

# 11th IEEE Conference on Technologies for Sustainability

## IEEE SusTech 2024



TECHNOLOGIES THAT IMPROVE AIR, WATER, ENERGY, FOOD AND HUMAN LIFE

**April 14-17, 2024**

**Portland, Oregon**



IEEE SusTech

# SusTech2024

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# IEEE SusTech2024



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## Welcome Message from the Conference Chair

It is our great pleasure to welcome you to the 11<sup>th</sup> anniversary IEEE Technologies for Sustainability Conference (SusTech 2024) held from April 14 to 17, 2024, in Portland, Oregon

Over the years this conference has attracted attendees from government, industry, business and manufacturing sectors as it rotated from its beginning in Portland through Arizona, California, Utah and now Oregon. We have scientists, academics, technologists, and scholars from many disciplines that share and contribute to the themes and tracks that we offer in the conference. And who have published over 550 papers in IEEE Xplore.

This year's program features an interactive workshop on challenges from climate change, keynote speakers, panel discussions, peer-reviewed technical paper presentations across 15 thematic sessions, a student poster contest, and a 1-day sustainability forum featuring a unique blend of experts in policy, leadership, and technology.

All sessions will be in a hybrid format using Zoom. You will find the program schedule with information about the scheduled technical papers for each track; bio-data of distinguished keynote speakers, and panelists; and student poster contestants in the Program Guide and on our website <https://iee-sustech.org/>. The technical papers can be found in the attendee proceedings ZIP file.

Undergraduate and graduate students submitted abstracts for the Student Poster Contest, representing ideas or designs for developing projects/products supporting the sustainability topics areas of the Conference. The accepted posters will be presented during the online SusTech 2023 Student Poster Competition Wednesday afternoon April 19, 2023. Prizes will be awarded to the top three posters; winners will be announced at the closing session.

We thank our sponsors: the IEEE Oregon, San Fernando Valley, Foothill, Orange County and Coastal Los Angeles Sections, IEEE Region 6, IEEE-USA and the IEEE Society on Social Implications of Technology (SSIT); co-sponsors IEEE Industry Applications Society (IAS), Oceanic Engineering Society, Power and Energy (PES) Society, Sensors Council, Standards Association (IEEE-SA) and Technology and Engineering Management (TEMS).

I want to personally thank the members of the Organizing and Program Committees whose support and dedication have enabled us to reach this 11<sup>th</sup> conference. And to thank you for participating in this SusTech 2024 hybrid conference. It is our sincere hope that you will enjoy and learn about the innovative developments in the area of sustainability.



Sincerely,

Edward G. Perkins  
SusTech 2024 Chair

## Conference Committee

Position	Name	Organization
Chair	Ed Perkins	Consultant
Vice Chair	Sharan Kalwani	DataSwing LLC
Secretary	Rick Smith	Intel
Treasurer	Lee Oien	MSEI
Past Chair	David E. Gonzalez	U.S. Navy
Technical Program Chair	Sevada Isayan	Glendale Community College
V. Chair	Adil Usman	NREL
Student Poster Chair	Sean Monemi	Cal. State Poly. Univ. Pomona
YP Program	Amritesh Rai	Intel
IEEE Climate Change Liaison	Naznin Akter	Intel
SusTech Talks Coordinator	Susan Dickey	none
Publication Chair	Ed Perkins	Consultant
EDAS Chair	Sevada Isayan	Glendale Community College
Marketing & Publicity	Gora Datta	CAL 2 CAL
	Farhad Mafie	Savant Company
Platform AV Chair	Sharan Kalwani	DataSwing LLC
Local Arrangements	Rick Smith	Intel
Exhibits & Patrons Chair	Rick Smith	
Registration Chair	Don Mayer	The Aerospace Corporation (Retired)
Webmaster	Ed Perkins	Consultant
<b>Co-sponsor Liaisons</b>		
IEEE IAS	Adil Usman	NREL
IEEE Oceanic Engineering Society	Bill Wilson	Consultant
IEEE Power & Energy Society	Daniel Goodrich	BPA
IEEE Sensors Council	John Vig	Vice President – Conferences
IEEE Standards Association (IEEE-SA)	John Havens	Sustainability Practice Lead
IEEE Technology and Engineering Management Society (TEMS)	Mike Andrews	Andrews & Associates
IEEE SusTech Initiative	Maike Luiken	Initiative Co-Chair
	Wei-Jen Lee	Initiative Co-Chair
<b>IEEE Sponsor Liaisons</b>		
Oregon Section	Daniel Goodrich	BPA
Oregon Section	Rick Smith	Intel
IEEE Region 6		
IEEE-USA	Scott Tamashiro	IEEE-USA Conferences Chair
IEEE Society Social Implications of Technology (SSIT)	Jay Pearlman	SSIT Conferences VP
San Fernando Valley Section	Sevada Isayan	Glendale Community College
Coastal LA Section	Gustavo Vejarano	Loyola Marymount University
Foothill Section	Osman Ceylan	
Foothill Section (Chair)	Max Cherubin	Pantron
Orange County Section	Alberto Tam Yong	Applied Medical

### Technical Program Committee

Role	Name	Affiliation	Country
<b>SusTech Committee</b>			
Chair	Ed Perkins	Consultant	USA
Vice Chair	Sharan Kalwani	DataSwing LLC	USA
Technical Program Chair	Sevada Isayan	Glendale Community College	USA
TP Vice Chair	Adil Usman	NREL	USA
EDAS Chair	Sevada Isayan	Glendale Community College	USA
SusTech Talks Coordinator	Susan Dickey	none	USA
Student Poster Chair	Sean Monemi	Cal. State Poly. Univ. Pomona	USA

### Program Committee

#### Track Chairs

Track	Name	Affiliation	Country
Agriculture and Food Technology	Adil Usman	National Renewable Energy Laboratory	USA
Intelligent Transportation Systems	Adil Usman		
Sustainable Electronics	Rakeshkumar Mahto	California State University, Fullerton	USA
Internet of Things (IOT) for sustainability	Susan Dickey	none	USA
Energy Efficiency	Rakeshkumar Mahto	California State University, Fullerton	USA
Renewable/Alternative Energy	Mohamed Osman	Washington State University-Tri-Cities	USA
Smart & Micro Grids	Salman Kahrobae	SCE	USA
Machine Learning	Prince Jain	Parul University	India
Ocean Waste & Pollution Management	Fausto Ferreira	University of Zagreb	Croatia
	Venugopal Pallayil	ARL	Singapore
Societal Implications / Quality of Life / Public Policy	Jay Pearlman	none	USA
Sustainable Management	Jay Pearlman		

### Reviewers

Ibrahim Abuishmais	Princess Sumaya University for Technology (PSUT)	Jordan
El-Shaimaa Abumandour	Bibliotheca Alexandrina	Egypt
Robert Bass	Portland State University	USA
Gora Datta	CAL2CAL	USA
Nuno Domingues	ISEL	Portugal
Dan Donahoe	1000 Kilometers LLC	USA
David Durocher	none	USA
Divya Garikapati	Woven by Toyota	USA
Prasanta Ghosh	Syracuse University	USA
Didem Gürdür Broo	Uppsala University & Cyber-Physical Systems Lab	Sweden
Mohsin Hamzah	University of Technology	Iraq
Rijo Jacob Robin	Superior Graphite	USA
Prince Jain	Parul University	India
Vivekananda Jayaram	Florida International University	USA
Muhammad Asif Khan	Qatar University	Qatar
Albert Lin	IEEE SFV Section	USA
Rakeshkumar Mahto	California State University, Fullerton	USA
Mohammad Al Bukhari Marzuki	Sultan Azlan Shah Polytechnic	Malaysia
Vidyasagar Parlapalli	KLA Corporation	USA
Md. Rasheduzzaman	Southeast Missouri State University	USA
Jayson Rogelio	Metals Industry Research and Development Center	Philippines
Gopal Venkata Tadepalli	College of Engineering, Guindy Campus	India
Pattharaporn Thongnim	Burapha University	Thailand
Yusheng Xiang	Karlsruhe Institute of Technology	Germany

## Patrons

### Diamond Patron



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Makersite is a Product Lifecycle Intelligence software tailored for the global manufacturing industry. Harnessing groundbreaking AI technology, Makersite empowers product teams to efficiently manage sustainability, cost, and compliance, turning complex multi-level criteria analysis and decisions at scale from months to minutes. Founded in 2018 by industry veterans, the Stuttgart-based company boasts team members across Europe, Asia, and North America supporting a customer portfolio of industry trailblazers such as Microsoft, Schaeffler, Cummins, and Vestas.

Makersite simplifies intricate product and supply chain data tasks by creating digital twins of product models. Enriched with global supply chain data, these models offer a comprehensive view of a product's environmental, cost, and compliance impact throughout its lifecycle. Makersite accelerates the product development process, allowing teams to effectively identify cost-saving and eco-friendly strategies in real-time. The result is a faster and more collaborative approach to product development.

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### Bronze Patron



*Nature Reviews Clean Technology* is a Nature Portfolio journal launching in 2025 that will publish Reviews, Perspectives, and opinion articles on the research, development, and implementation of clean technologies and processes. Focusing on the challenges of a sustainable transition and the technologies to address them, the journal will span fields and cover solutions that connect science, technology, economics, and policy.

Chief Editor Laura Zinke will be attending the conference and is available to meet prospective authors interested in discussing a Review, Perspective or Comment proposal for the journal. Get in contact at [laura.zinke@nature.com](mailto:laura.zinke@nature.com).

### Exhibitors and Sponsors

#### Marketing Patron



Sustainability Through Technology

The [IEEE SusTech Initiative](#) seeks to contribute technical expertise and solutions to address sustainability challenges, including climate change. This initiative is growing rapidly and new volunteers are always welcome.



IEEE-USA's mission is to recommend policies and implement programs specifically intended to serve and benefit the members, the profession, and the public in the United States in areas of economic, ethical, legislative, social and technology policy concern.

Our vision is to serve the IEEE U.S. member by being the technical professional's best resource for achieving lifelong career vitality and by providing an effective voice on policies that promote U.S. prosperity.

#### Financial Sponsors



[Oregon Section](#)



[IEEE Region 6](#)

IEEE Oregon Section

The IEEE Oregon Section serves approximately 3500 members in western and southern Oregon and southwest Washington.

IEEE Region 6

IEEE Region 6 serves approximately 50,000 members in the Western USA from Alaska to New Mexico and Montana to Hawaii. The Region has 35 Sections and 2 sub-Sections, organized into 5 Areas: Northeast, Northwest, Central, Southern and Southwest.





[Coastal LA Section](#)



[Orange County Section](#)



[San Fernando Valley Section](#)



[IEEE Foothill Section](#)



[IEEE-USA](#)

### IEEE Coastal Los Angeles Section

The Coastal LA Section starts in Long Beach, in the south, and goes to Malibu in the north. They have three engineering schools, UCLA, LMU, and CSULB in the section. There are a number of large companies in their area, including Raytheon, Boeing, Northrop Grumman, and more. It's a great place to be an electrical engineer.

### IEEE Orange County Section

The IEEE Orange County Section serves over 2,500 members in Orange County, CA; in addition to working closely with local communities, businesses and educational institutes.

### IEEE San Fernando Valley Section

The IEEE San Fernando Valley Section serves approximately 800 members. IEEE SFV encompasses the geographical area North-West of Los Angeles.

### IEEE Foothill Section

Our Inland Empire IEEE Foothill section prides itself in providing an ideal place for technical professionals, entrepreneurs, consultants, academics, and university students to meet, share, and give back to our communities. We are over 1,000 members covering all of Riverside and San Bernardino counties in Southern California. We are proud to be continuing sponsors of the Technologies for Sustainability Conference.

### IEEE-USA

IEEE-USA's mission is to recommend policies and implement programs specifically intended to serve and benefit the members, the profession, and the public in the United States in areas of economic, ethical, legislative, social and technology policy concern.

Our vision is to serve the IEEE U.S. member by being the technical professional's best resource for achieving lifelong career vitality and by providing an effective voice on policies that promote U.S. prosperity.



### [IEEE Society on Social Implications of Technology](#)

IEEE SSIT discusses the impact of technology on society, including both positive and negative effects.

## Technical Sponsors

### [IEEE Industry Applications Society](#)



The Industry Applications Society, as a transnational organization, is interested in advancement of the theory and practice of electrical and electronic engineering in the development, design, manufacture and application of electrical systems, apparatus, devices and controls to the processes and equipment of industry and commerce; promotion of safe, reliable and economic installations; industry leadership in energy conservation and environmental, health, and safety issues; creation of voluntary engineering standards and recommended practices; and the professional development of its membership.

### [IEEE Oceanic Engineering Society](#)



The United Nations Decade of Ocean Science for Sustainable Development 2021-2030 (referred to as ‘the Ocean Decade’), is a once in a lifetime opportunity for ocean actors across the world to come together to generate knowledge and foster the partnerships needed to support a well-functioning, productive, resilient, sustainable and inspiring ocean. The Ocean is our largest and most important ecosystem for human survival on Earth, and it requires a concerted effort from humanity to change our relationship with the ocean. The Ocean Decade Initiative (ODI) aims to boost OES’s participation in this global movement, and interface its actions and activities with the Decade.

### [IEEE Sensors Council](#)



The IEEE Sensors Council focuses on the theory, design, fabrication, manufacturing, and application of devices for sensing and transducing physical, chemical, and biological phenomena, with an emphasis on the electronics, physics, and reliability aspects of sensors and integrated

sensor-actuators. IEEE Sensors Council serves the sensor community with its well-recognized publications, conferences, and technical committees.



### [IEEE Power & Energy Society](#)

The IEEE Power & Energy Society (PES) provides the world's largest forum for sharing the latest in technological developments in the electric power industry.



### [IEEE Standards Association](#) (IEEE SA)

IEEE SA provides a neutral and open environment that empowers innovators – across borders and disciplines – to develop standards and solutions that shape and improve technology for the benefit of industry, society and humanity.



### [IEEE Technology and Engineering Management Society](#)

“Leaders Enabling Projects/Services Success For Good”

All times shown in Pacific Daylight Time (UTC-7).

<b>Day 1 – April 14 (Sunday)</b>			
08:00-09:00 am	Workshop Registration & Breakfast		
09:00-05:00 pm	Workshop: (Multnomah)		
02:00 – 06:00 pm	SusTech Registration		
03:00-06:00 pm	Student Poster Contest (Elowah)		
06:00-07:00 pm	Opening Reception		
<b>Day 2 – April 15 (Monday) 8am-6pm</b>			
7:45am-8:00 am	Opening Remarks: Goodrich/Hayashi/Perkins		
8:00-8:45 am	Opening Keynote: IEEE Climate Change Update – Luiken		
	<b>Multnomah</b>	<b>Elowah</b>	<b>Wakeenah</b>
9:00-10:20 am	Energy Efficiency I	Societal Implications I	Smart and Micro Grids I
10:30am-Noon	Panel 1: Ethics, Energy and Environment – by IEEE SSIT		
Noon-12:45 pm	Lunch Break		
1:00-1:45 pm	Keynote 2: Solar Trends – Lee		
2:00-3:20 pm	Energy Efficiency II	Societal Implications II	Smart and Micro Grids II
3:30-4:50 pm	Panel 2: Electrifying Agriculture – OR DOE		
5:00-6:30 pm	Energy Efficiency III	eWaste & Circular Economy	Sustainable Electronics I
6:30-8:00 pm	IEEE Young Professionals for Climate Change Action - Reception and Panel Discussion		
<b>Day 3 – April 16 (Tuesday) 8am-6pm</b>			
8:00-8:45 am	Opening Remarks and Keynote 3: Data Center Efficiency – Eric Dahlen, Intel		
	Multnomah	Elowah	Wakeenah
9:00-10:20 am	Renewable/Alternate Energy I	Sustainable Management	Sustainable Electronics II
10:30am-Noon	Panel 3: Novel Technologies for Sustainable Ocean Energy Generation – by IEEE OES		
Noon-12:45 pm	Lunch Break		
1:00-1:45 pm	Keynote 4: Lithium Batteries Recycling – Eva Allen, Argonne National Laboratory		
2:00-3:20 pm	Renewable/Alternate Energy II	IOT I	Sustainable Electronics III
3:30-4:15 pm	Keynote 5: Microvehicles – Tyler Folsom, UW Bothel		
4:30-5:40 pm	PS6A: ML Application	PS6B: IOT II	PS6C: Water
6:30-8:00 pm	Conference Dinner		
<b>Day 4 – April 17 (Wednesday) 8am-5pm</b>			
<b>Sustainability Forum (Multnomah)</b>			
8:00 – 8:50 am	Opening Remarks and Forum Keynote 1: Hellen Chen, ACEEE		
9:00 – 9:50 am	Forum Keynote 2: Ted Witham & Joe Cappeta, Eaton Corp		
10:00 – 11:30 am	Panel: Heat Pump Developments – OR DOE		
11:45 – 12:15 am	Special Session: Hot Topics, Maike Luiken		
12:15 – 1:15 pm	Lunch Break		
1:15 – 2:00 pm	Forum Keynote 3: Tina Kaarsberg, US DOE		
2:15 – 3:00 pm	Forum Keynote 4: Shudipto Konika Dishari, University of Nebraska-Lincoln		
3:15 – 4:00 pm	Forum Keynote 5: Dmitry Kosterev, BPA		
4:15 pm	Student Poster Awards		
4:30 pm	Closing Remarks & SusTech 2025		

## Special IEEE Workshop Event (separate registration)

Sunday April 14, 8:00 am – 5:00 pm PT (UTC-7)

### *Roadmap to Low Carbon Emission Building Materials and Architecture*

A free Hybrid workshop organized by IEEE Future Directions [SusTech Initiative](#) in collaboration with SusTech 2024. (Maximum limit of 30 in-person attendees.)

**Workshop Goals** – According to the United Nations’ [Environment Programme](#), “The buildings and construction sector is by far the largest emitter of greenhouse gases, accounting for a staggering 37% of global emissions. The production and use of materials such as cement, steel, and aluminum have a significant carbon footprint.”

This one-day workshop focuses on methods to decrease carbon emissions in new & existing buildings on materials and architecture to reduce the built environment’s impact on climate change. The workshop provides an informative and idea exchange platform among various stakeholders in the built environment industry with the aim of **developing a roadmap** for sustainable goals on Low Carbon Emission Building Materials and Architecture.

Materials used in the construction of buildings account for eight to nine percent of overall global CO2 emissions (UNEP 2022) with cement and steel being the largest contributors. Therefore, it is important to consider the use of energy-efficient technologies, resource-efficient materials, and environmentally friendly design strategies to create structures that are functional, aesthetically pleasing, and economically viable too.

The workshop program will address methods and technologies that engineers, architects, consultants, and researchers are to be aware of while considering sustainable construction/buildings.

This workshop will provide an informative ideas exchange platform among various stakeholders: technologists, engineers, architects, consultants, and researchers in the following areas and more:

- Energy-efficient materials and building technologies
- Functional, aesthetically pleasing, climate resilient and environmentally friendly design strategies
- Economically viable solutions to the climate crisis in the building industry.

#### **Moderators:**

- **Maike Luiken**, PhD, SMIEEE, IEEE-HKN, FEIC, chairs [Planet Positive 2030](#) – an initiative of the IEEE Standards Association – as well as the [P7800 Standards Working Group: Recommended Practice for Addressing Sustainability, Environmental Stewardship and Climate Change Challenges in Professional Practice](#).



- **Professor Wei-Jen Lee**, University of Texas at Arlington, Electrical Engineering Department and director of the Energy Systems Research Center.

### Speakers:

- **Webly Bowles**, Associate Director of Codes and Policy at New Buildings Institute (NBI) with 20 years of experience in architecture, sustainable building design, advocacy, and code development.
- **Beth Lavelle**, Senior Associate and Sustainability Manager at SERA Architects in Portland, OR.
- **Lona Rerick**, Architect and Sustainable Materials Leader at ZGF Architects.
- **Hellen Chen**, Research Analyst in the Industry Program at the American Council for an Energy-Efficient Economy (ACEEE).
- **Clinton J. Andrews**, Director, Center for Urban Policy Research at Rutgers University.
- **Yashima Jain**, Lawrence Berkeley National Laboratory.

### Moderators:



**Maike Luiken**, PhD, SMIEEE, IEEE-HKN, FEIC, chairs [Planet Positive 2030](#) – an initiative of the IEEE Standards Association – as well as the [P7800 Standards Working Group: Recommended Practice for Addressing Sustainability, Environmental Stewardship and Climate Change Challenges in Professional Practice](#). She served as the IEEE VP, [Member & Geographic Activities](#), 2021, as President of IEEE Canada during 2018-19 and, 2018, as Chair, Policy Track, IEEE Internet Initiative.

Maike is and has been for more than 15 years a very strong supporter of sustainable development.

She is a managing director, R&D, at a start-up company and Adjunct Research Professor, Western University, Canada. Previously, in Sarnia, Canada, she led the Bluewater Sustainability Initiative, 2006 – 2013.



**Professor Wei-Jen Lee** received the B.S. and M.S. degrees from National Taiwan University, Taipei, Taiwan., and the Ph.D. degree from the University of Texas, Arlington, in 1978, 1980, and 1985, respectively, all in Electrical Engineering.

In 1986, he joined the University of Texas at Arlington, where he is currently a professor of the Electrical Engineering Department and the director of the Energy Systems Research Center. He has been involved in the revision of IEEE Std. 141, 339, 551, 739, and 1584, and the development of 1584.1, 1584.2, 3002.8, and 3002.9. He is the past President of the IEEE Industry

Application Society (IAS), the chair of IEEE TAB (Technical Activity Board) Climate Change Program, co-chair of IEEE Sustainable Development Ad Hoc Committee, member of IEEE Ad Hoc Committee to Coordinate IEEE's Response to Climate Change (CCIRCC), member of IEEE TAB Hall of Honor Committee, member of Pillar 4 of the Global Power Systems Transformation (G-PST), chair of IEEE Smart Grid program, chair of IEEE Smart Cities Education Committee, member of IEEE Smart Grid Operation and Education Committees, and member of United Nations (UN) Council of Engineers for the Energy Transition (CEET).

### SusTech 2024 Keynotes and Plenary Speakers

*All times and dates shown in Pacific Daylight Time (UTC-7)*

#### Monday, April 15, 2024

Session ID	Time (PT)	Title
K1	8:00 am	<a href="#">Opening Keynote: IEEE Climate Change Update</a>
K2	1:00 pm	<a href="#">Solar Trends</a>

#### Tuesday, April 16, 2024

K3	8:00 am	<a href="#">Data Center Efficiency and Sustainability</a>
K4	1:00 pm	<a href="#">ReCell: Working to Advance Battery Recycling</a>
K5	3:30 pm	<a href="#">A Vision for Mid-Century Sustainable Urban Transportation</a>

#### Wednesday, April 17, 2024 Sustainability Forum

SFK1	8:00 am	<a href="#">Electrification is a key strategy for decarbonizing all sectors of the U.S. economy</a>
SFK2	9:00 am	<a href="#">Electrification and the Grid</a>
SFP1	10:00 am	<a href="#">Panel: Promising Heat Pump Developments: Perspectives from the Pacific Northwest</a>
SFSS	11:45 am	<a href="#">Special Session: Hot Topics in Sustainability</a>
SFK3	1:15 pm	<a href="#">Increasing Computing Energy Efficiency is Key Requirement for Sustainability</a>
SFK4	2:15 pm	<a href="#">Efficient, Cost-Effective Polymeric Materials Design for Clean Energy and Biomedical Technologies via Biomass Valorization</a>
SFK5	3:15 pm	<a href="#">Off-shore Wind Power Studies</a>

## Opening Keynote: IEEE Climate Change Update

Monday, April 15, 2024 @8:00 am

**Maike Luiken, IEEE SusTech Initiative**

### Abstract:

Overview of the IEEE SusTech Initiative and the IEEE Humanitarian Technologies Board (HTB).

- The **IEEE SusTech Initiative** seeks to contribute technical expertise and solutions to address sustainability challenges, including climate change. This initiative is growing rapidly and new volunteers are always welcome.

Workshops in various formats are offered free of charge throughout the year. These fascinating, interactive workshops engage technical professionals and academics from around the world to map technology development needs according to gaps identified by the work of the Planet Positive 2030 Compendium.

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## Solar Trends

Monday, April 15, 2024 @1:00 pm

**Wei-Jen Lee, University of Texas at Arlington**



**Professor Wei-Jen Lee** received the B.S. and M.S. degrees from National Taiwan University, Taipei, Taiwan., and the Ph.D. degree from the University of Texas, Arlington, in 1978, 1980, and 1985, respectively, all in Electrical Engineering.

In 1986, he joined the University of Texas at Arlington, where he is currently a professor and the interim chair of the Electrical Engineering Department.

He has been involved in the revision of IEEE Std. 141, 339, 551, 739, and 1584, and the development of 1584.1, 1584.2, 3002.8, and 3002.9. He is the past President of the IEEE Industry Application Society (IAS), co-chair of SusTech Initiative of IEEE TAB Future Direction Committee, member of IEEE TAB Hall of Honor Committee, member of Pillar 4 of the Global Power Systems Transformation (G-PST), chair of IEEE Smart Grid program, chair of IEEE Smart Cities Education Committee, member of IEEE Smart Grid Operation and Education Committees, and member of United Nations (UN) Council of Engineers for the Energy Transition (CEET).

Prof. Lee has been involved in research on Utility Deregulation, Renewable Energy, Arc Flash Hazards and Electrical Safety, Smart Grid, MicroGrid, Industrial Internet of Things (IIoT) and Virtual Power Plants (VPP), AI for Load, Price, and Wind Capacity Forecasting, Power Quality,



Distribution Automation, Demand Response, Power Systems Analysis, Short Circuit Analysis and Relay Coordination, Distributed Energy Resources, Energy Storage System, PEV Charging Infrastructure Design, AMI and Big Data, On Line Real Time Equipment Diagnostic and Prognostic System, and Microcomputer Based Instrument for Power Systems Monitoring, Measurement, Control, and Protection.

He has served as the primary investigator (PI) or Co-PI of over one hundred and ten funded research projects. He has published more than two hundred and twenty journal papers and three hundred and ten conference proceedings. He has provided on-site training courses for power engineers in Panama, China, Taiwan, Korea, Saudi Arabia, Thailand, and Singapore. He has refereed numerous technical papers for IEEE, IET, and other professional organizations.

Prof. Lee is a Fellow of IEEE, member of National Academy of Inventors, and registered Professional Engineer in the State of Texas.

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## Data Center Efficiency and Sustainability

April 16, 2024 @8:00 am

**Eric Dahlen, Senior Principal Engineer, Intel Data Center and AI Group**

### Abstract:

Data Center (DC) energy growth accelerated by AI proliferation and generative AI evolution is catalyzing demand for disclosure and improvement of DC energy efficiency and sustainability. The recently adopted [Delegated Act to the EU Energy Efficiency Directive](#) is the start of an expected wave of regulations intended to improve sustainability. This talk will tie together ongoing efforts across [Climate Neutral Data Centre Pact](#) (CNDCP), [the Green Grid](#), [Open Compute Project®](#) (OCP) and [iMasons](#) to facilitate and harmonize credible metrics to help meet these demands.

**Eric Dahlen** is a Senior Principal Engineer and the lead Cloud technologist in the Data Center and AI group. His responsibilities include primary technical support for the product sustainability office, representing Intel in the Data Center Energy Efficiency workgroup at the Green Grid, and co-leading the Sustainability Project in OCP. He is a 35-year Intel veteran with a BSEE from Washington State University, and has held validation, design, architecture, and first-line management roles spanning the entire duration of Intel's server business.



**ReCell: Working to Advance Battery Recycling****April 16, 2024 @1:00 pm****Eva Allen, Applied Materials Department, Argonne National Laboratory****Abstract:**

End-of-life lithium-ion batteries in electric and hybrid-electric vehicles are just now starting to reach their end of life. Battery recycling is needed to recover the valuable materials needed to support new battery production and reduce waste and environmental impact. The ReCell Center is working to develop, scale up, and demonstrate battery recycling processes that reduce cost and increase the profit of battery recycling. ReCell has developed direct recycling processes to recover cathode materials intact, reducing the processing steps for reuse. Four focus areas are targeted: direct cathode recycling, recovery of other materials, design for recycling, and modeling and analysis. Additionally, ReCell uses advanced characterization with synchrotron sources to study the directly recycled cathode materials in 3D to determine their composition after regeneration and gain a fundamental understanding of the direct recycling processes.



**Dr. Eva Allen** is a Materials Scientist at Argonne National Laboratory's Applied Materials Department. She has nine years of experience in cathode synthesis, process-scaleup, and electrochemical testing, beginning before her Ph.D. at Argonne National Laboratory from 2015-2017. From Argonne, she pursued her PhD in inorganic chemistry at the University of Illinois Chicago in 2022 with Prof. Jordi Cabana. After defending in 2022, She returned to Argonne for her postdoc in the battery recycling group ReCell at Argonne National Laboratory. Here, she worked on developing

synthetic processes for recycled cathode materials for reuse. Through her synthetic work, she has applied techniques of advanced 3D imaging using synchrotron sources to gain a comprehensive understanding of recycled cathode materials to improve the regenerative processes for reuse.

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**A Vision for Mid-Century Sustainable Urban Transportation****April 16, 2024 @3:30 pm****Tyler Folsom, University of Washington Bothell****Abstract:**

Near-term sustainability goals focus on eliminating greenhouse gases. Transportation is a major contributor to GHG and sustainability requires eliminating petroleum as well as fossil fuels used

for vehicle electrification. To effectively guide that action, this talk envisions how sustainable transportation improves on business as usual. The present paradigm of wasting energy on a 4000-pound vehicle to haul one or two people is not sustainable. The future requires going beyond bike share, automated automobile and automated transit networks. When these technologies are merged, small, choreographed pods could end congestion. People move faster, and at lower economic and energy costs. Freight can be moved more efficiently. A key to efficient energy use for passengers and freight is to make the vehicles lighter than the load. Light vehicles require fewer batteries, with beneficial effects on the grid.

**Dr. Tyler Folsom** is a creative thought leader who sees a strong connection between vehicle electrification, automation, and concern for climate change. They are an Affiliate Professor at University of Washington, Bothell. They received a BS in Mathematics from Villanova University, MA in Math from University of Maryland and MS and PhD in Electrical Engineering from University of Washington. They were part of a team that wrote the real-time control software system for two unmanned spacecraft at NASA's Goddard Space Flight Center and have done engineering R&D projects at Quest Integrated as the Principal Investigator for NSF, Air Force, Navy, Army, and private clients.

Dr. Folsom participated in the DARPA Grand Challenge races for autonomous vehicles. They have taught robotics, artificial intelligence, machine vision, embedded systems, software engineering, autonomous vehicles and digital electronics. They are an avid bicyclist, having biked around the world, and promote using autonomous cycles to build a transportation system that uses 30 times less energy than cars at the same speed. Research projects involve self-driving tricycles, which have been featured on TV several times. Dr. Folsom has written over 50 papers and technical reports, an e-book and is a senior member of IEEE.



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## **Electrification is a key strategy for decarbonizing all sectors of the U.S. economy**

**April 17, 2024 @8:00 am**

**Hellen Chen, American Council for an Energy-Efficient Economy**

### **Abstract:**

The Energy Information Administration reports that renewable sources comprised 21% of U.S. electricity generation in 2023, and more than 45% in leading states. The growth of carbon-free electricity makes electrification a key pillar for decarbonization in our economy that complements energy efficiency. ACEEE, historically known for ground-breaking work in the energy efficiency space, has found that 90% of U.S. energy use can be electrified while the remaining hard-to-electrify 10% has other decarbonization solutions. We support efficient beneficial electrification and energy efficiency to save energy, save money, and reduce emissions, especially as energy

sources become cleaner. We describe the different sectors in which our work focuses and offer examples of key barriers, technologies, policies, and other considerations (i.e., workforce, equity).



**Hellen Chen** is a Research Analyst in the Industry Program at the American Council for an Energy-Efficient Economy (ACEEE), a nonprofit research organization that develops policies to reduce energy waste, combat climate change, and help build an equitable clean energy future. Hellen conducts research on industrial decarbonization such as technologies and policies for reducing embodied carbon within the cement and concrete industries and on other emerging technologies including industrial heat pumps. Prior to joining ACEEE, Hellen worked as a graduate research assistant at the Baylor Energy and Renewable Systems lab, where she explored behaviors of and mitigation techniques for bearing currents, a key issue in advanced motor drive systems. Hellen has a master of science in electrical and computer engineering and bachelor of science in engineering, both from Baylor University.

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## Electrification and the Grid

**April 17, 9:00 am**

**C. E. Ted Witham & Joe Cappeta, Eaton Corp.**

### Abstract:

This talk will discuss how electrification is affecting the modern-day grid and how distributed energy resources strategies can mitigate those impacts.

### Speakers:



**Ted Witham** grew up in an Electrical Contracting family in Hudson, NY. He attended college at Rensselaer Polytechnic Institute in Troy, NY and the Florida Institute of Technology in Melbourne, Florida. Ted earned his MBA at UC Davis California in 2002.

After college Ted served as a Naval Flight Officer in a Patrol Squadron (P-3 Orion “submarine chasers” in the 80’s) in the Atlantic and Mediterranean regions. After the Navy, he started work in the public sector in Industrial Controls, earning his Professional Engineering license in Control Systems in California in the 1990’s.

Ted's main focus has been on the utility market from 1999 on, working for General Electric for 10 years in automation and after a few years of work in industrial communications and energy optimization, he joined Eaton 11 years ago in 2012.

Ted has been involved in a number of large systems projects with major west region utilities, in AMI, Demand Response, Grid Modernization and Substation Automation, and moved last year to Eaton's Energy Transition organization, and now focusing on EV Charging hardware and software, Microgrid, Renewable Integration, and balance of system distribution equipment for those applications.

**Joe Cappeta** joins us with more than 15 years of experience in the electrical industry. During his tenure with Eaton Joe has held roles spanning multiple functions and leadership positions.

Joe has designed and applied electrical power systems installed globally that integrate distributed energy resources, enable electrification of transport, back up critical data processing equipment, and distribute power to a world that is increasingly electrifying. Currently, Joe is the Director of Technical Applications for Energy Transition at Eaton.

Joe holds a B.S in Electrical Engineering from the University of Pittsburgh and an MBA from Georgetown University.



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## Special Session: Hot Topics in Sustainability

April 17, 2024 @11:45 am

**Maike Luiken, IEEE SusTech Initiative**

**Maike Luiken**, PhD, SMIEEE, IEEE-HKN, FEIC, chairs Planet Positive 2030 – an initiative of the IEEE Standards Association – as well as the P7800 Standards Working Group: Recommended Practice for Addressing Sustainability, Environmental Stewardship and Climate Change Challenges in Professional Practice.

She served as the IEEE VP, Member & Geographic Activities, 2021, as President of IEEE Canada during 2018-19 and, 2018, as Chair, Policy Track, IEEE Internet Initiative. Maike is and has been for more than 15 years a very strong supporter of sustainable development.

She is a managing director, R&D, at a start-up company and Adjunct Research Professor, Western University, Canada. Previously, in Sarnia, Canada, she led the Bluewater Sustainability Initiative, 2006 – 2013.



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## Increasing Computing Energy Efficiency is Key Requirement for Sustainability

Wednesday, April 17, 2024 @1:15 pm

**Tina Kaarsberg, Ph.D.**

**Acting Program Manager at U.S. Department of Energy (DOE), Advanced Materials and Manufacturing Technologies Office (AMMTO)**

### Abstract:

The future has arrived for climate change and unsustainable computing energy use. Experts confirm that the globe warmed 1.5 deg C—the threshold for dangerous human climate interference—in 2023, and each successive month has set temperature records. Then in March 2024, front page stories in the *Washington Post*, the *New York Times* and the *Wall Street Journal* documented AI-driven exponentially increasing energy demands for computing (e.g. data centers) that are quadrupling forecasts for electricity use. Other drivers of exponentially increasing microelectronics energy use—such as proliferation of web-connected smart devices and the build up to 6G and beyond in wireless communications, have yet to manifest.

Against this backdrop, our [2022 DOE initiative](#) on microelectronics Energy Efficiency Scaling over 2 Decades (EES2)—the topic of this talk—seems prescient. When launched—one month after the CHIPS and Science Act was signed—DOE’s Undersecretary Richmond declared that we could not reach Climate goals without it. It counters exponential increases in microelectronics electricity use with exponential increases in energy efficiency over the next 20 years. The talk will detail our efforts in the DOE’s Advanced Materials & Manufacturing Technologies Office (AMMTO) to develop an RD&D plan in 2023. Next steps are to get public input and to deploy the technologies—including at least a dozen that are commercially ready—as quickly as possible starting by the end of 2024. In addition to spreading the word on EES2 RD&D Roadmap and the workforce needed to perform the RD&D and manufacture the technologies—we will use the bully pulpit of the [EES2 Initiative](#) which so far includes 61 organizations that have pledged to join the DOE to stay on the path of doubling microelectronics’ energy efficiency every two years. See [the DOE EES2 Pledge](#).



**Dr. Tina Marie Kaarsberg** has decades of science and energy policy experience, starting as an APS Congressional Science Fellow for U.S. Senator Domenici working on the Climate Change negotiations, the Earth Summit and the Energy Policy Act of 1992 and later returned to Congress to work on EPACT 2005. She has held a variety of positions with the U.S. Department of Energy. She joined the Advanced Materials and Manufacturing Technologies Office in the Office of Energy Efficiency and Renewable Energy (EERE) in 2019 and became Program Manager in 2023. She has also worked for Sandia National Laboratories, Vista Technologies Inc., the American Physical Society (APS) and the Northeast-Midwest Institute. Prior to coming to Washington DC, she was a member of the UCLA

Physics Department faculty. She received a Bachelor of Arts degree with distinction in physics from Yale and a doctoral degree in physics from the State University of New York at Stony Brook for research performed while a Fellow at Cornell University. Dr. Kaarsberg is an elected Fellow of the APS.

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## Efficient, Cost-Effective Polymeric Materials Design for Clean Energy and Biomedical Technologies via Biomass Valorization

April 17, 2024 @2:15 pm

**Shudipto Konika Dishari, Ross McCollum Associate Professor, Chemical and Biomolecular Engineering, University of Nebraska-Lincoln**

### Abstract:

Addressing the technical challenges through cutting-edge materials research is the key to excel in sustainable, clean energy technologies, like fuel cells and electrolyzers. Some of the major challenges of current H-fuel cells include ion transport limitation (low-temperature), stability (high-temperature), expensive materials, and environmental sustainability.

To overcome these obstacles, we need to rethink the design of ion-conducting polymers (ionomers) playing the pivotal roles in separators and catalyst layers of these devices. Converting the untapped, industrial/agricultural lignin-rich wastes to design efficient, cost-effective ionomeric materials for eco-friendly electrochemical devices can aid in bio- and energy economies simultaneously. The major application of lignin in sustainable energy materials has so far been porous carbon materials for charge storage and/or electron conduction in electrodes. We have designed ion-conducting materials using lignin from plant-based sources.

This talk will primarily show how these lignin-based polymers improve the ion-transport at low- and high-temperature conditions. We consolidate the findings on average as well as distributed physical, mechanical and ion transport properties across lignin-based ionomeric materials to understand the ion transport process which can inform and guide the future design of sustainable energy technologies. The talk will also give a glimpse of how we are designing functional materials using lignin for biomedical applications.

**Dr. Shudipto Konika Dishari** is currently a Ross McCollum Associate Professor in the Department of Chemical and Biomolecular Engineering at the University of Nebraska-Lincoln (UNL). Dishari worked as a post-doctoral fellow in Chemical Engineering and Materials Science and Engineering at Penn State. She received her Ph.D. in Chemical and Biomolecular Engineering from the National University of Singapore. Dishari's research focuses on designing polymeric nanomaterials to impact sustainable energy and biomedical technologies.



Dishari has received several honors/awards in recognition of her research and teaching excellence, including, the *DOE Office of Science Early CAREER Award* (2019), *NSF CAREER Award* (2018), *3M Non-Tenured Faculty Award* (2021), *American Chemical Society Polymeric Materials Science and Engineering (ACS PMSE) Young Investigator Award* (2023), NUTech Emerging Innovator of the Year Award (2020), WEPAN Accelerator Core Concept Award (2022), American Society of Engineering Education (ASEE) Midwest Conference Best Paper Award (2023), UNL Distinguished Teaching Award (2023), Harold and Esther Edgerton Junior Faculty Award (2019), Baxter Young Investigator Award (2014), and more. Dishari is an associate editor of the *Journal of Electrochemical Energy Conversion and Storage (JEECS)*, an ASME journal. Dishari is also the current elected Chair of Area 8A (Polymers) in the Materials Engineering and Science Division (MESD) of the American Institute of Chemical Engineers (AIChE).

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## Off-shore Wind Power Studies

April 17, 3:15 pm

**Dmitry Kosterev, Bonneville Power Administration (BPA)**



**Dmitry Kosterev** is a senior transmission planning engineer at Bonneville Power Administration. He is involved in wide range of transmission planning projects, power plant modeling, testing and verification, synchrophasor technology application, and technology innovation projects.

He is involved in several off-shore wind generation integration studies at BPA, Western Power Pool, and serves as a technical adviser for DOE West Coast Off-Shore Wind study.

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## SusTech 2024 Panels

*All times and dates shown in Pacific Time (UTC-7)*

Time	Topic
April 15, 10:30 AM	<a href="#">Ethics, Energy and Environment</a>
April 15, 3:30 PM	<a href="#">Electrifying Agriculture</a>
April 16, 2024, 10:30 AM	<a href="#">Novel Technologies for Sustainable Ocean Energy Generation</a>
April 17, 2024 10:00 AM	<a href="#">Promising Heat Pump Developments: Perspectives from the Pacific Northwest</a>

### Ethics, Energy and Environment

**How to balance the energy demands with the concerns for anthropogenic climate change?**

April 15, 10:30 AM

**Organized by IEEE Society on Social Implications of Technology (SSIT)**

IEEE SSIT has been bringing together diverse areas of expertise, including researchers, industry, and communities to address and collectively answer this vital societal question. Ethics takes cognizance of the intrinsic value of nature, the interconnection of all living things, and the responsibility of humans to act in accordance with ethical principles. In creating ethically aligned IEEE Recommended Practices for technology, SSIT members must consider the values of care, fairness, privacy, trust, sustainability and respect. The panelists share their practical experience and insights in evaluating what practices produce human well being while preserving the natural world.



**Co-organizer & Moderator:** Susan Dickey, secretary of IEEE SA P7800 “Recommended Practice for Addressing Sustainability, Environmental Stewardship and Climate Change Challenges in Professional Practice.”



**Susan Dickey** received an M.S. in Computer Science from New York University in 1984 and Ph.D. in 1994. She was fortunate to begin her career in the 1980s with the NYU Ultracomputer Project doing research on massively parallel processing, and retire in 2020 after spending 10 years with Google helping to write datacenter software to manage millions of processors. In between she was able to do a lot of interesting work in real-time systems, graphics libraries, communications, and systems implementation of ITS and UAV prototypes. Since her retirement she has been an active volunteer with the IEEE SusTech conference and IEEE Planet Positive. She is currently secretary of the IEEE SA P7800 Working Group “Recommended Practice for

Addressing Sustainability, Environmental Stewardship and Climate Change Challenges in Professional Practice.”

**Panelists:**

- Clinton Andrews, Center for Urban Policy Research, Rutgers University
- Wei Jen Lee, Energy Systems Research Center, University of Texas Arlington
- Ann M. Marcus, The Marcus Consulting Group Inc., Portland, Oregon

**Panelist Bios:**

**Clinton J. Andrews** directs the Center for Urban Policy Research at Rutgers University. He was educated at Brown and MIT in engineering and planning, and he worked previously in the private sector and at Princeton University. He teaches urban planning and public informatics courses, and he performs research on how people use the built environment. His work addresses climate change mitigation and adaptation, and how technological changes affect urban life. He has current projects on the energy transition, fiscal impacts of coastal hazards, and how low-income urban seniors cope with heat stress and poor indoor air quality.

He publishes both scholarly and popular articles and his books include *Humble Analysis: The Practice of Joint Fact-finding*, *Regulating Regional Power Systems*, and *Industrial Ecology and Global Change*. He is a member of the American Institute of Certified Planners and a licensed Professional Engineer. Professor Andrews is a Fellow of AAAS and immediate Past President of the IEEE Society on Social Implications of Technology. You can reach him at [clintonjandrews@gmail.com](mailto:clintonjandrews@gmail.com)

**Wei-Jen Lee** received the B.S. and M.S. degrees from National Taiwan University, Taipei, Taiwan., and the Ph.D. degree from the University of Texas, Arlington, in 1978, 1980, and 1985, respectively, all in Electrical Engineering. In 1986, he joined the University of Texas at Arlington, where he is currently a professor of the Electrical Engineering Department and the director of the Energy Systems Research Center. He has been involved in the revision of IEEE Std. 141, 339, 551, 739, and 1584, and the development of 1584.1, 1584.2, 3002.8, and 3002.9.



He is the past President of the IEEE Industry Application Society (IAS), the chair of IEEE TAB (Technical Activity Board) Climate Change Program, co-chair of IEEE Sustainable Development Ad Hoc Committee, member of IEEE Ad Hoc Committee to Coordinate IEEE's Response to Climate Change (CCIRCC), member of IEEE TAB Hall of Honor Committee, member of Pillar 4 of the Global Power Systems Transformation (G-PST), chair of IEEE Smart Grid program, chair of IEEE Smart Cities Education Committee, member of IEEE Smart Grid Operation and Education Committees, and member of United Nations (UN) Council of Engineers for the Energy Transition (CEET).



**Ann M Marcus** has been President & Chief Communications Officer of the Marcus Consulting Group in Portland, Oregon for over 25 years. With a BA in Sociology from UCLA and an MBA in Business Analysis/Computing Systems (Decision Support) from San Francisco State University, she is an experienced communications strategist bringing a community-engagement orientation to technology-related projects, working within and across the public, non-profit, and private sectors. She crafts visual models that make complex concepts and frameworks accessible to any stakeholder, allowing them to envision and embrace the concept as their own.

Her current projects include: *Global Communities Technology Challenge (GCTC)*, a smart city community of practice under the US National Institute of Standards and Technology (NIST); *Schools as Community Resilience Hubs*, a Portland-based pilot project to raise community resilience capacity using neighborhood elementary school resources; and *Michigan City Economic Development Projects*, in conjunction with iNeighborhoods.us & WeAccel.io to enhance education, workforce development, and economic growth activities in the Lake Michigan South Shore region. Past clients include: Link Oregon, Cisco Systems, AT&T, Microsoft, Nikon Precision, PANO (Wildfire Early Detection System), Collaborative Strategies, Consortium for Service Innovation and, Lotus Development

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## Electrifying Agriculture

April 15, 3:30 PM

**Hosted/Moderated by Wendy Simons**, Energy Policy Analyst, Oregon Department of Energy

**Wendy Simons** is an Energy Policy Analyst at the Oregon Department of Energy where she is part of a small team administering a U.S. Department of Agriculture grant to fund energy audits for Oregon farms, ranches, and rural small businesses. Her work at ODOE includes authoring Oregon Biennial Energy Report articles on agricultural energy use and associated greenhouse gas emissions, opportunities for agricultural electrification, and agrivoltaics. Before joining ODOE, she worked as an analyst for the Oregon and Minnesota legislatures and as a greenhouse gas specialist with the Oregon Department of Environmental Quality. Wendy's education includes a Master in Public Policy degree at the Kennedy School of Government.

### Panelists:

- Robert Wallace CEM, Executive Director, Wy'East Resource Conservation and Development (Wy'East RCD), The Dalles (OR): "Oregon E-Farms Program"
- Marcelo Moretti, PhD, Associate Professor, Department of Horticulture, OSU: "Electricity for Weed Management"
- Chris Toman, PhD candidate, College of Agricultural Sciences, OSU: "Agrivoltaics"

**Panelist Bios:**

**Robert Wallace** is a Certified Energy Manager with over 13 years of experience working in medium & large industrial production facilities, managing O&M plans, and supervising maintenance staff. Robert is certified in Lean Manufacturing, Green Building, and Infrared Thermography. Robert is a Certified Energy Inspector, Commercial/Industrial Building Inspector, and a Certified Energy Manager (CEM). Robert has over 18 years of energy assessment and project development experience in commercial, industrial, agriculture, and residential sectors. Robert is a known leader in the PNW agriculture sector energy efficiency outreach efforts. Robert has operated as an Agricultural Program Specialist contractor for Bonneville Power Administration serving electric cooperative utilities; as of January 2023, Robert has worked as the Irrigation Lead for Energy Trust of Oregon programs under contract with Energy350.

Robert has made many inroads into the agricultural and rural communities utilizing a “boots on the ground” approach. Robert understands rural areas and how they operate. He currently serves on the Dufur School Board and is a Commissioner for the Port of The Dalles. Previously Robert served as Mayor for the City of Dufur. It takes the ability to understand these rural communities and how they work in order to be effective when delivering programs in these rural areas.

**Dr. Marcelo L. Moretti** is an associate professor in weed science in the Department of Horticulture at Oregon State University. He serves as the state-wide research and extension specialist for weed science in perennial horticultural crops. Dr. Moretti’s research program is focused on integrated weed management, aiming to develop effective and economical strategies for managing weeds in organic and conventional production systems. Moretti is particularly interested in non-chemical weed control strategies.

**Chris Toman** is an undergraduate research assistant at Oregon State University. He has been a mechanical engineer for 26 years and has gone back to school to seek a post-baccalaureate degree in Earth Systems, where he decided to join the Agrivoltaics research team at Oregon State University to focus on projects in Central Oregon to reduce impacts of drought suffered by farmers in the region. He is applying for a PhD in Ecological Engineering at OSU to expand research in the area of drought tolerance and heat stress on plants using shading techniques provided by solar panels.

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## **Novel Technologies for Sustainable Ocean Energy Generation**

April 16, 2024, 10:30 AM

**Organized by Bill Wilson, IEEE Oceanic Engineering Society**

The IEEE SusTech 2024 conference panel on “Novel Technologies for Sustainable Offshore Energy Generation” brings together leading experts, researchers, and innovators to explore groundbreaking advancements in the realm of offshore renewable energy. With the pressing need to mitigate climate change and reduce dependence on fossil fuels, offshore energy generation presents a promising



avenue towards achieving sustainability goals. The panel aims to showcase emerging technologies and discuss their potential to revolutionize the offshore energy landscape while addressing environmental concerns.

**Panelists:**

- Dr. Peter F. Green, National Energy Research Laboratory (NREL)
- Dr. Daniel Deng, Pacific Northwest National Laboratories
- Dr. Landon Mackey, C-Power, Corvallis, OR
- Andy Stough, Windlift, Durham, NC

**Panelist Bios:**

**Dr. Peter F. Green** – National Energy Research Laboratory, Golden, CO – Deputy Laboratory Director, Science and Technology; Chief Research Officer; and Alliance Senior Vice President



In his role as deputy laboratory director for Science and Technology, Dr. Green is responsible for NREL's science and research goals, strengthening the laboratory's core capabilities, and enhancing NREL's research portfolio. In addition, he oversees the Laboratory Directed Research and Development Program, NREL-university interactions, and the postdoctoral research program.

Prior to his appointment at NREL, Green spent 20 years in academia and 11 years at Sandia National Laboratories, where his professional career began in 1985. He moved from Sandia to The University of Texas in 1996, where he became a professor of chemical engineering and the B.F. Goodrich Endowed Professor of Materials Engineering. In 2005, he was recruited to the University of Michigan, where he served as the Vincent T. and Gloria M. Gorguze endowed professor of engineering. He was also a professor and chair of materials science and engineering, professor of chemical engineering, and professor of macromolecular science and engineering.

He was the 2006 president of the Materials Research Society (MRS), the inaugural editor-in-chief of *MRS Communications*, and a divisional associate editor for *Physical Review Letters*. Green serves in advisory roles for national laboratories, academic institutions, nonprofit organizations, and scientific journals.

His awards include election to the position of fellow of a number of societies: American Physical Society, the Royal Society of Chemistry (UK), the American Ceramics Society, the American Association of Arts and Science, and the MRS. He was recognized with Secretary of Energy's Achievement Awards in 2020 and 2023. Green was awarded the 2022 Distinguished Alumni award from Cornell University's materials science and engineering department.

He holds bachelor's and master's degrees in physics from Hunter College and a master's and doctorate in materials science and engineering from Cornell University. He is a member of the National Academy of Engineering.

See <https://www.nrel.gov/>

### **Dr. Daniel Deng – Pacific Northwest National Laboratory (PNNL), Richland, WA – Laboratory Fellow in the Energy & Environment Directorate**

In addition to his role at the PNNL Dr. Deng is an adjunct professor of Naval Architecture and Marine Engineering at the University of Michigan. He directs the PNNL Bio-Acoustics & Flow Laboratory, an accredited multi-disciplinary R&D laboratory that addresses a broad range of engineering and ecological issues for marine, hydrokinetic, conventional hydropower, and wind energy systems. Dr. Deng has developed several licensed technologies related to renewable energy and energy storage. He holds 16 US patents and has coauthored over 150 journal articles.



See <https://www.pnnl.gov/>

### **Landon Mackey – C-Power, Inc, Corvallis OR – Systems Engineering Group Lead**



Landon joined the electrical research and development team at C-Power in 2022. Prior to C-Power, Landon earned his Ph.D. in electrical engineering at North Carolina State University, where he developed facilitating technologies, specifically new circuit protection systems, for renewable ocean energy harvesting. While completing graduate studies, he also started a wave-powered disaster relief desalination company, Water Bros, in response to the Department of Energy Waves to Water Prize. As a U.S. Navy nuclear submarine electrician veteran, Landon has extensive experience operating and maintaining complex electrical and mechanical systems in the challenging ocean environment.

<https://cpower.co/>

### **Andy Stough – Windlift, Durham, NC – Chief Technology Officer**

Mr. Stough serves as chief technology officer for Windlift and has been working in the field of Airborne Wind Energy (AWE) since 2009. He has been the PI for five major development projects during his tenure. The latest project is an \$11M, 2-year effort to develop an airborne power generating system for customers at the Department of Defense. He has been awarded (3) patents with multiple patents pending and has spoken at numerous conferences and other public events about AWE.



Prior to Windlift, Mr. Stough worked for Caterpillar for 10 years. He held multiple roles of increasing responsibility, culminating in the management of an engine systems team, where he managed component design and specification with an annual spend of ~\$40M/year. While at Caterpillar, Mr. Stough was awarded two patents and led the technical development of a backhoe loader new product introduction program. He also conceived and executed implementation of a system that has saved customers well over 250 million gallons of diesel fuel over the platform life. Previously,

he worked at Westinghouse in manufacturing and design of stationary power generation systems, at Ericsson, and at Battelle Memorial Institute.

<https://windlift.com/>

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## Promising Heat Pump Developments: Perspectives from the Pacific Northwest

April 17, 2024 10:00 AM

Join us for a panel discussion featuring industry experts tasked with deploying heat pumps in the Pacific Northwest. Panelists will be sharing current opportunities and challenges that they are facing. This is a great opportunity to hear updates on how technology and policy developments may offer solutions for heat pump incentive programs.

**Hosted/moderated by Stephanie Kruse, P.E.**, a Facilities Engineer from the Oregon Department of Energy.



**Stephanie Kruse, P.E.**, is a facilities engineer for the Oregon Department of Energy's Energy Efficiency and Conservation section. Stephanie serves as a technical resource for many of the department's energy programs, recently assisting with the development of the state Rental Home Heat Pump and Community Heat Pump Deployment programs. She is currently focused on the upcoming federally funded Home Energy Rebate programs. Stephanie has 13 years of energy related experience, including implementing energy programs in Oregon and performing energy audits on public buildings in rural Alaska.

### Panelists:

- Christopher Dymond, Senior Product Manager, Northwest Energy Efficiency Alliance
- Thomas Elzinga, Energy Services Manager, Central Electric Cooperative, Inc.
- Rick Wittgraf, Southern Region Equipment Sales Manager, from Gensco, Inc.



**Christopher Dymond** (he/his) is NEEA's senior product manager for residential HVAC systems. His work at focuses on identifying and establishing partnerships and technical basis for accelerating market adoption of high efficiency variable speed heat pump systems. He has undergraduate degrees in physics and engineering physics and a master's degree in building systems engineering and over 25 years' experience in emerging technology development and market adoption of energy efficiency and solar energy solutions.



**Thomas Elzinga** serves as the Energy Services Manager for Central Electric Cooperative, a rural electric cooperative headquartered in the high desert of Redmond, OR. Thomas manages the utility's energy efficiency, beneficial electrification and regulatory compliance programs. He has spent his career educating members on the best practices of using electricity for homes and businesses of all types in central and western Oregon.



**Rick Wittgraf** is a Regional Equipment Sales Manager for Gensco Inc. Gensco Inc is a family owned, HVAC distributor located in 6 states in the PNW, and has been in business since 1948.

Gensco's corporate headquarters is in Tacoma WA, and we have 25 branch location throughout Washington, Oregon, Idaho, Montana, Alaska and northern California.

Rick has been with Gensco for 34 years and has been involved in the sales and distribution of many generations of Heat Pumps, along with other HVAC equipment and associated supplies. He currently lives in North Portland, and manages a large portion of the heat pump sales in Oregon and SW Washington, including 6 Territory Managers and 9 local branches.



## Sustainability Forum

Wednesday April 17, 8:00 am – 4:45 pm PT (UTC-7)

The Sustainability Forum is a unique conference track at SusTech 2024 that focuses on the aspirations and goals of industry practitioners and technical professionals. This one-day event features a unique blend of experts in policy, leadership, and technology. It features talks on energy efficiency; the affect of electrification on the modern-day grid; hot topics in sustainability; microelectronics energy efficiency scaling; improved polymers for fuel cells; and off-shore power generation. There will be a panel on "Promising Heat Pump Developments: Perspectives from the Pacific Northwest" organized by the Oregon Dept. of Energy.

CEU/PDH credit is available upon request.

### SusTech 2024 Sustainability Forum Agenda

Time	Session	Speaker(s)
8:00 am	<b>Opening Remarks and Keynote 1:</b>	Electrification is a key strategy for decarbonizing all sectors of the U.S. economy, Hellen Chen, American Council for an Energy-Efficient Economy (ACEEE)
9:00 am	<b>Keynote 2</b>	Electrification and the Grid, C. E. Ted Witham & Joe Cappeta, Eaton Corp.
10:00 am	<b>Panel 1</b>	Promising Heat Pump Developments: Perspectives from the Pacific Northwest, Organized by Oregon Dept. of Energy
11:45 am	<b>Special Session</b>	Hot Topics in Sustainability, Maike Luiken, IEEE SusTech Initiative
12:15 pm	<b>LUNCH</b>	
1:15 pm	<b>Keynote 3</b>	Increasing Computing Energy Efficiency is Key Requirement for Sustainability, Tina Kaarsberg, U.S. Department of Energy (DOE)
2:15 pm	<b>Keynote 4</b>	Efficient, Cost-Effective Polymeric Materials Design for Clean Energy and Biomedical Technologies via Biomass Valorization, Shudipto Konika Dishari, University of Nebraska-Lincoln
3:15 pm	<b>Keynote 5</b>	Off-shore Wind Power Studies, Dmitry Kosterev, BPA
4:15 pm	<b>Student Poster Awards</b>	Prof. Sean Monemi, Cal Poly Pomona
4:30 pm	<b>Closing Remarks &amp; SusTech 2025</b>	

### Special Events at SusTech 2024

#### Student Poster Competition

Join us for the SusTech 2024 online Student Poster Competition  
Worldwide entrants from undergrad and grad students.  
Presentations by recording with live Q&A.  
Each contestant has 10 minutes including Q&A.

**Date:** Sunday April 14, 2024

**Time:** 3:00 – 6:30 pm

**Location:** Elowah

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#### Welcome Reception

Join us for the SusTech 2024 attendee Welcome reception  
Meet your fellow attendees and SusTech Committee members

**Date:** Sunday April 14, 2024

**Time:** 6:00 – 7:00 pm

**Location:** Wakeena

Cash bar & light refreshments

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#### Conference Dinner

Join us for the SusTech 2024 Conference Dinner  
(Tickets required, purchase in advance or at Registration)

**Date:** Tuesday April 16, 2024

**Time:** 6:30 – 8:00 pm

**Location:** Willamette Ballroom (1<sup>st</sup> floor)

Cash bar & light appetizers

Dinner @ 7:00 pm

## YP Reception – Climate Change Action Panel Discussion



Join us on Monday April 15 at SusTech 2024 for a special reception organized by the IEEE Young Professionals (YP) and IEEE Women in Engineering (WIE) Oregon Section and Region  
6 IEEE YP and IEEE WIE.

**Date:** Monday April 15, 2024

**Time:** 6:00 – 7:30 pm

**Location:** Multnomah

Cash bar & light refreshments

Panelists from the [IEEE Young Professionals for Climate Change Action Task Force](#)

Climate change presents one of the most pressing challenges of our time, demanding concerted efforts from individuals, organizations, and governments worldwide. In this context, harnessing the potential of young professionals is crucial for driving innovative solutions and catalyzing meaningful change.

Recognizing the significance of engaging young professionals in the fight against climate change, the IEEE Young Professionals program has emerged as a key player in fostering a sustainable future. The aim of the panel forum at the SusTech 2024 Conference is to highlight the pivotal role of IEEE Young Professionals in the realm of climate change, exploring their current contributions and outlining strategies for more proactive engagement.

This event would be of value to:

- Graduate and undergraduate students, members of the IEEE Young Professionals community from diverse technical backgrounds, including engineering, computer science, environmental science, and related fields, would find value in participating. This audience brings fresh perspectives and innovative ideas to the discussion.
- Professionals working in industries related to energy, technology, sustainability, and environmental management can contribute their practical insights and experiences to the forum. Their expertise enriches the dialogue and provides real-world perspectives on implementing sustainable solutions.
- Scholars and researchers specializing in climate science, renewable energy, sustainable development, and related fields can offer valuable insights into the latest trends, innovations, and best practices. Their research findings can inform discussions and inspire collaborative efforts.

- Representatives from government agencies, non-governmental organizations (NGOs), and advocacy groups involved in climate policy and environmental advocacy can provide insights into the policy landscape, regulatory frameworks, and advocacy strategies relevant to sustainable climate solutions.

### Panelists:

### Moderator:

**Amritesh Rai** – IEEE YP Oregon Affinity Group Chair – Intel

### Speakers: (from IEEE Climate and Sustainability Taskforce (CTSFF))

1. **Sajith Wijesuriya** – Postdoctoral Researcher, National Renewable Energy Laboratory, Clean Energy Solutions Center (CESC), USA
2. **Sneha Hegde** – Postdoctoral Researcher / R&D Engineer at Ecole Centrale Lyon and Kapteos, France
3. **Sukanya S Meher** – Member of Technical Staff at Hypres Inc, NY, USA and IEEE YP CSTF Communications Lead
4. **Naznin Akter** – Module Development Engineer, Intel Corporation, USA
5. **Prantik Saha** – Clean Energy Consultant at Black & Veatch, USA
6. **Kayna Trujillo** – IEEE Humanitarian Technologies Board / Materials Engineer & PhD Fellow, Northwestern University & Argonne National Laboratory, USA
7. **Cybele Ghanem** – Support and Implementation Engineer, Invigo Offshore Lebanon

### Panel Agenda

Agenda Item	Detail
Opening Remarks	Welcome participants, set the context for the discussion, and introduce the panelists and moderators.
Introduction to CSTF	Brief presentation or overview of IEEE CSTF work, including Slido questions
IEEE’s Role and Initiatives on Climate change and how the CSTF is contributing on that space	<ul style="list-style-type: none"> <li>• IEEE’s current contributions, standards, and initiatives in advancing sustainable computing globally. Panelists may also share their insights.</li> <li>• Role of IEEE CSTF in Climate Change</li> <li>• Panel Discussion on individual’s perspective</li> </ul>
Young Professionals Engagement	Discussion on how young professionals can actively participate and contribute to sustainability initiatives within the field.
Closing Remarks	Summarize key takeaways, express gratitude to panelists and participants, and mention any follow-up actions or resources for further exploration.

### Panelists Bios



Naznin Akter, Ph.D, PMP®, Module Development Engineer, Intel Corporation

**Dr. Naznin Akter** received her Ph.D. (2022) and MS (2020) degrees in Electrical Engineering from the Department of ECE at Florida International University (FIU), where she worked at INSYST Integrated Nanosystems Research Lab. She is currently working as a Module Development Engineer for Intel Corporation. She holds a Project Management Professional (PMP®) certification from the Project Management Institute (PMI).

She is currently holding several leadership positions in IEEE. She is the Editor-in-Chief for the IEEE Photonics Society online newsroom. She is the Chair of IEEE Photonics Society Oregon Section chapter, Chair of IEEE Women-in-Engineering Oregon section AG, and Vice- Chair of the IEEE Young Professional Oregon section AG. She is the Student Activities Professional Coordinator for the IEEE-USA Career & Professional Development Center (CPDC) committee, R6 Experience specialist for IEEE YP Mentoring-Meet, and Vice-Chair of R6 IEEE Young Professional.

Apart from IEEE, she is the assistant VP of Marketing Communications at Project Management Institute Portland Chapter. She also served as the Treasure for the Sigma Xi, The Scientific Research Honor Society.

Cybele Ghanem, Support and Implementation Engineer, Invigo Offshore Lebanon



**Cybele Ghanem** is a Computer and Telecommunications Engineer from the Lebanese University Faculty of Engineering II Roumieh, with a Research Masters degree in Telecommunications, Networking and Cyber security. She is currently part of the Operations Team at Invigo Offshore as a Support and Implementation Engineer.

Besides her professional experience, her interpersonal skills are highlighted in her volunteering work.

Cybele joined IEEE in 2016 and has been an active volunteer ever since. She joined the IEEE YP Climate and Sustainability Task Force in January 2023 and was appointed as a member in the Region 8 Climate Change Adhoc Committee. She is also leading the IEEE Computer Society Students and Young Professionals Climate and Sustainability Space.

Additionally, Cybele holds several positions in IEEE and was recently appointed as IEEE Day 2023-2024 Chair and IEEE Students Virtual Speakers Bureau 2024 Chair. She is also currently the Design and



Sneha Satish Hegde, Postdoctoral Researcher / R&D Engineer at Ecole Centrale Lyon and Kapteos.

Social Media Lead for IEEEExtreme18.0 and Lead IEEE Puzzler Volunteer. She was also elected the Student Activities Representative of Lebanon Section, as well as the Treasurer of the IEEE Young Professionals Lebanon for 2023-2024.

**Dr. Sneha Satish Hegde** completed her doctoral studies in Electronics at the University of Montpellier, France. Her research project aligns with the Territorial Just Transition Plan and the Energy-Climate Plan in two key ways: First, by investigating the aging of components in future HVDC and MVDC energy networks, critical for renewable energy integration. Second, by studying eco-friendly insulation materials, it aims to reduce system size, enhance defect detection, and lower the carbon footprint in component manufacturing.

She has been a member of IEEE and DEIS, taking on the role of Chair for DEIS Women In Engineering (WIE) and Vice-Chair for DEIS Young Professionals (YP). Recently, she was appointed as the board member of DEIS AdCom. Additionally, she is the Vice-Chair for Communications for IEEE CS SYP and leads the Partnerships for the IEEE Young Professionals Climate and Sustainability Task Force (CSTF).

Sukanya S Meher, Member of Technical Staff, Hypres and IEEE YP CSTF Communications Lead



**Ms. Sukanya S Meher** is a Member of Technical Staff at Hypres Inc, NY. In her role, she focuses on the design and development of energy efficient superconductor electronic circuits with diverse applications in digital signal processing, sensors, computing, and communication systems. She earned her Master's degree in Electrical Engineering from Columbia University, NY, in 2016. Sukanya's proficiency spans circuit design, modeling, simulation, tool development, and testing of superconductor chips under cryogenic conditions. Sukanya's passion lies in contributing to sustainable and energy-efficient computing solutions.

Sukanya is actively involved with the IEEE Young Professionals Climate and Sustainability Taskforce (CSTF) by supporting the team in various events as Communications Lead. She recently played a key role in orchestrating a Young Professionals Dialogue Session with the UNFCCC during New York Climate Week. Additionally, Sukanya serves as a committee member of the IEEE Young Professionals Council on Superconductivity (CSC). Her commitment extends

to volunteering for AnitaB.org and the Grace Hopper Celebration, and advocating for empowerment of women in technology.



**Dr. Prantik Saha** is a senior consultant at Black & Veatch and works as an advisor for clean energy projects. He is an expert on low-carbon hydrogen and fuels, energy storage systems (lithium-ion and beyond), and carbon capture, storage, and utilization technologies. With 6+ years of experience in technology development (R&D), he acts as a subject matter expert for these technologies and uses it to help clients achieve their decarbonization goals. He assists Black & Veatch clients with conceptual project design, early-stage project engineering designs, feasibility analysis, technical due diligence, independent technology assessment (bankability), resource planning, and strategic advisory services.

Dr. Prantik Saha, Clean Energy Consultant at Black & Veatch, member IEEE YP CSTF

He got Ph.D. in Applied Physics from UC Irvine, USA, where he developed electrochemical clean energy conversion systems. He volunteers for the Climate & Sustainability Taskforce at Institute of Electrical & Electronics Engineers (IEEE) with technologies that are in his domain of expertise.



**Kayna Trujillo** has an academic and professional background in Metallurgical and Materials Engineering alongside 3 years of industry experience in the aerospace sector. She has since transitioned to research in nanomagnetism for energy efficient computing at Argonne National Laboratory.

Kayna Mendoza Trujillo, Materials Engineer & PhD Fellow, Northwestern University & Argonne National Laboratory

Kayna is a member and active volunteer of the Microscopy Society Student Council as Regional Liaison, IEEE Young Professionals Community Climate and Sustainability Task Force (CSTF) as well as the Humanitarian Technologies Board (HTB). She is focused on contributing to spaces that uplift students' voices and those that bridge technology and policy.



Sajith Wijesuriya, Postdoctoral Researcher at the National Renewable Energy Laboratory of the US. Clean Energy Ministerial.

**Sajith Wijesuriya** obtained his Ph.D. in Mechanical Engineering (Thermal Sciences) from the Colorado School of Mines in the USA. He works as a Postdoctoral Researcher at the National Renewable Energy Laboratory (NREL) of the United States and supports Clean Energy Ministerial (CEM) workstreams Clean Energy Solutions Center (CESC). NICE Future, and 21 CPP. His core research areas are Thermal Energy Storage (TES), building energy sciences, grid-responsive buildings and grid interaction modeling.

This is his 4th year with IEEE with a focus on interfacing IEEE with United Nations mechanisms. He has worked at the technology interfaces (SPI-MGCY), climate (UNFCCC TEC Task Force, YOUNGO), and development agendas (SDG7 Youth Constituency, CED Sri Lanka) spaces for the last decade. He also founded the organization Science Policy Circle which is accredited to the UNCCD process. He will be coming into the IEEE YP global task force as the Chair of the Climate and Sustainability Task Force.

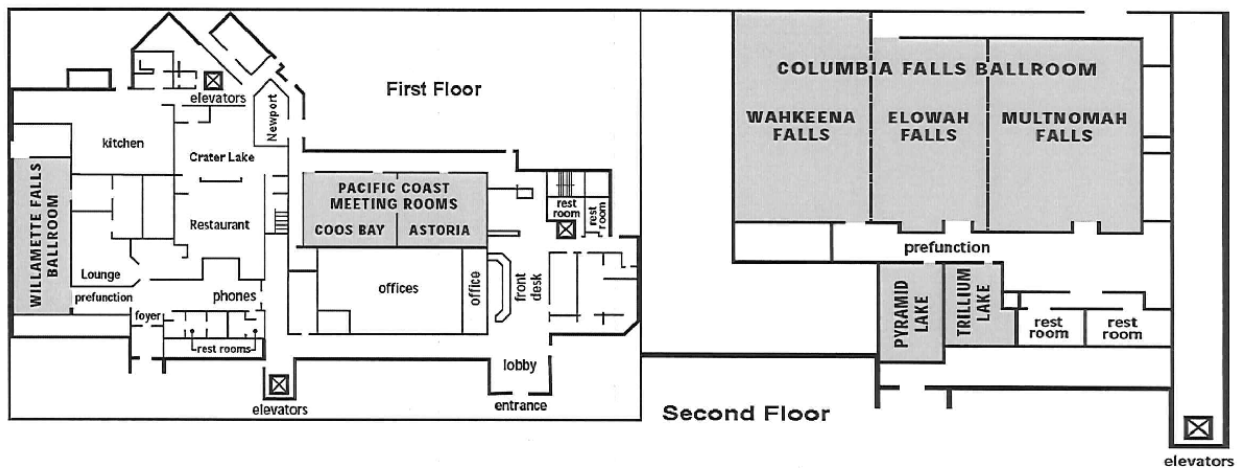


### 2024 IEEE Conference on Technologies for Sustainability (SusTech) Program and Floor Plan

Time	Multnomah	Elowah	Wakeenah	Willamette	
<b>Sunday April 14</b>					
08:00-15:00	WKSHP: <a href="#">Workshop - Roadmap to Low Carbon Emission Building Materials and Architecture</a>	SPC: <a href="#">Student Poster Competition</a>			
15:00-17:00					
17:00-18:00					
18:00-18:30				WR: <a href="#">Welcome Reception</a>	
18:30-19:00					
<b>Monday April 15</b>					
07:45-08:00	OPEN: <a href="#">Opening Remarks</a>				
08:00-08:50	K1: <a href="#">Keynote 1: IEEE Climate Change Update</a>				
09:00-10:20	PS1A: <a href="#">Energy Efficiency I</a>	PS1B: <a href="#">Societal Implications I</a>	PS1C: <a href="#">Smart and Micro Grids I</a>		
10:30-12:00	PNL1: <a href="#">Panel 1: Ethics, Energy and Environment</a>				
12:00-13:00				Lunch	
13:00-13:45	K2: <a href="#">Keynote 2: Solar Trends</a>				
14:00-15:20	PS2A: <a href="#">Energy Efficiency II</a>	PS2B: <a href="#">Societal Implications II</a>	PS2C: <a href="#">Smart and Micro Grids II</a>		
15:30-16:50	PNL2: <a href="#">Panel 2: Electrifying Agriculture</a>				
17:00-18:30	PS3A: <a href="#">Energy Efficiency III</a>	PS3B: <a href="#">eWaste &amp; Circular Economy</a>	PS3C: <a href="#">Sustainable Electronics I</a>		
18:30-20:00	YPR: <a href="#">WIE/YP Reception and Panel</a>				
<b>Tuesday April 16</b>					
08:00-08:50	ORK3: <a href="#">Opening Remarks and Keynote 3:</a>				
09:00-10:20	PS4A: <a href="#">Renewable / Alternate Energy I</a>	PS4B: <a href="#">Sustainable Management</a>	PS4C: <a href="#">Sustainable Electronics II</a>		
10:30-12:00	PNL3: <a href="#">Panel 3: Novel Technologies for Sustainable Ocean Energy Generation</a>				
12:00-13:00				Lunch	
13:00-13:45	K4: <a href="#">Keynote 4: ReCell: Working to Advance Battery Recycling</a>				
14:00-15:20	PS5A: <a href="#">Renewable / Alternate Energy II</a>	PS5B: <a href="#">IOT I</a>	PS5C: <a href="#">Sustainable Electronics III</a>		
15:30-16:15	K5: <a href="#">Keynote 5: A Vision for Mid-Century Sustainable Urban Transportation</a>				
16:30-17:40	PS6A: <a href="#">ML Application</a>	PS6B: <a href="#">IOT II</a>	PS6C: <a href="#">Water</a>		
18:30-20:30				Conference Dinner	

Wednesday April 17				
08:00-08:50	SFK1: <a href="#"><u>Opening Remarks and Keynote 1</u></a>			
09:00-09:45	SFK2: <a href="#"><u>Keynote 2: Electrification and the Grid</u></a>			
10:00-11:30	SFP1: <a href="#"><u>Panel 1: Promising Heat Pump Developments: Perspectives from the Pacific Northwest</u></a>			
11:45-12:15	SFSS: <a href="#"><u>Special Session: Hot Topics in Sustainability</u></a>			
12:15-13:15	Lunch			
13:15-14:00	SFK3: <a href="#"><u>Keynote 3: Increasing Computing Energy Efficiency is Key Requirement for Sustainability</u></a>			
14:15-15:00	SFK4: <a href="#"><u>Keynote 4: Efficient, Cost-Effective Polymeric Materials Design for Clean Energy and Biomedical Technologies via Biomass Valorization</u></a>			
15:15-16:00	SFK5: <a href="#"><u>Keynote 5: Off-shore Wind Power Studies</u></a>			
16:15-16:30	SPCA: <a href="#"><u>Student Poster Awards</u></a>			
16:30-16:45	CLOS: <a href="#"><u>Closing Remarks &amp; SusTech 2025</u></a>			

### Hotel Floor Plan



**Sunday, April 14****Sunday, April 14 8:00 - 17:00 (America/Los\_Angeles)**

Room: Multnomah

**WKSHP: Workshop - Roadmap to Low Carbon Emission Building Materials and Architecture**

A free Hybrid workshop organized by IEEE Future Directions SusTech Initiative in collaboration with SusTech 2024.

**Moderators:**

- **Maïke Luiken, PhD, SMIEEE, IEEE-HKN, FEIC**, chairs Planet Positive 2030 - an initiative of the IEEE Standards Association - as well as the P7800 Standards Working Group: Recommended Practice for Addressing Sustainability, Environmental Stewardship and Climate Change Challenges in Professional Practice.
- **Professor Wei-Jen Lee**, University of Texas at Arlington, Electrical Engineering Department and director of the Energy Systems Research Center.

**Speakers:**

- Weby Bowles, Associate Director of Codes and Policy at New Buildings Institute (NBI) with 20 years of experience in architecture, sustainable building design, advocacy, and code development.
- Beth Lavelle, Senior Associate and Sustainability Manager at SERA Architects in Portland, OR.
- Lona Rerick, Architect and Sustainable Materials Leader at ZGF Architects.
- Hellen Chen, Research Analyst in the Industry Program at the American Council for an Energy-Efficient Economy (ACEEE).
- Clinton J. Andrews, Director, Center for Urban Policy Research at Rutgers University.
- Yashima Jain, Lawrence Berkeley National Laboratory.
- Marc Elliott, Eaton Corp.

**Sunday, April 14 15:00 - 18:30 (America/Los\_Angeles)**

Room: Elowah

**SPC: Student Virtual Poster Competition**

Moderated by Prof Sean Monemi, CPP

**Sunday, April 14 18:00 - 19:00 (America/Los\_Angeles)**

Room: Wakeenah

**WR: Welcome Reception**

**Monday, April 15****Monday, April 15 7:45 - 8:00 (America/Los\_Angeles)**

Room: Multnomah

**OPEN: Opening Remarks**

Welcome and Introductory Remarks by Oregon Section Chair, IEEE Region 6 Director and SusTech 2024 Chair

- Dan Goodrich, IEEE Oregon Section Chair
- Kathy Hayashi, IEEE Region 6 Director
- Ed Perkins, SusTech 2024 Chair

**Monday, April 15 8:00 - 8:50 (America/Los\_Angeles)**

Room: Multnomah

**K1: Keynote 1: IEEE Climate Change Update**

Overview of the IEEE SusTech Initiative

Maïke Luiken, co-Chair, IEEE SusTech Initiative

The IEEE SusTech Initiative seeks to contribute technical expertise and solutions to address sustainability challenges, including climate change. This initiative is growing rapidly and new volunteers are always welcome.

**Monday, April 15 9:00 - 10:20 (America/Los\_Angeles)**

Room: Multnomah

**PS1A: Energy Efficiency I**

9:00 Design of HVAC Control System for Building Energy Management Systems

Daniel Fernando Espejel-Blanco (Mexico National Technological Hermosillo Institute of Technology, Mexico); Jose Hoyo-Montano (Instituto Tecnológico de Hermosillo, Mexico); Jose Manuel Chavez, Fredy Alberto Hernandez-Aguirre, Ingrid Ayleen Cruz-Flores and Francisco Javier Valenzuela-Soriano (Mexico National Technological Hermosillo Institute of Technology, Mexico)

9:20 Energy Efficiency: From Desire to an Integrated Management Solution

Alexandru G. Berciu, Timea Farkas, Andrei Ceclan, Levente Czumbil and Stefan Ungureanu (Technical University of Cluj-Napoca, Romania); Dan Micu (Technical University of Cluj-Napoca, United Kingdom (Great Britain))

9:40 GRMS: A Generalized Risk Modeling Approach for Sustainable Systems Design

Dilip Krishnaswamy and Anuradha Krishnaswamy (QWalks, USA)

10:00 Field Demonstration of Residential DER Service-Oriented Load Participation

Zhongkai Zeng, Robert Bass, Midrar A Adham and Dana Paresa (Portland State University, USA)

### **PS1B: Societal Implications I**

Room: Elowah

9:00 A New Method for Measuring Food-Aid Accessibility Considering Sustainability Constraints

Monirehalsadat Mahmoudi and Khadijeh Shirzad (Michigan State University, USA); Ying Song (University of Minnesota, USA)

9:20 Comprehensive Techno-Economic Analysis of Electrified and Fuel-Cell Vehicle Technologies for Sustainable Transportation: Insights from TechScape

Charbel Mansour (Argonne National Laboratory & Vehicle and Mobility Systems Department, USA); Amarendra Kancharla, Michel Alhajjar, Paul Phillips and Natalia Zuniga Garcia (Argonne National Laboratory, USA)

9:40 Driving Forces of Green Cryptocurrency Acceptance A Systematic Review

Alberic Aptatio Astri, Siti Elda Hiererra and Lindrianasari Lindrianasari (Bina Nusantara University, Indonesia)

10:00 A Cost Optimization Tool for Smart Integrated Renewable Energy Systems (SIREs)

Zeel Maheshwari, Tuyet Do and Andrea Cardenas Echavarria (Northern Kentucky University, USA)

### **PS1C: Smart and Micro Grids I**

Room: Wakeenah

9:00 Development for Electrical Fault Detection and Classification Analysis Model Based on Machine Learning Algorithms

Junho Kim (University of Keimyung, Korea (South)); Sunhwa Sim and Seokjun Kim (Kumoh National Institute of Technology, Korea (South)); Seokheon Cho (University of California, San Diego & Qualcomm Institute, USA); Changhee Han (Gyeongsang National University, Korea (South))

9:20 Improving Energy Flexibility in Photovoltaic-Battery Systems Through Switching Reinforcement Learning Control

Siebe Paesschesoone (University of Ghent & Flanders Make and VITO, Belgium); Nezman Kayedpour and Guillaume Crevecoeur (Ghent University, Belgium); Carlo Manna (Vito, Belgium)

9:40 Charting the Course for Sustainable Energy Development: The State of Energy Storage in South Africa's Decarbonization Efforts

Oluwagbenga Apata (University of Johannesburg, South Africa)

10:00 Distributionally Robust Optimization-Based Stochastic Operation Strategy of Soft Open Points in Distribution Networks

Changhee Han (Gyeongsang National University, Korea (South)); Seokheon Cho (University of California, San Diego & Qualcomm Institute, USA); Ramesh Rao (University of California San Diego, USA)

### **Monday, April 15 10:30 - 12:00 (America/Los\_Angeles)**

Room: Multnomah

#### **PNL1: Panel 1: Ethics, Energy and Environment**

How can we meet our energy needs and still care for the environment in the era of anthropogenic climate change?

Organized by IEEE Society on Social Implications of Technology (SSIT)

IEEE SSIT has been bringing together diverse areas of expertise, including researchers, industry, and communities to address and collectively answer this vital societal question. Ethics takes cognizance of the intrinsic value of nature, the interconnection of all living things, and the responsibility of humans to act in accordance with ethical principles. In creating ethically aligned IEEE Recommended Practices for technology, SSIT members must consider the values of care, fairness, privacy, trust, sustainability and respect. The panelists share their practical experience and insights in evaluating what practices produce human well being while preserving the natural world.

Co-organizer & Moderator: Susan Dickey, secretary of IEEE SA P7800 "Recommended Practice for Addressing Sustainability, Environmental Stewardship and Climate Change Challenges in Professional Practice."

#### **Panelists:**

- Clinton Andrews, Center for Urban Policy Research, Rutgers University
- Wei Jen Lee, Energy Systems Research Center, University of Texas Arlington
- Ann M. Marcus, The Marcus Consulting Group Inc., Portland, Oregon

**Monday, April 15 12:00 - 13:00 (America/Los\_Angeles)**

Room: Willamette

**L1: Lunch**

**Monday, April 15 13:00 - 13:45 (America/Los\_Angeles)**

Room: Multnomah

**K2: Keynote 2: Solar Trends**

Wei-Jen Lee, University of Texas at Arlington

**Monday, April 15 14:00 - 15:20 (America/Los\_Angeles)**

Room: Multnomah

**PS2A: Energy Efficiency II**

14:00 Energy Management Optimization for Retail Electricity Customers Under CUF-Based Contracts

Elvin D. Dulce (University of the Philippines Diliman, Philippines); Michael Angelo Pedrasa (University of the Philippines, Philippines)

14:20 Data-Driven Building Energy Efficiency Prediction Using Physics-Informed Neural Networks

Vasilis Michalakopoulos, Sotiris Pelekis, Georgios Korbakis, Vagelis Karakolis, Spiros Mouzakitis and Dimitris Askounis (National Technical University of Athens, Greece)

14:40 Lighting Analysis of Campus Classrooms

Saurav Basnet (550 Huntington Ave & Wentworth Institute of Technology, USA); Douglas E Dow (Wentworth Institute of Technology, USA)

15:00 Power Delivery and Communication with an Infrared Laser (PaCIR)

Brayden M Vargas-Calderon, Pranay Eedara and Sunil Khatri (Texas A&M University, USA)

**PS2B: Societal Implications II**

Room: Elowah

14:00 Granger Causality Analysis of Global Warming and Precipitation on Vegetation in the Himalayan Region

Tulsi Paudel (Sanming University, China); Thakur Dhakal (Yeungnam University, Korea (South))

14:20 An Investigation into Total Quality Management Practices in a Retail Bank in Bahrain

Minwir Al-Shammari and Saleh Isa (University of Bahrain, Bahrain)

14:40 Impact Assessment of Residential Electric Vehicle Charging on the LV Distribution Network in Uganda

Ronella Faith Nambi, Shem Christopher Luwandaga, Jane Namaganda-Kiyimba, Michael Alvin Mulumba and Jonathan Serugunda (Makerere University, Uganda)

15:00 Exploring the Nexus Between Digital Transformation and Sustainability

Oluwagbenga Apata (University of Johannesburg, South Africa)

**PS2C: Smart and Micro Grids II**

Room: Wakeenah

14:00 Identifying Electric Water Heaters from Low-Resolution Smart Meter Data

Markus Kreft, Tobias Brudermueller and Tyler Anderson (ETH Zurich, Switzerland); Thorsten Staake (University of Bamberg, Germany)

14:20 Incorporating Fairness in Transmission and Energy Storage Planning Utilizing Min-Max Formulation for Load Shedding Operations

Noah Allison, Leonardo Weber Stringini and Josue Campos do Prado (Washington State University Vancouver, USA)

14:40 Modeling and Parameter Estimation of Electric Thermal Storage Utilizing Residual Components for Residential Consumer

Sameer Sabir (Université du Québec à Trois-Rivières, Canada); Luis Rueda (Energy Technologies Laboratory, Canada); Michael Fournier (Hydroquebec, Canada); Shaival Hemant Nagarsheth (Smart Energy Research and Innovation Laboratory, Hydrogen Research Institute, Canada); Kodjo Agbossou (Université du Québec à Trois-Rivières, Canada); Nilson Henao (Université du Québec à Trois-Rivières, Canada); Souso Kelouwani (Université du Québec à Trois-Rivières, Canada)

15:00 A Comprehensive Test Infrastructure for the Evaluation of Energy Management Systems of the Household and Grid Level



Stephan Stieren (Fraunhofer IEM Paderborn, Germany); Achim Werner and Christian Henke (Fraunhofer IEM, Germany); Ansgar Trächtler (Universität Paderborn, Germany)

**Monday, April 15 15:30 - 16:50 (America/Los\_Angeles)**

Room: Multnomah

**PNL2: Panel 2: Electrifying Agriculture**

Hosted/Moderated by Wendy Simons, Energy Policy Analyst, Oregon Department of Energy

Panelists:

- Robert Wallace CEM, Executive Director, Wy'East Resource Conservation and Development (Wy'East RCD), The Dalles (OR): "Oregon E-Farms Program"
- Marcelo Moretti, PhD, Associate Professor, Department of Horticulture, OSU: "Electricity for Weed Management"
- Chris Toman, PhD candidate, College of Agricultural Sciences, OSU: "Agrivoltaics"

**Monday, April 15 17:00 - 18:30 (America/Los\_Angeles)**

Room: Multnomah

**PS3A: Energy Efficiency III**

17:00 On the Use of an Electret-Based Wind Energy Harvester to Power a Vibration Sensor - A Feasibility Study for the City of Freiburg

Seyedali Sabzpooshan, Dhruv Shah and Peter Woias (University of Freiburg, Germany)

17:20 Cyber Attack on Smart Grid Database

Sean Monemi, Aaron Aparicio and Andrew Zarour (California State Polytechnic University at Pomona, USA)

17:40 Computational Dynamic Performance of Thermal Mass in Hot & Dry Climate

Yesaswini Chilukuri (Smart Integrated Design Consultants, India); Adil Usman (National Renewable Energy Laboratory, USA); Wei-Jen Lee (Energy Systems Research Center, USA)

18:00 Forecasting Weather and Energy Demand for Optimization of Renewable Energy and Energy Storage Systems for Water Desalination

Om Sanan (Scarsdale High School & Day Zero Water, USA); Joshua Sperling and David Greene (National Renewable Energy Laboratory, USA); Ross Greer (University of California, San Diego, USA)

**PS3B: eWaste & Circular Economy**

Room: Elowah

17:00 Sustainable Energy Generation from Recycled Household Waste: A Low-Cost and Facile Rubber and Cardboard Based Triboelectric Nanogenerator

Muhammad Umaid Bukhari (Information Technology University, Pakistan); Kashif Riaz (Information Technology University, Pakistan & Hamad Bin Khalifa University, Qatar); Arshad Khan (Hamad Bin Khalifa University, Qatar); Khawaja Qasim Maqbool (Bahria University Lahore Campus, Pakistan); Bo Wang and Amin Bermak (Hamad Bin Khalifa University, Qatar)

17:20 RecyLink: Innovating Recycling Management Through Localized Drop-Off Zones and Machine Learning Integration

Aaron Li (USA); Ambrose Luo (Troy High School, USA); Yu Sun (California State Polytechnic University, Pomona, USA)

17:40 The Challenges and Opportunities of Transitioning to Modular Smartphones

Kevin L Lomax (University of Testing & Central Washington University, USA); Jaap Donker and Jonah J Milnor (University of Testing, USA); Charles Pringle (University of Testing & Central Washington University, USA); Susan Rivera (IT Management, USA & Central Washington University, USA)

18:00 Implementing BIM Technology for Effective Construction and Demolition Waste Management

Chukwumaobi N Ibe (Sheffield Hallam University, United Kingdom (Great Britain))

**PS3C: Sustainable Electronics I**

Room: Wakeenah

17:00 Designing Regenerative and Sustainable High Endurance Unmanned Ariel Vehicles

Maggie Hoang, Shawn Chen, Matthew Go, Zhen Yu, Alton Lo, Arriana Brumley, Matthew Li, Rebecca Santiago, Steven Dobbs and Justin Ocampo (California State Polytechnic University at Pomona, USA)

17:20 Design and Implementation of a Low-Cost LoRa-Based Sensor Node for Environmental Monitoring in Uganda

Patricia Esther Nyabel and Christopher Tumuhaise (Makerere University, Uganda); Edwin Mugume (Carnegie Mellon University Africa, Rwanda); Jonathan Serugunda (Makerere University, Uganda); Abel Kamagara (Kyambogo University, Uganda)

17:40 Accessible Remote Electronic Education: Affordable DIY Paper-Based Tunable RC Oscillator Circuits

Muhammad Nasir (Information Technology University, Pakistan); Kashif Riaz (Information Technology University, Pakistan & Hamad Bin Khalifa University, Qatar); Muhammad Hamza Zulfiqar and Muhammad Mateen Fawad (Information Technology University, Pakistan); Arshad Khan, Bo Wang and Amin Bermak (Hamad Bin Khalifa University, Qatar)

18:00 Eco-Reliability: A New Metric for the Eco-Design of the Electronic Systems

Chiara Sandionigi (CEA, France)

### **Monday, April 15 18:30 - 20:00 (America/Los\_Angeles)**

Room: Multnomah

#### **YPR: WIE/YP Reception and Panel**

Climate change presents one of the most pressing challenges of our time, demanding concerted efforts from individuals, organizations, and governments worldwide. In this context, harnessing the potential of young professionals is crucial for driving innovative solutions and catalyzing meaningful change.

**Moderator:** Amritesh Rai - IEEE YP Oregon Affinity Group Chair – Intel Corp.

**Speakers:** (from IEEE Climate and Sustainability Taskforce (CTSFF))

1. Sajith Wijesuriya - Postdoctoral Researcher, National Renewable Energy Laboratory, Clean Energy Solutions Center (CESC), USA
2. Sneha Hegde - Postdoctoral Researcher / R&D Engineer at Ecole Centrale Lyon and Kapteos, France
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4. Naznin Akter - Module Development Engineer, Intel Corporation, USA
5. Prantik Saha - Clean Energy Consultant at Black & Veatch, USA
6. Kayna Trujillo - IEEE Humanitarian Technologies Board / Materials Engineer & PhD Fellow, Northwestern University & Argonne National Laboratory, USA
7. Cybele Ghanem - Support and Implementation Engineer, Invigo Offshore Lebanon

**Tuesday, April 16****Tuesday, April 16 8:00 - 8:50 (America/Los\_Angeles)**

Room: Multnomah

**ORK3: Opening Remarks and Keynote 3:****Data Center Efficiency and Sustainability**

Eric Dahlen, Senior Principal Engineer, Intel Data Center and AI Group

Data Center (DC) energy growth accelerated by AI proliferation and generative AI evolution is catalyzing demand for disclosure and improvement of DC energy efficiency and sustainability. The recently adopted Delegated Act to the EU Energy Efficiency Directive is the start of an expected wave of regulations intended to improve sustainability. This talk will tie together ongoing efforts across Climate Neutral Data Centre Pact (CNDPC), the Green Grid, Open Compute Project® (OCP) and iMasons to facilitate and harmonize credible metrics to help meet these demands.

**Tuesday, April 16 9:00 - 10:20 (America/Los\_Angeles)**

Room: Multnomah

**PS4A: Renewable / Alternate Energy I**

9:00 Regression Model for Tree Trunk Temperature for Energy Harvesting

Yajun An (University of Washington-Tacoma, USA); Orlando Baiocchi and Heather E Dillon (University of Washington, USA); Cleonilson Protasio de Souza (Federal University of Paraiba, Brazil); Yanqi Qiu (University of Washington, USA)

9:20 Optimal Scheduling of Spinning Reserve for Enabling Microgrid Seamless Islanding

Tarek Masaud and Emmanuel Nwaulu (University of Colorado Colorado Springs, USA)

9:40 Modified DC-DC Converter Based on Step-Up Voltage Cells for Nano-Grids

John Lennon Nunes de Souza, Osian Meykson Bezerra Soares and Rafael Luz Espindola (The Federal University of the Semi-Arid Region - UFERSA, Brazil); Antônio Alisson Alencar Freitas (Universidade Federal Rural do Semi-Árido, Brazil)

10:00 Integration of the Centralized Grid and Decentralized Renewable Energy Off-Grid Systems: A Techno-Economic Analysis

Edward Nekemeya Seremba (Makerere University & NetLabs!UG, Uganda); Frank Ssemakula, Jane Namaganda-Kiyimba and Josephine Nakato Kakande (Makerere University, Uganda)

**PS4B: Sustainable Management**

Room: Elowah

- 9:00 Value Chain Co-Creation in Public Service Organizations: A Proposed Model  
Minwir Al-Shammari (University of Bahrain, Bahrain)
- 9:20 Prevalence of Social Responsibility in Construction Company Performance  
Ramyani Sengupta, Emad Elwakil and Yi Jiang (Purdue University, USA)
- 9:40 Enhancing Agricultural Development in Rural Indian Communities: The Contribution of NGOs Through Corporate Social Responsibility Initiatives  
Kochukrishna Kurup and Rangasami P (Amrita Vishwa Vidyapeetham, India);  
Sreelakshmi S Pillai (Amrita Viswa Vidyapeetham, India)
- 10:00 On-Site Zero Energy by Integrating Photovoltaic Technologies into Buildings  
Elsayed Salem and Emad Elwakil (Purdue University, USA)

**PS4C: Sustainable Electronics II**

Room: Wakeenah

- 9:00 Flexible Paper-Based Capacitive Touchpad for Wireless Switching Control Fabricated via Facile and Solvent-Free Method  
Muhammad Mateen Fawad (Information Technology University, Pakistan); Kashif Riaz (Information Technology University, Pakistan & Hamad Bin Khalifa University, Qatar); Muhammad Hamza Zulfiqar and Muhammad Nasir (Information Technology University, Pakistan); Arshad Khan, Bo Wang and Amin Bermak (Hamad Bin Khalifa University, Qatar)
- 9:20 Analyzing Frequency Event Detection Algorithm Performance Using Different Denoising Methods  
Hussain A Alghamdi, Midrar A Adham and Robert B Bass (Portland State University, USA)
- 9:40 MorteSense DIY Home Security  
Shohin Abdulkhmidov, Diego R Cruz, Diego Garcia-Carrasco, Spartak Gevorgyan and Faramarz Mortezaie (San Jose State University, USA)
- 10:00 Incorporating Machine Learning Algorithms and Finding Optimum Operation Point for Waste Heat Recovery in Industrial Applications: A Case Study  
Mohammad Hadi Katooli (Indiana University, USA); Ali Razban (Purdue University, Indianapolis, USA); Javad Katooli (University of Kashan, Iran)

**Tuesday, April 16 10:30 - 12:00 (America/Los\_Angeles)**

Room: Multnomah

**PNL3: Panel 3: Novel Technologies for Sustainable Ocean Energy Generation**

Organized by Bill Wilson, IEEE Oceanic Engineering Society

The IEEE SusTech 2024 conference panel on "Novel Technologies for Sustainable Offshore Energy Generation" brings together leading experts, researchers, and innovators to explore groundbreaking advancements in the realm of offshore renewable energy. With the pressing need to mitigate climate change and reduce dependence on fossil fuels, offshore energy generation presents a promising avenue towards achieving sustainability goals. The panel aims to showcase emerging technologies and discuss their potential to revolutionize the offshore energy landscape while addressing environmental concerns.

**Panelists:**

- Dr. Peter F. Green, National Energy Research Laboratory (NREL)
- Dr. Daniel Deng, Pacific Northwest National Laboratories
- Dr. Landon Mackey, C-Power, Corvallis, OR
- Andy Stough, Windlift, Durham, NC

**Tuesday, April 16 12:00 - 13:00 (America/Los\_Angeles)**

Room: Willamette

**L2: Lunch**

**Tuesday, April 16 13:00 - 13:45 (America/Los\_Angeles)**

Room: Multnomah

**K4: Keynote 4; ReCell: Working to Advance Battery Recycling**

Eva Allen, Argonne National Laboratory

End-of-life lithium-ion batteries in electric and hybrid-electric vehicles are just now starting to reach their end of life. Battery recycling is needed to recover the valuable materials needed to support new battery production and reduce waste and environmental impact. The ReCell Center is working to develop, scale up, and demonstrate battery recycling processes that reduce cost and increase the profit of battery recycling. ReCell has developed direct recycling processes to recover cathode materials intact, reducing the processing steps for reuse. Four focus areas are targeted: direct cathode recycling, recovery of other materials, design for recycling, and modeling and analysis. Additionally, ReCell uses advanced characterization with synchrotron sources to study the directly recycled cathode materials in 3D to determine their composition after regeneration and gain a fundamental understanding of the direct recycling processes.

**Tuesday, April 16 14:00 - 15:20 (America/Los\_Angeles)**

Room: Multnomah

**PS5A: Renewable / Alternate Energy II**

14:00 Comparison Between a Photovoltaic System and a Wind Power System in the Brazilian Semi-Arid Region

Osian Meykson Bezerra Soares, John Lennon Nunes de Souza and Rafael Luz Espindola (The Federal University of the Semi-Arid Region - UFERSA, Brazil); Antônio Alisson Alencar Freitas (Universidade Federal Rural do Semi-Árido, Brazil)

14:20 WE-Validate: An Open-Source Framework for Wind Power Validation

Malcolm Moncheur de Rieudotte, Allison Campbell, Larry Berg, Ye Liu, Nader Samaan, Lindsay Sheridan and Heng Wang (Pacific Northwest National Laboratory, USA)

14:40 Advancing the Economic Frontier of Green Hydrogen: A Systematic Modeling and Optimization Approach

Abdulaziz Alturki (King Abdulaziz University, Saudi Arabia)

15:00 Solar Powered Water Pumping System for Remote Areas

Mounica Gopisetty and Cameron Adlawan (San Diego State University, USA)

**PS5B: IOT I**

Room: Elowah

14:00 Trust Model Utilization for Energy Grid Communication

Sonali Fernando, John M Acken and Robert Bass (Portland State University, USA)

14:20 Decentralized, Distributed, and Hybrid ICT Architectures: Hierarchical Multitier Big Data Driven Management for Smart, Sustainable, Scalable and Reliable Cities

Amir Sinaeepourfard (IEEE Member, Norway); Shehenaz Shaik (East Tennessee State University, USA); Niusha Mesgaribarzi (USN, Norway)

14:40 Generative AI-Based Land Cover Classification via Federated Learning CNNs: Sustainable Insights from UAV Imagery

Oleksandr Jockusch (Southern Illinois University, USA); Md Zarif Hossain (Southern Illinois University Carbondale, USA); Ahmed Imteaj and Abdur Rahman Bin Shahid (Southern Illinois University, USA)

15:00 IoT Waste Management Conversion Kit

Daniil Slutskiy, Mirosław J. Wierzbicki, Marina Chuery and Douglas E Dow (Wentworth Institute of Technology, USA)

**PS5C: Sustainable Electronics III**

Room: Wakeenah

14:00 Facile and Wearable Textile-Based Temperature Sensor for Human Healthcare Monitoring

Umer Zahid and Muhammad Umaid Bukhari (Information Technology University, Pakistan); Kashif Riaz (Information Technology University, Pakistan & Hamad Bin Khalifa University, Qatar); Khawaja Qasim Maqbool (Bahria University Lahore Campus, Pakistan); Arshad Khan, Bo Wang and Amin Bermak (Hamad Bin Khalifa University, Qatar)

14:20 A Gap Analysis of Technical Standards for Active Safety Online Monitoring and Fire Hazards for Lithium-Ion Batteries

Yujie Yuan (Civil Aviation University of China, China); Xiaoyue Ji (Tsinghua University, China); Zhekang Dong (Hangzhou Dianzi University, China); Chun Sing Lai (Guangdong University of Technology, China)

14:40 An IoT Based Weather Monitoring System for Smart Agriculture

Hassan Ali (UDST, Qatar)

**Tuesday, April 16 15:30 - 16:15 (America/Los\_Angeles)**

Room: Multnomah

**K5: Keynote 5: A Vision for Mid-Century Sustainable Urban Transportation**

Tyler Folsom, University of Washington Bothell

Near-term sustainability goals focus on eliminating greenhouse gases. Transportation is a major contributor to GHG and sustainability requires eliminating petroleum as well as fossil fuels used for vehicle electrification. To effectively guide that action, this talk envisions how sustainable transportation improves on business as usual. The present paradigm of wasting energy on a 4000-pound vehicle to haul one or two people is not sustainable. The future requires going beyond bike share, automated automobile and automated transit networks. When these technologies are merged, small, choreographed pods could end congestion. People move faster, and at lower economic and energy costs. Freight can be moved more efficiently. A key to efficient energy use for passengers and freight is to make the vehicles lighter than the load. Light vehicles require fewer batteries, with beneficial effects on the grid.



**Tuesday, April 16 16:30 - 17:40 (America/Los\_Angeles)**

Room: Multnomah

**PS6A: ML Application**

16:30 Machine Learning Based Electric Vehicle Drivers Charging Satisfaction Analysis and Prediction

Shahab Sabzi and Laszlo Vajta (Budapest University of Technology and Economics, Hungary)

16:50 Prediction of Electric Vehicle Penetration and Its Impacts on Distribution Systems: A Real-World Case Study in Maryland

Wenyu Wang, Zuzhao Ye and Nanpeng Yu (University of California, Riverside, USA); Po-Chen Chen (Exelon Corporation, USA)

17:10 The Environmental Price of Intelligence: Evaluating the Social Cost of Carbon in Machine Learning

Syed Mhamudul Hasan, Abdur Rahman Bin Shahid and Ahmed Imteaj (Southern Illinois University, USA)

**PS6B: IOT II**

Room: Elowah

16:30 Home Grown Automated Garden

Douglas E Dow, Michael A Fiorino, Kyle D Lawless and Ben A Doucette (Wentworth Institute of Technology, USA); Saurav Basnet (550 Huntington Ave & Wentworth Institute of Technology, USA)

16:50 Automated Control and IoT-Based Water Quality Monitoring System for a Molibicus Tilapia Recirculating Aquaculture System (RAS)

Franz Joseph D Libao (Department of Science and Technology - Metals Industry Research and Development, Philippines); Oscar Sheen M Villaverde II (Department of Science and Technology - Metals Industry Research and Development Center & University of the Philippines Diliman, Philippines); Nicole Ann Portia U de Luna (DOST- Metals Industry Research and Development Center, Philippines); Von Jansen G Comedia, Manuel O Luna, Jr, Ana Marie C Atienza and Glen D Espeña (Department of Science and Technology - Metals Industry Research and Development, Philippines)

### **PS6C: Water**

Room: Wakeenah

16:30 Energy for Desalination of Saline Water and Brackish Groundwater - A Case Study of the Metropolitan Region of Recife

Débora dos Santos Carvalho (University of Sao Paulo, Brazil); Jose Baesso Grimoni, Sr (Universidade de Sao Paulo, Brazil)

16:50 Analysis of the Impacts of Urban Development on Flood Risk and Frequency in the Municipality of Angono, Rizal Using Urban Flood Modelling

Jasper Alain G. Viernes and Jay Arr R Formento (Philippines); Ian Patrick Darap Reyes (Mapúa University, Philippines)\

**Tuesday, April 16 18:30 - 20:30 (America/Los\_Angeles)**

Room: Willamette

**CD: Reception/Dinner**

**Wednesday, April 17****Wednesday, April 17 8:00 - 8:50 (America/Los\_Angeles)**

Room: Multnomah

**SFK1: Opening Remarks and Keynote 1**

Electrification is a key strategy for decarbonizing all sectors of the U.S. economy, Hellen Chen, ACEEE

The Energy Information Administration reports that renewable sources comprised 21% of U.S. electricity generation in 2023, and more than 45% in leading states. The growth of carbon-free electricity makes electrification a key pillar for decarbonization in our economy that complements energy efficiency. ACEEE, historically known for ground-breaking work in the energy efficiency space, has found that 90% of U.S. energy use can be electrified while the remaining hard-to-electrify 10% has other decarbonization solutions. We support efficient beneficial electrification and energy efficiency to save energy, save money, and reduce emissions, especially as energy sources become cleaner. We describe the different sectors in which our work focuses and offer examples of key barriers, technologies, policies, and other considerations (i.e., workforce, equity).

**Wednesday, April 17 9:00 - 9:45 (America/Los\_Angeles)**

Room: Multnomah

**SFK2: Keynote 2: Electrification and the Grid**

C. E. (Ted) Witham & Joe Cappeta, Eaton Corp.

This talk will discuss how electrification is affecting the modern-day grid and how distributed energy resources strategies can mitigate those impacts.

**Wednesday, April 17 10:00 - 11:30 (America/Los\_Angeles)**

Room: Multnomah

**SFP1: Panel 1: Promising Heat Pump Developments: Perspectives from the Pacific Northwest**

Hosted/moderated by Stephanie Kruse, P.E., Facilities Engineer, Oregon Department of Energy

Join us for a panel discussion featuring industry experts tasked with deploying heat pumps in the Pacific Northwest. Panelists will be sharing current opportunities and challenges that they are facing. This is a great opportunity to hear updates on how technology and policy developments may offer solutions for heat pump incentive programs.

## Panelists:

- Christopher Dymond, Senior Product Manager, Northwest Energy Efficiency Alliance
- Thomas Elzinga, Energy Services Manager, Central Electric Cooperative, Inc.
- Rick Wittgraf, Southern Region Equipment Sales Manager, from Gensco, Inc.

**Wednesday, April 17 11:45 - 12:15 (America/Los\_Angeles)**

Room: Multnomah

**SFSS: Special Session: Hot Topics is Sustainability**

Maïke Luiken, IEEE SusTech Initiative

Maïke Luiken, PhD, SMIEEE, IEEE-HKN, FEIC, chairs Planet Positive 2030 - an initiative of the IEEE Standards Association - as well as the P7800 Standards Working Group: Recommended Practice for Addressing Sustainability, Environmental Stewardship and Climate Change Challenges in Professional Practice.

**Wednesday, April 17 12:15 - 13:15 (America/Los\_Angeles)**

Room: Willamette

**L3: Lunch****Wednesday, April 17 13:15 - 14:00 (America/Los\_Angeles)**

Room: Multnomah

**SFK3: Keynote 3: Increasing Computing Energy Efficiency is Key Requirement for Sustainability**

Tina Kaarsberg, Ph.D. Acting Program Manager at U.S. Department of Energy (DOE), Advanced Materials and Manufacturing Technologies Office (AMMTO)

The future has arrived for climate change and unsustainable computing energy use. AI-driven exponentially increasing energy demands for computing (e.g. data centers) that are quadrupling forecasts for electricity use. Other drivers of exponentially increasing microelectronics energy use-such as proliferation of web-connected smart devices and the build up to 6G and beyond in wireless communications, have yet to manifest.

Against this backdrop, our 2022 DOE initiative on microelectronics Energy Efficiency Scaling over 2 Decades (EES2)--the topic of this talk-seems prescient.

The talk will detail our efforts in the DOE's Advanced Materials & Manufacturing Technologies Office (AMMTO) to develop an RD&D plan in 2023. Next steps are to get public input and to deploy the technologies-including at least a dozen that are commercially ready-as quickly as possible starting by the end of 2024. In addition to spreading the word on EES2 RD&D Roadmap

and the workforce needed to perform the RD&D and manufacture the technologies-we will use the bully pulpit of the EES2 Initiative which so far includes 61 organizations that have pledged to join the DOE to stay on the path of doubling microelectronics' energy efficiency every two years.

**Wednesday, April 17 14:15 - 15:00 (America/Los\_Angeles)**

Room: Multnomah

**SFK4: Keynote 4: Efficient, Cost-Effective Polymeric Materials Design for Clean Energy and Biomedical Technologies via Biomass Valorization**

Shudipto Konika Dishari, Ross McCollum Associate Professor, Chemical and Biomolecular Engineering, University of Nebraska-Lincoln

Addressing the technical challenges through cutting-edge materials research is the key to excel in sustainable, clean energy technologies, like fuel cells and electrolyzers. Some of the major challenges of current H-fuel cells include ion transport limitation (low-temperature), stability (high-temperature), expensive materials, and environmental sustainability.

To overcome these obstacles, we need to rethink the design of ion-conducting polymers (ionomers) playing the pivotal roles in separators and catalyst layers of these devices. Converting the untapped, industrial/agricultural lignin-rich wastes to design efficient, cost-effective ionomeric materials for eco-friendly electrochemical devices can aid in bio- and energy economies simultaneously. The major application of lignin in sustainable energy materials has so far been porous carbon materials for charge storage and/or electron conduction in electrodes. We have designed ion-conducting materials using lignin from plant-based sources.

This talk will primarily show how these lignin-based polymers improve the ion-transport at low- and high-temperature conditions. We consolidate the findings on average as well as distributed physical, mechanical and ion transport properties across lignin-based ionomeric materials to understand the ion transport process which can inform and guide the future design of sustainable energy technologies. The talk will also give a glimpse of how we are designing functional materials using lignin for biomedical applications.

**Wednesday, April 17 15:15 - 16:00 (America/Los\_Angeles)**

Room: Multnomah

**SFK5: Keynote 5: Off-shore Wind Power Studies**

Dmitry Kosterev, Bonneville Power Administration (BPA)

Dmitry Kosterev is a senior transmission planning engineer at Bonneville Power Administration. He is involved in wide range of transmission planning projects, power plant modeling, testing and verification, synchrophasor technology application, and technology innovation projects.

He is involved in several off-shore wind generation integration studies at BPA, Western Power Pool, and serves as a technical adviser for DOE West Coast Off-Shore Wind study.

**Wednesday, April 17 16:15 - 16:30 (America/Los\_Angeles)**

Room: Multnomah

### **SPCA: Student Poster Awards**

Sean Monemi, SusTech 2024 Student Poster Contest Chair

Student Poster Awards for first, second and third places as determined by the judges. First place \$1000; second \$500; third(x2) \$250. will be presented.

**Wednesday, April 17 16:30 - 16:45 (America/Los\_Angeles)**

Room: Multnomah

### **CLOS: Closing Remarks & SusTech 2025**