Sandia National Laboratories

2024 SANDIA BLADE WORKSHOP

September 16-20, 2024

wind.sandia.gov

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WELCOME & OVERVIEW

Welcome to Albuquerque, New Mexico, for the 2024 Sandia Blade Workshop!

Sandia National Laboratories' Wind Energy departments and I are excited to welcome you to discuss wind turbine blades and related topics. There is much to catch up on since the last workshop in 2022.

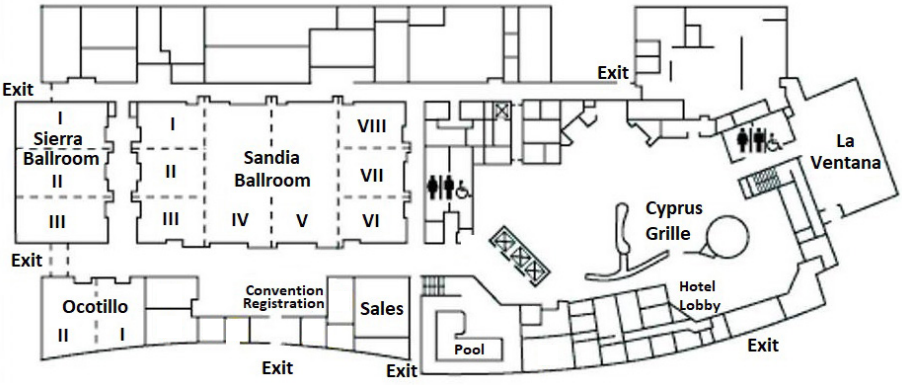
This workshop brings together wind energy experts, wind farm stakeholders and operators, manufacturers, and researchers to address the major topics for wind turbine blades, facilitate interaction and networking among the attendees, and identify future technology pathways.

We look forward to seeing you to connect, exchange ideas, and explore the latest in wind turbine blade research and development. We thank all our panelists and speakers for their expertise and contributions in making this event possible. And thank you as well to AC833 Renewable Energy Services for sponsoring the networking reception.

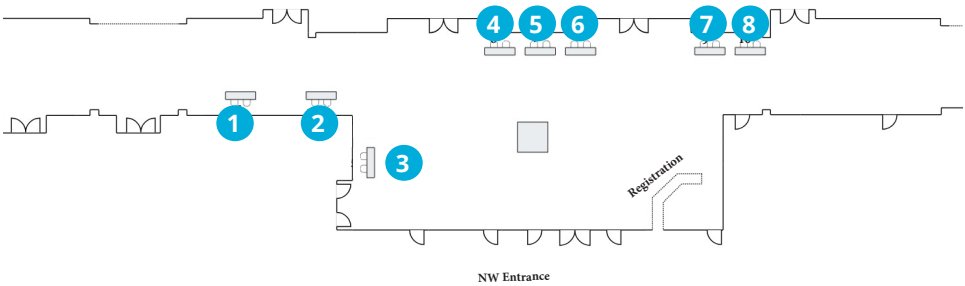
David Maniaci
2024 Sandia Blade Workshop General Chair

EVENT MAP & VENUE INFORMATION

EMBASSY SUITES ALBUQUERQUE - LOBBY LEVEL



Exhibitor Booths



1 eologix ping

2 AERONES

3 Skyraptor

4 Westlake

5 SWiFT

6 UMASS LOWELL

7 ONYX Insight

8 Predyct

DETAILED AGENDA

TIME		SESSION	ROOM
MONDAY, SEPTEMBER 16TH			
10:00–12:00	●	Check in	Registration
10:00–12:00	●	pyNuMAD Training	Ocotillo Room 1
10:00–12:00	●	Sandia Blade Reliability	Ocotillo Room 2
12:00–13:30	○	Lunch	Sierra Ballroom I-II
13:30–15:00	●	Building Skills to Interact Effectively with Communities	Ocotillo Room 1
13:00–16:00	●	Fourth Annual ESIG/EPRI Blade Workshop	Ocotillo Room 2
15:00–15:30	○	Afternoon Break	Convention Hallway
15:30–17:00	●	Building Skills to Interact Effectively with Communities	Ocotillo Room 1
TUESDAY, SEPTEMBER 17TH			
07:30–08:30	●	Check in	Registration
07:30–08:30	○	Breakfast	Sierra Ballroom I-III
08:30–10:00	●	Opening Session	Sandia Ballroom I-IV
10:00–10:30	○	Morning Break	Convention Hallway
10:30–12:00	●	Innovating Big Rotors for X	Sandia Ballroom I-IV
12:00–13:30	○	Lunch	Sierra Ballroom I-III
13:30–15:00	●	Growth vs. Reliability: What are the Tradeoffs?	Sandia Ballroom I-IV
15:00–15:30	○	Afternoon Break	Convention Hallway
15:30–17:00	●	Best Practices to Reliable Blade Operations	Sandia Ballroom I-IV
18:00–20:00	○	Reception	Sandia Ballroom VI-VIII

- Registration
- Meal/Break/Reception
- Side Meeting
- Member Only Side Meeting
- Plenary/Panel
- Podium Presentations

TIME		SESSION	ROOM
WEDNESDAY, SEPTEMBER 18TH			
07:30–08:30	○	Breakfast	Sierra Ballroom I-III
08:30–10:00	●	Design Methods for Blade Lifetime	Sandia Ballroom I-III
08:30–10:00	●	Innovation in Materials and Manufacturing	Sandia Ballroom IV
10:00–10:30	○	Morning Break	Convention Hallway
10:30–12:00	●	Field Experiments and Measurements	Sandia Ballroom I-III
10:30–12:00	●	Challenges for Offshore Blades	Sandia Ballroom IV
12:00–13:30	○	Lunch	Sierra Ballroom I-III
13:30–15:00	●	Control for Wind Farm Performance and Reliability	Sandia Ballroom I-III
13:30–15:00	●	Leading Edge Erosion	Sandia Ballroom IV
15:00–15:30	○	Afternoon Break	Convention Hallway
15:30–17:00	●	Blade Reliability, Repairs, and Inspection	Sandia Ballroom I-III
15:30–17:00	●	High Reynolds Number Aerodynamics	Sandia Ballroom IV
THURSDAY, SEPTEMBER 19TH			
07:30–08:30	○	Breakfast	Sierra Ballroom I-II
08:30–10:00	●	IEC O&M Standard	Sierra Ballroom III
09:00–10:00	●	Leading Edge Erosion Special Session (Open to all attendees)	Ocotillo Room 2
10:00–10:30	○	Morning Break	Convention Hallway
10:30–12:00	●	IEC O&M Standard	Sierra Ballroom III
10:30–12:00	●	Leading Edge Erosion Special Session (Open to all attendees)	Ocotillo Room 2
12:00-13:30	○	Lunch	Sierra Ballroom I-II
13:30-15:00	●	IEC O&M Standard	Sierra Ballroom III
13:30-15:00	●	IEA Wind Task 46	Ocotillo Room 2
15:00-15:30	○	Afternoon Break	Convention Hallway
15:30-17:00	●	IEC O&M Standard	Sierra Ballroom III
15:30-17:00	●	IEA Wind Task 46	Ocotillo Room 2

TIME		SESSION	ROOM
FRIDAY, SEPTEMBER 20TH			
07:30–08:30	○	Breakfast	Ocotillo Meeting Room II
08:30–10:00	●	IEC O&M Standard	Sierra Ballroom III
08:30–10:00	●	IEA Wind Task 46	Ocotillo Room 2
10:00–10:30	○	Morning Break	Convention Hallway
10:30–12:00	●	IEC O&M Standard	Sierra Ballroom III
10:30–12:00	●	IEA Wind Task 46	Ocotillo Room 2
12:00–13:30	○	Lunch	Ocotillo Meeting Room II
13:30–15:00	●	IEC O&M Standard	Sierra Ballroom III
13:30–15:00	●	IEA Wind Task 46	Ocotillo Room 2
15:00–15:30	○	Afternoon Break	Convention Hallway
15:30–17:00	●	IEC O&M Standard	Sierra Ballroom III

TECHNICAL PANEL AND PRESENTATION AGENDA

TIME	SESSION	SPEAKERS	
TUESDAY, OCTOBER 18TH			
08:30–08:45	**Opening Session**	David Maniaci	Sandia National Laboratories
08:45–09:00		Geoff Klise	Sandia National Laboratories
09:00–09:30		Eric Lantz	U.S. DOE Wind Energy Technologies Office
09:30-10:00		James Ellison	New Mexico Public Regulation Commission
10:30–12:00	**Innovating Big Rotors for X** Moderator: Carsten Westergaard	Ron Grife	LeeWard Energy
		James Martin	Gulf Wind Technologies
		Christopher Niezrecki	UMASS, Lowell; WindStar
		Steve Nolet	TPI Composites
		Brandon Ennis	Sandia National Laboratories
13:30–15:00	**Growth vs. Reliability: What are the Tradeoffs?** Moderator: Josh Paquette	Kevin Standish	Envision Energy
		Kyle Wetzel	Wetzel Wind
		Cara McLaughlin	DNV
		Dhanush Mariappan	GE Vernova
		James Madson	Wells Fargo
15:30–17:00	**Best Practices to Reliable Blade Operations** Moderator: Carsten Westergaard	Birgit Junker	Statkraft
		Katelyn Reynolds	Invenergy
		Alex Perry	Northland Power
		Ken Lee	EDF Renewables
		Alli Gallaher	NextEra Energy Resources

TIME	SESSION	SPEAKERS	
WEDNESDAY, SEPTEMBER 18TH			
08:30–10:00	**Design Methods for Blade Lifetime** Moderator: Josh Paquette	Birgit Junker	Statkraft
		Lili Haus	EPRI
		Lars Mikkelsen	Technical University of Denmark
10:30–12:00	**Innovation in Materials and Manufacturing** Chair: Brandon Ennis	Steve Nolet	TPI Composites
		Jim Tobin	Oak Ridge National Laboratory
		Evan Sproul	Sandia National Laboratories
10:30-12:00	**Field Experiments and Measurements** Chair: Tommy Herges	Joshua Morris	GE Vernova
		Brent Houchens	Sandia National Laboratories
		Jonathan Naughton	University of Wyoming
10:30-12:00	**Challenges for Offshore Blades** Chair: Brandon Ennis	Lars Hedegaard	Siemens Gamesa
		Murray Fisher	Gulf Wind Technologies
		Megan Rotondo	DNV
13:30-15:00	**Control for Wind Farm Performance and Reliability** Chair: Ken Brown	Mario Rotea	UT-Dallas
		Alex Bamberger	RES Group
		Dennice Gayme	Johns Hopkins
		Gopal Yalla	Sandia National Laboratories
13:30-15:00	**Leading Edge Erosion** Chair: David Maniaci	Charlotte Hasager	Technical University of Denmark
		Francesco Grasso	Vestas
		Tahir Malik	Vattenfall
15:30-17:00	**Blade Reliability, Repairs, and Inspection** Chair: Michelle Williams	Jeremy Heinks	CIC-NDT
		Javier Lopez	Polytech
		Matt Sigala	EDF Renewables
15:30-17:00	**High Reynolds Number Aerodynamics** Chair: Chris Kelley	Gerard Schepers	TNO
		Anna Wegner	Fraunhofer
		Edward Mayda	Envision Energy
		Alexander Meyer Forsting	Technical University of Denmark

SIDE MEETINGS OPEN TO ALL ATTENDEES:

pyNuMAD Training

Monday September 16, 10:00 – 12:00
Room: Ocotillo Room 1

This session offers a demonstration and basic tutorial of pyNuMAD, an open-source tool for the detailed structural design of wind turbine blades. Now written in Python for universal accessibility, this new version of NuMAD features a revised blade object (the main structure containing and organizing the design data of a blade) to improve efficiency, and in-house model generation tools have been introduced for ease of porting model information across multiple analysis tools (e.g. ANSYS, Abaqus, Nastran, Sierra, BeamDyn, VABS etc.).

Sandia Blade Reliability

Monday September 16, 10:00 – 12 :00
Room: Ocotillo Room 2

During this meeting, recent research results from Sandia's Blade Reliability program and future efforts will be discussed.

Fourth Annual ESIG/EPRI Blade Workshop

Monday, Sept. 16, 13:00 - 16:00
Room: Ocotillo Room 2

Blade experts from across the wind industry will discuss pressing issues in blade reliability. This meeting is open to anyone, provided they submit an example of blade damage for open discussion with the participants. Exceptions may be made for multiple people attending from the same organization. Examples are anonymous, but you are encouraged to present on your example during the workshop.

Please register separately for this meeting.

Building Skills to Interact Effectively with Communities

Monday September 16, 13:30 – 17:00
Room: Ocotillo Room 1

In this Energy Equity and Environmental Justice (EEEJ) session, several speakers will share how to effectively interact with the communities that your work may impact or with whom you need to directly interact for a successful project. Tips will be provided on how to communicate more inclusively. All are welcome to join this interactive and thought-provoking workshop!
Speakers:

- Michelle Burke, Sandia National Laboratories – Creating Accessible Graphics
- Dylan Moriarty, Sandia National Laboratories – Empowering Partnerships: Effective Collaboration with Tribes in Energy
- Jeremy Turner, Pattern Energy – SunZia Wind and Transmission - Public Engagement

Leading Edge Erosion Special Session

Thursday, September 19, 9:00 – 12:00
Room: Ocotillo Room 2

Hear the latest research on wind turbine blade leading edge erosion from participants in IEA Wind Task 46 on Wind Turbine Blade Leading Edge Erosion. Presentations will cover atmospheric drivers of erosion damage, operations with erosion, aerodynamic impacts and modeling, material testing methods, and material modeling.

EXHIBITORS

During the workshop, the exhibitor booths will be located in the East Atrium.

Booth	Exhibitors
1	eologix-Ping
2	Aerones
3	Skyraptor
4	Westlake
5	SWiFT
6	WindSTAR/UMass Lowell
7	Onyx
8	Predyct

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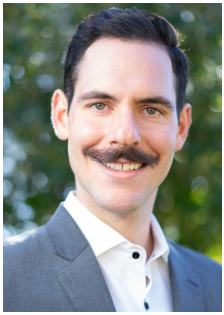
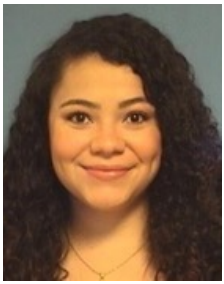
ABOUT THE SPEAKERS

ALEX BAMBERGER



Alex Bamberger is the vice president of Digital Services and Engineered Product at Renewable Energy Systems Digital Solutions. Alex has developed and commercialized innovative technology in renewables since 2010. He has innovated wind, solar and energy storage technologies, driving their commercial success across global markets. His goal is to improve the outcome of renewables and increase the success of the wind industry. He is currently delivering upon this mission in RES' new business, Digital Solutions.

MICHELLE BURKE



Michelle Burke is the UX Web Accessibility Team lead at Sandia National Laboratories in Albuquerque, New Mexico. She began working in Sandia's User Experience group, which led her to learn about the importance of creating an accessible web environment for all. Michelle has made it her personal mission to make accessibility considerations a part of Sandia's culture and not just an effort to meet requirements.

ABOUT THE SPEAKERS

JAMES ELLISON

James Ellison was appointed to the New Mexico Public Regulation Commission in January 2023 by Governor Michelle Lujan Grisham. The New Mexico Senate confirmed him for this position in February 2023. He is serving a two-year term which concludes on December 31, 2024. He worked at Sandia National Laboratories for over ten years, focusing on power systems analysis and planning, including energy storage and renewable energy integration. Prior to Sandia, he worked at AES Corporation, where he managed a power plant and a distribution company. He is committed to facilitating New Mexico's transition to renewable energy in a responsible way – one that maintains reliability at a reasonable cost.

MURRAY FISHER

Murray Fisher is chief engineer at Gulf Wind Technology. As a highly experienced engineering leader and trusted expert in wind turbine blades, Murray leverages decades of experience in blade design, manufacturing quality and operations to deliver impactful solutions for customer's problem statements. He has held key roles at Gulf Wind Technology, DNV, LM Wind Power and GE Vernova, consistently focusing on enhancing blade design, technology and performance. Murray is passionate about empowering teams to bring new, innovative, business-case backed ideas to market and fostering an environment that advances the blade design and manufacturing industry.

ABOUT THE SPEAKERS

ALEXANDER MEYER FORSTING

Alexander Meyer Forsting is a senior researcher at the Technical University of Denmark, DTU Wind and Energy Systems. Alexander graduated from Imperial College London in aeronautical engineering in 2014 and went on to DTU Wind to complete his doctorate in modeling the wind turbine induction zone. He is a developer of PyWake and EllipSys, DTU Wind's in-house CFD solver. Within DTU's Leading Edge Roughness and Categorization (LERCat) project, he heads the development of an aerodynamic digital twin of blade leading edge roughness.

ALLI GALLAHER

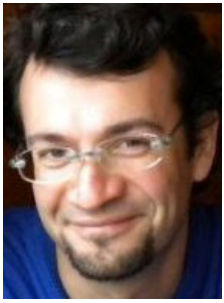
Alli Gallaher is the principal structural engineer at NextEra Energy. Alli has specialized in wind turbine blades at NextEra Energy since 2014. She provides engineering technical support to NextEra Energy Resources' fleet of over 16 GW of wind assets in the United States and Canada, including blade damage assessment and root cause investigations. Alli also leads special projects including ice mitigation strategies, the design of custom tooling and finite element analysis of wind turbine components. She holds a Federal Aviation Administration Part 107 certification for drone-based inspection.

ABOUT THE SPEAKERS

DENNICE GAYME

Dennice Gayme is a professor in mechanical engineering at Johns Hopkins University. She received her Mechanical Engineering and Society, Co-op degree (B.Eng. Society) from McMaster University in 1997, a Master of Science in Mechanical Engineering from the University of California at Berkeley in 1998 and her Doctorate in Control and Dynamical Systems from the California Institute of Technology in 2010. Her current research interests are in modeling, analysis and control of spatially distributed and large-scale networked systems, such as wind farms, wall-bounded shear flows, vehicle networks and power systems.

FRANCESCO GRASSO



Francesco Grasso is an aerodynamic specialist at Vestas Technology Centre, Portugal. From 2009 to 2014, he was an aerodynamic researcher at ECN. Since 2015, he has been part of Vestas' aerodynamic team. Francesco specializes in airfoil/rotor design optimization and wind tunnel testing.

ABOUT THE SPEAKERS

RON GRIFE

Ron Grife is the director of engineering for Leeward Renewable Energy where his duties include establishing the technical support functions at Leeward and driving improvements in equipment performance and reliability of the company's operating fleet. Prior to joining Leeward, Ron served as the manager of Turbine Performance and Reliability at EDPR and was a turbine upgrades project lead for Vestas' research and development. Ron has served as the chair of the AWEA Wind Standards Committee and is currently chairing the wind turbine foundation maintenance recommended practices update. Before joining the wind industry, Ron spent seven years at Bell Helicopter in the aerodynamics and performance group developing, modeling and testing helicopter technology. Ron received his master's degree in mechanical engineering from the University of Arizona in Tucson.

CHARLOTTE HASAGER

Charlotte Hasager is a professor of offshore wind energy meteorology at DTU Wind and Energy Systems. Her key interests are satellite remote sensing and wind energy. Charlotte is also an operating agent for IEA Task 46 Erosion of Wind Turbine Blades.

ABOUT THE SPEAKERS

LILI HAUS

Lili Haus is a research and development engineer IV in the Wind Power Generation Program at the Electric Power Research Institute (EPRI). Her research focuses on applications of data analytics in wind energy to advance wind turbine performance, reliability and data quality.

LARS HEDEGAARD

Lars Hedegaard is the engineering manager for blade structures at Siemens Gamesa. Lars began his career in Denmark, building a strong foundation in structural blade design, manufacturing, testing and validation. For the past decade, he has led the Structural Blade Design team within the Conceptual Blade Design department in Boulder, Colorado.

JEREMY HEINKS

Jeremy Heinks is the owner of Composite Inspection and Consulting, LLC (CICNDT). He has over 25 years of non-destructive testing (NDT) experience with a focus on composites, working for the aerospace, renewables, space, marine and automotive industry. Jeremy considers himself lucky to have inspected a wide variety of materials and parts within such incredible machines and structures. He has worked with people from all over the world and strives continuously to improve himself and his team to better serve their customers and the industry.

ABOUT THE SPEAKERS

BRENT C. HOUCHENS

Brent C. Houchens is a principal mechanical engineer at Sandia National Laboratories. Brent carries out computational and experimental research on energy conversion systems with a focus on wind and water energy technologies, and leads the Additively-Manufactured, System-Integrated Tip (AMSIT) project. He holds bachelor's, master's, and doctorate degrees in mechanical engineering from the University of Illinois, Urbana-Champaign.

BIRGIT JUNKER

Birgit Junker is a senior blade specialist at Statkraft and head of the Global Blade Group. She is an engineer with a background in wind turbine blade quality and field failures: 11 years with manufacturing and field failures of Vestas and Siemens blades, followed by 11 years of blades as seen from the owner's perspective. Since 2013, she has concurrently run the Global Blade Group, formerly known as WTO Network, a 50+ member organization.

GEOFF KLISE

Geoff Klise is manager of the Wind Energy Computational Sciences department at Sandia National Laboratories. Geoff has been at Sandia for 17 years, contributing to research and development in solar energy, biofuels and climate change security. He took on the role of laboratory program manager for wind energy research in 2018 and is the department manager for Wind Energy Computational Sciences with a focus on wind turbine and wind farm flow physics, software development for mid- and high-fidelity aeroelastic and blade resolved codes, and design optimization for novel floating offshore wind turbines.

ABOUT THE SPEAKERS

ERIC LANTZ

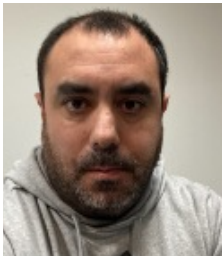
Eric Lantz is the director of the U.S. Department of Energy's (DOE) Wind Energy Technologies Office (WETO) where he oversees an annual budget of over $100 million to advance wind technology and support an equitable transition to a decarbonized energy system. The WETO portfolio includes innovative research on land-based, offshore and distributed wind energy systems as well as research into wind power grid integration, analysis and technical assistance. WETO also works to accelerate future wind energy technologies in support of widespread access to low-cost abundant wind energy. Eric works with DOE leadership and interagency partners on key issues such as supply chains, workforce training and siting and permitting. He holds a Master of Science in Energy Policy from the University of Colorado and has made significant contributions to more than 70 wind energy publications during his tenure in the wind energy industry.

KEN LEE

Ken Lee is EDF Renewables' wind fleet engineering manager where he leads a multi-disciplinary mechanical systems engineering team primarily responsible for identifying and correcting sub-optimal performance and reliability. Ken has spent 15 years within the wind industry. He worked at an expert consultancy firm, for a turbine original equipment manufacturer (OEM) and for several independent service providers (ISPs). His core technical expertise covers a broad range of wind turbine platforms, particularly in rotor blade design, manufacturing, testing and certification and operations and maintenance.

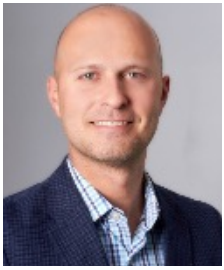
ABOUT THE SPEAKERS

JAVIER LÓPEZ



Javier López graduated as a telecommunications engineer in 2006 and completed a doctorate in lightning physics and protection of tall structures in 2012. Since 2014, he has worked in the wind industry in Denmark, with a focus on the design and validation of lightning protection systems (LPS) for wind turbine blades.

JAMES MADSON



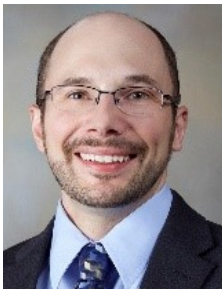
James Madson is an executive director of Technology and Technical Services within the Wells Fargo Renewable Energy and Environmental Finance tax equity team. He leads technical diligence on utility-scale wind (onshore and offshore), solar and energy storage tax equity investments, and supports the on-going management of the existing tax equity investment portfolio. Prior to Wells Fargo, he worked in a variety of commercial and technical roles with Pattern Energy, BP and Gamesa Energy. His experience includes business and project development, engineering, technology, mergers and acquisitions (M&A), strategy and leadership, as well as financing and joint ventures for renewable energy projects. James has been in the utility-scale renewable energy sector for over twenty years and received a bachelor's in mechanical engineering from the University of Minnesota-Twin Cities and a masters from Rice University.

ABOUT THE SPEAKERS

TAHIR H. MALIK

Tahir H. Malik is a doctoral student at the Technical University of Denmark (DTU) and a WTG blade engineer at Vattenfall. As a student, he focuses on quantifying blade aerodynamic performance degradation due to erosion in wind turbines. He is also a wind turbine blade engineer at Vattenfall, where he is responsible for aerodynamic assessments and technical due diligence of wind turbine blades. With a background in aeronautical engineering from Imperial College London, Malik brings extensive expertise in wind turbine engineering.

DAVID MANIACI



David Maniaci is the wind turbine aerodynamics and validation lead in the Wind Energy Computational Sciences department at Sandia National Laboratories. He is currently leading efforts on offshore wind energy validation experiment and instrumentation needs, wind turbine operation with erosion and the design of airfoils for offshore wind turbines. His research includes wind turbine wake dynamics, the effects of leading-edge erosion on airfoil and rotor performance and rotor aerodynamic innovation. He received a doctorate in aerospace engineering from the Pennsylvania State University, where he was an instructor of aircraft design for several years.

ABOUT THE SPEAKERS

DHANUSH MARIAPPAN

Dhanush Mariappan is the technology manager of the Mechanical Design and Manufacturing research group at the GE Vernova Advanced Research Center. He leads a team of more than 25 mechanical engineers who work on a portfolio of research and development programs to enable the energy transition in areas including mechanical design, structural mechanics, advanced manufacturing and inspection technologies. Dhanush received his doctorate in mechanical engineering from MIT.

JAMES MARTIN

James Martin is founder and CEO of Gulf Wind Technology (GWT), a U.S. company dedicated to de-risking decision making and technology introduction in wind energy industry. GWT established, and is currently expanding, an advanced rotor technology, testing and wind supply chain base leveraging the industrial infrastructure based in both South Louisiana and North Carolina.

EDWARD MAYDA

Edward Mayda is a principal engineer at Envision Energy. Eddie is a seasoned professional with 17 years of experience in the wind industry, specializing in blade design and testing. At Envision Energy's Global Blades Innovation Center in Boulder, Colorado, he advances wind turbine blade technology through cutting-edge airfoil design and wind tunnel testing. In addition to his leadership in airfoil design, Eddie plays a crucial role in supporting the Envision engineering team by developing sophisticated software tools for blade geometry definition, aerodynamic modeling in ENFAST, computational fluid dynamics and high-performance computing.

ABOUT THE SPEAKERS

CARA MCLAUGHLIN

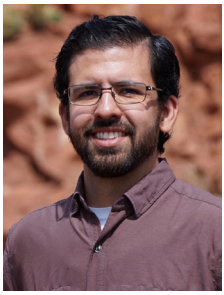
Cara McLaughlin is senior blade engineer at DNV. Ms. McLaughlin has over nine years of experience in the wind industry, with a focus on blade structural design, manufacturing and rotor system integration. She has led numerous blade failure investigations, performed inspections and assessments of blade damage, conducted manufacturing quality surveys and evaluated blade structural designs and analysis methods for technical due diligence. Ms. McLaughlin holds a bachelor's and master's in aerospace engineering.

LARS PILGAARD MIKKELSEN

Lars Pilgaard Mikkelsen is an associate professor of composites manufacturing and testing at the Technical University of Demark, DTU Wind. Lars has a doctorate in solid mechanics from DTU. For the last 20 years, he has worked with composite materials for wind turbine blades, including X-ray tomography, advanced segmentation method, experimental characterization methods and numerical modelling aimed at improving the fatigue resistance and compression strength behavior of unidirectional composite materials.

ABOUT THE SPEAKERS

DYLAN MORIARTY



Dylan Moriarty is a geoscience engineer at Sandia National Laboratories. His work focuses on data analytics in earth, energy and infrastructure. He has a bachelor's in civil engineering from the University of Arizona and a master's in energy resources engineering from Stanford University. Dylan is also a citizen of the Navajo Nation where he grew up.

JOSHUA MORRIS

Joshua Morris is a senior engineer of systems for GE Vernova. Joshua received his bachelor's, master's and doctorate degrees at the University of Massachusetts Lowell where he studied composites, blade design and mechanical metamaterials. After graduating in 2022, he joined GE to lead research and development projects. His current focus areas are controls, machine learning/artificial intelligence and blades.

ABOUT THE SPEAKERS

JONATHAN NAUGHTON

Jonathan Naughton is a professor of mechanical engineering at the University of Wyoming. His research focuses on instrumentation development for, and experimental studies of, unsteady aerodynamic flows. Unsteady pressure measurement instrumentation developed during his efforts led to a spin-off company, Resono Pressure Systems, Inc. He has been a professor of mechanical engineering at the University of Wyoming for 28 years.

STEPHEN NOLET

Mr. Stephen Nolet serves as senior director for Innovation and Technology at TPI Composites and has nearly 20 years of activity supporting utility-scale wind energy. In his role at TPI he manages the companies external research and development efforts. Recently, his focus has centered on creating a truly sustainable Circular Economy for end-of-life fiber reinforced composites and specifically, the growing number of decommissioned wind turbine blades.

CHRISTOPHER NIEZRECKI

Christopher Niezrecki is a distinguished university professor of the Department of Mechanical and Industrial Engineering at the University of Massachusetts Lowell. He is currently the co-director of the Structural Dynamics and Acoustic Systems Laboratory (http://sdasl.uml.edu/), and leads the Center for Energy Innovation at the University of Massachusetts Lowell (www.uml.edu/energy). Dr. Niezrecki is also the director of the NSF-Industry/University Cooperative Research Center for Wind Energy Science Technology and Research (WindSTAR). His areas of current research include renewable energy and hydrogen systems, wind turbine dynamics, monitoring and inspection, structural dynamic and acoustic systems, smart structures, signal processing, structural health monitoring, optical sensing and smart materials. Funding for his research ($30M+) has been provided through grants from numerous federal and state agencies as well as industry sponsors.

ALEXANDER PERRY

Alexander Perry is director of operations performance at Northland Power. Since 2014, Alex has been responsible for monitoring and optimizing the physical performance of Northland Power's renewable generation assets operating in North America. This includes evaluating, planning and executing projects to upgrade, enhance and/or repair operating wind turbine equipment to optimize yield and minimize operating risks. He also advises on new projects and merger and acquisition due diligence.

ABOUT THE SPEAKERS

KATELYN REYNOLDS

Katelyn Reynolds is senior manager of operations engineering for Invenergy where she has specialized in wind turbine blade reliability since 2015. She has led a number of blade reliability improvement programs including third party blade contractor qualification, development of in-house repair capabilities, quality control program creation and implementation and pilot project development for blade add-ons and condition monitoring systems (CMS). Katelyn leads a blade engineering team dedicated to blade reliability and analytics which focuses on total cost of ownership reduction and long-term blade performance improvement. She holds certifications for composite repair and the Federal Aviation Administration's Part 107 certificate for commercial drone operations.

MARIO A. ROTEA

Mario A. Rotea is professor and director of the Center for Wind Energy at the University of Texas at Dallas (UT Dallas). The center is dedicated to the advancement of wind energy science and engineering. He is also cofounder and site director of the National Science Foundation (NSF) Industry University Cooperative Research Center, WindSTAR. Mario also is a professor of mechanical engineering at UT Dallas, where his research interests are in condition monitoring, optimization and control of wind energy systems. He has 30+ years of experience in the development of tools for control systems design and their application to electromechanical, aeromechanical and aerospace systems.

ABOUT THE SPEAKERS

MEGAN ROTONDO

Megan Rotondo is principal engineer at DNV. Ms. Rotondo has over 10 years of engineering experience in the wind industry where she has been focused on rotor design and analysis. Her experience includes conceptual rotor design, new product development, detailed structural analysis, manufacturing quality and composite damage evaluation and repair. She has her master's in mechanical engineering and bachelor's in civil engineering from Cornell University.

GERARD SCHEPERS

Gerard Schepers is a senior scientist at TNO and a professor at Hanze University of Applied Sciences on Wind Energy. Gerard Schepers graduated in 1986 from the Department of Aerospace Engineering at TUDelft after which he started to work at the Department of Wind Energy at the Energy Research Center of the Netherlands, ECN (now TNO). He worked as a researcher in the field of wind turbine aerodynamics, and he also coordinated several EU and IEA cooperation projects. In 2012, he received a doctorate based on the experiences gained in the development and validation of aerodynamic engineering models. He also works part-time as a professor of wind energy at the University of Applied Science Hanze Groningen.

ABOUT THE SPEAKERS

MATT SIGALA

Matt Sigala is the senior manager of Composite Repair Services at EDF Renewables, where he specializes in optimizing wind turbine blade maintenance and repair. With a background in aviation and composite materials, he has implemented cost-effective, data-driven strategies that enhance the performance and lifespan of EDF's turbine fleet.

EVAN SPROUL

Evan Sproul is a senior member of technical staff at Sandia National Laboratories. He performs techno-economic analysis and life cycle assessment to evaluate the costs and environmental impacts of renewable energy systems. Evan's recent research has been focused on manufacturing, operation and recycling of wind turbine blades.

ABOUT THE SPEAKERS

KEVIN STANDISH

Kevin Standish is director of blade design at Envision Energy. Kevin earned his master's degree in mechanical and aeronautical engineering from the University of California, Davis (UC Davis). He spent his entire 20+-year career in wind turbine blade design technology research and development, working for five years at GE, seven years at Siemens, and the last nine years with Envision as director of their Global Blade Innovation Center in Boulder, Colorado.

JIM TOBIN

Jim Tobin currently serves as the composites and additive manufacturing innovation lead for renewable energy at Oak Ridge National Laboratory's (ORNL's) Manufacturing Demonstration Facility in Knoxville, Tennessee. He is responsible for a portfolio of advanced hybrid-additive manufacturing research currently targeted at utility scale composite wind turbine blades and critical components for hydroelectric turbines. Prior to joining ORNL in 2023, Jim served as a principal engineer for GE Renewable Energy for over 12 years, focusing on advanced manufacturing and field prototype testing of large-scale components for wind and hydro turbines. Prior to joining GE, Jim held senior engineering product development/manufacturing positions at Procter & Gamble and Britax Child Safety & Specialty Manufacturing. He has decades of hands-on experience developing and testing new products and manufacturing techniques and has over 50 granted U.S. patents.

ABOUT THE SPEAKERS

JEREMY TURNER

Jeremy Turner is the director of New Mexico Project Development for Pattern Energy. Prior to joining Pattern, he was a managing partner with Forever Energy Consulting LLC, the executive director of the New Mexico Renewable Energy Transmission Authority, and the chief financial advisor for the New Mexico Finance Authority. Jeremy has over 15 years of experience in the electric transmission and renewable industry and over 20 years experience managing and structuring complex public and private transactions. He holds a master's and bachelor's in agricultural economics from New Mexico State University.

ANNA WEGNER

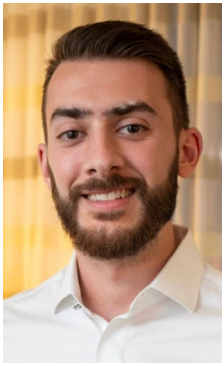
Anna Wegner is the group manager for the Fraunhofer Institute for Wind Energy and Energy System Technology (Frainhofer IWES). She graduated in 2003 from the Department of Physics at the University of Heidelberg. She received her doctorate in 2008 from the University of Bremen. She works as researcher and group manager for Wind Energy Field Measurements at Fraunhofer IWES.

DR. KYLE WETZEL

Dr. Kyle Wetzel is the principal consulting engineer at Wetzel Wind Energy Services. Kyle has worked in the wind energy industry since 1993. He currently focuses primarily on providing engineering services related to blade operations and management to owners and operators of wind farms and independent service providers.

ABOUT THE SPEAKERS

GOPAL YALLA



Gopal Yalla is a postdoctoral researcher at Sandia National Laboratories. He joined Sandia in 2023 as a member of the Wind Energy Computational Science department. Prior to joining Sandia, Gopal earned his doctorate in computational science, engineering, and mathematics from the University of Texas at Austin under the supervision of Dr. Robert Moser where he worked on fundamental problems of LES modeling and numerics. He also served as a postdoctoral fellow in the Department of Mechanical Engineering at Johns Hopkins University, focusing on adjoint sensitivity analysis of stratified wakes.

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