and Ash Properties of Sewage Sludge, Palm Fiber and Their Blends**

PowerEnergy 2018-7355

**Wenjun Yang**

**Dynamic Characteristic Behavior of Spent Fuel Assembly for Pressurized Water Reactor in the Spent Fuel Pool due to Seismic Load**

PowerEnergy 2018-7123

**Kyung-ho Yoon**

**First and Second Law Analysis Combined Cycle Irreversible on the Criteria of Maximum Power in Finite Time Thermodynamics**

PowerEnergy2018-7138

**Amir Ghasemkhani**

**Extended Real-time, Hardware-in-the-Loop, and Communications Modeling and Simulation Environment for Cyber-physical Systems Testing**

PowerEnergy2018-7282

**Karl Schoder**

**Fuel Cell Systems as Critical Power in Railroad Backup Power System**

PowerEnergy2018-7249

**Wen-Lin Wang**

**Low Temperature Cold Storage PCM**

PowerEnergy2018-7639

**Samuel Habtai**

**In search of Best-Cost Solar Concentration- A Moderate-Scale Power-Tower Design, Utilizing Concentrating Dishes with Mirror-Reflective Film**

PowerEnergy2018-7647

**Doug Simmers**

**Adaptive Power Control of Proton Exchange Membrane Fuel Cells Using Extended Kalman Filter Estimation of Membrane Aging Parameters**

PowerEnergy2018-7383

**Chukwunyere Ofoegbu**

**Transient Operating Characteristics of Micro-CHP's**

PowerEnergy2018-7399

**Youngjik Youn**

**Non-Invasive Method to Measure Energy Flow Rate in a Pipe**

PowerEnergy2018-7690

**Mohammed Alanazi**

**Thermodynamic and Performance Analyses of Organic Rankine Cycles for Solar based Micro-Combined Heat and Power Generation Applications**

PowerEnergy2018-7718

**Wahiba Yaici**

**Optimizing a Hybrid Nuclear Heat Storage Power Plant with Market Uncertainty**

PowerEnergy2018-7732

**William Mann**

**Development of an Efficient Compressor for Ocean Compressed Air Energy Storage**

PowerEnergy2018-7737

**Vikram Patil**

**Net-Zero Energy Building Design with an Air-Source Variable Refrigerant Flow (VRF) and Distributed Photovoltaic (PV) Systems**

PowerEnergy2018-7751

**Heejin Cho**

**Thermal Conductivity of Solid and Molten Reactive Compounds**

PowerEnergy2018-7749

**Matthew Wingert**

## POWER CONFERENCE

**Utilizing Higher Carbon Number Alcohols in Gasoline Blends to Meet RFS2 Requirements**

PowerEnergy2018-7252

**Kristina Lawyer**

**Power Station Audits to Improve Reliability, Minimize Failure and Reduce Stock Inventory of Pressure & Temperature Instruments**

PowerEnergy2018-7116

**Ravi Jethra**

**Flow Visualization and Characteristics of Microscale Transpiration Cooling on Porous Surface**

PowerEnergy2018-7562

**Junsik Lee**

**Integrated Fluid-Structure Interaction Simulations of Gas Foil Bearing Performance**

PowerEnergy2018-7645

**Ibrohim Rustamov**

**Energy Harvesting of a Building with Modulation of the Infrastructure of a Building**

PowerEnergy2018-7605

**Britney Singh**

**Numerical Simulation for Inverse Heat Conduction Problem of Single-Layer Lining Erosion of Blast Furnace**

PowerEnergy2018-7614

**Fuyong Su**

**Designing of Darrieus Cross Flow Water Turbines**

PowerEnergy2018-7753

**Wajiha Rehman**

**Geothermal Solar Thermal Combined Cycle Hybrid System with a Bottoming Supercritical Organic Rankine Cycle**

PowerEnergy2018-7714

**Francesca Moloney**

**Thermodynamic Analysis and Multi-Objective Optimizations of a Combined Recompression sCO2 Brayton Cycle - tCO2 Rankine Cycles for Waste Heat Recovery**

PowerEnergy2018-7656

**Ali Alsagri**

**Performance Comparison and Parametric Analysis of sCor2 Power Cycles Configurations**

PowerEnergy2018-7657

**Ali Alsagri**


ASME
POWER
CONFERENCE
Power
6/26-6/28

## 11:00AM - 12:30PM

### TRACK 1-2 COMBUSTION TURBINES COMBINED CYCLES

**SESSION 1-2-1: COMBINED AND SIMPLE CYCLE PLANT PERFORMANCE**
**DISNEY'S CONTEMPORARY RESORT, FANTASIA A** **11:00AM - 12:30PM**

**Session Organizer: Nicholas Gritz**, *POWER Engineers, Duluth, GA, United States*

**11:00am FTW4000: Case Study of a Customer in Argentina Changing Gas Turbine Technology to the New, State of the Art, FT4000 SWIFTPAC 60, After Site Civil Work had Already Been Completed**

**Technical Presentation.** PowerEnergy2018-7128

***Harsh Shah, Phil Vecchiarelli**, PW Power Systems, Inc., Glastonbury, CT, United States*

**11:30am Water-free Combined Cycle Power Plants for Distributed Power Generation**

**Technical Paper Publication.** PowerEnergy2018-7146

***Michael Welch**, Siemens Industrial Turbomachinery Ltd, Lincoln, Lincolnshire, United Kingdom*

**12:00pm Speaker on the Economics Panel**

**Technical Presentation.** PowerEnergy2018-7766

***Douglas Hilleman**, Intertek AIM, Power Group, Jacksonville, FL, United States*

### TRACK 1-6 RENEWABLE ENERGY SYSTEMS

**SESSION 1-6-2: MARINE AND HYDROKINETIC ENERGY I**
**DISNEY'S CONTEMPORARY RESORT, FANTASIA M** **11:00AM - 12:30PM**

**11:00am North Carolina Wave Energy Resource: Hydrogen Production Potential**

**Technical Paper Publication.** PowerEnergy2018-7388

***Gagee Raut**, University of North Carolina at Charlotte, Charlotte, NC, United States, **Navid Goudarzi,** UNCC, Charlotte, NC, United States*

**11:22am Integration of Wave Energy Technologies to Electric Grid in North Carolina**

**Technical Paper Publication.** PowerEnergy2018-7389

***Akshith Subramanian,** UNCC, Charlotte, NC, United States, **Gagee Raut,** University of North Carolina At Charlotte, Charlotte, NC, United States, **Navid Goudarzi,** UNCC, Charlotte, NC, United States*

**11:44am A Parametric Study of Wave Interaction with a Rotor Having Hydrofoil Blades**

**Technical Paper Publication.** PowerEnergy2018-7391

***Yingchen Yang, Fredrick Jenet,** University of Texas Rio Grande Valley, Brownsville, TX, United States, **Ben Xu,** University of Texas Rio Grande Valley, Edinburg, TX, United States, **Juan Carlos Garza, Benjamin Tamayo, Yessica Chavez, Oscar Reyes, Samuel Fuentes,** Instituto Tecnológico de Matamoros, Matamoros, Mexico*

**12:06pm Computational Investigation of Full-Scale Tethered Underwater Kite**

**Technical Paper Publication.** PowerEnergy2018-7397

***Amirmahdi Ghasemi,** Worcester Polytechnic Institute, Worcester, MA, United States, **David Olinger,** Worcester Polytechnic Institute, Upton, MA, United States, **Gretar Tryggvason,** Johns Hopkins University, Baltimore, MD, United States*

### TRACK 1-7 HEAT EXCHANGER TECHNOLOGIES

**SESSION 1-7-1: STEAM SURFACE CONDENSERS AND COOLING SYSTEMS**
**DISNEY'S CONTEMPORARY RESORT, FANTASIA P** **11:00AM - 12:30PM**

**Session Organizer: Zachary Godish,** *Conco Services Corporation, Verona, PA, United States*

**Session Co-Organizer: Kim Massey,** *Day & Zimmermann, Norfolk, VA, United States*

**11:00am Guidelines for the Design, Installation, Operation and Maintenance of Safety Relief Devices for Steam Surface Condensers**

**Technical Presentation.** PowerEnergy2018-7104

***Darren Nightingale,** Thermal Engineering International, Santa Fe Springs, CA, United States*

# Tuesday, June 26

**11:30am Condensing Turbine Exhaust Steam in a Steam Surface Condenser Using Multiple Sources of Cooling Water**

**Technical Paper Publication.** PowerEnergy2018-7148

***Ranga Nadig,*** *Maarky Thermal Systems, Cherry Hill, NJ, United States*

**12:00pm Kansas City Power and Light - Hawthorn Station Unit 5 Modular Titanium Tubed Condenser Project: A Case Study**

**Technical Paper Publication.** PowerEnergy2018-7563

***Kim Grogan,*** *Kansas City Power & Light, Kansas City, MO, United States,* ***Richard Pearce,*** *Kansas City Power & Light, Raymore, MO, United States,* ***Darren Nightingale,*** *Thermal Engineering International, Santa Fe Springs, CA, United States*

## TRACK 1-8 STEAM TURBINES, GENERATORS AND AUXILIARIES

### SESSION 1-8-1 TUTORIAL - INSIDE THE GENERATOR
**DISNEY'S CONTEMPORARY RESORT, FANTASIA D** **11:00AM - 12:30PM**

**Session Organizer: Jane Hutt,** *National Electric Coil*

## TRACK 1-9 PLANT PERFORMANCE

### SESSION 1-9-1: MODELING & ANALYSIS 1
**DISNEY'S CONTEMPORARY RESORT, FANTASIA Q** **11:00AM - 12:30PM**

**Session Organizer: Edward Dundon,** *Dominion Energy, Clinton, CT, United States*

**11:00am The Power Flow Method for Analysis and Optimization of Heat Recovery and Power Generation System**

**Technical Paper Publication.** PowerEnergy2018-7246

***Qun Chen, Xi Chen,*** *Tsinghua University, Beijing, Beijing, China*

**11:20am Parametric Investigation on Supercritical Carbon Dioxide Brayton Cycle for High Temperature Gas-cooled Reactor**

**Technical Paper Publication.** PowerEnergy2018-7276

***Gang Zhao,*** *Tsinghua University, Beijing, China,* ***Ping Ye,*** *INET, Tsinghua University, Beijing, China,* ***Xiao Yong Yang,*** *INET, Tsinghua University, Beijing, China,* ***Jie Wang,*** *Tsinghua University, Beijing, China*

**11:40am Metamodeling-Based Performance Analysis for Digital Power Plant**

**Technical Paper Publication.** PowerEnergy2018-7385

***Dengji Zhou,*** *Shanghai Jiao Tong University, Shanghai, China,* ***Tingting Wei,*** *Shanghai Jiao Tong University, Shanghai, China,* ***Shixi Ma,*** *Shanghai Jiaotong University, Shanghai, China,* ***Huisheng Zhang,*** *Shanghai Jiao Tong University, Shanghai, China,* ***Di Huang,*** *State Grid Jiangsu Electric Power Company Research Institute, Shanghai, China,* ***Zhenhua Lu,*** *Shanghai Jiao Tong University, Shanghai, OO, China*

**12:00pm Enhancing Prediction Accuracy in the Evaluation of Power Plant Uprates Utilizing a Novel Big Data Approach**

**Technical Paper Publication.** PowerEnergy2018-7407

***Peter Pechtl,*** *VTU Energy GmbH, Grambach, Austria,* ***Christian Scheinecker,*** *Voestalpine Stahl GmbH, Linz, Austria,* ***Josef Petek,*** *VTU Energy GmbH, Grambach, Austria*

## TRACK 1-10 THERMAL HYDRAULICS AND COMPUTATIONAL FLUID DYNAMICS

### SESSION 1-10-1: THERMAL HYDRAULICS AND COMPUTATIONAL FLUID DYNAMICS I
**DISNEY'S CONTEMPORARY RESORT, PASTORAL 2** **11:00AM - 12:30PM**

**Session Organizer: George Mesina,** *INL, Idaho Falls, ID, United States*

**11:00am Erosion Wear and Performance Simulation of Centrifugal Pump for Solid-Liquid Flow**

**Technical Paper Publication.** PowerEnergy2018-7151

***Fen Lai, Xiangyuan Zhu, Xun Xu, Guojun Li,*** *Xi'an Jiaotong University, Xi'an, China*

**11:20am The Influence of Vaned Diffuser Outlet Diameters on Operating Performance of a Single Stage Centrifugal Pump**

**Technical Paper Publication.** PowerEnergy2018-7153

***Xiangyuan Zhu, Fen Lai, Liping Zhu, Guojun Li,*** *Xi'an Jiaotong University, Xi'an, China*

**11:40am Computational Thermal/Fluid Flow Analysis for Phase Change Heat and Mass Transfer Processes in a Loop Heat Pipe Capillary Pump**

**Technical Paper Publication.** PowerEnergy2018-7556

***Triem Hoang,*** *TTH Research Inc., Clifton, VA, United States,* ***Robert Baldauff,*** *U.S. Naval Research Laboratory, Washington, DC, United States*

**12:00pm Comprehensive Study of S-Shaped Shaft Extension Pump**

**Technical Presentation.** PowerEnergy2018-7125

***Chao Liu,*** *Yangzhou University, Yangzhou, China*

## TRACK 1-12 STUDENT COMPETITION

**SESSION 1-12-1: STUDENT COMPETITION**
**DISNEY'S CONTEMPORARY RESORT,**
**PASTORAL 3** **11:00AM - 12:30PM**

**Session Organizer: Steven Greco,** *Retired, Wales, WI, United States*

**Session Co-Organizer: Michael Kelly,** *University of California, Berkeley, Berkeley, CA, United States*

**11:00am Additive Manufacturing: A New Paradigm for the Next Generation Of High-Power-Dense Direct-Drive Electric Generators**

**Technical Paper Publication.** PowerEnergy2018-7140

***Austin Hayes,*** *Rochester Institute of Technology, Rochester, NY, United States,* ***Latha Sethuraman,*** *National Renewable energy laboratory, Golden, CO, United States,* ***Lee J. Fingersh, Katherine Dykes,*** *NREL, Boulder, CO, United States*

**11:20am Potential Impacts of Net-Zero Energy Buildings with Distributed Photovoltaic (PV) Power Generation on the Electrical Grid**

**Technical Paper Publication.** PowerEnergy2018-7319

***Dongsu Kim, Heejin Cho, Rogelio Luck,*** *Mississippi State University, Mississippi State, MS, United States*

**11:40am Solar Energy in India: Status, Policies, Expectations and Challenges ahead**

**Technical Paper Publication.** PowerEnergy2018-7359

***Ravi Shankar, Hridesh Singh, Rajat Diwakar, Shubham Pathak,*** *Guru Gobind Singh Indraprastha University, New Delhi, Delhi, India*

**12:00pm Techno- Economic Comparison between Conventional and Innovative Combined Solar Thermal Power and Desalination Methods for Cogeneration**

**Technical Paper Publication.** PowerEnergy2018-7515

***Megan W. Haynes, Andrey Gunawan, Shannon K. Yee,*** *Georgia Institute of Technology, Atlanta, GA, United States*

## 2:00PM - 3:30PM

## TRACK 1-1 FUELS, COMBUSTION & MATERIAL HANDLING

**SESSION 1-1-1: ADVANCED COMBUSTION SYSTEMS AND ISSUES I**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA N** **11:00AM - 12:30PM**

**Session Organizer: Ashwani Gupta,** *University Of Maryland, College Park, MD, United States*

**Session Co-Organizer: David C. Bell,** *University of Dayton, Cincinnati, OH, United States*

**2:00pm Reduced Chemical Kinetic Models Using Alternate and Stochastic Species Elimination**

**Technical Paper Publication.** PowerEnergy2018-7242

***Mazen Eldeeb,*** *California State University, Fresno, Fresno, CA, United States,* ***Benjamin Akih-Kumgeh,*** *Syracuse University, Syracuse, NY, United States*

**2:18pm Derived Cetane Number as Chemical Potential Indicator for Near-limit Combustion Behaviors in Gas Turbine Applications**

**Technical Paper Publication.** PowerEnergy2018-7414

***Sang Hee Won, Dalton Carpenter, Stuart Nates, Frederick L. Dryer,*** *University of South Carolina, Columbia, SC, United States*

**2:36pm A Reduced Fidelity Model for the Rotary Chemical Looping Combustion Reactor**

**Technical Paper Publication.** PowerEnergy2018-7106

***Chukwunwike Iloeje,*** *Massachusetts Institute of Technology, Cambridge, MA, United States,* ***Ahmed Ghoniem,*** *Massachusetts Inst Of Technology, Cambridge, MA, United States,* ***Zhenlong Zhao,*** *Massachusetts Institute of Technology, Cambridge, MA, United States*

# Tuesday, June 26

**2:54pm Co-Combustion Characteristics of Semi-Coke and Coal Under air Conditions**

**Technical Paper Publication.** PowerEnergy2018-7207

***Pengqian Wang, Chang'an Wang, Zichen Tao, Maobo Yuan, Yongbo Du, Jinping Shang, Defu Che,*** *Xi'an Jiaotong University, Xian China*

**3:08pm A Reduced Kinetic Mechanism for Oxy/Methane sCO2 Combustor Simulations**

**Technical Paper Publication.** PowerEnergy2018-7341

***K.R.V. Manikantachari,*** *UCF, Orlando, FL, United States,* ***Scott Martin,*** *Embry-Riddle Aeronautical University, Daytona Beach, FL, United States,* ***Jose Bobren-Diaz,*** *UCF, Orlando, FL, United States,* ***Ladislav Vesely,*** *Czech Technical University In Prague, Prague, Czech Republic,* ***Subith Vasu,*** *University of Central Florida, Orlando, FL, United States*

## TRACK 1-2 COMBUSTION TURBINES COMBINED CYCLES

### SESSION 1-2-3: MANUFACTURING & ADVANCES IN COMBINED CYCLE EFFICIENCY
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA A** **2:00PM - 3:30PM**

**Session Organizer: Nicholas Gritz,** *POWER Engineers, Duluth, GA, United States*

**2:00pm Study of Gas Turbine Hydrodynamic Bearing Using Lobe Profile for Enhanced Performance**

**Technical Presentation.** PowerEnergy2018-7156

***Prasun Chakraborty, Nabarun Biswas,*** *National Institute of Technology, Agartala, Agartala, India*

**2:22pm Application of Specific Entropy Generation to Enhance Thermal Efficiency of a Combined Cycle**

**Technical Paper Publication.** PowerEnergy2018-7328

***Yousef Haseli,*** *Central Michigan University, Mount Pleasant, MI, United States*

**2:44pm Assessment of Gas Turbine's Cooling Systems Integrated with Bottoming Cycle**

**Technical Paper Publication.** PowerEnergy2018-7551

***Mohamed Gadalla,*** *American University of Sharjah, Sharjah, United Arab Emir.,* ***Waleed ElDamaty,*** *American University of Sharjah, Sharjah, United Arab Emir*

**3:06pm An Investigation of the Influence of Fluidics Insertion Technique on Acetylene/Argon Gas Additives to LPG on the Turbulent Lean Premixed Flame Characteristics for an EV Burner**

**Technical Paper Publication.** PowerEnergy2018-7129

***Sameh Hamed Elsayed Hassan,*** *Helwan University, Mattaria Engineering University, Cairo, Egypt,* ***Ahmed Abdelrazek Emara,*** *Technical University Berlin- TUB, Berlin, Germany,* ***Mahmoud Elkady,*** *Elazhar University of Engineering, Cairo, Egypt*

## TRACK 1-4 VIRTUAL PLANT AND CYBER-PHYSICAL SYSTEMS

### SESSION 1-4-1: CYBER-PHYSICAL APPROACH FOR ENERGY SYSTEM DESIGN AND DEVELOPMENT
**DISNEY'S CONTEMPORARY RESORT,**
**PASTORAL 2** **2:00PM - 3:30PM**

**Session Organizer: Nor Farida Harun,** *U.S. DOE, National Energy Technology Laboratory, Morgantown, WV, United States*

**Session Co-Organizer: Nana Zhou,** *National Energy Technology Laboratory, Morgantown, WV, United States*

**2:00pm Cyber-Physical Systems: A New Paradigm for Energy Technology Development**

**Technical Paper Publication.** PowerEnergy2018-7315

***David Tucker,*** *National Energy Technology Laboratory, Morgantown, WV, United States,* ***Paolo Pezzini, Kenneth Mark Bryden,*** *Ames Lab, Ames, IA, United States*

**2:20pm Optimal Controlled Variable Selection for Cyber-Physical Systems**

**Technical Paper Publication.** PowerEnergy2018-7486

***Temitayo Bankole, Debangsu Bhattacharyya,*** *West Virginia university, Morgantown, WV, United States,* ***Paolo Pezzini, Kenneth Mark Bryden,*** *Ames Lab, Ames, IA, United States,* ***David Tucker,*** *National Energy Technology Laboratory, Morgantown, WV, United States*

**2:40pm PID Control Design and Demonstration Using a Cyber-Physical Fuel Cell/Gas Turbine Hybrid System**

**Technical Paper Publication.** PowerEnergy2018-7346

***Bernardo Restrepo, Harry Bonilla,*** *Universidad Del Turabo, Gurabo, PR, United States,* ***Paolo Pezzini, Kenneth Mark Bryden,*** *Ames Lab, Ames, IA, United States,* ***David Tucker,*** *National Energy Technology Laboratory, Morgantown, WV, United States*

**3:00pm Real Time Implementation of Standpipe Model for Solids Flow in Fluidized Bed Applications**

**Technical Paper Publication.** PowerEnergy2018-7425

***Rupendranath Panday,*** *REM Engineering LLC, Morgantown, WV, United States, Lawrence Shadle, U.S. D.O.E. NETL, Morgantown, WV, United States,* ***Ronald Breault,*** *US Dept Energy, National Energy Technology Laboratory, Morgantown, WV, United States*

**TRACK 1-6 RENEWABLE ENERGY SYSTEMS**

**SESSION 1-6-1: ADVANCED TECHNOLOGIES FOR WIND ENERGY**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA F** **2:00PM - 3:30PM**

**Session Organizer: Weifei Hu,** *Cornell University, Ithaca, NY, United States*

**Session Co-Organizer: Navid Goudarzi,** *UNCC, Charlotte, NC, United States*

**2:00pm IC6A1A6 Vs. IC3A1 Squirrel Cage Induction Generator Cooling Configuration Challenges & Advantages for Wind Turbine Application**

**Technical Paper Publication.** PowerEnergy2018-7159

***Gopal Singh,*** *Siemens Gamesa Renewable Energy / University of Central Florida, Winter Springs, FL, United States,* ***Ahmad Saleh,*** *Siemens Wind Power, ORLANDO, FL, United States,* ***John Amos,*** *Siemens Gamesa Renewable Energy, Orlando, FL, United States,* ***Kalpathy Sundaram,*** *University of Central Florida, Orlando, FL, United States,* ***Jayanta Kapat,*** *University of Central Florida, Oviedo, FL, United States*

**2:22pm Reliability Analysis of Offshore Wind Turbines Using Copula**

**Technical Paper Publication.** PowerEnergy2018-7195

***Weifei Hu,*** *Cornell University, Ithaca, NY, United States,* ***Zhiyu Jiang,*** *Norwegian University of Science and Technology, Trondheim, Norway,* ***Yeqing Wang,*** *University of Florida, Shalimar, FL, United States*

**2:44pm Overview of Wind Turbine Field Failure Databases: A Discussion of the Requirements for an Analysis**

**Technical Paper Publication.** PowerEnergy2018-7311

***Roozbeh Bakhshi, Peter Sandborn,*** *University of Maryland, College Park, MD, United States*

**3:06pm CFD and Control Analysis of a Smart Hybrid Vertical Axis Wind Turbine**

**Technical Paper Publication.** PowerEnergy2018-7488

***Arian Hosseini,*** *KTH Royal Institute of Technology, Stockholm, Sweden,* ***Navid Goudarzi,*** *UNCC, Charlotte, NC, United States*

**SESSION 1-6-5: MARINE AND HYDROKINETIC ENERGY II**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA M** **2:00PM - 3:30PM**

**Session Organizer: Ossama Abdelkhalik,** *Michigan Tech University, Houghton, MI, United States*

**Session Co-Organizer: Weifei Hu,** *Cornell University, Ithaca, NY, United States*

**2:00pm Cavitation Modelling in Different Designs of Micro Kaplan Hydro- Turbine**

**Technical Paper Publication.** PowerEnergy2018-7109

***Ryoichi Amano,*** *University Of Wisconsin-Milwaukee, Glendale, WI, United States,* ***Tarek Elgammal,*** *University of Wisconsin-Milwaukee, Milwaukee, WI, United States,* ***Tomoki Sakamoto,*** *University of Wisconsin-Milwaukee, Glendale, WI, United States*

**2:22pm Modeling and Experimental Validation of a Pico-Scale Francis Turbine for a Self-Powered Water Disinfection System**

**Technical Paper Publication.** PowerEnergy2018-7312

***Rowan W. Walsh, Hossein Hosseinimanesh,*** *Department of Mechanical and Industrial Engineering, University of Toronto, Toronto, ON, Canada,* ***Seyed Nourbakhsh, Mohammad Meshkahaldini,*** *Formarum Inc., Richmond Hill, ON, Canada,* ***Amy M. Bilton,*** *Department of Mechanical and Industrial Engineering, University of Toronto, Toronto, ON, Canada*

# Tuesday, June 26

**2:44pm A Novel Methodology to Extract River Current Energy by a Drag Turbine**

**Technical Paper Publication.** PowerEnergy2018-7585

***Ahmed Mohamed,*** *Arab Academy for Science, Technology and Maritime Transport ( AASTMT), Cairo, Cairo, Egypt,* ***Mohamed Mohamed,*** *Umm Al-Qura University, Makka, Saudi Arabia*

**3:06pm Control of Wave Energy Converters for Maximum Energy**

**Technical Presentation.** PowerEnergy2018-7640

***Ossama Abdelkhalik,*** *Michigan Tech University, Houghton, MI, United States*

## TRACK 1-7 HEAT EXCHANGER TECHNOLOGIES

### SESSION 1-7-2 HEAT EXCHANGER DESIGN AND IMPROVEMENTS
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA P** **2:00PM - 3:30PM**

**Session Organizer: Dan Janikowski,** *Plymouth Tube, East Troy, WI, United States*

**Session Co-Organizer: Darren Nightingale,** *Thermal Engineering International, Santa Fe Springs, CA, United States*

**2:00pm Innovative Low-Cost Field Repair of a Drain Cooler Top Plate in a Low-Pressure Feedwater Heater**

**Technical Paper Publication.** PowerEnergy2018-7348

***Eric Svensson,*** *Powerfect, Brick, NJ, United States,* ***Dominic Marra,*** *Florida Power and Light, Florida City, FL, United States,* ***Mike Catapano,*** *Powerfect, Brick, NJ, United States*

**2:30pm Simulation and Analysis of the Supercritical ORC Heat Exchanger**

**Technical Paper Publication.** PowerEnergy2018-7406

***Yung-Ming Li, Chi-chuan Wang,*** *National Chiao Tung University, Hsinchu, Taiwan*

**3:00pm Multi-Objective Design Optimization of Rotary Regenerative Air Preheater using Genetic Algorithm**

**Technical Paper Publication.** PowerEnergy2018-7417

***Limin Wang, Yufan Bu,*** *Xi'an Jiaotong University, Xi'an, Shaanxi, China,* ***Xun Chen,*** *Hunan Xiangdian Test and Research Institute Co.,Ltd., Changsha, China,* ***Xiaoyang Wei, Dechao Li, Defu Che,*** *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

## TRACK 1-9 PLANT PERFORMANCE

### SESSION 1-9-2: MODELING & ANALYSIS 2
**MAIN LEVEL, DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA Q** **2:00PM - 3:30PM**

**Session Organizer: Nelson Malcolm,** *Alcoa, Newburgh, IN, United States*

**Session Co-Organizer: Brian Wodka,** *RMF Engineering, York, PA, United States*

**2:00pm Experimental Study on the Speed Matching of Two Rotors for A Counter-Rotating Fan**

**Technical Paper Publication.** PowerEnergy2018-7108

***Zijian Ai, Guoliang Qin, Jingxiang Lin, Xuefei Chen,*** *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

**2:20pm Uncertainty Analysis of the Performance of Centrifugal Compressors -Numerical Model and Measured Uncertainties**

**Technical Paper Publication.** PowerEnergy2018-7191

***Lina Xu, Eric Huss,*** *FS-Elliott Co., LLC, Export, PA, United States*

**2:40pm Analysis and Operation Optimization Of Recompression Supercritical Carbon Dioxide Power Systems Based On The Power Flow Method**

**Technical Paper Publication.** PowerEnergy2018-7522

***Qun Chen, Xia Li, Xi Chen,*** *Tsinghua University, Beijing, Beijing, China*

**3:00pm The Effect of Temperature on Lithium-ion Battery Energy Efficiency with Graphite/LiFePO4 Electrodes at Different Nominal Capacities**

**Technical Paper Publication.** PowerEnergy2018-7375

***Ashkan Nazari,*** *Virginia Tech, Blacksburg, VA, United States,* ***Roja Esmaeeli, Seyed Reza Hashemi, Haniph Aliniagerdroudbari, Siamak Farhad,*** *University of Akron, Akron, OH, United States*

## TRACK 1-11 WATER MANAGEMENT FOR POWER SYSTEMS

### SESSION 1-11-1: COOLING, EFFICIENCY, AND WATER MANAGEMENT
**DISNEY'S CONTEMPORARY RESORT, FANTASIA D** **2:00PM - 3:30PM**

**Session Organizer: Jessica Mullen,** *US DOE / National Energy Technology Laboratory, Pittsburgh, PA, United States*

**2:00pm Overview of the Water Management Research and Development Program at NETL**

**Technical Presentation.** PowerEnergy2018-7689

***Jessica Mullen,*** *US DOE / National Energy Technology Laboratory, Pittsburgh, PA, United States*

**2:20pm Water-Energy Prototype Model for the NEMS Modeling Platform: Thermoelectric Water Demand and Its Implications on Regional Electricity Market**

**Technical Presentation.** PowerEnergy2018-7708

***Erik Shuster,*** *US DOE/National Energy Technology Laboratory, Pittsburgh, PA, United States*

**2:40pm Maximizing Plant Efficiency While Minimizing Water Usage through Use of a Phase Change Material-Based Cold Storage System**

**Technical Paper Publication.** PowerEnergy2018-7318

***Joshua Charles, Carlos Romero, Sudhakar Neti, Chunjian Pan, Xingchao Wang,*** *Lehigh University, Bethlehem, PA, United States,* ***Richard Bonner,*** *Advanced Cooling Tech., Inc., Lancaster, PA, United States,* ***Ying Zheng, Chien-Hua Chen, Sean Hoenig,*** *Advanced Cooling Technologies, Inc., Lancaster, PA, United States*

**3:00pm Hybrid Cooling for Power Generation and Water Scarcity in the South African Context**

**Technical Paper Publication.** PowerEnergy2018-7410

***Mubenga Carl Tshamala, Derik Ehlers,*** *Stellenbosch University, Stellenbosch, OO, South Africa*

## TRACK 1-12 STUDENT COMPETITION

### SESSION 1-12-2: STUDENT COMPETITION
**MAIN LEVEL, DISNEY'S CONTEMPORARY RESORT, PASTORAL 3** **2:00PM - 3:30PM**

**Session Organizer: Marta Hatzell, Georgia Institute of Technology, Atlanta, GA, United States**

**Session Co-Organizer: Moritz Hübel, University of Rostock, Rostock, MV, Germany**

**2:00pm Micro-tubular Flame-assisted Fuel Cell Power Generation Running Propane and Butane**

**Technical Paper Publication.** PowerEnergy2018-7175

***Ryan Milcarek, Syracuse University, Syracuse, NY, United States, Jeongmin Ahn, Syracuse University, Manlius, NY, United States***

**2:20pm Powering the Pearl: A Study of Cuba's Energy Autonomy**

**Technical Paper Publication.** PowerEnergy2018-7198

***Elizabeth Worsham,*** *North Carolina State University, Raleigh, NC, United States,* ***Genesis Vargas Esposito,*** *Embry-Riddle Aeronautical University, Holly Hill, FL, United States*

**2:40pm A New Probabilistic Economic Load Dispatch Approach for Power Systems with Combined Heat and Power (CHP), Wind and Photovoltaic Units**

**Technical Paper Publication.** PowerEnergy2018-7220

***Zahra Sardoueinasab, Mohammad Javad Morshed, Peyman Nikaeen, Jalel BenHmida, Afef Fekih,*** *University of Louisiana at Lafayette, Lafayette, LA, United States*

**3:00pm Using LIDAR on Wind Turbines for Yaw Error Correction: A Financial Prospective**

**Technical Paper Publication.** PowerEnergy2018-7310

***Roozbeh Bakhshi, Peter Sandborn,*** *University of Maryland, College Park, MD, United States*

# Tuesday, June 26

## 3:45PM - 5:15PM

### TRACK 1-1 FUELS, COMBUSTION & MATERIAL HANDLING

**SESSION 1-1-3: ADVANCED COMBUSTION SYSTEMS AND ISSUES - II**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA N** **3:45PM - 5:15PM**

**Session Organizer: Ashwani Gupta,** *University Of Maryland, College Park, MD, United States*

**Session Co-Organizer: Chukwunwike Iloeje,** *Massachusetts Institute of Technology, Cambridge, MA, United States*

**3:45pm Preferential Vaporization's Impact on Lean Blowout**

**Technical Paper Publication.** PowerEnergy2018-7432

***David C. Bell,*** *University of Dayton, Cincinnati, OH, United States,* ***Joshua Heyne,*** *University of Dayton, Dayton, OH, United States,* ***Sang Hee Won, Frederick L. Dryer,*** *University of South Carolina, Columbia, SC, United States*

**4:05pm Bluff-Body Flames in Hot and Diluted Environments**

**Technical Paper Publication.** PowerEnergy2018-7179

***Chengyu Liu, Jian Zhang, Tao Yang,*** *LNM, Institute of Mechanics, Chinese Academy of Science, Beijing, Beijing, China,* ***Yanhong Ma,*** *Beihang University; Collaborative Innovation Center of Advanced Aero-Engine, Beijing, China*

**4:25pm Modeling and Simulation of a Solid Waste Incineration Sustainable Energy System**

**Technical Paper Publication.** PowerEnergy2018-7497

***Matias N. Munoz, Jose Vargas,*** *Universidade Federal do Parana, Curitiba, Select State/Province, Brazil,* ***Wellington Balmant,*** *UFPR, Curitiba, Parana, Brazil,* ***Juan C. Ordonez,*** *Florida State University, Tallahassee, FL, United States,* ***Andre B. Mariano,*** *Universidade Federal do Parana, Curitiba, Select State/Province, Brazil*

**4:45pm Combustion Modeling Software Development, Verification and Validation**

**Technical Paper Publication.** PowerEnergy2018-7433

***Alejandro Briones, Robert Olding,*** *University of Dayton Research Institute, Dayton, OH, United States,* ***Joshua Sykes,*** *Innovative Scientific Solutions, Inc., Dayton, OH, United States,* ***Brent Rankin,*** *Air Force Research Laboratory, WPAFB, OH, United States,* ***Kyle McDevitt,*** *Williams-International, Commerce Township, MI, United States,* ***Joshua Heyne,*** *University of Dayton, Dayton, OH, United States*

### TRACK 1-2: COMBUSTION TURBINES COMBINED CYCLES

**SESSION 1-2-4: NON TRADITIONAL GAS TURBINE APPLICATIONS**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA A** **3:45PM - 5:15PM**

**Session Organizer: Nicholas Gritz,** *POWER Engineers, Duluth, GA, United States*

**3:45pm Syngas Production and Combustion Turbine Operation with Hydrogen-Rich Fuel at the Kemper County IGCC**

**Technical Paper Publication.** PowerEnergy2018-7173

***Matthew Nelson,*** *Southern Co Services, Birmingham, AL, United States,* ***Pannalal Vimalchand, WanWang Peng,*** *Southern Company, Birmingham, AL, United States,* ***Tim Lieuwen,*** *Georgia Institute of Technology, Atlanta, GA, United States,* ***Diane Revay Madden,*** *U. S. Department of Energy, National Energy Technology Laboratory, Pittsburgh, PA, United States,* ***Paul Miller, Tim Pinkston, Steve Wilson,*** *Southern Company, Birmingham, AL, United States*

**4:07pm Distributed Integrated Solar Combined Cycle Power Plants: Despatchable, Reliable, Affordable, Low Carbon Electricity**

**Technical Paper Publication.** PowerEnergy2018-7192

***Michael Welch,*** *Siemens Industrial Turbomachinery Ltd, Lincoln, Lincolnshire, United Kingdom,* ***Heidi Anttila,*** *Siemens Industrial Turbomachinery, Lincoln, Lincolnshire, United Kingdom*

**4:29pm Innovative Concepts for the Regasification of LNG**

**Technical Presentation.** PowerEnergy2018-7228

***Tatiana Morosuk,*** *Technical University Berlin, Berlin, Germany,* ***George Tsatsaronis,*** *Technical University of Berlin, Berlin, Germany*

**4:51pm Study on the Thermodynamic Performance and Optimization of Gas-Steam Combined Cycle System with a Triple HRSG System Integrated with Solar Energy**

**Technical Paper Publication.** PowerEnergy2018-7568

***Liqiang Duan, Zhen Wang, Zhipeng lv, Liping Pang,*** *North China Electric Power University, Beijing, China*

**TRACK 1-6 RENEWABLE ENERGY SYSTEMS**

**SESSION 1-6-7: BIOMASS, DISTRIBUTED, AND SMALL SCALE GENERATION**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA M** **3:45PM - 5:15PM**

**Session Organizer: John Fall,** *American Electric Power, Columbus, OH, United States*

**3:45pm Performance Analysis of an IT-SOFC/GT Hybrid System Using Gasified Biomass Fuel in Different Operating Modes**

**Technical Paper Publication.** PowerEnergy2018-7216

***Xiaojing Lv, Xiaoyi Ding, Yiwu Weng,*** *Shanghai Jiao Tong University, Shanghai, China*

**4:07pm Energy Analysis of Bio-Diesel Production in India**

**Technical Presentation.** PowerEnergy2018-7677

***Shailendra K. Shukla,*** *Centre for Energy and Resources Development, Varanasi, U.P., India,* ***Ajeet Kumar,*** *Mechanical Engineering, Varanasi, Select State/Province, India*

**4:51pm The Effects of Camelina Methyl Ester - Bioethanol Blends on the Performance of Diesel Engine and Combustion Characteristics**

**Technical Presentation.** PowerEnergy2018-7650

***Hasan Aydogan,*** *Selcuk University, Konya, Turkey, Turkey,* ***Mustafa Acaroglu,*** *Engin Ozcelik, Selcuk, Konya, Turkey*

**SESSION 1-6-10: ADVANCED RENEWABLE TECHNOLOGIES**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA F** **3:45PM - 5:15PM**

**Session Organizer: Weifei Hu,** *Cornell University, Ithaca, NY, United States*

**3:45pm Distributed Power Generation and Energy Storage from Renewables Using a Hydrogen-Oxygen Turbine**

**Technical Paper Publication.** PowerEnergy2018-7183

***Susan Schoenung,*** *Longitude 122 West, Inc., Menlo Park, CA, United States,* ***Jay O. Keller,*** *Zero Carbon Energy Solutions, Inc., Oakland, CA, United States*

**4:07pm CFD Analysis of Stall in a Wells Turbine**

**Technical Paper Publication.** PowerEnergy2018-7558

***Kellis Kincaid, David MacPhee,*** *University of Alabama, Tuscaloosa, AL, United States*

**4:29pm The Future of Traditional SCADA Systems Technology is Now Present with Real-Time Technology**

**Technical Presentation.** PowerEnergy2018-7591

***Luis Ivan Ruiz Flores,*** *ETAP, CDMX, Mexico*

**4:51pm Thermophotovoltaics: A Potential Pathway to High Efficiency Concentrated Solar Power**

**Technical Presentation.** PowerEnergy2018-7774

***Hamid Reza Seyf,*** *Georgia Institute of Technology, Atlanta, GA, United States*

**SESSION 1-6-11: ADVANCED RENEWABLE TECHNOLOGIES 1**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA K** **3:45PM - 5:15PM**

**Session Organizer: David MacPhee,** *University of Alabama, Tuscaloosa AL, United States*

**3:45pm Thermo-Economic Analyses and Comparisons of Two S-CO2-Brayton-Cycle-Based Combined Power Cycles for Concentrated Solar Power Plants**

**Technical Paper Publication.** PowerEnergy2018-7177

***Yuegeng Ma, Xuwei Zhang, Ming Liu, Jiping Liu,*** *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

# Tuesday, June 26

**4:07pm Fast Fault Diagnosis of a Lithium- Ion Battery for Hybrid Electric Aircraft**

**Technical Paper Publication.** PowerEnergy2018-7476

***Seyed Reza Hashemi,*** *University of Akron, Akron, OH, United States,* ***Ashkan Nazari,*** *Virginia Tech, Blacksburg, VA, United States,* ***Roja Esmaeeli, Haniph Aliniagerdroudbari,*** *University of Akron, Akron, OH, United States,* ***Muapper Alhadri,*** *University of Akron, Cuyahoga Falls, OH, United States,* ***Waleed Zakri, Abdul Haq Mohammed,*** *University of Akron, Akron, OH, United States,* ***Ajay Mahajan, Siamak Farhad,*** *University of Akron, Akron, OH, United States*

**4:29pm A Modeling Study of a Hybrid System Using the Waste Heat in Solar Cells to Run an Electric Generator**

**Technical Paper Publication.** PowerEnergy2018-7538

***Abdulrahman Homadi, Tony Hall,*** *University of Arkansas at Little Rock, Little Rock, AR, United States*

**4:51pm Micro Hybridized Auto-rickshaw for Bangladesh: An Analytic Solution to Green Energy Vehicle**

**Technical Paper Publication.** PowerEnergy2018-7619

***Avijit Mallik, Arman Arefin,*** *Rajshahi University of Engineering and Technology, Rajshahi, Rajshahi, Bangladesh*

**3:45pm Power Station Audits to Improve Reliability, Minimize Failure and Reduce Stock Inventory of Pressure & Temperature Instruments**

**Technical Presentation.** PowerEnergy2018-7115

***Ravi Jethra,*** *WIKA, Broadlands, VA, United States*

**4:05pm The Economics of West African Power Pool: Cost Efficiency of Electricity Distribution Companies**

**Technical Presentation.** PowerEnergy2018-7602

***Richard Oduro,*** *University of Surrey, Guildford, United Kingdom*

**4:25pm Flexible Thermal Power Plants Using Thermal Energy Storage**

**Technical Presentation.** PowerEnergy2018-7604

***Fletcher Carlson, Jane Davidson,*** *University of Minnesota, Minneapolis, MN, United States*

**4:45pm Cyber Security for the Power Sector: Where Regulation and Reality Converge**

**Technical Presentation.** PowerEnergy2018-7609

***Mark Rabuano,*** *NAES Corporation, Issaquah, WA, United States*

## TRACK 1-7 HEAT EXCHANGER TECHNOLOGIES

### SESSION 1-7-5: HEAT EXCHANGER NDE METHODS & APPLICATIONS
**DISNEY'S CONTEMPORARY RESORT, FANTASIA P** **3:45PM - 5:15PM**

**Session Organizer: Frank Michell,** *AEP, Westerville, OH, United States*

## TRACK 1-9 PLANT PERFORMANCE

### SESSION 1-9-3: MODELING & ANALYSIS 3
**DISNEY'S CONTEMPORARY RESORT, FANTASIA Q** **3:45PM - 5:15PM**

**Session Organizer: Nelson Malcolm,** *Alcoa, Newburgh, IN, United States*

**Session Co-Organizer: Brian Wodka,** *RMF Engineering, York, PA, United States*

## TRACK 1-10 THERMAL HYDRAULICS AND COMPUTATIONAL FLUID DYNAMICS

### SESSION 1-10-2: THERMAL HYDRAULICS AND COMPUTATIONAL FLUID DYNAMICS II
**DISNEY'S CONTEMPORARY RESORT, PASTORAL 2** **3:45PM - 5:15PM**

**Session Organizer: Munendra Pal Singh,** *Indian Institute of Technology Bombay, Mumbai, India*

**Session Co-Organizer: Homayoon Feiz,** *General Electric, Greenville, SC, United States*

**3:45pm Nodalized Reduced Ordered Model for Stability Analysis of Supercritical Fluid in Heated Channel**

**Technical Paper Publication.** PowerEnergy2018-7366

***Munendra Pal Singh, Md. Emadur Rahman, Suneet Singh,*** *Indian Institute of Technology Bombay, Mumbai, India*

**4:05pm A Validation of CFD Methods on Predicting Valve Performance Parameters**

**Technical Paper Publication.** PowerEnergy2018-7434

***Yu Duan, Matthew Eaton, Michael Bluck,*** *Imperial College London, London, United Kingdom,* ***Christopher Jackson,*** *Rolls-Royce plc, London, United Kingdom*

**4:25pm Spray Characteristics of Multiple Liquid Jets in Cross Flow**

**Technical Presentation.** PowerEnergy2018-7642

***Homayoon Feiz,*** *General Electric, Greenville, SC, United States*

## TRACK 1-11 WATER MANAGEMENT FOR POWER SYSTEMS

### SESSION 1-11-3: WATER TREATMENT
### DISNEY'S CONTEMPORARY RESORT, FANTASIA D — 3:45PM - 5:15PM

**Session Organizer: Nicholas Siefert,** *US DOE / National Energy Technology Laboratory, Pittsburgh, PA, United States*

**3:45pm Membrane-based Water Treatment at Coal Power Plants**

**Technical Presentation.** PowerEnergy2018-7681

***Nicholas Siefert,*** *US DOE / National Energy Technology Laboratory, Pittsburgh, PA, United States,* ***Jason Arena,*** *US DOE National Energy Technology Laboratory, Pittsburgh, PA, United States,* ***Timothy Bartholomew, Meagan Mauter,*** *Carnegie Mellon University, Pittsburgh, PA, United States*

**4:05pm Performance Analysis of Solar Thermal Powered Supercritical Organic Rankine Cycle Assisted Low-Temperature Multi Effect Desalination Coupled with Mechanical Vapor Compression**

**Technical Paper Publication.** PowerEnergy2018-7307

***Eydhah Almatrafi,*** *University of South Florida Clean Energy Research Center, Tampa, FL, United States,* ***D. Yogi Goswami,*** *University Of South Florida, Tampa, FL, United States,* ***Francesca Moloney,*** *University of South Florida Clean Energy Research, Land O Lakes, FL, United States*

**4:25pm CCR Toxic Elements In-Situ Treatment**

**Technical Presentation.** PowerEnergy2018-7750

***James Cox,*** *Pureous Products, Richmond, TX, United States*

**4:45pm Study of Surface Tension and Natural Evaporation of Aqueous Surfactant Solutions**

**Technical Paper Publication.** PowerEnergy2018-7281

***Birce Dikici, Matthew Lehman,*** *Embry-Riddle Aeronautical University, Daytona Beach, FL, United States*

## TRACK 1-12 STUDENT COMPETITION

### SESSION 1-12-3: STUDENT COMPETITION
### DISNEY'S CONTEMPORARY RESORT, PASTORAL 3 — 3:45PM - 5:15PM

**Session Organizer: Joseph Ciras,** *JRC PAS, Westminster, MA, United States*

**Session Co-Organizer: Sarvenaz Sobhansarbandi,** *University of Missouri-Kansas City, Kansas City, MO, United States*

**3:45pm Time and Spatial Modeling of Wear Mechanisms in Nuclear Steam Turbine Blades Using Dynamic Bayesian Networks**

**Technical Paper Publication.** PowerEnergy2018-7193

***David A. Quintanar-Gago,*** *Universidad Nacional Autónoma de México, Mexico City, Mexico,* ***Pamela F. Nelson,*** *UNAM, Jiutepec, Mexico,* ***Ángeles Díaz-Sánchez,*** *Instituto Nacional de Investigaciones Nucleares, Estado de México, Mexico*

**4:05pm Multi-Objective Design Optimization for Distributed Energy Systems with Energy Storage: A Case Study**

**Technical Paper Publication.** PowerEnergy2018-7204

***Jian Zhang, Heejin Cho, Fubin Yang,*** *Mississippi State University, Mississippi State, MS, United States,* ***Hongguang Zhang,*** *Beijing University of Technology, Beijing, Select State/Province, China*

**4:25pm Experimental Investigation of Heat Transfer and Friction Factor Characteristics Using Helical Surface Turbulators in an Annuli of Double Pipe Heat Exchanger**

**Technical Paper Publication.** PowerEnergy2018-7231

***Saurabh Yadav, Maheandera Prabu Paulraj,*** *Indian Institute of Technology Indore, Indore, Madhya Pradesh, India,* ***Santosh Sahu,*** *Indian Institute of Technology, Indore, Indore, India*

# Tuesday, June 26 - Wednesday, June 27

4:45pm A Review of Darrieus Water Turbines

**Technical Paper Publication.** PowerEnergy2018-7547

***Wajiha Rehman,*** *UET Lahore, KSK Campus, Lahore, Punjab, Pakistan,* ***Fatima Rehman,*** *Lahore College for Women University, Lahore, Pakistan,* ***Muhammad Zain Malik,*** *Golden Jubliee Insurance Company, Lahore, Pakistan*

## WEDNESDAY, JUNE 27
## 9:00AM - 10:30AM

### TRACK 1-5 PLANT DEVELOPMENT AND CONSTRUCTION

**SESSION 1-5-1: ECONOMICS ASSOCIATED WITH GAS TURBINES AND STATUS OF COAL FIRED PROJECTS GLOBALLY**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA A** **9:00AM - 10:30AM**

**Session Organizer Frank Michell,** *AEP, Westerville OH, United States*

9:00am Gas Turbine Engine Price Estimation Using Artificial Neural Network

**Technical Paper Publication.** PowerEnergy2018-7141

***David O. Rowlands, Mark Savill,*** *Cranfield University, Bedford, United Kingdom*

9:30am Economic Modelling and Evaluation of a Repurposed Gas Turbine Engine

**Technical Paper Publication.** PowerEnergy2018-7142

***David O. Rowlands, Mark Savill,*** *Cranfield University, Bedford, United Kingdom*

10:00am Coal and Gas Fired Power Construction and Cellation Trends in Countries with the Most New Coal Power Capacity Since 2003

**Technical Paper Publication.** PowerEnergy2018-7466

***Scott Smouse,*** *U.S. Department of Energy, Washington, DC, United States,* ***Ayaka Jones,*** *Department of Energy, Washington, DC, United States,* ***Babatunde Fapohunda,*** *KeyLogic Systems, Inc., Pittsburgh, PA, United States,* ***Mark Render,*** *West Virginia University Innovation Corporation, Pittsburgh, PA, United States,* ***John W. Hindman,*** *Leidos, Pittsburgh, PA, United States*

### TRACK 1-7 HEAT EXCHANGER TECHNOLOGIES

**SESSION 1-7-6: TUBE-TO-TUBESHEET JOINTS**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA P** **9:00AM - 10:30AM**

**Session Organizer: Dan Janikowski,** *Plymouth Tube, East Troy, WI, United States*

**Session Co-Organizer: Ranga Nadig,** *Maarky Thermal Systems, Cherry Hill, NJ, United States*

### TRACK 1-8 STEAM TURBINES, GENERATORS AND AUXILIARIES

**SESSION 1-8-3: REPAIRS, RETROFITS AND UPGRADES**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA D** **9:00AM - 10:30AM**

**Session Organizer: John Sassatelli,** *GE*

9:20am Side Effect in Power Plant from Load Rejection

**Technical Paper Publication.** PowerEnergy2018-7267

***Obaid Namsheh,*** *Saudi Electricity Company, Riyadh, Saudi Arabia*

9:40am Technical Licensing Support for LP Turbine Retrofit

**Technical Presentation.** PowerEnergy2018-7567

***Jeong Hwan Seo,*** *KEPCO E&C, Gyeongsangbuk-Do, Gimcheon-si, Korea (Republic)*

### TRACK 1-9 PLANT PERFORMANCE

**SESSION 1-9-4: MODELING & ANALYSIS 4**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA Q** **9:00AM - 10:30AM**

**Session Organizer: Edward Dundon,** *Dominion Energy, Clinton, CT, United States*

9:00am Data Segmentation Criteria Assessment for Fault Detection Techniques based on Principal Component Analysis for Natural Gas Transmission System

**Technical Paper Publication.** PowerEnergy2018-7479

***Cinthia Audivet, Horacio Pinzon, Jesus Garcia, Marlon Consuegra, Javier Alexander, Marco Sanjuan,*** *Promigas S.A. E.S.P., Barranquilla, Colombia*

**9:20am Concepts for S-CO2 Power Cycles**

**Technical Presentation.** PowerEnergy2018-7229

***Tatiana Morosuk, Mohamed Noaman, George Saade,*** *Technical University Berlin, Berlin, Germany,* ***George Tsatsaronis,*** *Technical University Of Berlin, Berlin, Germany*

**9:40am Power Quality Issues: Interruptions as Key Constraints to Development in Ekiti State, Nigeria**

**Technical Presentation.** PowerEnergy2018-7309

***Oluwatosin Adeoye,*** *The Federal Polytechnic, Ado-Ekiti, NIL, Nigeria*

**10:00am Optimize Automatic Self Cleaning Air Intake Filters System**

**Technical Presentation.** PowerEnergy2018-7632

***Saeed Alshahrani, Saud Abuabthan,*** *Saudi Electricity Company, Abha, Abha, Saudi Arabia*

## TRACK 1-10 THERMAL HYDRAULICS AND COMPUTATIONAL FLUID DYNAMICS

### SESSION 1-10-3: THERMAL HYDRAULICS AND COMPUTATIONAL FLUID DYNAMICS III
### DISNEY'S CONTEMPORARY RESORT, PASTORAL 2 — 9:00AM - 10:30AM

**Session Organizer: George Mesina,** *INL, Idaho Falls, ID, United States*

**9:00am Simulation of Dissolution Front Propagation during Acid Injection into Porous Media: A CFD Approach**

**Technical Paper Publication.** PowerEnergy2018-7167

***Elsayed Abdelfatah,*** *University of Calgary, Calgary, AB, Canada,* ***Maysam Pournik,*** *University of Texas Rio Grande Valley, Edinburg, TX, United States,* ***David Craig,*** *University of Oklahoma, Norman, OK, United States*

**9:20am Fast Local Pressure Estimation for Two Dimensional Systems from Molecular Dynamics Simulations**

**Technical Paper Publication.** PowerEnergy2018-7263

***Sibi Chacko,*** *Heriot Watt University, Dubai, United Arab Emir.,* ***Sumith Yesudasan,*** *University of Georgia, Athens, GA, United States*

**9:40am Numerical Simulation of Oscillating Multiphase Heat Transfer in Parallel Plates using Pseudopotential Multiple-Relaxation-Time Lattice Boltzmann Method**

**Technical Paper Publication.** PowerEnergy2018-7544

***Wandong Zhao,*** *Nanchang University, Nanchang, Jiangxi, China,* ***Ben Xu,*** *University of Texas Rio Grande Valley, Edinburg, TX, United States,* ***Ying Zhang,*** *Nanchang University, Nanchang, Jiangxi, China*

## TRACK 1-12 STUDENT COMPETITION

### SESSION 1-12-4: STUDENT COMPETITION
### DISNEY'S CONTEMPORARY RESORT, PASTORAL 3 — 9:00AM - 10:30AM

**Session Organizer: Andrey Gunawan,** *Georgia Institute of Technology, Atlanta, GA, United States*

**Session Co-Organizer: Steven Greco,** *Retired, Wales, WI, United States*

**9:00am Study on Cogeneration of Setting Up Control Stage in Non-High Pressure Cylinder for Large Coal- Fired Power Units**

**Technical Paper Publication.** PowerEnergy2018-7268

***Junjie Liu,*** *Shanghai University Of Electric Power, Shanghai, Shanghai, China,* ***Weizhong Feng,*** *Shanghai Waigaoqiao No.3 Power Generation Co.,Ltd, Shanghai, China*

**9:20am Research Concerning Heating Surface of Furnace Outlet Slagging Problems in Pulverized Coal Fired Boilers**

**Technical Paper Publication.** PowerEnergy2018-7275

***Qihua Li,*** *Shanghai University of Electric Power, Shanghai, China,* ***Weizhong Feng,*** *Shanghai Waigaoqiao No.3 Power Generation Co.,Ltd, Shanghai, China*

**9:40am CFD Analysis of a Water Flume Design for Testing Marine and Hydrokinetics Energy Converters**

**Technical Paper Publication.** PowerEnergy2018-7390

***Akshith Subramanian, Navid Goudarzi,*** *UNCC, Charlotte, NC, United States*

# Wednesday, June 27

10:00am Design and Performance of a Diaphragm Free-Piston Stirling Engine for Power Production from Low-Temperature Heat Sources

**Technical Paper Publication.** PowerEnergy2018-7396

***Anas Nawafleh,*** *Jordan University of Science and Technology, Anaheim, CA, United States,* ***Khaled R. Asfar,*** *Jordan University of Science & Technology, Irbid TN, Jordan*

## 2:00PM - 3:30PM

### TRACK 1-3 BOILERS & HEAT RECOVERY STEAM GENERATORS

**SESSION 1-3-1: STEAM GENERATOR DESIGN**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA K** **2:00PM - 3:30PM**

**Session Organizer: Paul Weitzel,** *Paul Weitzel Technical Consulting LLC, Canal Fulton, PI, United States*

2:00pm A Novel Design for Reduction of Ammonium Bisulfate Deposition in the Rotary Air Preheater

**Technical Paper Publication.** PowerEnergy2018-7278

***Yufan Bu, Limin Wang, Xiaoyang Wei, Lei Deng, Defu Che,*** *Xi'an Jiaotong University, Xi'an, China*

2:30pm Influence of Flow Arrangement Pattern on Thermal Performance of Tri-sector Rotary Regenerative Air Pre-heater and Deposition Rule for Ammonium Bisulfate

**Technical Presentation.** PowerEnergy2018-7411

***Xun Chen,*** *Hunan Xiangdian Test and Research Institute Co.,Ltd., Changsha, China,* ***Limin Wang,*** *School of Energy and Power Engineering, Xi'an Jiaotong University, Xian, China,* ***Yi Yang,*** *Hunan Xiangdian Test and Research Institute Co.,Ltd., Changsha, China,* ***Yufan Bu,*** *Xi'an Jiaotong University, Xi'an, China,* ***Gang Cheng,*** *Hunan Xiangdian Test and Research Institute Co.,Ltd., Changsha, China*

3:00pm Impact of New High-Performance HRSG Designs on Formation of Evaporator Waterside Deposits

**Technical Presentation.** PowerEnergy2018-7306

***David S. Moelling,*** *Tetra Engineering, Weatogue, CT, United States,* ***James Malloy,*** *Tetra Engineering, Sophia Antipolis, France*

### TRACK 1-4 VIRTUAL PLANT AND CYBER-PHYSICAL SYSTEMS

**SESSION 1-4-2: CYBER-PHYSICAL APPROACH TO ACCELERATE ENERGY TECHNOLOGY DEVELOPMENT**
**DISNEY'S CONTEMPORARY RESORT,**
**PASTORAL 2** **2:00PM - 3:30PM**

**Session Organizer: Nor Farida Harun,** *U.S. DOE, National Energy Technology Laboratory, Morgantown, WV, United States*

**Session Co-Organizer: Nana Zhou,** *National Energy Technology Laboratory, Morgantown, WV, United States*

2:00pm Real-time Probabilistic Risk Assessment in Nuclear Power Systems

**Technical Presentation.** PowerEnergy2018-7682

***Daniel Cole,*** *University Of Pittsburgh, Pittsburgh, PA, United States*

2:20pm Extended Real-time, Hardware-in-the-Loop, and Communications Modeling and Simulation Environment for Cyber-Physical Systems Testing

**Technical Presentation.** PowerEnergy2018-7679

***Karl Schoder,*** *Florida State University, Tallahassee, FL, United States*

2:40pm Addressing a Real-Time Modeling Challenge within Advanced Energy Cyberphysical Systems

**Technical Presentation.** PowerEnergy2018-7734

***Comas Haynes,*** *Georgia Tech Research Institute, Atlanta, GA, United States*

3:00pm The National Energy Technology Laboratory (NETL) Perspective on Cyber-Physical Systems

**Technical Presentation.** PowerEnergy2018-7673

***Sydni Credle,*** *US Department of Energy/Netl, Morgantown, WV, United States*

# Wednesday, June 27

## TRACK 1-6 RENEWABLE ENERGY SYSTEMS

### SESSION 1-6-3: ADVANCED TECHNOLOGIES FOR SOLAR ENERGY I
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA A** **2:00PM - 3:30PM**

**Session Organizer: David MacPhee,** *University of Alabama, Tuscaloosa, AL, United States*

**Session Co-Organizer: Navid Goudarzi,** *UNCC, Charlotte, NC, United States*

**2:00pm Development of a small solar thermal Power Plant for hear and power supply to domestic and small business buildings**

**Technical Paper Publication.** PowerEnergy2018-7336

***Khamid Mahkamov,*** *Northumbria University, New Castle upon Tyne, UK*

**2:18pm Modeling of a New Crank-less Rotary Heat Engine Concept for Solar Power Utilization**

**Technical Paper Publication.** PowerEnergy2018-7374

***Muhammmad I. Rashad, Hend A. Faiad,*** *Faculty of Engineering, Alexandria University, Alexandria, Egyptian, Egypt,* ***Mahmoud Elzouka,*** *University of Nebraska-Lincoln, Lincoln, NE, United States*

**2:36pm A Cost-Effective Active Single Axis Solar Tracking Mechanism Based on Weight Imbalance Principle**

**Technical Paper Publication.** PowerEnergy2018-7378

***A. M. Kader, Muhammmad I. Rashad,*** *Faculty of Engineering, Alexandria University, Alexandria, Egypt,* ***Mahmoud Elzouka,*** *University of Nebraska-Lincoln, Lincoln, NE, United States,* ***B. M. El-Souhily,*** *Faculty of Engineering, Alexandria University Alexandria, Alexandria, Egypt*

**2:54pm Rheological Investigation of the behavior of Nanofluids used in Solar Collectors**

**Technical Paper Publication.** PowerEnergy2018-7587

***Ovais Gulzar,*** *National Institute of Technology Srinagar, Hazratbal, Srinagar, J&K, India,* ***Adnan Qayoum,*** *National Institute of Technology Srinagar, J&K, India*

**3:12pm Ramp Rate Control for Solar Power Generation**

**Technical Presentation.** PowerEnergy2018-7259

***Terence Goh,*** *Singapore Power, Singapore*

### SESSION 1-6-8: ENERGY STORAGE AND GRID-CONNECTED DISTRIBUTED ENERGY SYSTEMS
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA M** **2:00PM - 3:30PM**

**Session Organizer Weifei Hu,** *Cornell University, Ithaca NY, United States*

**2:00pm DC-Microgrids as a Means of Rural Development in East African Countries**

**Technical Paper Publication.** PowerEnergy2018-7405

***Yohannes Biru Aemro, Pedro Soares Moura, Anibal T. de Almeida,*** *University of Coimbra, Coimbra, Portugal*

**2:22pm Planning a Solar-Powered Microgrid for Remote Rural Communities on Mountainous Terrain**

**Technical Paper Publication.** PowerEnergy2018-7525

***Maximiliano Lainfiesta,*** *Texas A&M University-Kingsville, Kingsville, TX, United States,* ***Xuewei Zhang,*** *Texas A&M University-Kingsville, Corpus Christi, TX, United States*

**2:44pm Compact Cryo-Adsorbent Hydrogen Storage Systems for Fuel Cell Vehicles**

**Technical Paper Publication.** PowerEnergy2018-7474

***David Tamburello, Bruce Hardy,*** *Savannah River National Laboratory, Aiken, SC, United States,* ***Martin Sulic,*** *Savannah River Consulting, Aiken, SC, United States,* ***Matthew Kesterson,*** *Savannah River National Laboratory, Aiken, SC, United States,* ***Claudio Corgnale,*** *Savannah River Consulting, Aiken, SC, United States,* ***Donald Anton,*** *Savannah River National Laboratory, Aiken, SC, United States*

**3:06pm Techno-Economic Analysis of a PV-Battery System for a Commercial Building under Different Utility Rate Structures**

**Technical Paper Publication.** PowerEnergy2018-7291

***Anupam Raj, Atelier Ten,*** *San Francisco, CA, United States,* ***T. Agami Reddy,*** *Arizona State University, Tempe, AZ, United States*

# Wednesday, June 27

## TRACK 1-7 HEAT EXCHANGER TECHNOLOGIES

### SESSION 1-7-7: TUTORIAL- PTC 12.1- CLOSED FEEDWATER HEATERS
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA N** **2:00PM - 3:30PM**

**Session Organizer: Aziz Siman,** *Thermal Engineering International, Santa Fe Springs, CA, United States*

## TRACK 1-8 STEAM TURBINES, GENERATORS AND AUXILIARIES

### SESSION 1-8-2: TUTORIAL - INSIDE THE STEAM TURBINE
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA D** **2:00PM - 3:30PM**

**Session Organizer: Michael Smiarkowski,** *Siemens*

**Session Co-Organizer: Brain Haller,** *GE*

## TRACK 1-9 PLANT PERFORMANCE

### SESSION 1-9-5: CONCEPTS & CASE STUDIES 1
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA Q** **2:00PM - 3:30PM**

**Session Organizer: Brian Wodka,** *RMF Engineering, York, PA, United States*

**2:00pm Case Study: Testing for Wall Loss as due to Flow Accelerated Corrosion of Boiler Feed Water Pump Discharge Piping**

**Technical Presentation.** PowerEnergy2018-7233

***Lange Kimball,*** *Stress Engineering Services Inc, Houston, TX, United States,* ***Kuda Mutama,*** *Newmont Nevada Energy Investment, Elko, NV, United States*

**2:20pm Electric Power Reliability: Building a Best Practices Culture**

**Technical Presentation.** PowerEnergy2018-7288

***Alan Ross,*** *SDMyers Inc., Tallmadge, OH, United States*

**2:40pm Case Study: Continuing a Best in Class Fitness for Service Program on P91 Main Steam Piping – Non Destructive Testing**

**Technical Presentation.** PowerEnergy2018-7232

***Lange Kimball,*** *Stress Engineering Services Inc, Houston, TX, United States,* ***Kuda Mutama,*** *Newmont Nevada Energy Investment, Elko, NV, United States*

## TRACK 1-12 STUDENT COMPETITION

### SESSION 1-12-5: STUDENT COMPETITION
**DISNEY'S CONTEMPORARY RESORT,**
**PASTORAL 3** **2:00PM - 3:30PM**

**Session Organizer: Sarvenaz Sobhansarbandi,** *University of Missouri-Kansas City, Kansas City, MO, United States*

**Session Co-Organizer: Andrey Gunawan,** *Georgia Institute of Technology, Atlanta, GA, United States*

**2:00pm Personal Augmented Reality Reference System for the Energy Industry**

**Technical Paper Publication.** PowerEnergy2018-7495

***Geoffrey Momin,*** *University of Ontario Institute of Technology, Markham, ON, Canada,* ***Raj Panchal, Daniel Liu,*** *University of Ontario Institute of Technology, Oshawa, ON, Canada,* ***Sharman Perera,*** *UOIT, Oshaw, ON, Canada*

**2:20pm Harvesting Waste Thermal Energy from Military Systems**

**Technical Paper Publication.** PowerEnergy2018-7514

***Rondolf Moreno, Anthony G. Pollman, Dragoslav Grbovic,*** *Naval Postgraduate School, Monterey, CA, United States*

**2:40pm Experimental Study of Thermal Performance Enhancement of Molten Salt Nanomaterials**

**Technical Paper Publication.** PowerEnergy2018-7516

***Amirhossein Mostafavi,*** *The University of Texas at Arlington, Arlington, TX, United States,* ***Vamsi Kiran Eruvaram,*** *University of Texas at Arlington, Arlington, TX, United States,* ***Donghyun Shin,*** *The University of Texas At Arlington, Arlington, TX, United States*

## 3:45PM - 5:15PM

### TRACK 1-4 VIRTUAL PLANT AND CYBER-PHYSICAL SYSTEMS

**SESSION 1-4-3: OPEN DISCUSSION ABOUT CYBER-PHYSICAL SYSTEMS**
**DISNEY'S CONTEMPORARY RESORT,**
**PASTORAL 2** **3:45PM - 5:15PM**

**Session Organizer: David Tucker,** *National Energy Technology Laboratory, Morgantown, WV, United States*

**Session Co-Organizer: Larry Shadle,** *US DOE NETL, Morgantown, WV, United States*

**3:45pm An Advanced Cyber-Physical Framework to Accelerate the Design Process of New Technologies Development**

**Technical Presentation.** PowerEnergy2018-7672

***Kenneth Mark Bryden,*** *Iowa State University, Ames, IA, United States*

**4:15pm Panel Discussion about Cyber-Physical Systems**

**Technical Presentation.** PowerEnergy2018-7728

***Lawrence Shadle,*** *U.S. D.O.E. NETL, Morgantown, WV, United States*

### TRACK 1-5 PLANT DEVELOPMENT AND CONSTRUCTION

**SESSION 1-5-2: NEW MAINTENANCE TECHNIQUES AND IMPROVED EFFICIENCY CONCEPTS**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA A** **3:45PM - 5:15PM**

**Session Organizer: Frank Michell,** *AEP, Westerville OH, United States*

**3:45pm Elimination of Backing Gas in Austenitic Stainless Steel Welds using High Deposition Metal Transfer Gas Tungsten-Arc Welding**

**Technical Presentation.** PowerEnergy 2018-7701

***Charles Patrick, Scott Witkowski, Brad Berglan, Ramon Solo,*** *ALS Maverick Testing Laboratories, Inc., La Porte, TX, United States,* ***William Newell,*** *Euroweld, Ltd., Mooresville, NC, United States,* ***Juvenal Calvo,*** *TIPTIG USA, Runnemede, NJ, United States*

**4:15pm Cost & Time Reduction of Major Overall Inspection**

**Technical Presentation.** PowerEnergy2018-7631

***Saud Abuabthan, Saeed Alshahrani, Musfer Al-Sanhani,*** *Saudi Electricity Company, Abha, Saudi Arabia*

**4:45pm Comprehensive Study on the Integration Technique for Gas Turbine and Air Separation Unit for IGCC Power Plant**

**Technical Presentation.** PowerEnergy2018-7775

***AneeqLNu, Fu Zhongguan Fu, Muhammad Aqeel,*** *North China Electric Power University, Changping District, Beijing, China, China,* ***Muhammad Sajid,*** *Universiti Technologi Petronas, Seri Iskander, Perak, Malaysia,* ***Zulqarnain Arain, Zulfiqar Ali,*** *North China Electric Power University, Changping District, Beijing, China, China*

### TRACK 1-6 RENEWABLE ENERGY SYSTEMS

**SESSION 1-6-4: ADVANCED TECHNOLOGIES FOR SOLAR ENERGY II**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA K** **3:45PM - 5:15PM**

**Session Organizer: David MacPhee,** *University of Alabama, Tuscaloosa, AL, United States*

**Session Co-Organizer: Navid Goudarzi,** *UNCC, Charlotte, NC, United States*

**3:45pm Thermal Performance Study of Helically Grooved Absorber Tubes for Parabolic Trough Solar Collector**

**Technical Paper Publication.** PowerEnergy2018-7270

***Suresh Vishwakarma, Biplab Kumar Debnath, Kishore Debnath,*** *NIT Meghalaya, Shillong, India*

**4:07pm Exergetic and Exergoeconomic Analyses of A Parabolic Trough Solar Power Generation System**

**Technical Paper Publication.** PowerEnergy2018-7189

***Anming Wang, Ming Liu, Xiaoqu Han, Jiping Liu,*** *Xi'an Jiaotong University, Xi'an, China*

# Wednesday, June 27 - Thursday June 28

**4:29pm Thermodynamic Analysis of a Parabolic Trough Solar Collector Power Generation Plant Coupled with an Organic Rankine Cycle**

**Technical Paper Publication.** PowerEnergy2018-7548

***Mohamed Gadalla,*** *American Univ of Sharjah, Sharjah, United Arab Emir.,* ***Adnan Alashkar,*** *American University of Sharjah, Sharjah, Sharjah, United Arab Emir.*

**4:51pm Thermodynamic Analysis of a Solar-Coal Hybrid Poly-Generation Process for Methanol Synthesis and Power Generation**

**Technical Paper Publication.** PowerEnergy2018-7430

***Tuantuan Xin,*** *North China Electric Power University, Beijing, Beijing, China,* ***Cheng Xu,*** *North China Electirc Power University, Beijing, Beijing, China,* ***Gang Xu, Wenyi Liu, Yongping Yang,*** *North China Electric Power University, Beijing, Beijing, China*

**SESSION 1-6-6: ENERGY STORAGE AND HYBRID ELECTRIC VEHICLES**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA M** **3:45PM - 5:15PM**

**Session Organizer: Navid Goudarzi,** *UNCC, Charlotte, NC, United States*

**Session Co-Organizer: John Fall,** *American Electric Power *, Columbus, OH, United States*

**3:45pm Optimal Design for Fuel Cell Electric Vehicle Systems using MATLAB/Simulink**

**Technical Presentation.** PowerEnergy2018-7261

***Hoe-Gil Lee,*** *Tarleton State University, Stephenville, TX, United States*

**4:07pm Studying Degradation of Lithium-Ion Batteries Using an Empirical Model for Aircraft Applications**

**Technical Paper Publication.** PowerEnergy2018-7428

***Muapper Alhadri,*** *University of Akron, Cuyahoga Falls, OH, United States,* ***Siamak Farhad, Waleed Zakri, Abdul Haq Mohammed, Roja Esmaeeli, Haniph Aliniagerdroudbari, Seyed Reza Hashemi,*** *University of Akron, Akron, OH, United States,* ***Himel Barua,*** *The University of Akron, Akron, OH, United States*

**4:29pm Analysis of Out-of-Spec Cell in an Operating Fuel Cell Stack**

**Technical Presentation.** PowerEnergy2018-7293

***Manish Sinha,*** *General Motors, Pontiac, MI, United States,* ***Pinkhas Rapaport,*** *Generals Motors, Penfield, NY, United States,* ***Hiromichi Yoshida, Shohei Toyota, Honda, Tochigi, Japan, Srikanth Arisetty,*** *General Motors, Pontiac, MI, United States*

**4:51pm Heat Transfer Enhancement of Sensible Energy Storage for Low Temperature Application**

**Technical Paper Publication.** PowerEnergy2018-7271

***Sujit Roy,*** *National Institute of Technology Meghalaya, Shillong, Meghalaya, India,* ***Biplab Kumar Debnath,*** *NIT Meghalaya, Shillong, India*

**TRACK 1-9 PLANT PERFORMANCE**

**SESSION 1-9-7: PTC-46 TUTORIAL**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA Q** **3:45PM - 5:15PM**

**Session Organizer: Brian Wodka,** *RMF Engineering, York, PA, United States*

## THURSDAY, JULY 28
## 9:00AM - 10:30AM

**TRACK 1-1 FUELS, COMBUSTION & MATERIAL HANDLING**

**SESSION 1-1-6: ADVANCED AND ALTERNATIVE FUELS**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA N** **9:00AM - 10:30AM**

**Session Organizer: Mazen Eldeeb,** *California State University, Fresno, Fresno, CA, United States*

**Session Co-Organizer: Alejandro Briones,** *University of Dayton Research Institute, Dayton, OH, United States*

**9:00am Characteristics of Char from Co-Pyrolysis of Biomass and Plastic Waste Technical Paper**

**Technical Paper Publication.** PowerEnergy2018-7255

***Ashwani Gupta,*** *University Of Maryland, College Park, MD, United States,* ***Kiran Raj Goud Burra,*** *University of Maryland, College Park, College Park, MD, United States*

**9:22am Investigation of the Evaporation Processes for Aqueous Ammonia and Aqueous Urea and Guidelines for Using Simplifying Assumptions**

**Technical Paper Publication.** PowerEnergy2018-7218

***Thomas Eldredge, Morgan Thomas,*** *Liberty University, Lynchburg, VA, United States*

**9:44am Multi-Component Separation and Purification of Natural Gas**

**Technical Paper Publication.** PowerEnergy2018-7537

***David Tamburello,*** *Savannah River National Laboratory, Aiken, SC, United States,* ***Martin Sulic,*** *Savannah River Consulting, Aiken, SC, United States,* ***Bruce Hardy,*** *Savannah River National Laboratory, Aiken, SC, United States*

**10:06am Numerically Study on Combustion and NOx Emission Characteristics in Tangentially Fired Boiler Co-Firing Semi-Coke**

**Technical Paper Publication.** PowerEnergy2018-7211

***Yongbo Du, Chang'an Wang, Pengqian Wang, Qiang Lv, Defu Che,*** *Xi'an Jiaotong University, Xi'an, China*

## TRACK 1-6 RENEWABLE ENERGY SYSTEMS

### SESSION 1-6-9: OTHER ADVANCED ENERGY SYSTEMS
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA M** **9:00AM - 10:30AM**

**Session Organizer, John Fall,** *American Electric Power, Columbus OH, United States*

**9:00am Critical Design Elements for Traveling Wave Thermoacoustic Engines**

**Technical Paper Publication.** PowerEnergy2018-7376

***Mitchell McGaughy,*** *Clemson University, Charleston, SC, United States,* ***Eric Boessneck,*** *Clemson University Restoration Institute, North Charleston, SC, United States,* ***Thomas Salem,*** *Clemson University, North Charleston, SC, United States,* ***John Wagner,*** *Clemson University, Clemson, SC, United States*

**9:30am Effect of Using Different Equations of State of Stat in the Analysis of Rotary Displacer Stirling Engine**

**Technical Paper Publication.** PowerEnergy2018-7221

***Amirhossein Bagheri, Pavlina J. I., Williams, Phillip R., Foster, Huseyin Bostanci,*** *University of North Texas, Denton, TX, United States*

**10:00am Comprehensive Energy Modeling of Tri-Sol, A Three-In-One Solar Concentrating BIPV/Thermal/Daylighting System**

**Technical Paper Publication.** PowerEnergy2018-7213

***Sean Lawless,*** *Lawless Energy LLC, Milford, CT, United States,* ***Ravi Gorthala,*** *University of New Haven, West Haven, CT, United States*

## TRACK 1-10 THERMAL HYDRAULICS AND COMPUTATIONAL FLUID DYNAMICS

### SESSION 1-10-4: THERMAL HYDRAULICS AND COMPUTATIONAL FLUID DYNAMICS IV
**DISNEY'S CONTEMPORARY RESORT,**
**PASTORAL 2** **9:00AM - 10:30AM**

**Session Organizer: George Mesina,** *INL, Idaho Falls, ID, United States*

**Session Co-Organizer: Morgan Thomas,** *Liberty University, Lynchburg, VA, United States*

**9:00am Experimental Study of Swirl Cooling Flow on a Circular Chamber Using 3-D Stereo-PIV**

**Technical Paper Publication.** PowerEnergy2018-7379

***Daisy Galeana,*** *SDSU/UCSD/Solar Turbines, Chula Vista, CA, United States,* ***Asfaw Beyene,*** *San Diego State University, San Diego, CA, United States*

**9:20am A Novel Parameter for the Evaluation of Static Mixers**

**Technical Paper Publication.** PowerEnergy2018-7510

***Morgan Thomas, Thomas Eldredge, Hector Medina, David Fazzina,*** *Liberty University, Lynchburg, VA, United States*

**9:40am Miniature Multiple-Evaporator Loop Heat Pipes for Thermal Management of Space-Based Electronics**

**Technical Presentation.** PowerEnergy2018-7557

***Triem Hoang,*** *TTH Research Inc., Clifton, VA, United States*

# Thursday, June 28

## 11:00AM - 12:30PM

**TRACK 1-9 PLANT PERFORMANCE**

**SESSION 1-9-6: CONCEPTS & CASE STUDIES 2**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA Q** **11:00AM - 12:30PM**

**Session Organizer: Brian Wodka,** *RMF Engineering, York, PA, United States*

**11:00am Gas Turbine Fouling offshore; an analysis of engine air flow**

**Technical Paper Publication.** PowerEnergy2018-7269

***Stian Madsen,*** *Statoil ASA, Stavanger, Norway,* ***Mehmet Serkan Yildirim,*** *Dresser-Rand A/S (A Siemens Business), Kongsberg, Norway,* ***Lars Eirik Bakken,*** *NTNU, Trondheim, Norway*

**11:20am Evaluation of Flexibility Optimization for Thermal Power Plants**

**Technical Paper Publication.** PowerEnergy2018-7573

***Moritz Hübel,*** *University of Rostock, Rostock, MV, Germany,* ***Jens Prause, Uni Rostock,*** *Rostock, Mecklenburg-Vorpommern, Germany,* ***Conrad Gierow,*** *FVTR GmbH, Rostock, Germany,* ***Egon Hassel,*** *University of Rostock, Rostock, MV, Germany,* ***Raphael Wittenburg,*** *Rostock, 18059, MV, Germany,* ***Dorian Holtz,*** *University of Rostock, 18059, Germany*

**11:40am Artificial Intelligence (AI) Techniques for Maximizing Value of Power Generating Assets**

**Technical Paper Publication.** PowerEnergy2018-7137

***Komandur Sunder Raj,*** *Power & Energy Systems Services, Oradell, NJ, United States*

**12:00pm Operational Flexibility Assessment by Condensate Throttling Coupled with Thermal Storage Tanks on a 660 MW Supercritical Coal-Fired Power Plant**

**Technical Paper Publication.** PowerEnergy2018-7176

***Yongliang Zhao, Chaoyang Wang, Ming Liu, Daotong Chong, Junjie Yan,*** *Xi'an Jiaotong University, Xi'an, Shaanxi, China*


ASME
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CONFERENCE
Energy
Sustainability
6/25 - 6/28

# Monday, June 25

## 11:00AM - 12:30PM

### TRACK 2-9: SUSTAINABLE BUILDING ENERGY SYSTEMS

**SESSION 2-9-3: SOLAR RESOURCE, CLIMATE, AND HUMAN COMFORT**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA F** **11:00AM - 12:30PM**

**Session Organizer: M Keith Sharp,** *University of Louisville, Louisville, KY, United States*

**11:00am WRF- Solar Validation and Potential Power Forecast in New York City**

**Technical Paper Publication.** PowerEnergy2018-7130

***Harold Gamarro,*** *The City College of New York, Richmond Hill, NY, United States,* ***Luis Ortiz,*** *The City College of New York, New York, NY, United States,* ***Jorge Gonzalez,*** *City College of New York, New York, NY, United States*

**11:20am Analysis of climate variability on energy demands for indoor human comfort levels in tropical urban environments**

**Technical Paper Publication.** PowerEnergy2018-7131

***Rabindra Pokhrel,*** *City College of New York, CCNY, New York, NY, United States,* ***Luis Ortiz,*** *The City College of New York, New York, NY, United States,* ***Nazario Ramirez-Beltran,*** *The University of Puerto Rico-Mayaguez, Mayaguez, PR, United States,* ***Jorge Gonzalez,*** *City College of New York, New York, NY, United States*

**11:40am Energy Harvesting of a Building with Modulation of the Infrastructure of a Building**

**Technical Presentation.** PowerEnergy2018-7606

***Britney Singh,*** *Brooklyn Technical High School, South Ozone Park, NY, United States,* ***Horace Walcott,*** *Brooklyn Technical High School, Brooklyn, NY, United States*

**12:00pm Data Analytics of Outdoor Air: What to Measure to Generate Actionable Information**

**Technical Presentation.** PowerEnergy2018-7729

***Robert Gilbert,*** *Sinclair Community College, Beavercreek, OH, United States*

## 2:00PM - 3:30PM

### TRACK 2-9 SUSTAINABLE BUILDING ENERGY SYSTEMS

**SESSION 2-9-1: PANEL ON INTEGRATED MECHANICAL SYSTEMS FOR SUSTAINABLE BUILDINGS**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA F** **2:00PM - 3:30PM**

**Session Organizer: Jorge Gonzalez,** *City College of New York, New York, NY, United States*

**Dr. Jorge E. Gonzales,** *Professor of Mechanical Engineering of the City College of New York*
**Dr. Moncef Krarti,** *Professor of the Civil and Environmental Engineering Department, University of Colorado-Boulder*
**Dr. Ming Qu,** *Associate Professor of Civil and Environmental Engineering of Purdue University*
**Dr. Andy Walker,** *Principal Engineer, The National Renewable Energy Laboratory*

### TRACK 2-11 CONCENTRATED SOLAR POWER

**SESSION 2-11-5: SYSTEM DESIGN AND ANALYSIS**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA B** **2:00PM - 3:30PM**

**Session Organizer: Daniel Codd,** *University of San Diego, San Diego, CA, United States*

**2:00pm Streamlining the Power Generation Profile of Concentrating Solar Power Plants**

**Technical Paper Publication.** PowerEnergy2018-7136

***Mohammad Abutayeh,*** *Arkansas State University, Jonesboro, AR, United States,* ***Anas Alazzam,*** *Khalifa University of Science, Technology & Research (KUSTAR), Abu Dhabi, United Arab Emir.,* ***Bashar El-Khasawneh,*** *Khalifa University, Abu Dhabi, United Arab Emir.*

**2:20pm Transient Simulation of a 1 MWt Test Bed of an Integrated Particle-Based CSP Plant Driving an sCO2 Flow Loop**

**Technical Presentation.** PowerEnergy2018-7144

***Kevin Albrecht, Clifford Ho,*** *Sandia National Laboratories, Albuquerque, NM, United States*

**2:40pm Techno-Economic Analysis of Dual-Stage Sodium Thermal Electrochemical Converter (Na-TEC) Power Block for Distributed CSP**

**Technical Paper Publication.** PowerEnergy2018-7505

***Andrey Gunawan, Alexander Limia, Jong Min Ha, Peter A. Kottke, Seung Woo Lee, Andrei G. Fedorov, Shannon K. Yee,*** *Georgia Institute of Technology, Atlanta, GA, United States*

**3:00pm Comprehensive Parametric Analysis and Sensitivity Study of Latent Heat Thermal Energy Storage System in Concentrated Solar Power Plants**

**Technical Paper Publication.** PowerEnergy2018-7437

***Hermes Chirino,*** *The University of Texas Rio Grande Valley, Edinburg, TX, United States,* ***Ben Xu,*** *University of Texas Rio Grande Valley, Edinburg, TX, United States*

## 3:45PM- 5:15PM

**TRACK 2-11 CONCENTRATED SOLAR POWER**

**SESSION 2-11-1: ENERGY POLICY AND MARKETS**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA B** **3:45PM - 5:15PM**

**Session Organizer: Zhiwen Ma,** *National Renewable Energy Laboratory, Lakewood, CO, United States*

**3:45pm CSP Plants for Operation in Flexible Electricity Markets**

**Invited Presentation.** PowerEnergy2018-7712

***Tobias Hirsch,*** *DLR, Stuttgart, Germany,* ***Ana Carolina do Amaral Burghi,*** *DLR (German Aerospace Center, Institute of Solar Research), Stuttgart, Germany,* ***Marion Schroedter-Homscheidt,*** *DLR (German Aerospace Center, Earth Observation Center), Wessling, Germany*

**4:30pm CSP in South Africa: A Case of Brief Candle**

**Technical Presentation.** PowerEnergy2018-7660

***Toyosi Craig,*** *Stellenbosch University, Stellenbosch, 7602, South Africa,* ***Alan Brent,*** *Victoria University of Wellington, Wellington, Wellington, New Zealand,* ***Frank Dinter,*** *Stellenbosch University, Stellenbosch, South Africa*

**4:50pm Sub-hourly Dispatch Optimization of Photovoltaic and Concentrating Solar Power Hybrid Systems**

**Technical Presentation.** PowerEnergy2018-7742

***William Hamilton, Robert Braun, Alexandra Newman,*** *Colorado School of Mines, Golden, CO, United States*

**TRACK 2-12 PHOTOVOLTAICS**

**SESSION 1-12-1: SOLAR PHOTOVOLTAICS: MATERIALS, SYSTEMS, MANUFACTURING AND RELIABILITY**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA F** **3:45PM - 5:15PM**

**Session Organizer: Ryoichi Amano,** *University of Wisconsin-Milwaukee, Glendale, WI, United States*

**3:45pm Simulation of Inverted Perovskite Solar Cells**

**Technical Paper Publication.** PowerEnergy2018-7227

***Jiawei Gong,*** *Penn State Behrend, Erie, PA, United States,* ***Sumathy Krishnan,*** *North Dakota State University, Fargo, ND, United States*

**4:05pm Investigation of Parasitic Absorption in the Back Contact / Reflector of thin film CdTe/CdS Solar Cells**

**Technical Paper Publication.** PowerEnergy2018-7533

***Joshua Smay,*** *Penn State- Harrisburg, Middletown, PA, United States,* ***Ola Rashwan,*** *Penn State University-Harrisburg, Middletown, PA, United States,* ***James Then, Darien Perez,*** *Penn State- Harrisburg, Middletown, PA, United States*

**4:25pm A Stand-Alone Hybrid Photovoltaic, Fuel Cell and Battery System**

**Technical Paper Publication.** PowerEnergy2018-7121

***Ryoichi Amano,*** *University Of Wisconsin-Milwaukee, Glendale, WI, United States,* ***Mohammad Qandil, Ahmad Abbas,*** *University of Wisconsin-Milwaukee, Milwaukee, WI, United States*

**4:45pm Cooling of Concentrator Photovoltaic Cells Using Mini- Scale Jet Impingement Heat Sinks**

**Technical Paper Publication.** PowerEnergy2018-7569

***Mahmoud Ahmed,*** *Assiut University, Assiut, Egypt,* ***Ali Radwan,*** *Egypt-Japan University of Science and Technology, Alexanderia, Egypt,* ***Meshack Hawi,*** *E-Just, New Borg El Arab Alexandria, Egypt*

# Tuesday, June 26

## 11:00AM- 12:30PM

### TRACK 2-5 DISTRIBUTED ENERGY SYSTEMS

**SESSION 2-5-1: DISTRIBUTED ENERGY SYSTEMS 1**
**DISNEY'S CONTEMPORARY RESORT,**
**PASTORAL 1** **11:00AM - 12:30PM**

**Session Organizer: Abdulrahman Homadi,** *University of Arkansas at Little Rock, Little Rock, AR, United States*

**11:00am Performance Prediction and Optimization of an Organic Rankine Cycle (ORC) Using Back Propagation Neural Network for Diesel Engine Waste Heat Recovery**

**Technical Paper Publication.** PowerEnergy2018-7158

***Fubin Yang, Heejin Cho,*** *Mississippi State University, Mississippi State, MS, United States****, Hongguang Zhang,*** *Beijing University of Technology, Beijing, Select State/Province, China*

**11:20am Thermoelectric Heating and Cooling System with Integrated Thermal Energy Storage (Thermal Battery) for Electric Vehicles**

**Technical Paper Publication.** PowerEnergy2018-7238

***Ravi Gorthala, Annika Hacker, Maria-Isabel Carnasciali,*** *University of New Haven, West Haven, CT, United States*

**11:40am Experimental Investigation of a Flat Plate Photovoltaic/Thermal Collector**

**Technical Paper Publication.** PowerEnergy2018-7223

***Mohamad Modrek,*** *The Petroleum Institute, Abu Dhabi, United Arab Emir.,* ***Ali Al-Alili,*** *Khalifa University of Sciences and Technology - Sas Al Nakhl Campus, Abu Dhabi, United Arab Emir.*

**12:00pm Modeling a New Design of an Electrical Generator Using Waste Heat**

**Technical Paper Publication.** PowerEnergy2018-7532

***Abdulrahman Homadi, Tony Hall,*** *University of Arkansas at Little Rock, Little Rock, AR, United States*

### TRACK 2-6: SUSTAINABILITY AND SOCIETY

**SESSION 2-6-1: SUSTAINABLE ENERGY RECOURSE**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA C** **11:00AM - 12:30PM**

**Session Orgnizer: Dr. Hamidreza Najafi,** *Florida Institute of Technology, Menbourne FL, United States*

**11:00am The Potential for Integrating Solar Thermal Energy in both Centralized and Decentralized Systems in Egypt**

**Technical Paper Publication.** PowerEnergy2018-7465

***Ramy Imam,*** *Georgia Institute of Technology, Atlanta, GA, United States,* ***Mohamed Yassin,*** *Carnegie Mellon University, Pittsburgh, PA, United States*

**11:20am Li-ion Batteries vs. Synthetic Natural Gas: a Life Cycle Analysis Study on Sustainable Mobility**

**Technical Presentation.** PowerEnergy2018-7593

***Guido Lorenzi,*** *KTH - Royal Institute of Technology, Stockholm, Europe, Sweden,* ***Jacopo Romanelli, Marco Gorgoroni, Massimo Santarelli,*** *Politecnico di Torino, Torino, Italy,* ***Carlos Silva,*** *Instituto Superior Técnico, Lisbon, Portugal,* ***Andrew Martin,*** *KTH - Royal Institute of Technology, Stockholm, Sweden*

**11:40am Political Economy Analyses: Inefficiencies of Electricity Distribution Companies (EDCs)**

**Technical Presentation.** PowerEnergy2018-7603

***Richard Oduro, Matthew Leach,*** *University of Surrey, Guildford, United Kingdom*

**12:00pm Cost of Conserved Energy as Screening Metric to Prioritize Energy Conservation Measures Under Subsidized Energy Tarrifs**

**Technical Presentation.** PowerEnergy2018-7368

***Fotouh Al-Ragom,*** *Kuwait Institute For Scientific Research, Safat, Kuwait*Track 2-6: Sustainability and Society

## 11:00AM- 12:30PM

### TRACK 2-7 ELECTROCHEMICAL ENERGY CONVERSION AND STORAGE

**SESSION 2-7-5: MANUFACTURING METHODS FOR ELECTROCHEMICAL ENERGY CONVERSION AND STORAGE**
**DISNEY'S CONTEMPORARY RESORT, FANTASIA L** **11:00AM - 12:30PM**

**Session Organizer: Andrey Gunawan,** *Georgia Institute of Technology, Atlanta, GA, United States*

**11:00am Brazings for Metal-Ceramic Joining in Sodium Thermal Electrochemical Converter (Na-TEC) Devices**

**Technical Paper Publication.** PowerEnergy2018-7517

***Andrey Gunawan, Jong Min Ha, Diane M. England, Alexander Limia, Peter A. Kottke, Andrei G. Fedorov, Seung Woo Lee, Shannon K. Yee,*** *Georgia Institute of Technology, Atlanta, GA, United States*

**11:45am Study on the Effect of Locking Bolt Loading Method on the Deformation of Bipolar Plate in PEMFC**

**Technical Presentation.** PowerEnergy2018-7612

***Tao Chen, Shihua Liu, Jiwei Zhang,*** *Wuhan University of Technology, Wuhan, Hubei, China*

### TRACK 2-10 SOLAR CHEMISTRY

**SESSION 2-10-2: SOLAR HYDROGEN I**
**DISNEY'S CONTEMPORARY RESORT, FANTASIA E** **11:00AM - 12:30PM**

**Session Organizer: Luke Venstrom,** *Valparaiso University, Valparaiso, IN, United States*

**Session Co-Organizer: Justin Lapp,** *University of Maine, Orono, ME, United States*

**11:00am Perovskites and Particle Reactor: A Multinational Effort to Advance Solar Hydrogen**

**Invited Presentation.** PowerEnergy2018-7704

***Anthony McDaniel,*** *Sandia National Laboratories, Livermore, CA, United States,* ***Ivan Ermanoski,*** *Sandia National Labs, Albuquerque, NM, United States*

**11:40am Integrating Thermochemical and Electrochemical Processes with a Concentrating Solar Thermal System for Hydrogen Production**

**Technical Presentation.** PowerEnergy2018-7678

***Zhiwen Ma,*** *National Renewable Energy Laboratory, Lakewood, CO, United States,* ***Janna Martinek, Patrick Davenport,*** *NREL, Golden, CO, United States,* ***Claudio Corgnale,*** *Savannah River Consulting, Aiken, SC, United States*

**12:00pm Techno-Economic Analysis of an Industrial Plant for Solar Hydrogen Production via the Zn/ZnO Thermochemical Cycle**

**Technical Presentation.** PowerEnergy2018-7746

***Erik Koepf,*** *ETH Zurich, Zurich, Switzerland,* ***Willy Villasmil,*** *Lucerne University of Applied Sciences and Arts, Lucerne, Switzerland,* ***Roland Jackober,*** *ETH Zurich, Zurich, Switzerland,* ***Anton Meier,*** *The Paul Scherrer Institute, Villigen-PSI, Switzerland*

### TRACK 2-11 CONCENTRATED SOLAR POWER

**SESSION 2-11-3: PANEL DISCUSSION: KEY CSP RESEARCH FACILITIES**
**DISNEY'S CONTEMPORARY RESORT, FANTASIA B** **11:00AM - 12:30PM**

**Session Organizer: Matthew Bauer,** *Department of Energy SunShot, Washington, DC, United States*

**11:00am Commonwealth Scientific and Industrial Research Organization's Key CSP Research Facilities**

**Invited Presentation.** PowerEnergy2018-7776

***Wes Stein,*** *CSIRO, Newcastle, Australia*

**11:18am National Renewable Energy Laboratory's Key CSP Research Capabilities**

**Invited Presentation.** PowerEnergy2018-7777

***Mark Mehos,*** *National Renewable Energy Lab, Golden, CO, United States*

**11:36am Sandia National Laboratories' Key Research Capabilities**

**Invited Presentation.** PowerEnergy 018-7778

***Paul Gauche,*** *Sadia National Laboratories, Albuquerque, NM, United States*

# Tuesday, June 26

**11:54pm Oak Ridge National Laboratory's Key CSP Research Capabilities**

**Invited Presentation.** PowerEnergy2018-7779

***Kevin Robb,*** *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

**12:12pm German Aerospace Center (DLR) Key CSP Research Facilities**

**Invited Presentation.** PowerEnergy2018-7780

***Christian Sattler,*** *German Aerospace Center DLR, Koeln, Germany*

## 2:00PM- 3:30PM

### TRACK 2-5 DISTRIBUTED ENERGY SYSTEMS

**SESSION 2-5-2: DISTRIBUTED ENERGY SYSTEMS 2**
**DISNEY'S CONTEMPORARY RESORT,**
**PASTORAL 1** **2:00PM - 3:30PM**

**Session Organizer: Jian Zhang,** *Mississippi State University, Mississippi State, MS, United States*

**2:00pm Thermodynamic and Economic Analysis of a Biomass Fired Small Scale CHP with ORC for Low-Temperature Heat Source**

**Technical Presentation.** PowerEnergy2018-7580

***Márcio Santos,*** *University of Coimbra, Coimbra, Coimbra, Portugal,* ***José Manuel Baranda Ribeiro, Ricardo Mendes, Jorge André,*** *Universidade Coimbra, Coimbra, Coimbra, Portugal*

**2:20pm Optimal Scheduling and Distribution Temperature of CO2 District Energy Networks**

**Technical Presentation.** PowerEnergy2018-7305

***Raluca Ancuta Suciu,*** *École Polytchnique Fédérale de Lausanne, Sion, Valais, Switzerland,* ***Paul Stadler, Luc Girardin, François Maréchal,*** *École Polytechnique Fédérale de Lausanne, Sion, Valais, Switzerland*

**2:40pm A Thermally Driven Recuperative Adsorption Power Generation System**

**Technical Presentation.** PowerEnergy2018-7114

***Jeromy Jenks,*** *PNNL, Hines, OR, United States,* ***Pete McGrail, Radha Motkuri,*** *PNNL, Richland, WA, United States*

**3:00pm Study on Optimization of Pressure Ratio Distribution in Multistage Compressed Air Energy Storage System**

**Technical Paper Publication.** PowerEnergy2018-7181

***Shang Chen, Tong Zhu, Huayu Zhang,*** *Tongji University, Shanghai, China*

### TRACK 2-6 SUSTAINABILITY AND SOCIETY

**SESSION 2-6-2: ENERGY SUSTAINABILITY IN BUILDINGS**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA C** **2:00PM - 3:30PM**

**Session Organizer: Dr. Hamidreza Najafi,** *Florida Institute of Technology, Melbourne FL,United States*

**2:00pm Demographical Energy Usage Analysis of Residential Buildings**

**Technical Paper Publication.** PowerEnergy2018-7327

***Alice Sokolova, Baris Aksanli,*** *San Diego State University, San Diego, CA, United States*

**2:20pm Accurate Control of Thermal Conditions in Large Space Buildings like an Underground Metro Station**

**Technical Paper Publication.** PowerEnergy2018-7413

***Ryoichi Amano,*** *University Of Wisconsin-Milwaukee, Glendale, WI, United States,* ***Alaa Hasan,*** *University of Wisconsin-Milwaukee, Glendale, WI, United States,* ***Essam Khalil,*** *Cairo University, Dokki 11321, Egypt,* ***Tarek Elgammal,*** *University of Wisconsin-Milwaukee, Milwaukee, WI, United States*

**2:40pm Solar Mini-grids for Sudan Rural Areas: Case Study, Arquit Village**

**Technical Presentation.** PowerEnergy2018-7598

***Nagwa Ibrahim,*** *Qassim University, Buraidah, TX, Saudi Arabia*

**3:00pm A Comparative Study of Industrial Energy Assessments for Small and Medium Sized Industrial Facilities**

**Technical Paper Publication.** PowerEnergy2018-7550

***Ryoichi Amano,*** *University Of Wisconsin-Milwaukee, Glendale, WI, United States,* ***Ahmad Abbas,*** *University of Wisconsin-Milwaukee, Milwaukee, WI, United States,* ***Mandana Saravani, Muhannad Al-Haddad,*** *University of Wisconsin-Milwaukee, Glendale, WI, United States,* ***Mohammad Qandil,*** *University of Wisconsin-Milwaukee, Milwaukee, WI, United States*

## TRACK 2-7 ELECTROCHEMICAL ENERGY CONVERSION AND STORAGE

### SESSION 2-7-3: ELECTROCHEMICAL ENERGY STORAGE 1
**DISNEY'S CONTEMPORARY RESORT, FANTASIA L** **2:00PM - 3:30PM**

**Session Organizer: George Nelson,** *University of Alabama in Huntsville, Huntsville, AL, United States*

**2:00pm Experimental Performance Evaluation of a Rechargeable Lithium-Air Battery with Hyper-Branched Polymer Electrolyte**

**Technical Paper Publication.** PowerEnergy2018-7262

***Susanta Kumar Das, K. Joel Berry,*** *Kettering University, Flint, MI, United States*

**2:30pm Quasi-Solid Graphite Anode for Flexible Lithium-ion Batteries**

**Technical Paper Publication.** PowerEnergy2018-7456

***Waleed Zakri, Siamak Farhad, Haniph Aliniagerdroudbari,*** *University of Akron, Akron, OH, United States,* ***Muapper Alhadri,*** *University of Akron, Cuyahoga Falls, OH, United States,* ***Abdul Haq Mohammed, Seyed Reza Hashemi, Roja Esmaeeli,*** *University of Akron, Akron, OH, United States*

**3:00pm Structural Changes in Alloy Anodes for Li-ion Batteries Assessed with X-ray Microtomography**

**Technical Paper Publication.** PowerEnergy2018-7539

***Jacob N. Adams, Logan Ausderau, George Nelson,*** *University of Alabama in Huntsville, Huntsville, AL, United States*

## TRACK 2-10 SOLAR CHEMISTRY

### SESSION 2-10-3: SOLAR HYDROGEN II
**DISNEY'S CONTEMPORARY RESORT, FANTASIA E** **2:00PM - 3:30PM**

**Session Organizer: Peter Loutzenhiser,** *Georgia Institute of Technology, Atlanta, GA, United States*

**2:00pm Design and Experimental Demonstration of a Compact Solar-Driven High-Temperature Electrolysis Reactor for Hydrogen Production**

**Technical Presentation.** PowerEnergy2018-7683

***Meng Lin,*** *École Polytechnique Fédérale De Lausanne, Renens, Switzerland,* ***Clemens Suter,*** *EPFL, Lausanne, Vaud, Switzerland,* ***Sophia Haussener,*** *École Polytechnique Fédérale de Lausanne,Lausanne, Switzerland*

**2:20pm Comparative Thermodynamic Analyses of Solar Hydrogen Production via Ceria-Based Metal Oxide Redox Cycles**

**Technical Presentation.** PowerEnergy2018-7354

***Sha Li, Vincent Wheeler, Peter Kreider,*** *The Australian National University, Canberra, Australian Capital Territory, Australia,* ***Wojciech Lipinski,*** *Australian National University, Bamberra, Australia,* ***Roman Bader,*** *ITP Thermal Pty Ltd, Turner, ACT, Australia*

**2:40pm Technological Learning and the Future of Solar H2: A Component Learning Comparison of Solar Thermochemical Cycles and Electrolysis Using Solar PV**

**Technical Presentation.** PowerEnergy2018-7638

***Julia Haltiwanger Nicodemus,*** *Lafayette College, Easton, PA, United States*

**3:00pm Comparative Assessment of Hydrogen Production via Steam Reforming, Solar Reforming and Solar Cracking**

**Technical Presentation.** PowerEnergy2018-7758

***Brady Rau, Nesrin Ozalp, Richard Davis,*** *University of Minnesota Duluth, Duluth, MN, United States* Track 2-10 Solar Chemistry

# Tuesday, June 26

**TRACK 2-11 CONCENTRATED SOLAR POWER**

**SESSION 2-11-4: COMPONENT ON-SUN TEST**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA B** **2:00PM - 3:30PM**

**Session Organizer: Kevin Albrecht,** *Sandia National Laboratories, Albuquerque, NM, United States*

**2:00pm First On-Sun Tests Of a Centrifugal Particle Receiver System**

**Technical Paper Publication.** PowerEnergy2018-7166

***Miriam Ebert, Lars Amsbeck,*** *German Aerospace Center (DLR), Stuttgart, Germany,* ***Reiner Buck,*** *German Aerospace Center, Stuttgart, Germany,* ***Jens Rheinländer,*** *German Aerospace Center (DLR), Stuttgart, Germany,* ***Bärbel Schlögl-Knothe, Stefan Schmitz,*** *German Aerospace Center, Jülich, Germany,* ***Marcel Sibum,*** *German Aerospace Center (DLR), Jülich, Germany,* ***Hannes Stadler, German Aerospace Center, Jülich, Germany, Ralf Uhlig,*** *German Aerospace Center, Stuttgart, Germany*

**2:20pm On-Sun Testing of a High-Temperature Bladed Solar Receiver and Transient Efficiency Evaluation using Air**

**Technical Paper Publication.** PowerEnergy2018-7543

***Jesus D. Ortega,*** *Sandia National Laboratories, Albuquerque, NM, United States,* ***Sagar Khivsara,*** *Indian Institute of Science, Bangalore, Karnataka, India,* ***Joshua Christian,*** *Sandia National Laboratories, Albuquerque, NM, United States,* ***Pradip Dutta,*** *India Institute of Science, Bangalore, Karnataka, India,* ***Clifford Ho,*** *Sandia National Laboratories, Albuquerque, NM, United States*

**2:40pm Concentrated Solar Power on Demand (CSPonD) Beam Down Demonstration: Molten Salt Commissioning and Initial Performance**

**Technical Presentation.** PowerEnergy2018-7723

***Daniel Codd,*** *University of San Diego, San Diego, CA, United States,* ***Antoni Gil Pujol,*** *Massachusetts Institute of Technology, Cambridge, MA, United States,* ***Radia Lahlou, Nicolas Calvet,*** *Masdar Institute of Science and Technology, Abu Dhabi, United Arab Emir.,* ***Alexander Slocum,*** *Massachusetts Institute of Technology, Cambridge, MA, United States*

**3:00pm Status Report on Silicone Based Heat Transfer Fluids for CSP**

**Technical Presentation.** PowerEnergy2018-7769

***Christoph Hilgert,*** *German Aerospace Center (DLR), Institute of Solar Research, Köln, Germany,* ***Christian Jung,*** *German Aerospace Center (DLR), Institute of Solar Research, Koeln, Germany,* ***Guillaume Saliou,*** *German Aerospace Center (DLR), Institute of Solar Research, Tabernas, Spain,* ***Jürgen Dersch,*** *German Aerospace Center (DLR), Institute of Solar Research, Köln, Germany,* ***Christoph Wasserfuhr,*** *TÜV NORD Systems GmbH & Co. KG, Hamburg, Germany,* ***Javier Leon,*** *PSA-CIEMAT, Tabernas, Spain*

## 3:45PM- 5:15PM

**TRACK 2-2 SMART AND CYBER-PHYSICAL SYSTEMS**

**SESSION 2-2-1: POWER APPLICATIONS**
**DISNEY'S CONTEMPORARY RESORT,**
**PASTORAL 1** **3:45PM - 5:15PM**

**Session Organizer: Alex Tsai,** *U.S. Coast Guard Academy, New London, CT, United States*

**Session Co-Organizer: Paolo Pezzini,** *Ames Lab, Ames, IA, United States*

**3:45pm Cyber-Physical Hybrid Power Generation and Advanced Power Control Optimization and Design**

**Technical Presentation.** PowerEnergy2018-7446

***Rick Lank,*** *DERP Technologies, L.L.C., Hagerstown, MD, United States,* ***David Tucker,*** *National Energy Technology Laboratory, Morgantown, WV, United States,* ***Paolo Pezzini,*** *Ames Lab, Ames, IA, United States*

**4:05pm Fuel Cell Backup Power System for Grid-Service and Micro-Grid in Telecommunication Applications**

**Technical Paper Publication.** PowerEnergy2018-7184

***Zhiwen Ma,*** *National Renewable Energy Laboratory, Lakewood, CO, United States,* ***Joshua Eichman, Jennifer Kurtz,*** *National Renewable Energy Laboratory, Golden, CO, United States*

**4:25pm Demand Response for Reliable Grid Balancing**

**Technical Presentation.** PowerEnergy2018-7670

***Anna Demeo,*** *Racepoint Energy, Osterville, MA, United States*

## TRACK 2-6 SUSTAINABILITY AND SOCIETY

### SESSION 2-6-3: SUSTAINABILITY AND SOCIETY
**DISNEY'S CONTEMPORARY RESORT, FANTASIA C** **3:45PM - 5:15PM**

**Session Organizer Dongsu Kim,** *Mississippi State University, United States*

**3:45pm Addressing Economic and Energy Poverty through Locally Available Sustainable Biomass Resources: Investigation of the Issues Concerning India and South Africa**

**Technical Paper Publication.** PowerEnergy2018-7292

***Christopher Enweremadu,*** *University of South Africa, Johannesburg, Gauteng, South Africa,* ***Debendra C Baruah,*** *Tezpur University, Napaam, Assam, India,* ***Sadhan Mahapatra,*** *Tezpur University, Napaam, Assam, India,* ***Dipam Patowary, Gunajit D Sarma, Sampriti Kataki,*** *Tezpur University, Napaam, Assam, India*

**4:05pm Effectiveness of Technology and Policy on Human Behavior For Regulating Lawn Water Consumption**

**Technical Presentation.** PowerEnergy2018-7596

***Rachana Vidhi, Prasanna Shrivastava,*** *Harvard University, Palm Beach Gardens, FL, United States*

**4:25pm Coconut-Castor Oil Blend as a Sustainable Basestock for IC Engine Oils: The Low-Temperature Fluidity**

**Technical Presentation.** PowerEnergy2018-7329

***Audu Ibrahim Ali,*** *The Federal Polytechnic Idah, Nigeria,* ***Binfa Bongfa,*** *University Teknologi Malaysia, Skudai, Johor, Malaysia, Johor, Malaysia*

**4:45pm Economic and Social Challenges to Energy Sustainability in Kuwait**

**Technical Presentation.** PowerEnergy2018-7360

***Essam Asem,*** *Kuwait Foundation for the Advancement of Sciences, Sharq, Kuwait*

## TRACK 2-7 ELECTROCHEMICAL ENERGY CONVERSION AND STORAGE

### SESSION 2-7-4: ELECTROCHEMICAL ENERGY STORAGE 2
**DISNEY'S CONTEMPORARY RESORT, FANTASIA L** **3:45PM - 5:15PM**

**Session Organizer: Susanta Kumar Das,** *Kettering University, Flint, MI, United States*

**3:45pm A Dynamic Model Incorporating the Effects of the Ion Diffusion and Side Reactions for the Vanadium/Air Redox Flow Battery**

**Technical Paper Publication.** PowerEnergy2018-7120

***Yu Shi, Jiyun Zhao,*** *City University of Hong Kong, Kowloon, Hong Kong*

**4:15pm Comparison of Different Energy Storage Systems for a Small Airport Facility**

**Technical Paper Publication.** PowerEnergy2018-7203

***Shahin Shafiee,*** *Florida Institute of Technology, Melbourne, FL, United States,* ***Mary Helen McCay,*** *National Center for Hydrogen Research, Melbourne, FL, United States*

**4:45pm Design optimization of Large Scale Redox Flow Battery Stack for Energy Grid System**

**Technical Presentation.** PowerEnergy2018-7335

***Seunghun Jung,*** *Chonnam National University, Gwangju, Korea* ***(Republic), Soowhan Kim,*** *Sungkyunkwan University, Suwon, Korea (Republic)*

# Tuesday, June 26

## TRACK 2-10 SOLAR CHEMISTRY

### SESSION 2-10-5: THERMOCHEMICAL ANALYSIS
**DISNEY'S CONTEMPORARY RESORT, FANTASIA E** **3:45PM - 5:15PM**

**Session Organizer: Erik Koepf,** *ETH Zurich, Zurich, Switzerland*

**3:45pm Multi-scale and Multi-physics Modeling For Analyzing Solar-driven Thermochemical H2 and CO Production**

**Technical Presentation.** PowerEnergy2018-7705

***Xiaoyu Dai,*** *Ecole Polytechnique Federale de Laussane, Lausanne, Switzerland,* ***Sophia Haussener,*** *École Polytechnique Fédérale de Lausanne,, Lausanne, Switzerland*

**4:05pm Characterization of a Laser-Based Heating System Coupled with In Operando Raman Spectroscopy Utilized in Solar Thermochemical Redox Cycles**

**Technical Presentation.** PowerEnergy2018-7720

***Kangjae Lee, Jonathan Scheffe,*** *University of Florida, Gainesville, FL, United States*

**4:25pm Moving Brick Receiver-Reactor (MBR2): A Solar Thermochemical Reactor and Process Design with a Solid-Solid Heat Exchanger and On-demand Production of Hydrogen and/or Carbon Monoxide**

**Technical Presentation.** PowerEnergy2018-7665

***Silvan Siegrist, Henrik von Storch,*** *German Aerospace Center (DLR), Juelich, Germany,* ***Martin Roeb,*** *German Aerospace Center (DLR), Koeln, Germany,* ***Christian Sattler,*** *German Aerospace Center DLR, Koeln, Germany*

**4:45pm Experimental Framework for Evaluation of the Thermodynamic and Kinetic Parameters of Metal-Oxides for Solar Thermochemical Fuel Production**

**Technical Presentation.** PowerEnergy2018-7724

***Richard Carrillo, Jonathan Scheffe,*** *University of Florida, Gainesville, FL, United States*

## TRACK 2-11 CONCENTRATED SOLAR POWER

### SESSION 2-11-8: COMPONENT CONCEPT TESTS
**DISNEY'S CONTEMPORARY RESORT, FANTASIA B** **3:45PM - 5:15PM**

**Session Organizer: Roman Bader,** *ITP Thermal Pty Ltd, Turner, ACT, Australia*

**3:45pm Challenges in Design of Solar Receivers and Auxiliary Components**

**Technical Presentation.** PowerEnergy2018-7757

***Cedric Ophoff,*** *KU Leuven, Lier, Belgium,* ***Mostafa Abuseada,*** *University of Minnesota Duluth, Duluth, MN, United States,* ***Hamed Abedini Najafabadi,*** *Iran University of Science and Technology, Tehran, Iran,* ***MD Helal Uddin, Samuel Lucas, Timothy Johnson, Patrick Martin, Nesrin Ozalp,*** *University of Minnesota Duluth, Duluth, MN, United States*

**4:05pm Bladed or Conventional Flat Receivers: Which Geometry is More Efficient?**

**Technical Presentation.** PowerEnergy2018-7726

***Meige Zheng,*** *The Australian National University, FRANKLIN, ACT, Australia,* ***Ye Wang, Juan F. Torres,*** *The Australian National University, Canberra, Australia,* ***Joe Coventry,*** *The Australian National University, ACT, Australia,* ***John Pye,*** *The Australian National University, Canberra, Australia*

**4:25pm Numerical Investigation of a Helical Receiver for a New CSP Concept Based on the Solar Bowl Technology**

**Technical Presentation.** PowerEnergy2018-7733

***Mattia Cagnoli,*** *Dipartimento Energia, Politecnico Di Torino, Torino, Italy,* ***Inigo Pagola Barrio, Marcelino Sanchez Gonzalez,*** *cener, sarriguren, Spain,* ***Laura Savoldi,*** *Dipartimento Energia, Politecnico Di Torino, Torino, T, Italy,* ***Cristobal Villasante,*** *ik4 tekniker, bilbao, Spain,* ***Roberto Zanino,*** *Dipartimento Energia, Politecnico Di Torino, Torino, Italy*

**4:45pm Design and Performance of a Dish-Based Hybrid Solar Converter Using Transmissive Photovoltaics**

**Technical Presentation.** PowerEnergy2018-7725

***Daniel Codd, Christopher Spitler, Jacob Platz, Alexander Benson,*** *University of San Diego, San Diego, CA, United States,* ***Brian Riggs, Matthew Escarra,*** *Tulane University, New Orleans, CA, United States*

## 9:00AM- 10:30AM

### TRACK 2-2 SMART AND CYBER-PHYSICAL SYSTEMS

**SESSION 2-2-2: SMART SYSTEMS**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA C** **9:00AM - 10:30AM**

**Session Organizer: Alex Tsai,** *U.S. Coast Guard Academy, New London, CT, United States*

**Session Co-Organizer: Paolo Pezzini,** *Ames Lab, Ames, IA, United States*

**9:00am Accurate and Data-Limited Prediction for Smart Home Energy Management**

**Technical Paper Publication.** PowerEnergy2018-7461

***Baris Aksanli,*** *San Diego State University, San Diego, CA, United States*

**9:20am EnergyPlus Integration into Co-Simulation Environment to Improve Home Energy Saving Through Cyber-Physical System Development**

**Technical Paper Publication.** PowerEnergy2018-7295

***Joe Singer,*** *Santa Clara University, Santa Clara, CA, United States,* ***Thomas Roth,*** *National Institute of Standards and Technology, Gaithersburg, MD, United States,* ***Chenli Wang,*** *Santa Clara University, Santa Clara, CA, United States,* ***Cuong Nguyen,*** *National Institute of Standards and Technology, Gaithersburg, MD, United States,* ***Hohyun Lee,*** *Santa Clara University, Santa Clara, CA, United States*

**9:40am Optimization of a Rainbow Piezoelectric Energy Harvesting System for the Monitoring Applications**

**Technical Paper Publication.** PowerEnergy2018-7496

***Roja Esmaeeli, Haniph Aliniagerdroudbari,*** *University of Akron, Akron, OH, United States,* ***Ashkan Nazari,*** *Virginia Tech, Blacksburg, VA, United States,* ***Seyed Reza Hashemi,*** *University of Akron, Akron, OH, United States,* ***Muapper Alhadri,*** *University of Akron, Cuyahoga Falls, OH, United States,* ***Waleed Zakri, Abdul Haq Mohammed, Celal Batur, Siamak Farhad,*** *University of Akron, Akron, OH, United States*

### TRACK 2-3 GEOTHERMAL TECHNOLOGIES

**SESSION 2-3-1: POWER CONVERSION, ABSORPTION CHILLERS, AND GROUND-SOURCE HEAT PUMPS**
**DISNEY'S CONTEMPORARY RESORT,**
**PASTORAL 1** **9:00AM - 10:30AM**

**Session Organizer: Ty Neises,** *NREL, Golden, CO, United States*

**9:00am Enhanced Ground Source Heat Pump System with Thermal Storage System**

**Technical Paper Publication.** PowerEnergy2018-7330

***Hirotoshi Taira, Takashi Sato, Takao Kakizaki, Masahito Oguma,*** *College of Engineering, Nihon University, Koriyama, Japan*

**9:20am Gradient Based Soil Thermal Conductivity Optimization for Ground Source Heat Exchangers**

**Technical Paper Publication.** PowerEnergy2018-7418

***Anthony A. DiCarlo, Rickey A. Caldwell Jr.,*** *Merrimack College, North Andover, MA, United States*

**9:40am A Hybrid Power Plant Combining Geothermal, Concentrating Solar, and Thermal Energy Storage Provides Dispatchability and Increased Power Generation**

**Technical Presentation.** PowerEnergy2018-7686

***Josh McTigue,*** *NREL, Golden, CO, United States,* ***Jose Castro,*** *Coso Operating Company, China Lake, CA, United States,* ***Greg Mungas, Nick Kramer, John King,*** *Hyperlight Energy, Lakeside, CA, United States,* ***Craig Turchi,*** *National Renewable Energy Laboratory (NREL), Golden, CO, United States,* ***Guangdong Zhu,*** *NREL, Golden, CO, United States*

**10:00am Application of geothermal energy in space cooling: A simulator study of existing oil well to activate an absorption chiller**

**Technical Paper Publication.** PowerEnergy2018-7163

***Fadi Ghaith,*** *Heriot Watt University Dubai Campus, Dubai, United Arab Emir.,* ***Kamal Majlab Wars,*** *Heriot Watt University, Dubai, United Arab Emir.*

# Wednesday, June 27

## TRACK 2-7 ELECTROCHEMICAL ENERGY CONVERSION AND STORAGE

### SESSION 2-7-1: LOW TEMPERATURE FUEL CELLS AND ELECTROLYSIS
**DISNEY'S CONTEMPORARY RESORT, FANTASIA L** **9:00AM - 10:30AM**

**Session Organizer: Stefano Campanari,** *Politecnico Di Milano, Milan, Italy*

**9:00am Modeling, Development and Preliminary Testing of a 2 MW PEM Fuel Cell Plant Fueled with Hydrogen from a Chlor-Alkali Industry**

**Technical Paper Publication.** PowerEnergy2018-7340

***Stefano Campanari,*** *Politecnico Di Milano, Milan, Italy,* ***Giulio Guandalini,*** *Politecnico di Milano, Milano, Italy,* ***Jorg Coolegem,*** *Nedstack Fuel Cell Technology B.V., ARNHEM, Netherlands,* ***Jan ten Have,*** *MTSA Technopower B.V., ARNHEM, Select State/Province, Netherlands,* ***Patrick Hayes,*** *Johnson Matthey, Swindon, United Kingdom,* ***A.H. Pichel,*** *Akzo Nobel Industrial Chemicals BV, ARNHEM, Select State/Province, Netherlands*

**9:22am Heat Management of a Microscale Fuel Cell**

**Technical Presentation.** PowerEnergy2018-7345

***Liyong Sun,*** *Penn State University Behrend, Erie, PA, United States,* ***Adam S. Hollinger,*** *Penn State Behrend, Erie, PA, United States*

**9:44am Numerical and Experimental Analysis of Multiphase Flow in PEM Water Electrolysis**

**Technical Presentation.** PowerEnergy2018-7453

***Saeed Sadeghi Lafmejani, Anders Christian Olesen, Søren Knudsen Kær,*** *Aalborg University, Aalborg, Nordjylland, Denmark*

**10:06am Sustainable Alkaline Membrane Fuel Cell (SAMFC)**

**Technical Paper Publication.** PowerEnergy2018-7545

***Rodrigo C. Raimundo, Jose Vargas,*** *Universidade Federal do Parana, Curitiba, Select State/Province, Brazil,* ***Wellington Balmant,*** *UFPR, Curitiba, Parana, Brazil,* ***Juan C. Ordonez,*** *Florida State University, Tallahassee, FL, United States*

## TRACK 2-11 CONCENTRATED SOLAR POWER

### SESSION 2-11-10: CONCENTRATORS AND OPTICS II
**DISNEY'S CONTEMPORARY RESORT, FANTASIA B** **9:00AM - 10:30AM**

**Session Organizer: Miriam Ebert,** *German Aerospace Center (DLR), Stuttgart, Germany*

**9:00am Waveguide Optical Collector for Solar Thermal Applications**

**Technical Presentation.** PowerEnergy2018-7743

**Bal Mukund Dhar, Rudenc Lushi, Josue Martinez Hardigree, Deven Jacobi,** *Agira Photonics, Boston, MA, United States*

**9:22am Optical Performance Sensitivity Analysis of a Novel Linear Fresnel Concentrating Solar Power Collector**

**Poster Presentation.** PowerEnergy2018-7715

**Nick Kincaid, Guangdong Zhu,** *NREL, Golden, CO, United States,* **Greg Mungas, Nick Kramer,** *Hyperlight Energy, Lakeside, CA, United States*

**9:44am Investigation of Concentrated Solar Power Collector with Linear Discretized Fresnel Mirrors in Parabolic Arrangement**

**Technical Presentation.** PowerEnergy2018-7649

**Arun Kumar Ramasamy,** *PSG College of Technology, Coimbatore, Tamil Nadu, India,* **Madhu Ganesh,** *Reneo Energy Ssytems, Coimbatore, Tamil Nadu, Tamil Nadu, India,* **Suriyaprakash S.,** *PSG College of Technology, Coimbatore, India,* **Keerthivasan Rajamani,** *PSG College of Technology, Tiruppur, Tamil Nadu, India,* **Ashok Kumar Loganathan, Rudramooorthy R,** *PSG College of Technology, Coimbatore, Tamil Nadu, India*

### SESSION 2-11-12: PANEL DISCUSSION: 3RD GENERATION OF CSP (GEN 3)
**DISNEY'S CONTEMPORARY RESORT, FANTASIA F** **9:00AM - 10:30AM**

**Session Organizer: Mark Lausten,** *US Energy Dept, Solar Office, CSP, Bethesda, MD, United States*

**9:00am The Third Generation of Concentrating Solar Thermal Power**

**Invited Presentation.** PowerEnergy2018-7781

***Mark Lausten,*** *US Energy Dept, Solar Office, CSP, Bethesda, MD, United States*

9:30am Panel Discussion

**Mr. Shawn Sullivan,** *Brayton Energy (Hampton, New Hampshire): Gen3 Gas-Phase System Development and Demonstration*

**Dr. Craig Turchi,** *National Renewable Energy Laboratory (Golden, Colorado): Liquid-Phase Pathway to SunShot*

**Dr. Clifford Ho,** *Sandia National Laboratories (Albuquerque, New Mexico): Gen3 Particle Pilot Plant: Integrated High-Temperature Particle System for CSP*

## 11:00AM- 12:30PM

### TRACK 2-1 NEXUS: ENERGY, WATER, CLIMATE, FOOD

**SESSION 2-1-1: SUSTAINABLE ENERGY**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA C** **11:00AM - 12:30PM**

**Session Organizer: Xiaobo Yin,** *University of Colorado, Boulder, CO, United States*

**11:00am Performance Analysis and Optimization of Power Cycles via Mean Cycle Pressure Criterion (MCP) and Entropy Generation (EG)**

**Technical Presentation.** PowerEnergy2018-7595

***A. Sinan Karakurt, Bahri Sahin,*** *Yildiz Technical University, Istanbul, Turkey*

**11:20am Synergistic Integration of Energy Systems and Closed-loop Manufacturing Systems**

**Technical Presentation.** PowerEnergy2018-7611

***Benjamin Cross,*** *Ohio University, Aiken, SC, United States,* ***Stephanie Howe, Michael Zimmer,*** *Ohio University, Athens, OH, United States*

**11:40am Ocean Energy? An emphasis on the extraction of renewable energy from the available resources**

**Technical Presentation.** PowerEnergy2018-7643

***Surupa Shaw,*** *Texas A&M University, Galveston, TX, United States*

### TRACK 2-4 CONVERSION AND PROCESSING OF BIOFUEL AND ALTERNATIVE FUEL

**SESSION 2-4-1 CONVERSION AND PROCESSING OF BIOFUEL AND ALTERNATIVE FUEL-I**
**DISNEY'S CONTEMPORARY RESORT,**
**PASTORAL 1** **11:00AM - 12:30PM**

**Session Organizer: Nick Nagle,** *National Renewable Energy Laboratory, Golden, CO, United States*

**Session Co-Organizer: Erik Kuhn,** *National Renewable Energy Laboratory, Golden, CO, United States*

**11:00am Drive Cycle Performance and Emissions of CME-Diesel Blends**

**Technical Paper Publication.** PowerEnergy2018-7197

***Edwin N. Quiros,*** *Department of Mechanical Engineering, University of the Philippines, Quezon, Metro Manila, Philippines,* ***Rupert Karlo D. Aguila,*** *First Gen Corporation, Batangas City, Philippines,* ***Manuel V. Hernandez, Joseph Gerard T. Reyes, Jose Gabriel E. Mercado,*** *Dept. of Mechanical Engineering, University of the Philippines, Quezon, Philippines*

**11:40am Biogas Potentials Evaluation of Household Wastes in Johannesburg Metropolitan Area Using AMPTS II**

**Technical Paper Publication.** PowerEnergy2018-7553

***Kevin Nwaigwe, Abhishek Agarwal,*** *University of Botswana, Gaborone, Botswana,* ***Emmanuel Enyioma Anyanwu****, Federal University of Technology, Owerri IMO State Nigeria, OO, Nigeria*

**12:00pm Conversion of Household Wastes from Gaborone Municipality into Useful Biogas through Anaerobic Co-Digestion with Cow Dung**

**Technical Presentation.** PowerEnergy2018-7549

***Kevin Nwaigwe,*** *University of Botswana, Gaborone, Botswana*

# Wednesday, June 27

## TRACK 2-7 ELECTROCHEMICAL ENERGY CONVERSION AND STORAGE

### SESSION 2-7-2: HIGH TEMPERATURE FUEL CELLS AND ELECTROLYSIS
**DISNEY'S CONTEMPORARY RESORT, FANTASIA L** **11:00AM - 12:30PM**

**Session Organizer: Luca Mastropasqua,** *Politecnico di Milano, Milan, Milan, Italy*

**11:00am An Application of MRI to Measure Flow Distribution in Fuel Cell Channels**

**Technical Paper Publication.** PowerEnergy2018-7224

***Rajan Thandi,*** *Loughborough University, Leicester, England, United Kingdom,* ***David Beedie,*** *Rolls-Royce Fuel Cell Systems Ltd., Derby, United Kingdom,* ***Paul Glover,*** *Nottingham University, Nottingham, United Kingdom,* ***Chathura Kasun Kannangara,*** *Rolls-Royce plc, Derby, Select State/Province, United Kingdom,* ***Henk Versteeg,*** *Loughborough University, Loughborough, United Kingdom*

**11:22am Electrochemical Energy Storage and Synthetic Natural Gas Production Based on Reversible Molten Carbonate Cells**

**Technical Paper Publication.** PowerEnergy2018-7344

***Luca Mastropasqua, Francesca Baia, Luca Conti, Stefano Campanari,*** *Politecnico di Milano, Milan, Milan, Italy*

**11:44am Comparing the Performance and Cost Benefits between Protonic Ceramic and Solid Oxide Fuel Cell Systems**

**Technical Presentation.** PowerEnergy2018-7739

***Alexis Dubois, Robert Braun,*** *Colorado School of Mines, Golden, CO, United States*

**12:06pm Techno-Economic Analysis of Reversible Solid Oxide Cell Systems for Distributed Energy Storage and Grid-Scale Synthetic Natural Gas Production**

**Technical Presentation.** PowerEnergy2018-7745

***Evan Reznicek,*** *Colorado School of Mines Mechanical Engineering, Golden, CO, United States,* ***Robert Braun,*** *Colorado School Of Mines, Golden, CO, United States*

## TRACK 2-9 SUSTAINABLE BUILDING ENERGY SYSTEMS

### SESSION 2-9-2: SUSTAINABLE HEATING AND COOLING SYSTEMS
**DISNEY'S CONTEMPORARY RESORT, FANTASIA F** **11:00AM - 12:30PM**

**Session Organizer: Menglian Zheng,** *Zhejiang University, Hangzhou, Zhejiang, China*

**Session Co-Organizer: Julia Haltiwanger Nicodemus,** *Lafayette College, Easton, PA, United States*

**11:00am Ambient House: Ambient Energy-Harvesting Buildings of the Future**

**Invited Presentation.** PowerEnergy2018-7763

***M. Keith Sharp,*** *University of Louisville, Louisville, KY, United States*

**11:40am Numerical Simulations of Heat Transfer to Single-loop and Double-loop Immersed Heat Exchangers with Different Baffle-Shroud Configurations**

**Technical Presentation.** PowerEnergy2018-7470

***Julia Haltiwanger Nicodemus, Joshua Smith,*** *Lafayette College, Easton, PA, United States,* ***Hannah Goldstein,*** *Carnegie Mellon University, Pittsburgh, PA, United States*

**11:55am Testing of CO2 Heat Pump for Different Withdrawal Conditions Under Tropical Climate**

**Technical Presentation.** PowerEnergy2018-7680

***Swapnil Dubey,*** *Energy Research Institute @ NTU, Singapore, Singapore*

**12:10pm Planning Tool Development of Integrating Fuel Cell Distributed Generation with Buildings for Combined Heat and Power**

**Technical Presentation.** PowerEnergy2018-7664

***Zhiwen Ma,*** *National Renewable Energy Laboratory, Lakewood, CO, United States,* ***Genevieve Saur, Yashen Lin,*** *NREL, Golden, CO, United States,* ***Dustin McLarty,*** *WSU, Pullman, WA, United States*

## TRACK 2-10 SOLAR CHEMISTRY

### SESSION 2-10-1: SOLAR THERMOCHEMICAL PROCESSES
**DISNEY'S CONTEMPORARY RESORT, FANTASIA E** **11:00AM - 12:30PM**

**Session Organizer: Christopher Muhich,** *Blank, Blank, AZ, United States*

**11:00am The Potential for Concentrating Solar Thermal Energy in High Temperature Minerals Processing**

**Invited Presentation.** PowerEnergy2018-7703

***Gus Nathan,*** *University of Adelaide, Adelaide, SA, Australia,* ***Bassam Dally,*** *University Of Adelaide, Adelaide 5005, Australia,* ***Woei Saw,*** *The University of Adelaide, Adelaide, SA, Australia*

**11:40am Sustainable Solar Fuels? An Economic and Environmental Analysis of Fuels from the Zn/ZnO Thermochemical Cycle**

**Technical Presentation.** PowerEnergy2018-7765

***Julia Haltiwanger Nicodemus, Paige Ferrell, Ava Shore, Casey Banta-Ryan,*** *Lafayette College, Easton, PA, United States*

**12:00pm Redox Oxides-Based Solar Thermochemistry and its Materialization to Reactor/Heat Exchanger Concepts for Efficient Solar Energy Harvesting, Transformation and Storage**

**Technical Presentation.** PowerEnergy2018-7439

***Christos Agrafiotis,*** *Deutsches Zentrum für Luft- und Raumfahrt (DLR) - German Aerospace Center, Cologne, Germany,* ***Stefania Tescari,*** *Deutsches Zentrum für Luft- und Raumfahrt (DLR)-German Aerospace Center, Cologne, Germany,* ***Martin Roeb,*** *German Aerospace Center (DLR), Koeln, Germany,* ***Christian Sattler,*** *German Aerospace Center DLR, Koeln, Germany*

## TRACK 2-11 CONCENTRATED SOLAR POWER

### SESSION 2-11-11: HEAT AND MASS TRANSFER MODELING AND ANALYSIS II
**DISNEY'S CONTEMPORARY RESORT, FANTASIA B** **11:00AM - 12:30PM**

**Session Organizer: Like Li,** *Mississippi State University, Mississippi State, MS, United States*

**11:00am Heat Transfer and Fluid Flow Analysis of a Volumetric Ceramic Solar Receiver for High-Temperature Processing**

**Technical Presentation.** PowerEnergy2018-7702

***Vikas R. Patil, Aldo Steinfeld,*** *ETH Zurich, Switzerland*

**11:20am Selective Thermal Radiation from Nanoribbons**

**Technical Presentation.** PowerEnergy2018-7629

***Mahmoud Elzouka,*** *University of Nebraska-Lincoln, Lincoln, NE, United States,* ***Ravi Prasher,*** *Lawrence Berkeley National Laboratory, Berkeley, CA, United States*

**11:40am FluxTracer? A 3D-Partitioning and Radiant Flux Computer Tool to Analyse the Optical Behaviour of Light Collection and Concentration Subsystems using High Performance Computers**

**Technical Paper Publication.** PowerEnergy2018-7415

***Manuel Blanco, Evgeny Votyakov, Chariton Christou, Costas N. Papanicolas,*** *The Cyprus Institute, Nicosia, Cyprus,* ***Clotilde Corsi,*** *Australian National University, Canberra, ACT, Australia,* ***John Pye,*** *The Australian National University, Canberra, Australia*

**12:00pm Inverse Analysis of Flux Maps for the Characterization of High-Flux Sources**

**Technical Presentation.** PowerEnergy2018-7699

***Clemens Suter,*** *EPFL, Lausanne, Vaud, Switzerland,* ***Gael Leveque,*** *Enogia, Marseille, Provence-Alpes-Côte d'Azur, France,* ***Sophia Haussener,*** *École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland*

# 2:00PM- 3:30PM

## TRACK 2-1 NEXUS: ENERGY, WATER, CLIMATE, FOOD

### SESSION 2-1-2: WATER MANAGEMENT
**DISNEY'S CONTEMPORARY RESORT, FANTASIA C** **2:00PM - 3:30PM**

**Session Organizer: Guangdong Zhu,** *NREL, Golden, CO, United States*

**Session Co-Organizer: Jessica Mullen,** *US DOE / National Energy Technology Laboratory, Pittsburgh, PA, United States*

# Wednesday, June 27

**2:00pm Utilization of Hydro-Turbines in Wastewater Treatment Plants (WWTPs)**

**Technical Paper Publication.** PowerEnergy2018-7349

***Ryoichi Amano,*** *University Of Wisconsin-Milwaukee, Glendale, WI, United States,* ***Ahmad Abbas,*** *University of Wisconsin-Milwaukee, Milwaukee, WI, United States,* ***Muhannad Al-Haddad,*** *University of Wisconsin-Milwaukee, Glendale, WI, United States,* ***Mohammad Qandil,*** *University of Wisconsin-Milwaukee, Milwaukee, WI, United States,* ***Mandana Saravani,*** *University of Wisconsin-Milwaukee, Glendale, WI, United States*

**2:20pm Designing and Analysis of Rotor Assembly for Micro Gravitational Vortex Turbine**

**Technical Presentation.** PowerEnergy2018-7756

***Wajiha Rehman,*** *UET Lahore, KSK Campus, Lahore, Punjab, Pakistan*

**2:40pm Parametric Experiments of Water Transport Characteristics in Nafion Membrane**

**Technical Paper Publication.** PowerEnergy2018-7304

***Jaemin Son, Sangseok Yu,*** *Chungnam National University, Daejeon, Korea (Republic)*

## TRACK 2-4 CONVERSION AND PROCESSING OF BIOFUEL AND ALTERNATIVE FUEL

### SESSION 2-4-2: CONVERSION AND PROCESSING OF BIOFUEL AND ALTERNATIVE FUEL-II
**DISNEY'S CONTEMPORARY RESORT, PASTORAL 1** **2:00PM - 3:30PM**

**Session Organizer: Maysam Pournik,** *University of Texas Rio Grande Valley, Edinburg, TX, United States*

**Session Co-Organizer: Xiankun Xu,** *University of Arizona, Tucson, AZ, United States*

**2:00pm Technical and Economical Analysis of Biomethane Upgrading for Mobile Applications Using Gas Microturbines**

**Technical Presentation.** PowerEnergy2018-7377

***Andy Castillo,*** *Universidad del Norte, Barranquilla, Atlántico, Colombia,* ***Jorge Echeverri,*** *Universidad del Norte, Soledad, Atlántico, Colombia,* ***Ariana Castillo,*** *Universidad del Norte, Puerto Colombia, Atlántico, Colombia,* ***Germán Güell, Lesmes Corredor,*** *Universidad del Norte, Barranquilla, Atlántico, Colombia*

**2:44pm Agglomeration of Woodust and Charcoal Powder for Solid Fuel Production**

**Technical Presentation.** PowerEnergy2018-7601

***Ganiyat Salawu,*** *The Federal Polytechnic Offa, Offa, Kwara State, West Africa, Nigeria*

**3:06pm Off Design Performance of Biomass Integrated Gasification/ Gas Turbine Technology for Power Generation**

**Technical Presentation.** PowerEnergy2018-7655

***Gangaraju Srinivasa Sharma,*** *MVSR Engineering College, Hyderabad, Telangana, India,* ***Maddali V S Murali Krishna,*** *CBIT, Hyderabad, Telangana, India*

## TRACK 2-8 THERMAL AND MECHANICAL ENERGY STORAGE

### SESSION 2-8-1 PHASE CHANGE MATERIALS 1
**DISNEY'S CONTEMPORARY RESORT, FANTASIA L** **2:00PM - 3:30PM**

**Session Organizer: Bill Conlon,** *Pintail Power LLC*

**2:00pm Application of Low-temperature Phase Change Materials to Improve the Cold Weather Operability of B100 Biodiesel in Diesel Trucks**

**Technical Paper Publication.** PowerEnergy2018-7161

***Obiajulu Nnaemeka, Eric L. Bibeau,*** *University of Manitoba, Winnipeg, MB, Canada*

**2:22pm Melting Process Expedition of Phase Change Materials via Silicone Oil**

**Technical Paper Publication.** PowerEnergy2018-7503

***Sarvenaz Sobhansarbandi,*** *University of Missouri-Kansas City, Kansas City, MO, United States,* ***Fatemeh Hassanipour,*** *University of Texas at Dallas, Richardson, TX, United States*

**2:44pm Optimization of the Layout of Phase Change Materials in a Thermal Energy Storage System**

**Technical Presentation.** PowerEnergy2018-7594

***Taha Aldoss, Habeeb Ur Rahman Khan, Muhammad Rahman,*** *Wichita State University, Wichita, KS, United States*

**3:06pm Design and Preparation of a Shape-Stabilized Composite Phase Change Material by Encapsulating Polyethylene Glycol within a Ca2+-doped MgCO3 Mesoporous Structure for use in Thermal Energy Storage**

**Technical Presentation.** PowerEnergy2018-7651

***Hasan Md. Zahir,*** *King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia,* ***Fahad Al-Sulaiman,*** *Renewable Energy Center, Dhahran, Easter Province, Saudi Arabia*

## TRACK 2-10 SOLAR CHEMISTRY

### SESSION 2-10-6: SOLAR THERMOCHEMICAL REACTORS I
**DISNEY'S CONTEMPORARY RESORT, FANTASIA E** **2:00PM - 3:30PM**

**Session Organizer: Nesrin Ozalp,** *University of Minnesota Duluth, Duluth, MN, United States*

**2:00pm Heat Transfer Driven Dynamics and Control of Transient Variations in Solar Fuels Production**

**Technical Presentation.** PowerEnergy2018-7761

***Mostafa Abuseada, Nesrin Ozalp,*** *University of Minnesota Duluth, Duluth, MN, United States*

**2:20pm Analysis of Solar Reactor Receiver Design for Chemical Looping Integration with a Concentrating Solar Thermal System**

**Technical Paper Publication.** PowerEnergy2018-7185

***Zhiwen Ma,*** *National Renewable Energy Laboratory, Lakewood, CO, United States,* ***Janna Martinek,*** *NREL, Golden, CO, United States*

**2:40pm A Windowless, Solar Rotary Drum Reactor for the Reduction of Metal Oxide Particles in Air at Atmospheric Pressure**

**Technical Presentation.** PowerEnergy2018-7727

***Michael Donovan, Dylan Antonides, Ryan Hutson, Rachel Silcox, Tanner Gesell, Dan Blood, Jeff Will, Luke Venstrom,*** *Valparaiso University, Valparaiso, IN, United States*

**3:00pm Assessment of Solid Heat Recovery Strategies for Solar Thermochemical Cycles- Proposal of a New Particle Based Solid Heat Recovery Concept**

**Technical Presentation.** PowerEnergy2018-7713

***Stefan Brendelberger,*** *German Aerospace Center DLR, Köln, Germany,* ***Sebastian Richter,*** *Deutsches Zentrum für Luft-und Raumfahrt, Köln, Germany,* ***Henrik von Storch,*** *German Aerospace Center (DLR), Juelich, Germany,* ***Christian Sattler,*** *German Aerospace Center DLR, Koeln, Germany*

## TRACK 2-11 CONCENTRATED SOLAR POWER

### SESSION 2-11-2: CONCENTRATORS AND OPTICS I
**DISNEY'S CONTEMPORARY RESORT, FANTASIA B** **2:00PM - 3:30PM**

**Session Organizer: Clifford Ho,** *Sandia National Laboratories, Albuquerque, NM, United States*

**2:00pm Method to Optimize the Heliostat Field Layout of Multi-Tower and Multi-Tracking Concentrating Solar Thermal Systems**

**Technical Presentation.** PowerEnergy2018-7296

***Clotilde Corsi,*** *CSIRO/ANU (Australian National University), Mayfield West, NSW, Australia,* ***Manuel Blanco,*** *The Cyprus Institute, Nicosia, Cyprus,* ***Jin-Soo Kim,*** *CSIRO Energy, Newcastle, NSW, Australia,* ***John Pye,*** *The Australian National University, Canberra, Australia*

**2:20pm Design Using Ray Tracing for a Solar Chemistry Test Module**

**Technical Paper Publication.** PowerEnergy2018-7502

***Clayton Nguyen, Lu Shen, Peter Loutzenhiser, Sheldon Jeter,*** *Georgia Institute of Technology, Atlanta, GA, United States*

**2:40pm Performance Comparison of Three Concentrating Solar Power Collector Designs in Linear Fresnel, Parabolic Trough, and Power Tower**

**Technical Presentation.** PowerEnergy2018-7685

***Nick Kincaid, Guangdong Zhu,*** *NREL, Golden, CO, United States*

## TRACK 2-13 WIND ENERGY SYSTEMS AND TECHNOLOGIES

### SESSION 1-13-1: WIND ENERGY SYSTEMS 1
**DISNEY'S CONTEMPORARY RESORT, FANTASIA F** **2:00PM - 3:30PM**

**Session Organizer: Weifei Hu,** *Cornell University, Ithaca, NY, United States*

**Session Co-Organizer: Ali Mehmani,** *Columbia University, New York, NY, United States*

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**2:00pm Method to Optimize the Heliostat Field Layout of Multi-Tower and Multi-Tracking Concentrating Solar Thermal Systems**

**Technical Presentation.** PowerEnergy2018-7296

***Clotilde Corsi,*** *CSIRO/ANU (Australian National University), Mayfield West, NSW, Australia,* ***Manuel Blanco,*** *The Cyprus Institute, Nicosia, Cyprus,* ***Jin-Soo Kim,*** *CSIRO Energy, Newcastle, NSW, Australia,* ***John Pye,*** *The Australian National University, Canberra, Australia*

**2:20pm A Novel Vibration Suppression Device for Floating Offshore Wind Generator**

**Technical Paper Publication.** PowerEnergy2018-7357

***Xun Xu, Fen Lai, Guojun Li, Xiangyuan Zhu, Liping Zhu,*** *Xi'an Jiaotong University, xi'an, China*

**2:40pm Acoustic Study of a Small Vertical Axis Wind Turbine in Urban Areas Using Computational Fluid Dynamics and Computational Aero-Acoustics**

**Technical Presentation.** PowerEnergy2018-7634

***Amir Bashirzadeh Tabrizi, Binxin Wu,*** *Jiangsu University, Zhenjiang, Jiangsu, China*

## 3:45PM- 5:15PM

**TRACK 2-1 NEXUS: ENERGY, WATER, CLIMATE, FOOD**

**SESSION 2-1-3: SUSTAINABLE ENERGY II**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA C** **2:00PM - 3:30PM**

**Session Organizer: Reza Baghaei Lakeh,** *California State Polytechnic University Pomona, Pomona, CA, United States*

**3:45pm The Impact of Lack of Clean Cooking Fuels on Sustainable Development in Developing Countries**

**Technical Paper Publication.** PowerEnergy2018-7112

***Ifeoluwa Garba,*** *University of Strathclyde, Glasgow, United Kingdom,* ***Richard Bellingham,*** *Institute for Future Cities, University of Strathclyde, Glasgow, United Kingdom*

**4:05pm Estimating the Agricultural Environmental Burden as Part of a Holistic Life Cycle Assessment of Food**

**Technical Paper Publication.** PowerEnergy2018-7564

***Tao Dai, Amy Fleischer, Ross Lee, Aaron Wemhoff,*** *Villanova University, Villanova, PA, United States*

**4:25pm Numerical Simulation on the Multiphase Flow and Heat Transfer from Hydrate-Bearing Layer by Depressurization Method in the Shenhu Area of South China Sea**

**Technical Presentation.** PowerEnergy2018-7607

***Huaizhi Han, Longbin Yang, Yanjun Li,*** *Harbin Engineering University, Harbin, China*

## TRACK 2-4 CONVERSION AND PROCESSING OF BIOFUEL AND ALTERNATIVE FUEL

### SESSION 2-4-3: CONVERSION AND PROCESSING OF BIOFUEL AND ALTERNATIVE FUEL-III
**DISNEY'S CONTEMPORARY RESORT, PASTORAL 1** **2:00PM - 3:30PM**

Session Organizer: Hamidreza Shabgard, *University of Oklahoma, Norman, OK, United States*

**3:45pm 100% Test Burn of Torrefied Wood Pellets at a Full-Scale Pulverized Coal Fired Utility Steam Generator**

**Technical Paper Publication.** PowerEnergy2018-7273

***Roderick Hatt,*** *Coal Combustion, Inc., Versailles, KY, United States,* ***David Rodgers,*** *Portland General Electric, Hermiston, OR, United States,* ***Randy Curtis,*** *Portland General Electric, Boardman, OR, United States*

**4:15pm A Simple EAM Potential for Hydrogen-Selective Palladium Based Membranes for Biomass Derived Syngas Processing**

**Technical Paper Publication.** PowerEnergy2018-7369

***Iyad Hijazi, Robert Fuller, Yang Zhang,*** *Marshall University, Huntington, WV, United States*

**4:45pm Autothermal Operation of a Biomass Torrefaction Plant**

**Technical Paper Publication.** PowerEnergy2018-7531

***Yousef Haseli,*** *Central Michigan University, Mount PLeasant, MI, United States*

## TRACK 2-8 THERMAL AND MECHANICAL ENERGY STORAGE

### SESSION 2-8-3: THERMOCHEMICAL ENERGY STORAGE
**DISNEY'S CONTEMPORARY RESORT, FANTASIA L** **2:00PM - 3:30PM**

Session Organizer: Kevin Albrecht, *Sandia National Laboratories, Albuquerque, NM, United States*

**3:45pm Absorption Process in MgCl2-NH3 Thermal Batteries with Constant Mass Flow Rate**

**Technical Paper Publication.** PowerEnergy2018-7512

***Seyyed Ali Hedayat Mofidi, Kent Udell,*** *University of Utah, Salt Lake City, UT, United States*

**4:07pm Integrated Thermochemical Energy Storage System Using an MgO-Based sCO2 Sorbent in Direct Contact with Power Cycle Working Fluid**

**Technical Presentation.** PowerEnergy2018-7740

***Andrew Muto, Kevin McCabe, Daniel Real,*** *Southern Research, Durham, NC, United States*

**4:29pm Design and Demonstration of a Highly Durable CaO-Based sCO2 Sorbent for High-Temperature Thermochemical Energy Storage**

**Technical Presentation.** PowerEnergy2018-7741

***Andrew Muto, Kevin McCabe, Daniel Real,*** *Southern Research, Durham, NC, United States*

**4:51pm Thermochemical Energy Storage and Release in Redox Cycles of Sr-doped CaMnO3-? Porous Particles**

**Technical Presentation.** PowerEnergy2018-7772

***Luca Imponenti,*** *Colorado School of Mines, Golden, CO, United States,* ***Kevin Albrecht,*** *Sandia National Laboratories, Albuquerque, NM, United States,* ***Gregory Jackson, Robert Braun,*** *Colorado School of Mines, Golden, CO, United States*

## TRACK 2-11 CONCENTRATED SOLAR POWER

### SESSION 2-11-6: HEAT AND MASS TRANSFER MODELING AND ANALYSIS I
**DISNEY'S CONTEMPORARY RESORT, FANTASIA B** **2:00PM - 3:30PM**

Session Organizer: Tobias Hirsch, *DLR, Stuttgart, Germany*

**3:45pm Modeling of Coupled Gas-Solid Reactions and Transport Phenomena in Thermochemical Energy Storage Structures**

**Technical Presentation.** PowerEnergy2018-7711

***Like Li,*** *Mississippi State University, Mississippi State, MS, United States,* ***Kelvin Randhir,*** *Michigan State University, East LAnsing, MI, United States,* ***Nicholas AuYeung,*** *Oregon State University, Corvallis, OR, United States,* ***Renwei Mei,*** *University Of Florida, Gainesville, FL, United States,* ***James Klausner,*** *Michigan State University, East Lansing, MI, United States*

**4:07pm Effective Thermal Conductivity of Wall-Adjacent Layer in Gravity-Driven Vertical Dense Granular Flows**

**Technical Paper Publication.** PowerEnergy2018-7464

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***Megan Watkins, Yesaswi Chilamkurti,*** *NC State University, Raleigh, NC, United States,* ***Richard Gould,*** *NC State University, Fuquay Varina, NC, United States*

**4:29pm Efficient CFD Modeling and Analysis of a Moving Packed-Bed Particle-to-sCO2 Heat Exchanger**

**Technical Presentation.** PowerEnergy2018-7324

***Kevin Albrecht,*** *Clifford Ho, Sandia National Laboratories, Albuquerque, NM, United States*

**4:51pm Evaluation of Alternative Designs for a High Temperature Particle-to-sCO2 Heat Exchanger**

**Technical Paper Publication.** PowerEnergy2018-7504

***Clifford Ho,*** *Sandia National Laboratories, Albuquerque, NM, United States,* ***Matt Carlson,*** *Sandia National Labs, Albuquerque, NM, United States,* ***Kevin Albrecht,*** *Sandia National Laboratories, Albuquerque, NM, United States,* ***Zhiwen Ma,*** *National Renewable Energy Laboratory, Lakewood, CO, United States,* ***Sheldon M. Jeter, Clayton Nguyen,*** *Georgia Institute of Technology, Atlanta, GA, United States*

## TRACK 2-13 WIND ENERGY SYSTEMS AND TECHNOLOGIES

**SESSION 1-13-2: WIND ENERGY SYSTEMS 2**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA F** **2:00PM - 3:30PM**

**Session Organizer: Weifei Hu,** *Cornell University, Ithaca, NY, United States*

**Session Organizer: Ali Mehmani,** *Columbia University, New York, NY, United States*

**3:45pm Power from the Prairie: Enabling Large Scale Renewables in the Upper Midwest**

**Technical Presentation.** PowerEnergy2018-7105

***Robert Schulte,*** *Schulte Associates LLC, Raleigh, NC, United States*

**4:05pm Energy Harvesting Evaluation of the Building-Integrated Wind-Induced Flutter Energy Harvester (WIFEH)**

**Technical Presentation.** PowerEnergy2018-7289

***Angelo Aquino,*** *University of Sheffield, Sheffield, United Kingdom,* ***John Kaiser Calautit,*** *University of Nottingham, Nottingham, United Kingdom,* ***Ben Richard Hughes,*** *University of Sheffield, Sheffield, United Kingdom*

# THURSDAY, JUNE 28
# 9:00AM- 10:30AM

## TRACK 2-8 THERMAL AND MECHANICAL ENERGY STORAGE

**SESSION 2-8-4: THERMAL ENERGY STORAGE APPLICATIONS**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA L** **9:00AM - 10:30AM**

**Session Organizer: Gregory Jackson,** *Colorado School of Mines, Golden, CO, United States*

**9:00am Energy Storage Combined Cycle**

**Technical Presentation.** PowerEnergy2018-7648

***William Conlon,*** *Pintail Power LLC, Palo Alto, CA, United States*

**9:22am Thermal Energy Storage Systems with Variable Thermal Conductivity**

**Technical Presentation.** PowerEnergy2018-7117

***Maria M. Figueroa, Sarada Kuravi, Mason Hardy,*** *New Mexico State University, Las Cruces, NM, United States*

**9:44am Quaternary Chloride Mixtures with Variable Proportions of ZnCl2 for High-Temperature Sensible Thermal Storage**

**Technical Presentation.** PowerEnergy2018-7353

***Gowtham Mohan, Mahesh Venkataraman,*** *Australian National University, Canberra, Canberra, ACT, Australia,* ***Joe Coventry,*** *The Australian National University, ACT, Australia*

**10:06am Thermal Conductivity Measurements of Solid and Molten Reactive High Temperature Materials**

**Technical Presentation.** PowerEnergy2018-7748

***Matthew Wingert,*** *University of California San Diego, San Diego, CA, United States,* ***Andrew Zhao, Javier E. Garay,*** *University of California San Diego, La Jolla, CA, United States*

## TRACK 2-9 SUSTAINABLE BUILDING ENERGY SYSTEMS

### SESSION 2-9-4: DEMAND SIDE MANAGEMENT, EFFICIENCY, AND PASSIVE HEATING AND COOLING
**DISNEY'S CONTEMPORARY RESORT,**
**PASTORAL 1** **9:00AM - 10:30AM**

Session Organizer: Cinthia Audivet, Promigas S.A. E.S.P., Barranquilla, Colombia

9:00am Durable Hybrid Metamaterial Based on Glass-Polymer and Phase Change Materials for Passive Cooling of Buildings

**Technical Presentation.** PowerEnergy2018-7222

***Jiakang Gong, Zhejiang University, Hangzhou, Zhejiang, China, Menglian Zheng,*** *Zhejiang University, Hangzhou, Zhejiang, China*

9:20am Control Strategies and Design Parameters for a Combined Passive Heating and Cooling System in Louisville, KY

**Technical Presentation.** PowerEnergy2018-7710

***M. Adrienne Parsons, M Keith Sharp,*** *University of Louisville, Louisville, KY, United States*

9:40am Passive Directional Daytime Radiative Cooling

**Technical Presentation.** PowerEnergy2018-7716

***Bikram Bhatia, Arny Leroy, Yichen Shen, Lin Zhao, Melissa Gianello, Duanhui Li, Tian Gu, Juejun Hu, Marin Soljacic,*** *Massachusetts Institute of Technology, Cambridge, MA, United States,* ***Evelyn Wang,*** *MIT, Cambridge, MA, United States*

10:00am Evaluation of Energy Efficiency Retrofit Options for Office Buildings in Florida Climate

**Technical Presentation.** PowerEnergy2018-7747

***Owen G. Betharte, Florida Institute of Tech, Melbourne, FL, United States, Hamidreza Najafi,*** *Florida Institute of Technology, Melbourne, FL, United States* Track 2-9 Sustainable Building Energy Systems

## TRACK 2-10: SOLAR CHEMISTRY

### SESSION 2-10-4: MATERIALS CHEMISTRY
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA E** **9:00AM - 10:30AM**

Session Organizer: Justin Lapp, *University of Maine, Orono, ME, United States*

9:00am Principles and thermodynamics of paired charge compensating doped ceria for solar thermochemical H2O and CO2 splitting

**Technical Presentation.** PowerEnergy2018-7641

***Christopher Muhich,*** *Blank, Blank, AZ, United States,* ***Marie Hoes,*** *ETH, Zurich, Select State/Province, Switzerland,* ***Aldo Steinfeld,*** *ETH Zurich, Zurich, Switzerland*

9:22am Beneficial Effect of Ca/Sr A-site and Cu B-site Substitution of LaNiO3 Perovskite Oxygen Carrier for Solar-Driven Chemical Looping Combustion at Middle Temperature

**Technical Presentation.** PowerEnergy2018-7427

***Qiongqiong Jiang, Hao Zhang, Hui Hong,*** *Institute of Engineering Thermophysics, Chinese Academy of Sciences, Beijing, China,* ***Hongguang Jin,*** *Inst Of Engrg Thermophysics, Beijing, China*

9:44am Kinetics Insights into Methane-Driven Ceria Reduction

**Technical Presentation.** PowerEnergy2018-7721

***Kent Warren, Jonathan Scheffe,*** *University of Florida, Gainesville, FL, United States*

10:06am Kinetics Insights into Methane-Driven Ceria Reduction

**Technical Presentation.** PowerEnergy2018-7722

***Kent Warren, Jonathan Scheffe,*** *University of Florida, Gainesville, FL, United States*

# Thursday, June 28

**TRACK 2-11: CONCENTRATED SOLAR POWER**

## SESSION 2-11-7: HIGH TEMPERATURE MATERIALS

**DISNEY'S CONTEMPORARY RESORT, FANTASIA F** **9:00AM - 10:30AM**

**Session Organizer: Nesrin Ozalp,** *University of Minnesota Duluth, Duluth, MN, United States*

**9:00am Inert vs. Reactive Oxides for Thermal Energy Storage in Concentrating Solar Power**

**Invited Presentation.** PowerEnergy2018-7773

***Gregory Jackson, Luca Imponenti, Daniel Miller,*** *Colorado School of Mines, Golden, CO, United States*

**9:45am High Performance Reduction/Oxidation Metal Oxides for Thermochemical Energy Storage (PROMOTES): A Project Overview**

**Technical Presentation.** PowerEnergy2018-7709

***Andrea Ambrosini,*** *Sandia National Laboratories, Albuquerque, NM, United States,* ***Hany Al-Ansary,*** *King Saud University, Riyadh, Saudi Arabia,* ***Sean M. Babiniec,*** *Sandia National Laboratories, Albuquerque, NM, United States,* ***Sheldon M. Jeter, Peter Loutzenhiser,*** *Georgia Institute of Technology, Atlanta, GA, United States,* ***Ellen B. Stechel,*** *ASU-LightWorks, Tempe, AZ, United States,* ***James E. Miller,*** *Sandia National Laboratories, Albuquerque, NM, United States*

**10:05am Magnesium Manganese Oxides for High Temperature Solar Thermochemical Energy Storage**

**Technical Presentation.** PowerEnergy2018-7730

***Kelvin Randhir, Keith King,*** *Michigan State University, East Lansing, MI, United States,* ***Like Li,*** *Mississippi State University, Mississippi State, MS, United States,* ***James Klausner,*** *Michigan State University, East Lansing, MI, United States,* ***Nicholas AuYeung, Fuqiong Lei,*** *Oregon State University, Corvallis, OR, United States*

# 2:00PM- 3:30PM

**TRACK 2-8 THERMAL AND MECHANICAL ENERGY STORAGE**

## SESSION 2-8-6: COMPRESSED AND LIQUID AIR ENERGY STORAGE

**DISNEY'S CONTEMPORARY RESORT, FANTASIA L** **2:00PM - 3:30PM**

**Session Organizer: Ayyoub M. Momen,** *Oak Ridge National Lab, Oak Ridge, TN, United States*

**Session Co-Organizer: William Conlon,** *Pintail Power LLC, Palo Alto, CA, United States*

**2:00pm Thermal Design and Analysis of a Solid-state Grid-tied Thermal Energy Storage for Hybrid Compressed Air Energy Storage Systems**

**Technical Paper Publication.** PowerEnergy2018-7485

***Reza Baghaei Lakeh,*** *California State Polytechnic University Pomona, Pomona, CA, United States,* ***Khashayar Hakamian,*** *California State Polytechnic University, Pomona, Pomona, CA, United States,* ***Kevin Anderson,*** *California State Polytech Univ, Pomona, CA, United States,* ***Maryam Shafahi,*** *California State Polytechnic University, Pomona, Pomona, CA, United States*

**2:22pm Development of an Efficient Compressor for Ocean Compressed Air Energy Storage**

**Technical Presentation.** PowerEnergy2018-7736

***Vikram Patil,*** *North Carolina State University, Raleigh, NC,USA., Raleigh, NC, United States,* ***Pinaki Acharya, Paul Ro,*** *North Carolina State University, Raleigh, Raleigh, NC, United States*

**2:44pm Draft ASME Performance Test Code PTC-53 for Energy Storage Systems**

**Technical Presentation.** PowerEnergy2018-7693

***Alan Thelen,*** *Consumers Eenrgy, Jackson, MI, United States,* ***Frederick Buckingham,*** *NAES Corporation, Houston, TX, United States,* ***William Conlon,*** *Pintail Power LLC, Palo Alto, CA, United States*

**3:06pm Economic Analysis of Liquid Air Power & Storage (LAPS)**

**Technical Presentation.** PowerEnergy2018-7662

***William Conlon,*** *Pintail Power LLC, Palo Alto, CA, United States*

## TRACK 2-11 CONCENTRATED SOLAR POWER

### SESSION 2-11-9: ADVANCED POWER SYSTEMS
**DISNEY'S CONTEMPORARY RESORT, FANTASIA F** **2:00PM - 3:30PM**

**Session Organizer: Manuel Blanco,** *The Cyprus Institute, Nicosia, Cyprus*

**2:00pm Transient Simulation of the sCO2 Recompression Brayton Cycle with Regenerators**

**Technical Presentation.** PowerEnergy2018-7744

***Evan Reznicek,*** *Colorado School of Mines Mechanical Engineering, Golden, CO, United States,* ***Robert Braun,*** *Colorado School Of Mines, Golden, CO, United States*

**2:22pm Supercritical Carbon Dioxide Recompression Cycle Integration with A Molten Salt Power Tower CSP Plant**

**Technical Presentation.** PowerEnergy2018-7738

***Ty Neises,*** *NREL, Golden, CO, United States*

**2:44pm Structural Analysis of Small Scale Compressed Air Radial Turbine for Solar Powered Brayton Cycle Application**

**Technical Paper Publication.** PowerEnergy2018-7597

***Ahmed Daabo, Saad Mahmoud, Raya Al- Dadah,*** *University Of Birmingham, Birmingham, United Kingdom*

**3:06pm Analysis of Thermal Energy Conversion Efficiency to Electricity by Brayton Cycle in a Solar Hybrid Gas Turbine**

**Technical Presentation.** PowerEnergy2018-7599

***Nnamdi Anosike, Amos Madhlopa,*** *Energy Research Centre, University of Cape Town, Cape Town, Western Cape, South Africa*

## 3:45PM- 5:15PM

## TRACK 2-10 SOLAR CHEMISTRY

### SESSION 2-10-7: SOLAR THERMOCHEMICAL REACTORS II
**DISNEY'S CONTEMPORARY RESORT, FANTASIA E** **3:45PM - 5:15PM**

**Session Organizer: Meng Lin,** *École Polytechnique Fédérale De Lausanne, Renens, Switzerland*

**3:45pm Development of a Novel Solar Photoelectrochemical Tandem Reactor with a Perforated Photocathode for Simultaneous Hydrogen Production and Waste Water Treatment**

**Technical Paper Publication.** PowerEnergy2018-7187

***Michael Wullenkord, Christian Jung, Olena Smirnova,*** *German Aerospace Center (DLR), Institute of Solar Research, Koeln, Germany,* ***Christian Sattler,*** *German Aerospace Center DLR, Koeln, Germany*

**4:05pm Photocataylst-Suspension Reactors for Solar Water Splitting**

**Technical Presentation.** PowerEnergy2018-7692

***Rohini Bala Chandran,*** *University of Michigan, Ann Arbor, MI, United States,* ***Shane Ardo,*** *University of California, Irvine, Irvine, CA, United States,* ***Adam Weber,*** *Lawrence Berkeley National Laboratory, Berkeley, CA, United States*

**4:25pm Continuous Synthesis Gas Production via Steam Gasification in a 1.5 kWth Hybrid Solar/Autothermal Gasifier**

**Technical Presentation.** PowerEnergy2018-7731

***Alexander Muroyama,*** *ETH Zurich, Zurich, Switzerland,* ***Iacopo Guscetti,*** *École Polytechnique Fédérale de Lausanne, Luasanne, Switzerland,* ***Garrett Schieber,*** *Georgia Institute of Technology, Atlanta, GA, United States,* ***Sophia Haussener,*** *École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland,* ***Peter Loutzenhiser,*** *Georgia Institute of Technology, Atlanta, GA, United States*

**4:45pm Pre-Commercial Scale Liquid Fuels from Concentrated Sunlight: An Overview of the Sun-to-Liquid Project**

**Technical Presentation.** PowerEnergy2018-7676

***Erik Koepf,*** *ETH Zurich, Zurich, Switzerland,* ***Stefan Zoller,*** *ETH, Zurich, Switzerland,* ***Aldo Steinfeld,*** *ETH Zurich, Zurich, Switzerland*


# Nuclear
# 6/26 - 6/27

# Tuesday, June 26

## 11:00AM- 12:30PM

**TRACK 3-2 PLANT CONSTRUCTION ISSUES AND SUPPLY CHAIN MANAGEMENT**

**SESSION 3-2-1: PLANT CONSTRUCTION, SUPPLY CHAIN MANAGEMENT AND LICENSING-I**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA K** **11:00AM - 12:30PM**

**Session Organizer: Jovica Riznic,** *Canadian Nuclear Safety Commission, Ottawa, ON, Canada*

**Session Co-Organizers: Hakan Ozaltun,** *Idaho National Laboratory, Idaho Falls, ID, United States,* **Guoqiang Wang,** *Westinghouse Electric Company LLC, Murrysville, PA, United States*

**11:00am Managing Management and Customer Expectations**

**Technical Presentation.** PowerEnergy2018-7102

***Douglas Woodward,*** *AECOM, Graniteville, SC, United States*

**11:22am Implementation Plan of Intelligent Procurement Platform for Nuclear Power Based on Internet of Things Technology**

**Technical Paper Publication.** PowerEnergy2018-7363

***Wenling Wu,*** *China Nuclear Power Engineering Co., Ltd., Beijing, China,* ***Xu Shi, Hui Zhou,*** *China Nuclear Power Engineering Co.,Ltd., Beijing, Select State/Province, China*

**11:44am Study and Practice on Nuclear Power Equipment Procurement and Supplier Management Based on Internet Plus**

**Technical Paper Publication.** PowerEnergy2018-7490

***Hui Zhou,*** *China Nuclear Power Engineering Co.,Ltd., Beijing, China,* ***Liang Ding, Xu Shi, Zhongkui Li,*** *China Nuclear Power Engineering Co., Ltd, Beijing, China*

**12:06pm Qualification Tests of Nuclear Grade HEPA Filters Under ASME AG-1 Code on Nuclear Air and Gas Treatment**

**Technical Presentation.** PowerEnergy2018-7719

***Heejin Cho,*** *Mississippi State University, Mississippi State, MS, United States*

## 2:00PM- 3:30PM

**TRACK 3-2 PLANT CONSTRUCTION ISSUES AND SUPPLY CHAIN MANAGEMENT**

**SESSION 3-2-2: PLANT CONSTRUCTION, SUPPLY CHAIN MANAGEMENT AND LICENSING-II**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA K** **2:00PM - 3:30PM**

**Session Organizer: Hakan Ozaltun,** *Idaho National Laboratory, Idaho Falls, ID, United States*

**Session Co-Organizer: Jovica Riznic,** *Canadian Nuclear Safety Commission, Ottawa, ON, Canada*

**2:00pm Additive Manufacturing of Spent Fuel Storage Rack Model by Selective Laser Melting**

**Technical Paper Publication.** PowerEnergy2018-7409

***Xiaoming He, Ziqiang Zhu, Changlei Shao, Ran Huang,*** *Shanghai Nuclear Engineering Research and Design Institute, Shanghai, China*

**2:30pm Second License Renewal for U.S. Nuclear Power Plants - Developments in 2018**

**Technical Presentation.** PowerEnergy2018-7621

***Andrew Taylor,*** *Sargent & Lundy LLC, Chattanooga, TN, United States,* ***Brian Jelke,*** *Sargent & Lundy LLC, Chicago, IL, United States*

**3:00pm Requirement Analysis of Reliability Standard System for Nuclear Power Equipment in China**

**Technical Paper Publication.** PowerEnergy2018-7297

***Beibei XU, Zhijun Liu, Jun Pan, Chunhui QIU, Minxue Yang, Kun Tan,*** *China Productivity Center for Machinery, Beijing, China*

# Wednesday, June 27

## 11:00AM- 12:30PM

### TRACK 3-6 THERMAL HYDRAULICS AND COMPUTATIONAL FLUID DYNAMICS

**SESSION 3-6-1: THERMAL HYDRAULICS AND COMPUTATIONAL FLUID DYNAMICS**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA P** **11:00AM - 12:30PM**

**Session Organizer: Guoqiang Wang,** *Westinghouse Electric Company LLC, Murrysville, PA, United States*

**Session Co-Organizers: Grant Hawkes,** *Idaho National Laboratory, Idaho Falls, ID, United States,* **Hakan Ozaltun,** *Idaho National Laboratory, Idaho Falls, ID, United States,* **Jovica Riznic,** *Canadian Nuclear Safety Commission, Ottawa, ON, Canada*

**11:00am Thermal Analysis Safety Margins Using ABAQUS for the MP-2 Experiment in the Advanced Test Reactor**

**Technical Paper Publication.** PowerEnergy2018-7600

***Grant Hawkes, Douglas Crawford, Gregory Housley,*** *Idaho National Laboratory, Idaho Falls, ID, United States*

**11:45am Runtime Study of Recent Versions of RELAP5-3D**

**Technical Presentation.** PowerEnergy2018-7684

***George Mesina,*** *INL, Idaho Falls, ID, United States*

## 2:00PM- 3:30PM

### TRACK 3-6 THERMAL HYDRAULICS AND COMPUTATIONAL FLUID DYNAMICS

**SESSION 3-6-2: THERMAL HYDRAULICS AND ANALYSIS OF HIGH TEMPERATURE REACTORS**
**DISNEY'S CONTEMPORARY RESORT,**
**FANTASIA P** **2:00PM - 3:30PM**

**Session Organizer: Grant Hawkes,** *Idaho National Laboratory, Idaho Falls, ID, United States*

**Session Co-Organizers: Hakan Ozaltun,** *Idaho National Laboratory, Idaho Falls, ID, United States,* **Guoqiang Wang,** *Westinghouse Electric Company LLC, Murrysville, PA, United States*

**2:00pm Analysis of Loss-of-Flow Accidents in Pre-Cooler and Inter-Cooler of HTR-10GT**

**Technical Paper Publication.** PowerEnergy2018-7381

***Xiao Yong Yang,*** *INET, Tsinghua University, BEIJING, China,* ***Xiao Li,*** *China United Gas Turbine Technology CO. LTD., Beijing, China,* ***Youjie Zhang, Jie Wang,*** *INET, Tsinghua University, Beijing, China*

**2:30pm The Features of Closed Brayton Cycle and Sub-Critical Combined Cycles Coupled with (Very) High Temperature Gas-Cooled Reactor**

**Technical Paper Publication.** PowerEnergy2018-7384

***Xinhe Qu, Xiao Yong Yang, Gang Zhao, Jie Wang,*** *INET, Tsinghua University, Beijing, China*

**3:00pm Analysis of the Thermohydraulic and Mechanical Performance of Intermediate Heat Exchangers (IHX) Used in Systems with Very High Temperature Reactors (VHTR)**

**Technical Paper Publication.** PowerEnergy2018-7620

***Raciel de la Torre Valdes, Juan Luis Francois Lacouture,*** *National Autonomous University of Mexico, Mexico City, Mexico*

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| Yang | Zhang | 2-4-3 |
| Jiwei | Zhang | 2-7-5 |
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| Qinxin | Zhao | 2-4-1 |
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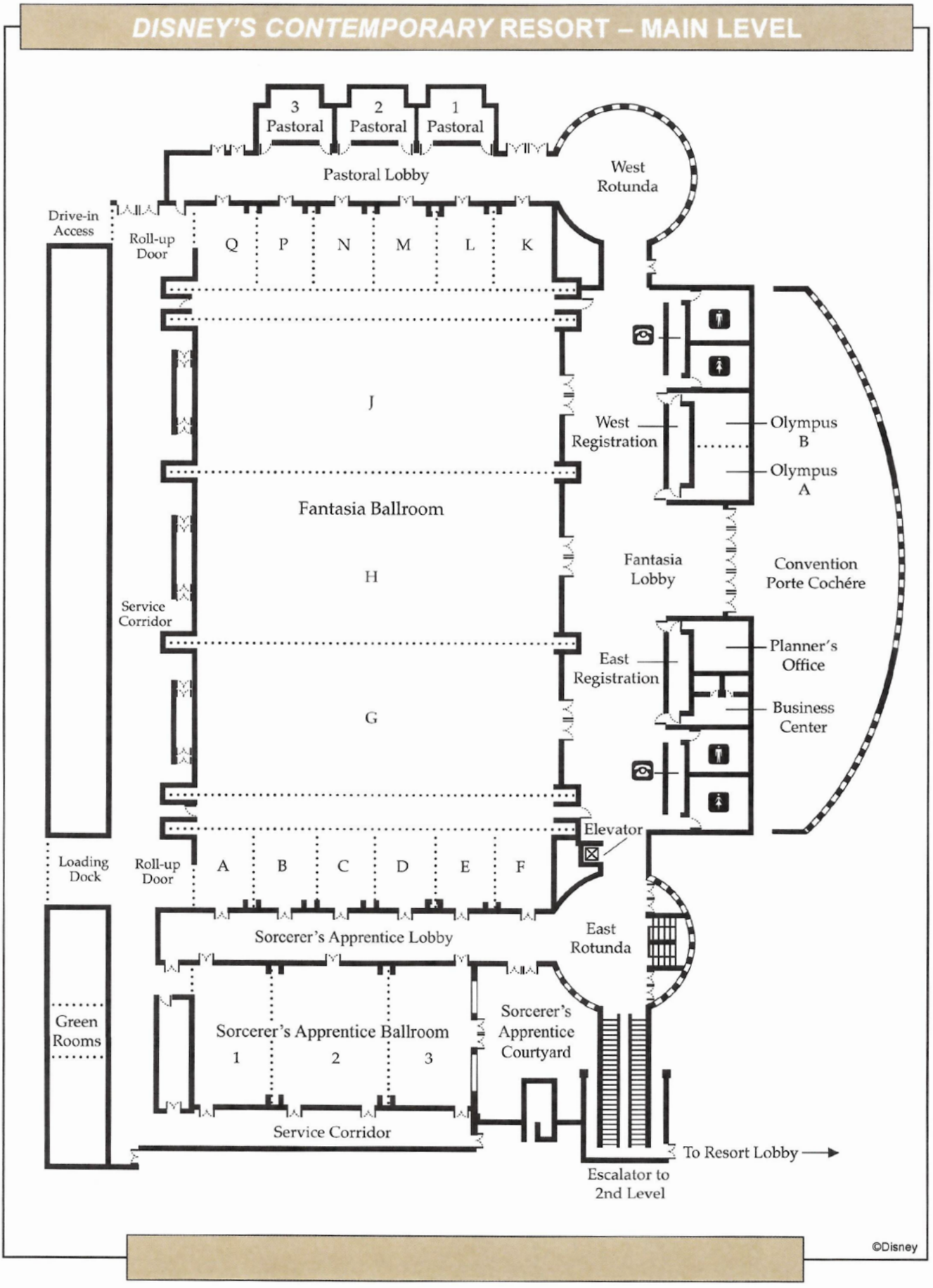
DISNEY'S CONTEMPORARY RESORT – MAIN LEVEL
3 Pastoral
2 Pastoral
1 Pastoral
Pastoral Lobby
West Rotunda
Drive-in Access
Roll-up Door
Q
P
N
M
L
K
J
West Registration
Olympus B
Olympus A
Fantasia Ballroom
H
Fantasia Lobby
Convention Porte Cochére
Service Corridor
East Registration
Planner's Office
Business Center
G
Elevator
Loading Dock
Roll-up Door
A
B
C
D
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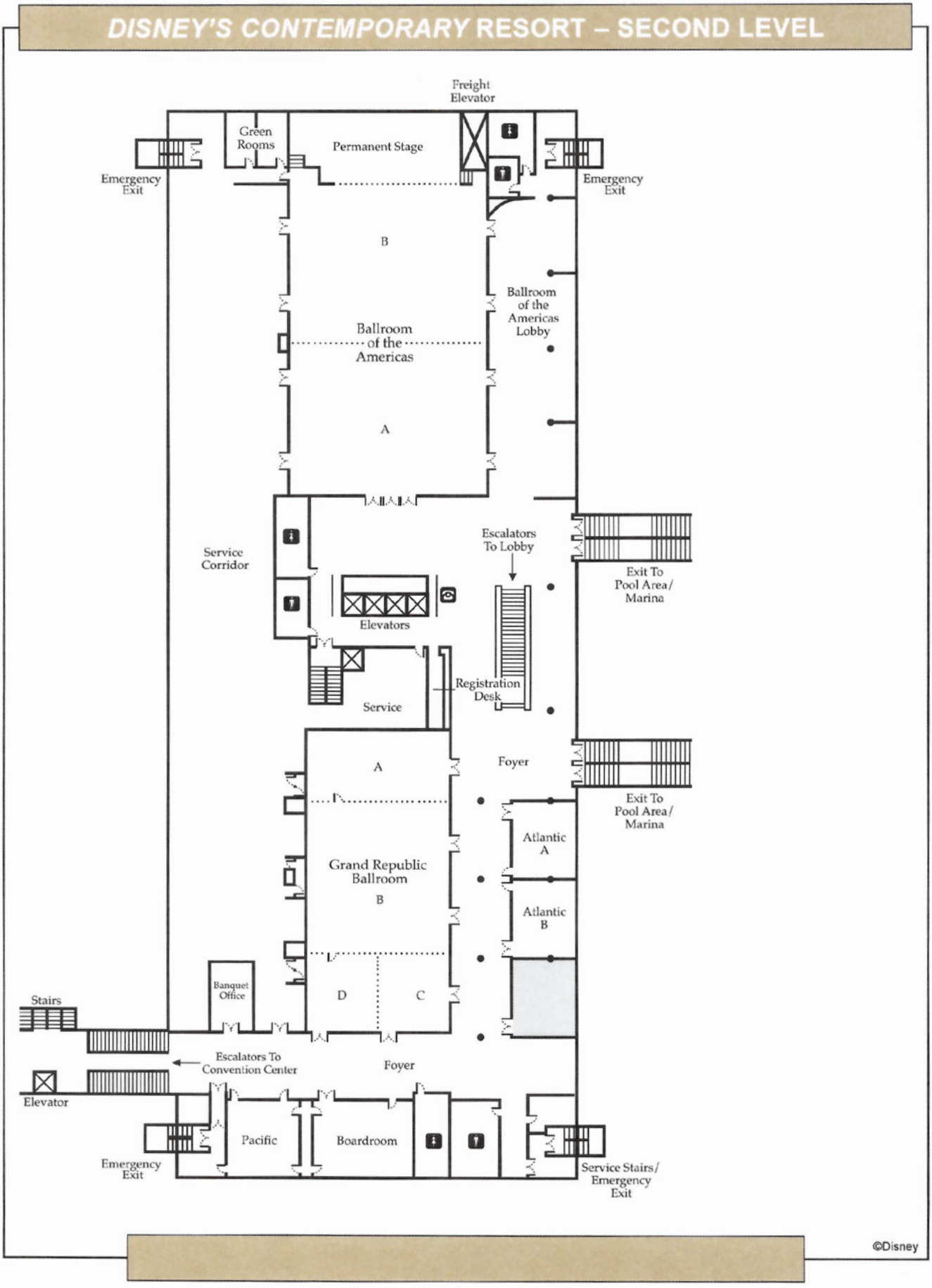
F
Sorcerer's Apprentice Lobby
East Rotunda
Green Rooms
Sorcerer's Apprentice Ballroom
1
2
3
Sorcerer's Apprentice Courtyard
Service Corridor
To Resort Lobby
Escalator to 2nd Level
©Disney

# Hotel Floor Plan



# Notes

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# Notes

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