

*2016 CALIFORNIA RENEWABLE ENERGY AND
STORAGE TECHNOLOGY
CONFERENCE*

SPEAKERS



Matt Petersen, Chief Sustainability Officer, City of Los Angeles

Matt Petersen was named Chief Sustainability officer by Mayor Eric Garcetti of Los Angeles. As the first ever CSO for the City of LA, Matt is focused on helping Mayor Garcetti create 20,000 green jobs in LA, create a more sustainable and livable city and neighborhoods, and hold every city department responsible for cleaner air and water.

For 19 years, Matt served as President and CEO of Global Green USA, building the group into one of the country's leading environmental organizations (and the only national environmental organization headquartered in greater Los Angeles). Passionate about improving the environment and the lives of those in need, Petersen forged a national partnership with Habitat for Humanity International in 1995 to save homeowners money and improve their health. In 1997, Global Green and the City of LA hosted a sustainable housing summit, launching the organization's broader greening affordable housing initiative. As result of partnerships, legislation, and incentives put in place by Global Green over the last 15 years, over 100,000 individuals across the US now live in affordable housing with lower energy bills, better indoor air quality, and better access to transit. In California, Petersen's leadership has led to \$320 million being set aside for solar on affordable housing, addressing the disproportionate impact on minority and low-income communities through the community empowerment amendment to global warming law AB32, and the first state mandate to increase energy efficiency in existing buildings via AB758.

The focus on the urban environment also included the greening of schools and cities, including crafting an initiative funded by the Annenberg Foundation to green all new LAUSD schools, ensuring over \$15 billion in new construction will result in significant utility savings, and better learning environments for kids and teachers. Global Green's work with cities, including Los Angeles, New Orleans, San Francisco, and others has created ground breaking green building policies, climate action plans, and solar initiatives, including the first large city municipal green building policy created in LA with then Councilman Eric Garcetti in 2002.

Petersen is widely credited for his successful vision for the green rebuilding of New Orleans after Hurricane Katrina, leading TIME Magazine to recognize Global Green's leadership. Top on Petersen's agenda was the greening of New Orleans' schools rebuilt after the storm, as well as increasing energy efficiency and indoor air quality of existing classrooms. Petersen, along with actor Brad Pitt, also launched the New Orleans Sustainable Design Competition, which resulted in the Holy Cross Project, a sustainable village under construction in the Lower 9th Ward.

More recently, Petersen turned Global Green's attention to the communities devastated by Hurricane Sandy. He created the Solar for Sandy initiative that is bringing grid-tied, back-up solar systems to

community centers in New York and New Jersey. This year, Petersen appeared with former President Bill Clinton to announce the initiative and the support of IKEA for the 2nd solar system to be installed in Red Hook in Brooklyn, NY.

Over many years, Petersen has called not only for corporations and elected officials to act to combat climate change and create more sustainable communities, but for individuals to become "citizen entrepreneurs" and take responsibility for a corner for their world. The search for "citizen entrepreneurs" is emerging as a major initiative within Global Green, leading to support and recognition of individuals across the United States who are improving their communities. Petersen also created partnerships with major American companies to support the organization's efforts, including Starbucks as among the very first major U.S. corporations to call for action on climate change.

Matt continues as a board member of Global Green USA, while also serving on the board of Habitat for Humanity of Greater Los Angeles. He also is a member of the Council on Foreign Relations, and is an advisor on energy and environment to the Clinton Global Initiative.

Smart and Advanced Manufacturing Innovation in DOE

Sudarsan Rachuri PhD

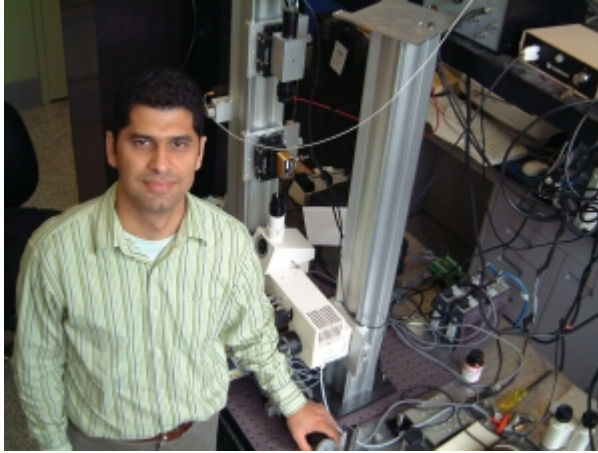
Federal Program Officer and Technology Manager
Advanced Manufacturing Office
Office of Energy Efficiency and Renewable Energy (EERE)
Department of Energy

Abstract

The talk will describe the objective of the “smart” manufacturing and the proposed Manufacturing USA Institute for Smart Manufacturing: Advanced Sensors, Controls, Platforms, and Modeling for Manufacturing. Smart manufacturing is an emerging field that combines physical systems with big data and intelligence. It is also referred to as Advanced Manufacturing, Digital Manufacturing, Cyber Physical Systems (CPS), the Internet of Things (IoT) and in Germany “Industrie 4.0.” It can mean different things to different people, but essentially it is about smartly extracting information from the system to improve overall efficiency of manufacturing. Smart Manufacturing has the potential to fundamentally change how products are designed, manufactured, supplied, used, remanufactured and eventually retired.



Bio: Dr. Sudarsan Rachuri is a Technology Manager in the Advanced Manufacturing Office, EERE, and DOE. He is also the Federal Program Manager for the proposed Manufacturing USA Institute for Smart Manufacturing. Prior to joining DOE, he was the program manager at NIST and also a research professor at George Washington University. Dr. Rachuri is an ASME Fellow, having been elected in 2012 for his significant contributions in the areas of information and semantic modeling of product life cycle management, and the application of measurement science for sustainable manufacturing. Dr. Sudarsan Rachuri was given the 2016 ASTM International President’s Leadership Award. This recognizes individuals early in their ASTM International career who have significantly advanced the organization's mission through extraordinary accomplishment, example, and vision. Dr. Rachuri is serving as Editor-in-Chief of ASTM International’s new journal, Smart and Sustainable Manufacturing Systems, which launches in January 2017. Rachuri is also a founding member and vice chair of the ASTM subcommittee that develops standards in sustainable manufacturing (E60.13). He also serves on ASTM International's Smart Manufacturing Advisory Committee. Rachuri serves as the Chair of the standards committee on ASME V&V 50 Verification and Validation of Computational Modeling for Advanced Manufacturing.



Dr. Pirouz Kavehpour, MAE, UCLA

Energy Storage System from Utility Scale to Small Scale: Over-rated and under-rated parameters.

Abstract:

Utilities has pursued cost-effective energy storage for many decades. They traditionally limited by the need to match demand with supply, to store produced energy for use during

more valuable periods has been recognized. Recently a series of parameters, including technological progress, legislative and regulatory tailwinds, and new grid challenges associated with integrating variable renewable generation, have put energy storage to the forefront of industry. This, however, does not by itself solve the various complexities facing energy storage. Even the definition of “storage” can be confusing, as the term refers to multiple different technologies and potential uses across the electrical grid. Additionally, while these options continue to develop and emerge, there is little consensus on how their worth should be evaluated. In this presentation, we discuss several different storage systems and important parameters depend on the scale of the storage system.

Bio:

Prof. H. Pirouz Kavehpour is professor and vice chair of graduate studies in the Department of Mechanical and Aerospace Engineering at UCLA. He is also director of the Complex Fluid & Interfacial Physics Laboratory. He received his B.S from Sharif University of Technology (Tehran, Iran) in 1991, and his M.S. in 1997 at the University of Rhode Island where he investigated the heat transfer and fluid mechanics of gaseous flows in microchannels. Dr. Kavehpour performed his Ph.D. research at MIT (2003) in the Hatsopoulos Microfluids Laboratory. His thesis focused on the imaging and theoretical investigation of contact-line dynamics in spreading films. He stayed at MIT for his post-doctoral research on the lubricity and rheology of complex fluids in microfluidic devices and in high-speed fiber-coating processes.

Prof. Kavehpour’s research includes spreading of polymeric fluids, biofluids, transport phenomena in biological tissues, micro-scale fluid mechanics, energy storage and tribo-rheology of complex fluids. Prof. Kavehpour is fellow of ASME, and recipient of L. E. Scriven young investigator award from the International Society of Coating Science and Technology. He is also a recipient of the Army Young Investigator award (YIP) for his research on interfacial properties of the ionic liquids.

California State Lands Commission Renewable Energy Program

Greg Pelka, Richard Lee

SB 350 was signed by Governor Jerry Brown in October, 2015, which requires California utilities to obtain 50% of their electricity from renewable sources by 2030. In September of this year, Governor Brown signed SB 32, requiring California to further reduce emissions to 40% of that from 1990. The California State Lands Commission (Commission) has been involved in the leasing of lands for geothermal energy for nearly 50 years since the passage of the Geothermal Resources Act in 1967. More recently, State Lands has become involved in wind and solar energy, bringing about new opportunities and challenges for all of the stakeholders involved. Geothermal energy however, remains a critical component of renewable energy that is capable of providing 24 hours of baseload power, 7 days a week, which can be relied upon when other renewable energy sources, such as solar and wind, are producing power intermittently due to variable weather conditions.

The United States leads the world in geothermal energy production, with 80% of that originating in California. There are 44 operating geothermal power plants in California with an installed capacity of over 2700MW, providing over 6% of the State's electricity. The Commission manages 13 geothermal leases located at the Geysers in northern California, and in the Imperial Valley in southern California. Geothermal exploration is also underway in other parts of the State, such as the Coso region within the Owens Valley. The Commission is presently embarking upon the development of other renewable energy leases, such as its first lease for wind power in San Diego County, and a large photovoltaic facility near Desert Center that could be acquired by the Commission through the Desert Renewable Energy Conservation Plan. This presentation will review some of the opportunities and challenges of expanding California's renewable energy portfolio. This review will also be accompanied by a description of the different geologic and reservoir characteristics between the Geysers and Salton Sea geothermal fields, and how these differences affect the production of energy at each site.



Greg Pelka

Greg Pelka is a Senior Mineral Resources Engineer with the California State Lands Commission in Long Beach with over 34 years of experience with natural resource exploration, development and management. Mr. Pelka has a broad background in the issuance and administration of Geothermal and Solid Mineral permits and leases on State owned school and sovereign lands. He has also worked in numerous facets of Petroleum Engineering involving the onshore and offshore oil and gas facilities the State Lands Commission manages in the Long Beach, Orange County, Santa Barbara Channel area and Sacramento Valley. Greg Pelka received his Bachelor degree in Geology from the California State University, Los Angeles and has been licensed in the State of California as a Professional Geologist for 30 years. One of Greg Pelka's current projects is to determine how

State lands may best contribute to achieve the goal of SB 350, 50% renewable energy in California by 2030. Greg Pelka resides in Long Beach, California.



Richard Lee

Ricky Lee joined the California State Lands Commission in 2012. He has been working as a geologist on characterizing and assessing mineral and alternative energy resources with regards to conservation, reclamation, and production of those resources. Ricky obtained a B.S. and an M.S. in Geology from the California State University at Long Beach, specializing in structural geology and sedimentology. His graduate work was funded in part, by the American Chemical Society's Petroleum Research Fund, for studying basin-bounding fault systems along California's coast. Since joining state service in 2012, Ricky has been actively involved in mineral potential studies within the desert for pending land exchanges with the federal government. He has also been supporting the recent proactive evaluation of State's geothermal resources. Ricky is currently involved with the use of drones for assisting in the management of state leases and permits, and will continue to support State's various renewable energy activities. Ricky lee lives in Fullerton, California.

Sustainable Renewable Energy: Scale, Feasibility and Viability

Anupam Madhukar

University of Southern California

Biosketch:



Anupam Madhukar heads the Nanostructure Materials and Devices Laboratory (NMDL) at the University of Southern California (USC) and is internationally known for pioneering several elements of semiconductor nanoscience, including the spawning and development of self-organized quantum dots that provide the basis of the next generation of optoelectronic devices for optical communication. He is the Kenneth T. Norris Professor of Engineering, holds appointments in Biomedical Engineering, Chemical Engineering, Materials Science, and Physics, and is a Founding Member of the Center for Photonics and the Center for Microscopy and Microanalysis at USC. He obtained PhD in Materials Science and Physics from the California Institute of Technology (1971) and, after serving at the IBM T. J. Watson Research Center and the University of Chicago, joined the USC faculty in 1976. His group carries out inter- and multi-disciplinary research with a focus on quantum phenomena in novel functional nanostructures aimed at: electronic and photonic applications in information processing and communication; conversion of solar photons to power; real-time imaging of multiple markers of intra-cellular biochemical processes in live cells under applied stress; and quantum dots as single photon sources integrated on-chip in optical circuits for quantum information processing.

Madhukar is a Fellow of the American Physical Society and recipient of an Alfred P. Sloan Fellowship (Physics, 1977-79). He is the recipient of the Outstanding Research Achievement Award (1988) of the USC School of Engineering and DARPA/MTO Award of Sustained Excellence (1997). He has served on a variety of professional committees and national panels including the US National Nanotechnology Initiative (NNI) Panel on Nanoelectronics, Nanomagnetism, and Nanophotonics (2004), National Solar Energy Workshop Panel (2005), and the Panel on Sustainable Energy of the MPS Division of NSF (2010).



Casandra Rauser, Ph.D.
UCLA Office of the Vice Chancellor for Research
Director, Sustainable LA Grand Challenge

Dr. Rauser is the Director of UCLA's Sustainable LA Grand Challenge. She has extensive experience strategically developing and funding major research and training programs across campus, and formerly worked abroad building partnerships among private companies, local and national government and the community to create a public-private nature preserve in the tropics. In her current position, Dr. Rauser is working to advance a campus-led Grand Challenge project at UCLA to transform Los Angeles into the first fully sustainable megacity in the areas of energy, water, and ecosystem health. She is using her demonstrated ability to build

relationships and forge collaborations among diverse groups to identify challenges specific to the LA region, and implement solutions with the goal of creating a more equitable and livable world.

Title: UCLA Sustainable LA Grand Challenge: Strategies for transitioning LA County to 100% renewable energy

Abstract: Although the region is on track to meet mandated renewable portfolio standards and greenhouse gas emission targets, Los Angeles continues to face some of the most severe air quality and climate emission challenges. Over the coming decades, population growth, rising temperatures, electrified transportation, and water needs will put increased pressure on the region's energy system. A comprehensive and multi-faceted approach is necessary to address these challenges and develop game-changing clean-energy solutions that are affordable to all residents. Collaboration and partnerships across sectors are imperative, and on a local level, UCLA's [Sustainable LA Grand Challenge](#) initiative has committed to assessing the capabilities of currently available technologies and strategies, targeting areas where new research is needed, and serving as a nexus for partnerships to transition LA County to 100% renewable energy by 2050. Since its launch in 2013, Sustainable LA has identified nearly 40 research recommendations related to renewable energy that must be addressed in the near term in its [Five-Year Work Plan](#), and invested in a number of projects that will contribute to a clean-energy future for the region. This presentation will provide an overview of Sustainable LA's renewable energy research and strategies.



Dr. Diego Rosso

Diego Rosso is an Associate Professor in the Civil and Environmental Engineering Department and is the Director of the Water-Energy Nexus Center at UCI. Since 2000, he has been investigating the water-energy-carbon nexus and water reclamation and reuse processes. His research portfolio has been supported by federal and state funding, and from a variety of industrial sources. He is a Chemical Engineering Laureate from the University of Padua in Italy and earned a Ph.D. in Environmental Engineering from UCLA.

WATER-ENERGY-CARBON NEXUS IN WATER RECLAMATION, REUSE, AND WASTEWATER TREATMENT

ABSTRACT

Education and experience have formed us to foster steady-state conditions as the operational mode of choice for numerous processes, including water reuse. However, due to the influent variability and the heavy reliance on energy usage during processing, the energy in water reuse is almost never a steady-state operation. Due to the dynamics of power generation, the carbon footprint of both power generation and water processes are almost never at steady-state.

This presentation covers our work at the water-energy nexus spanning over a decade and includes carbon and energy footprint models and field measurements in several areas of the world. In this presentation we will also cover how to understand, model, and present the diurnal carbon and energy footprint dynamics of water and resource recovery processes and the effects of diurnal variations of influent water and process characteristics on process energy and cost.



Dr. Karthik Nithyanandam

Karthik Nithyanandam is a postdoctoral researcher in the Mechanical and Aerospace Engineering department at UCLA. His current research is focused on developing low-cost thermal energy storage system for concentrating solar power plant. Karthik received his PhD in 2013 from Virginia Tech where he investigated latent thermal energy storage systems for concentrating solar power. While at Virginia Tech, he was awarded the Edward H. Cahill Memorial Scholarship award in 2011. Prior to joining UCLA, he worked as a postdoctoral researcher at Virginia Tech. His research contributions include developing phase change electrodes for irreversible electroporation (IRE) based cancer treatment, fixed-axis waveguide solar concentrators for low-cost water desalination, modeling of polymeric flow in micromolds with integral microscreens during injection molding and designing polymer processing system for producing nonwoven filters by melt blowing process.

ELEMENTAL SULFUR BASED THERMAL ENERGY STORAGE

Abstract:

UCLA Energy Innovation Laboratory is developing a novel 'thermal battery' using elemental sulfur as the heat storage fluid for cost effective, large scale energy storage solutions. Thermal energy storage (TES) is a vital part of the energy storage portfolio that will help relieve the strain on the power grid coping with increased penetration of intermittent renewables, such as solar energy. Two-tank molten salt TES system is state of the art technology, however, the primary challenges with it include high cost of storage material and low chemical stability at high temperatures (>565°C).

UCLA researchers have discovered a new approach that addresses both these challenges. Elemental sulfur based TES offers both low cost, which is well below US Department of Energy cost objective of 15 \$/kWh leading to decrease in the share of TES in LCOE from 3.0 ¢/kWh to 0.4 ¢/kWh, and high temperature stability to above 1000 °C. This talk discusses how we exploit the sensible, latent (phase change), and thermochemical properties of sulfur to achieve low-cost thermal energy storage over a wide temperature range. The research efforts include material compatibility analysis for sulfur containment, pressure temperature characterization of sulfur, investigation of the thermo-fluidic behavior of sulfur at different operating conditions, and demonstration of modular 10kWh TES system. The system performance is assessed based on energy charge and discharge rate, round-trip efficiency, exergetic efficiency and cost.



Bio for Dr. Jeffrey Reed

Jeffrey Reed is the Director of Business Strategy and Advanced Technology for Southern California Gas Company. In that capacity he leads a variety of activities aimed at supporting the development and deployment of sustainable energy solutions. In his current and prior roles Jeff has led the electric and natural gas RD&D, venture investment and low-emission vehicle programs and he is responsible for the company's long-range technology forecasting and strategic planning. Jeff is currently on the Leadership Council of the Los Angeles CleanTech Incubator and is board president for the California Hydrogen Business Council. Prior to joining the Sempra utilities, Dr. Reed was a senior strategy consultant, an officer with ABB Power Generation and held various prior positions in product design, development and research. He holds a doctorate in engineering from UC Berkeley and a master's degree in management from Stanford University.

Abstract: "The Role of Renewable Gaseous Fuels in Supporting Grid Integration of Wind and Solar Resources"

Renewable gaseous fuels, in particular, methane and hydrogen derived from renewable feedstocks, can play an important role in supporting the introduction of large quantities of renewable electricity onto the power grid. As greater and greater amounts of renewable electricity from solar and wind resources are introduced, a growing challenge in matching production and load occurs with solar resources tending to over-produce relative to demand in the middle of the day, a phenomenon known as the duck curve, while wind resources may over-produce at night when there is very little load. One approach to addressing these over-supply periods is to use electrolyzers to serve as dispatchable load to produce renewable hydrogen or methane. This energy conversion pathway is referred to as Power-to-Gas. The product gas can be stored in the natural gas system or in local storage systems. Although energy is converted from electrical energy to chemical energy, this technique serves a function similar to batteries. Several dozen such systems have been deployed in Europe, particularly Germany and initial pilot projects are under way in the U.S. Technical progress on the cost and efficiency of electrolyzers offers the promise for Power-to-Gas to become widely deployed to support integration of high levels of renewables onto the power grid.

The Network for Global Innovation

Abstract

The Network for Global Innovation (NGIN, pronounced engine) proposes to accelerate the deployment of cleantech innovation globally to slow climate change's life-threatening impact on the global poor - estimated to be 100 million by 2030. By closing this "Innovation Delivery Gap," the aim of NGIN is to provide affordable clean energy to all countries of the world while creating jobs and solutions that foster a global green economy.

Bio



Tom White, Executive Director, Los Angeles
Cleantech Incubator at CSUN

Tom White is a company builder and the Director of the Los Angeles Cleantech Incubator at CSUN. Tom is a customer experience architect and an award-winning communicator with a distinguished career centered on harnessing human emotion to fuel attraction and growth. Tom helped Lockheed-Martin win the \$70 billion F-22 fighter jet contract, and helped generate billions in sales for companies like Motorola, Volvo, Philips, Unilever and others. He has achieved

unprecedented growth for entrepreneurial ventures, design firms, advertising agencies and academic institutions. Tom collaborates with start-ups and early stage organizations to enable them to own their markets when launching new products and services.