

SusTech2024 Sustainability Forum Program

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.

Attendees can receive PDH/CEU credit for attendance.

Agenda

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

April 17 (Wednesday) 8:00 am - 4:30pm	
SusTech 2024 Sustainability Forum	
8:00 – 8:50 am	Opening Remarks and Keynote 1: Hellen Chen, ACEEE
9:00 – 9:50 am	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 – 1:00 pm	Lunch Break
1:10 – 2:00 pm	Keynote 3: Tina Kaarsberg, US DOE
2:10 – 3:00 pm	Keynote 4: Shudipto Konika Dishari, University of Nebraska-Lincoln
3:10 – 4:00 pm	Keynote 5: Dmitry Kosterev, BPA
4:15 pm	SusTech 2024 Student Poster Awards
4:30 pm	Closing Remarks & SusTech 2025

Speakers and Panel

Keynote 1	Electrification is a key strategy for decarbonizing all sectors of the U.S. economy	Hellen Chen, Research Analyst in the Industry Program, American Council for an Energy-Efficient Economy (ACEEE)
Keynote 2	Electrification and the Grid	C. E. Ted Witham & Joe Cappeta, Eaton
Panel	Promising Heat Pump Developments: Perspectives from the Pacific Northwest	Organized by Stephanie Kruse, P.E., Oregon Dept. of Energy
Special Session	Hot Topics in Sustainability	Maike Luiken, IEEE SusTech Initiative

Keynote 3	Increasing Computing Energy Efficiency is Key Requirement for Sustainability	Tina Kaarsberg, Acting Program Manager, Advanced Materials and Manufacturing Technologies Office (AMMTO), U.S. Department of Energy (DOE)
Keynote 4	Efficient, Cost-Effective Polymeric Materials Design for Clean Energy and Biomedical Technologies <i>via</i> Biomass Valorization	Shudipto Konika Dishari, Ross McCollum Associate Professor, Chemical and Biomolecular Engineering, University of Nebraska-Lincoln
Keynote 5	Off-shore Wind Power Studies	Dmitry Kosterev, BPA

Session Descriptions

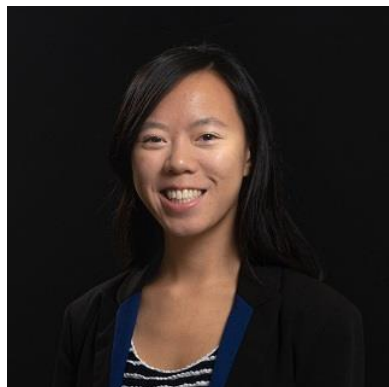
Electrification is a key strategy for decarbonizing all sectors of the U.S. economy

April 17, 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.

Electrification and the Grid

April 17, 9:00 am

C. E. Ted Witham & Joe Cappeta, Eaton

Abstract:

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



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.

Panel: 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.

Panelist Bios:



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.

Special Session: Hot Topics in Sustainability

April 17, 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.

Increasing Computing Energy Efficiency is Key Requirement for Sustainability

Wednesday, April 17, 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.

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

April 17, 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).

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.