

IEEE SusTech2023

SusTech 2023 Sustainability Forum Program

Saturday April 22, 8:00 am – 4:45 pm

The Sustainability Forum is a unique conference track at SusTech 2023 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 goals and barriers to achieve them; the role advances in electronic materials and components play in advancing sustainability; policy efforts to support sustainability; distributed power generation and storage; and the role of people in achieving sustainability. There will be a panel on “Implementing a Sustainable Future for Aviation: An Ecosystem Approach” organized by the AIAA.

Agenda

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

Time	Session	Speaker(s)
8:00 am	Opening Remarks and Keynote 1:	Where We Thought We Would Be and Where We Think We’re Going , Eric Olson, Northwest Energy Efficiency Alliance (NEEA)
9:00 am	Keynote 2	Electronics materials and components enabling sustainability , Dan Donahoe
10:00 am	Panel 1	Implementing a Sustainable Future for Aviation: An Ecosystem Approach (organized by AIAA)
11:45 am	Special Session	IEEE-USA’s policy efforts to support sustainable technology , Russell Harrison, Managing Director, IEEE-USA
12:15 pm	LUNCH	
1:15 pm	Keynote 3	Distributed Power Generation and Storage for a Renewable Future , Mahima Gupta, Portland State University
2:15 pm	Keynote 4	Second-Life EV Batteries for Renewable and Smart Grid Storage Applications , Chris Mi, San Diego State University
3:15 pm	Keynote 5	From Boundaries to Beauty – The Human Side of Sustainability , John Havens, Lead of Sustainability Practice, the IEEE Standards Association
4:15 pm	Student Poster Awards	Prof. Sean Monemi, Cal Poly Pomona
4:30 pm	Closing Remarks & SusTech 2024	

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Speakers

Where We Thought We Would Be and Where We Think We're Going

Saturday, April 22, 2023 @ 8:00 am

Eric Olson, Manager of Emerging Technology and Product Management at the Northwest Energy Efficiency Alliance (NEEA)

Abstract:

Innovative and emerging technologies are crucial in energy efficiency and achieving sustainability goals. What technologies did experts think would be successful a decade ago but are struggling for adoption, and what are some that have surprised us all? Multiple technologies are available and in development that can support energy efficiency goals. We will examine barriers stakeholders can address to increase awareness and adoption and discuss some successfully promoted products.



Eric Olson is the Manager of Emerging Technology and Product Management at the Northwest Energy Efficiency Alliance (NEEA). He leads a team of product managers that collaborate with efficiency organizations, utilities, and national laboratories to identify, test, and vet products, technologies, and practices that help NEEA's 140 utility stakeholders achieve their energy efficiency goals.

Olson has launched multiple innovative products throughout his nearly 25-year career, with more than ten years in environmentally focused products and industries. He focuses on discovering opportunities for product development that drive market adoption. Before joining NEEA, he was the manager of product management and product marketing for the largest and most experienced solar cell and solar panel manufacturer in the western hemisphere, launching pioneering photovoltaic products and dealer programs; developing long-term field testing with Sandia National Labs and NREL to measure the performance and durability of solar panels across various climates; and contributed to UL and IEC standards for photovoltaics. Olson also has deep experience developing and bringing consumer, commercial, and industrial engine and motor-powered equipment to market.

Olson holds a Bachelor's degree in Business Administration and an MBA.

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Electronics materials and components enabling sustainability

Saturday, April 22, 2023 @ 9:00 am

Dan Donahoe, 1000 Kilometers LLC

Abstract:

Clayton Christensen's 1997 book *The Inventor's Dilemma* popularized the word "disruption" explaining innovation by depicting technology against time as an "S-Curve". The "S" is formed by phases of slow growth followed by rapid growth and finally by slowing growth constrained by "carrying capacity". A series of incremental improvements of said technology, each with its own "s-curve", agglomerates into a class forms a logarithmic curve such as the familiar Moore's Law. Specifically, this presentation reflects on advances in materials that enabled these technology leaps with an eye to how technology impacts sustainability. Behind each of these advances are marvelous stories about people and how their work continues to enable mankind to grow population far beyond the planet's natural carrying capacity for humans in their historical role of hunter-gatherers.

Dan Donahoe has worked around electronics for over 4 decades. He has worked for defense companies and for the Air Force, worked for computer companies, and worked as a consultant. Dan's business is named *1000 kilometers*. Dan is a Life Senior Member of IEEE and has served as a Section Chair, as an Associate Editor, as a Member at Large on both the IEEE-USA Board and the Electronics Packaging Society (EPS) Boards, as an ad hoc committee chair for IEEE TAB, and as General Chair for SusTech 2015 and Program Chair for SusTech 2023. In 2022, Dan was awarded the inaugural IEEE EPS Distinguished Achievement Certificate for Professional Engagement and Service and the Utah Engineers Council's Engineer of the Year 2022. In 2021 he was honored by the Air Force Meritorious Civilian Service Award. He has a BS & MS from the University of Illinois, MBA from Santa Clara and PhD from the University of Maryland. He is a Registered Professional Engineer in several states.



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IEEE-USA's policy efforts to support sustainable technology

Saturday, April 22, 2023 @ 11:45 am

Russell Harrison, Managing Director, IEEE-USA

Abstract:

IEEE-USA government relations addresses sustainability in a variety of ways. In energy policy, electric grid issues have been a longstanding focus.

- How can the US ensure strong physical and cybersecurity of the grid so that when natural disasters strike, Americans regardless of geographic location can have access to electricity? This talk will address grid policy issues in both rural as well as urban areas and will also address the current issues in all aspects of grid security, including cybersecurity.
- Sustainability in space policy is another area where IEEE-USA is looking to build better federal policy. Remote sensing is critical to mitigating and recovering from natural disaster. Satellite protection, including physical and cybersecurity is vital to space sustainability.
- IEEE-USA has been a leader in advocating for support for the basic research programs at the National Institute of Standards and Technology as well as the National Science Foundation. Many of these programs have implications for environmental sustainability and the development of technology used in sustainability practices. This talk will provide an overview of IEEE-USA's advocacy efforts for these agencies.
- Lastly, this talk will cover how IEEE-USA staff are working on sustainable artificial intelligence policy.



Russell Harrison is the Managing Director of the IEEE-USA, which focuses on the unique needs and concerns of IEEE members in the United States. Over his 20-year career with IEEE-USA, Russ has represented IEEE members to the American government on dozens of policy issues including autonomous vehicles, digital privacy, AI, federal research funding, export control, and immigration. In addition to directly engaging with policy makers, Russ strives to build bridges between technology professionals and politicians. He has spoken at over 300 local, national, and international events about public policy and the need for technology professionals to

interact with their elected leaders.

Prior to IEEE-USA, Russ represented recycling facilities and the steel industry on Capitol Hill. He has a Master's in Public Management from the University of Maryland and a B.A. in Political Science from Allegheny College.

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Distributed Power Generation and Storage for a Renewable Energy Dominant Future

Saturday, April 22, 2023 @ 1:15 pm

Mahima Gupta, Portland State University

Abstract:

Replacing fossil fuels with clean and sustainable energy sources is essential to avoid critical disruptions due to climate change. The electric grid in many countries have high fractions of renewables: Iceland (100%), Norway (97%), Kenya (90%), Brazil (80%), Canada (65%). As per the U.S. Energy Information Agency, in 2021, the share of renewables in the U.S. electricity generation resource mix is 21% and could reach 42% by 2050. Could we aim for higher? How would a 100% Green U.S. Electric Grid look like? What is the expected mix of renewable energy resources? What technological advancements are essential for a renewable energy dominant future? This talk focuses on the role of distributed power generation and storage systems in a renewable energy dominant future, from its definition to the system-level aspects, with emphasis on power electronics systems designs.

Mahima Gupta received her Ph.D. and M.S. degree in Electrical and Computer Engineering from University of Wisconsin-Madison, Madison, WI, in 2019 and 2015 respectively. At UW-Madison, she was affiliated with the Wisconsin Electric Machine and Power Electronics Consortium (WEMPEC). She received her B.E. degree in Electrical and Electronics Engineering from Birla Institute of Technology and Science, Pilani, India. Currently, she is an Assistant Professor at Portland State University, Portland, OR.



Her research interests include power electronic conversion & control, modular multilevel power converters, motor drive systems, and electromagnetic interference issues due to power electronics. Prior to joining PSU in 2020, she was a part of the Research and Advanced Engineering group with Ford Motor Company at Dearborn, MI where she worked on next-generation electrified powertrains.

Dr. Gupta, in recognition of her teaching and research excellence, was the recipient of the 2018 Gerald Holdridge Teaching Award, and the 2016 Edward R. Felber Power Fellowship. Her research has been funded by the National Science Foundation.

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Second-Life EV Batteries for Renewable and Smart Grid Storage Applications

Saturday, April 22, 2023 @ 2:15 pm

Chris Mi, Fellow of IEEE & SAE, San Diego State University

Abstract:

The number of electric vehicles (EVs) on roads is growing rapidly. EV batteries today, almost exclusively lithium-ion based, can last about 10 years before they can no longer provide the required performance such as power and range. They cost heavily in both production and recycling. So economically dealing with retired EV batteries is an important topic. It is estimated that the first huge wave of EV battery retirement will hit in 2025, and more retired batteries will be available each year thereafter.

On the other hand, renewable energy, such as solar photovoltaic (PV) and wind, also enjoy a high rate of penetration. To buffer the volatile nature of the energy output of renewable energy systems, battery energy storage systems (BESSs) are frequently incorporated to balance out the variability in power generation, efficiently manage the dynamics of demand and supply, mitigate the potential failure of the grid due to over generation, provide power during a power outage, and enable cost savings by shifting the peak use and reduce demand charge. However, the high cost of new batteries in renewable and grid storage systems is a major concern for potential home and business owners.

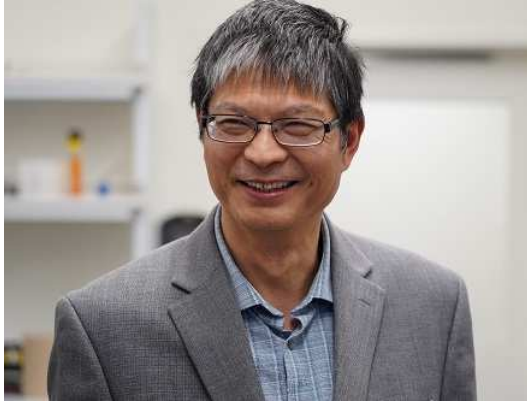
Batteries in EVs degrade gradually over the lifetime of the vehicle and will reach the point that it is no longer able to provide the required performance, such as range and acceleration. Second-life EV batteries include not only the batteries that are discarded from EVs due to degraded conditions; but also in-warranty replacements; road accidents; test vehicle batteries; and unsold batteries. Second-life EV batteries, though no longer roadworthy in the vehicle, still have considerable capacity for renewable energy and smart grid applications where the requirement for energy and power density is not as stringent in vehicles. The use of second-life EV batteries in grid BESS extends the life cycle of batteries after their first life in EVs, improves the environment, reduces EV ownership cost by selling them for second-life use, and reduces the cost of BESS in renewable energy systems.

However, there are a number of barriers to overcome in the deployment of second-life EV batteries, including how to properly remove them from vehicles, transport, store, test, and select second-life batteries for storage applications; how to quickly, and accurately identify the battery health conditions of every cell before and after deployment in grid storage; how to dynamically manage them so as to minimize degradation and optimize usage; and how to meet various standards related to fire hazardous mitigation/prevention, certification, permit, and safety.

This talk will holistically look at these issues and address how second-life EV batteries can be used in renewable energy and smart grid applications. The talk will include storage system design, battery management, battery balancing, size optimization, and system control and optimization for

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demand charge management and peak shaving. We will also look at the various testing requirements for identifying the conditions of used EV batteries. The aging mechanism of second-life EV batteries will be presented. Various topologies for storage applications, safety, standard, and permit-related issues, will also be discussed.



Chris Mi is distinguished Professor of Electrical and Computer Engineering at San Diego State University. He is a Fellow of IEEE (Institute of Electrical and Electronics Engineers) and SAE (Society of Automotive Engineers). He is also the Director of the US Department of Energy-funded Graduate Automotive Technology Education (GATE) Center for Electric Drive Transportation at SDSU. He was previously a faculty member at the University of Michigan-Dearborn from 2001 to 2015, and an Electrical Engineer with General Electric from 2000 to 2001. He also served as the CTO of 1Power Solutions

from 2008 to 2011 and is currently the CTO of EV Safe Charge, Inc. Dr. Mi received his Ph. D from the University of Toronto, Canada, in 2001.

Dr. Mi has published five books, 204 journal papers, 126 conference papers, and 25 issued and pending patents. He served as Editor-in-Chief, Area Editor, Guest Editor, and Associate Editor of multiple IEEE Transactions and international journals, as well as the General Chair of over ten IEEE international conferences. Dr. Mi has won numerous awards, including the “Distinguished Teaching Award” and “Distinguished Research Award” from the University of Michigan-Dearborn, IEEE Region 4 “Outstanding Engineer Award,” IEEE Southeastern Michigan Section “Outstanding Professional Award,” and SAE “Environmental Excellence in Transportation (E2T) Award.” He is the recipient of three Best Paper Awards from IEEE Transactions on Power Electronics and the 2017 ECCE Student Demonstration Award. In 2019, he received the Inaugural IEEE Power Electronics Emerging Technology Award. In 2022, he received the Albert W. Johnson Research Lectureship and named the Distinguished Professor, the highest honor given to a SDSU faculty member and only one award is given each year.

Dr. Mi was the Chair (2008-2009) and Vice-Chair (2006-2007) of the IEEE Southeastern Michigan Section. Dr. Mi was the General Chair of the 5th IEEE Vehicle Power and Propulsion Conference, Area Editor of IEEE Transactions on Vehicular Technology, associate editor of IEEE Transactions on Power Electronics, Associate Editor of IEEE Transactions on Industry Applications. He is the topic chair for the 2011 IEEE International Future Energy Challenge and the General Chair for the 2013 IEEE International Future Energy Challenge. Dr. Chris Mi is a Distinguished Lecturer (DL) of the IEEE Vehicular Technology Society.

He is Guest Editor-in-Chief of IEEE Journal of Emerging and Selected Topics in Power Electronics – Special Issue on WPT, Guest Co-Editor-in-Chief of IEEE Transactions on Power Electronics Special Issue on WPT, Guest Editor of IEEE Transactions on Industrial Electronics – Special Issue on dynamic wireless power transfer, and steering committee member of the IEEE Transportation Electrification Conference (ITEC- Asian). He is Program Chair or General Chair

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of a number of international conferences, including Workshop on Wireless Power Transfer (WoW), IEEE International Electric Vehicle Conference (IEVC), and IEEE International Transportation Electrification Conference – Asia-Pacific. He is the Guest Editor of a Special Issue of the Proceedings of the IEEE – Electric and Hybrid Vehicles.

From Boundaries to Beauty – The Human Side of Sustainability

Saturday, April 22, 2023 @ 3:15 pm

John C. Havens, Lead of Sustainability Practice, the IEEE Standards Association



John C. Havens is Lead of the Sustainability Practice of the IEEE Standards Association where he drives the strategy, coordination, and vision for the IEEE SA [Planet Positive 2030](#) Program. He is also Executive Director of [The IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems](#) which was responsible for the creation and iteration of a body of work known as [Ethically Aligned Design: A Vision for Prioritizing Human Well-being with Autonomous and Intelligent Systems](#) that was utilized by the United Nations, the OECD, IBM and dozens of organizations to create their AI principles, policies, and technology.

Previously, John was an EVP of Social Media at PR Firm, Porter Novelli, led Business Development at BlogTalkRadio, and was a professional actor for over 15 years. John has written for Mashable and The Guardian and is author of the books, [Heartificial Intelligence: Embracing Our Humanity To Maximize Machines](#) and [Hacking Happiness: Why Your Personal Data Counts and How Tracking it Can Change the World](#). For more information, follow [John on LinkedIn](#) or [@johnchavens](#) on twitter. John currently has over [ninety citations on Research Gate](#) and [dozens of articles](#) for outlets such as The Guardian, Quartz, IEEE Spectrum and Mashable.

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Panel: Implementing a Sustainable Future for Aviation: An Ecosystem Approach

Organized by the American Institute of Aeronautics and Astronautics (AIAA)

Saturday April 22, 10:00 am

Sustainable aviation is a cross-industry priority requiring cooperation across aerospace disciplines, including both classical aeronautics science and engineering, as well as adjacent fields such as chemical engineering and transportation planning, to determine the priorities and implement a vision which can be both scaled and maintained. In this panel, organized by the American Institute of Aeronautics and Astronautics (AIAA), speakers will share their perspectives on sustainable aviation developments in policy, practice, and implementation. Panel discussion will emphasize an inclusive ecosystem approach that attempts to embrace a comprehensive view of all technology elements—vehicles, fuels, infrastructure—necessary for a sustainable future for aviation.

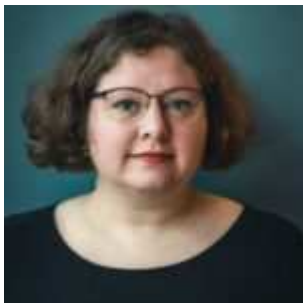
Panelists:

- [Carol Sim](#), Assistant Director of the Aviation Sustainability Center (ASCENT) at Washington State University
- [Matt Orr](#), Associate Technical Fellow in Product Development at The Boeing Company

Moderator:

[Ashira Beutler-Greene](#), Senior Manager, Content and Product Strategy at the American Institute of Aeronautics and Astronautics (AIAA)

Bios:



Ashira Beutler-Greene, Ph.D. is responsible for the management of initiatives related to sustainable aviation and advanced air mobility at the American Institute of Aeronautics and Astronautics (AIAA). She enjoys providing opportunities for cross-industry stakeholders to share their perspectives on common areas of concern. Prior to her role at AIAA, she managed educational media programming for the Annual Meeting of the American Association for the Advancement of Science. Ashira holds degrees from University College London, Carnegie Mellon University, and Wellesley College.

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Ms. Carol Sim is an Assistant Director in the Washington State University Office of National Laboratory Partnerships and supports the FAA Center of Excellence for Alternative Jet Fuel and the Environment (commonly known as ASCENT) – an aviation-based research organization providing science-based solutions for many of aviation’s environmental challenges. Carol also facilitates the Washington Sustainable Aviation Biofuels Work Group- a diverse group of public and private stakeholders – working to promote sustainable aviation fuels as a productive industry in Washington. Prior to joining WSU, Carol was the Director of Environmental Affairs for Alaska Airlines.



Dr. Matthew Orr is an Associate Technical Fellow, Boeing Commercial Airplanes Product Development, with over 20 years of experience in aircraft design. Matt’s career has been focused on improving fuel efficiency and reducing the environmental footprint of commercial aviation. He is an American Institute for Aeronautics and Astronautics (AIAA) Associate Fellow and a member of the Aircraft Design Technical Committee, Student Activities Committee, and the Sustainable Aviation Task Force within the AIAA.