

### Presentation Schedule

| Monday        | Sagauro I  | Palo Verde  | Mesquite  | Amphitheater  |
|---------------|--|---|---|---|
| 1:30-3:00 PM  | I1 – Solar Technology<br>(Patterson)<br>1: Goodnick<br>2: Ekstrom<br>3: Siblingrud | I2 – Renewable / Alternate Energy<br>(McCulley)<br>1: Durocher<br>2: McAlister<br>3: <open> | I3 – Transportation<br>(Barazandeh)<br>1: Tateosian<br>2: Pacheco<br>3: Rimal | I4 – Smart Grid<br>(Gentle)<br>1: Decuir<br>2: Barrett [60 m] |
| Tuesday       | Hohokam  |   |   |   |
| 9:15-10:15 AM | I5 – Water Resource Management<br>(Garello)<br>1: Goldstein<br>2: Garello          | I6 – Microgrid<br>(Gentle)<br>1: Johnson [60 m]   | I7 – Societal Implications<br>(Stewart)<br>1: Cunningham<br>2: Ko             | I8 – Green Business<br>(Andrews)<br>1: Parker [60 m]          |

### Invited Speakers Tracks

- Green Business
- Microgrid
- Renewable / Alternate Energy
- Smart Grid
- Societal Implications / Quality of Life
- Solar Technology
- Transportation
- Water Resource Management

### Contents

- Grid Project Impacts Quantification (GridPIQ) Tool (Pacific Northwest National Laboratory)
- Social Implications of Technology – Creating Sustainable Interventions in Resource Constrained Environments (IEEE SSIT)
- Draft IEEE Standard for DC Microgrids
- On-Site Biomass Co-Gen Case Study: Unleashing Power to Create Value for the Wood Products Industry (Eaton)
- Utility-Scale Photovoltaics: Increasing Capacity Growth, Grid Penetration, and Grid Stability Challenges (Burns & McDonnell)
- Ocean Sustainability and Resources (IMT Atlantique)
- Global Future of Water (International Research Center)
- The Terawatt Challenge for Photovoltaics (Arizona State University)
- Powering Innovation in Global Development (Arizona State University)
- Sustain & Gain: Growing a business that multiplies your impact! (ER2)
- Sustainable Economic Development to Overcome Local Pollution and Global Climate Change Damages
- Autonomous Vehicles for a Sustainable World (NXP Semiconductors)
- Green Incentives & Green Company Positioning for Funding and Growth (Rodman CPAs)
- Cloud-based Charging Management of Electric Vehicles and Democratizing Energy Trading in the Era of Blockchain (University of New Mexico)
- Solar Nights: The Economics of Large Utility Scale Hybrid Solar Storage Systems (ViZn Energy Systems)
- Wireless Power – Improving Lives and Our Environment (NXP Semiconductors)

## GridPIQ: Explore the Impacts of Your Smart Grid Project

**Emily Barrett & Brandon Thayer**  
**Pacific Northwest National Laboratory**

### Abstract:

A grid project, whether technology or policy added in one specific location, can have surprising and significant repercussions throughout the interconnected power system. Every project can impact the total energy consumption, voltage profiles in the distribution system, costs, mixture of generation dispatched and so on. Benefits from these grid technologies can be significant, but unintended consequences can be surprising. Context matters — the same project can have wildly different impacts when rolled out in different places. The Grid Project Impacts Quantification (GridPIQ) web screening tool aims to incorporate specific grid technology and objectives, coupled with enough detail about the system context to yield insight. The focus is on transparency, modularity, ease of use, and versatility rather than precision. The tool allows users to sift through the impacts of diverse ideas quickly and with confidence, importing specifics when known and drawing on clear, relevant suggestions when not. This talk will dive into some GridPIQ how-to examples, explore the methodologies that drive the calculator engine, and open a discussion on what metrics are of most interest to the community.

### Speakers:



**Emily Barrett** received her MS in Power Systems Engineering from Portland State University where she conducted research for Portland General Electric on new technological solutions for shifting demand to manage seasonal peaks. Prior to receiving her Master's degree, she was a project manager for the Bonneville Environmental Foundation's Renewable Energy Group where she worked with utilities across the country to design and develop renewable energy projects. In 2016, she joined the Pacific Northwest National Laboratory's Electricity Infrastructure Group as a Power Systems Engineer. Her research interests include modeling and simulation, optimal asset utilization, real-time power system applications and generation control.

**Brandon Thayer** (S'15—M'17) was born in Spokane, WA, USA, in 1994. He received the B.S. degree in electrical engineering from the University of Washington, WA, USA, in 2016. In 2013 he was an Engineering Intern at Seattle City Light, Seattle, USA. In 2014 he joined Alcoa, Ferndale, WA, USA as an Electrical Engineering Intern. In 2015 he joined Pacific Northwest National Laboratory as an Electrical Engineering Intern. He is currently a Power Systems Engineer with Pacific Northwest National Laboratory. His research interests include grid-based emissions quantification, volt/VAR optimization, distributed energy resource integration, modeling and simulation, and software development.



## Social Implications of Technology – Creating Sustainable Interventions in Resource Constrained Environments

**Paul Cunningham**

**2017-2018 President, IEEE Society on Social Implications of Technology (SSIT)**

**Abstract:**

This invited SSIT presentation focuses on social implications and ethical issues to be considered when designing sustainable technology-enabled interventions in resource constrained environments.

It introduces the concepts of collaborative open innovation and co-design in the context of addressing the UN Sustainable Development Goals (SDGs). It then discusses ethical conundrums and ethical research principles.

These concepts will be contextualised through mHealth4Afrika, an African case study focusing on the co-design approach taken to implementing a cross-border health oriented, research and innovation project supported by the European Commission. The sustainability oriented approach adopted by the IEEE SSIT IST-Africa SIGHT (Special Interest Group on Humanitarian Technology) to address digital literacy and infrastructural deficits in resource constrained environments will then be discussed.

**Speaker:**

**Paul M Cunningham** is the President and CEO of International Information Management Corporation; Founder and Director of the IST-Africa Institute; Visiting Professor, International University of Management (IUM), Namibia; Visiting Senior Fellow, Wrexham Glyndŵr University, Wales; and Founder and Coordinator of mHealth4frika. Paul works as a technology, strategy, and policy expert for international and national government organizations as well as international and nationally funded research and innovation programs in Europe and Africa.



Supported by the European Commission and African Union Commission, IST-Africa ([www.IST-Africa.org](http://www.IST-Africa.org)) is a not-for-profit strategic collaboration with ministries and national councils responsible for innovation, science and technology in 18 African Member States.

Supported by the European Commission, *mHealth4Afrika* ([www.mHealth4Afrika](http://www.mHealth4Afrika)) is co-designing an open source, multilingual mHealth platform integrating electronic medical records, medical sensors, and generation of monthly aggregate health indicators to strengthen primary healthcare delivery in resource constrained health clinics in Africa.

An IEEE Senior Member, Paul is 2017 - 2018 President, IEEE Society on Social Implications of Technology (SSIT); Projects Chair, IEEE Humanitarian Activities Committee; Member, IEEE Technical Activities Board and IEEE Global Public Policy Committee; and Founder and Chair, IEEE SSIT IST-Africa SIGHT.

Paul is a graduate of Trinity College Dublin and UCD Michael Smurfit Graduate Business School; has studied at postgraduate level in Hungary and USA; and is completing a PhD at the Department of Computer and Systems Sciences (DSV), Stockholm University.

## Draft IEEE Standard for DC Microgrids

**Joseph Decuir**  
IEEE Seattle Section, USA

### Abstract:

Beneficial public engineering standards meld market needs and engineering expertise. They also codify sound design, embrace legacy systems, and frequently include testing specifications for quality. These standards then attract companies to implement solutions, promote market development, and lower costs.

The draft IEEE 2030.10 standard targets sustainable DC off-grid and remote power, in both the developed and developing world. In much of the developing world, the investments needed to supply standard wired AC power remain financially unfeasible.

IEEE Smart Grid community, with contributions from IEEE Smart Village, has assembled a team defining engineering standards for DC Microgrids. This paper will address the market needs that are understood, the plan for assembling the technical, including testing standards. The planned architecture includes a scalable network of sources, storage, power management and loads. The architecture can support a home, a network of homes, and joint use buildings.

The working group needs: standards development engineers, marketing support and manufacturers to implement the resulting products. Keywords—Standards; Smart Grid; DC Microgrid;"

### Speaker:



**Joseph Decuir**, IEEE Fellow, has chaired several IEEE Global Humanitarian Technology Conferences. One focus of those conferences is electric power for the developing world.

Joseph has contributed to dozens of widely used public engineering standards, including ITU-T V-series modems, USB and Bluetooth. He is also works in the electrical engineering faculty at the University of Washington.

Joseph serves on the IEEE Consumer Electronics Society Board of Governors, and as Secretary for IEEE Region 6.

## On-Site Biomass Co-Gen Case Study: Unleashing Power to Create Value for the Wood Products Industry

**David B. Durocher**  
**Eaton Corp.**

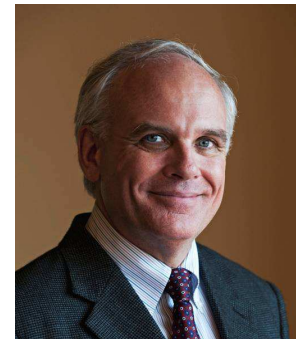
### **Abstract:**

Over the past several years, the business of manufacturing dimension lumber in the United States has become a hill for climbers! This traditionally cyclical business, driven primarily by housing starts, has experienced significant challenges and setbacks in the current economic climate where new construction has been depressed for several years, where environmental pressures have limited availability of wood fiber, and where supply and demand continue to struggle to find a balance: as some sawmills continue to produce in hopes of producing enough product to “save their way to profitability”.

This paper is a case study of one sawmill in the Pacific Northwestern US that pursued a bold initiative to expand the scope of produced products, adding generation of electrical energy to their legacy core competency of producing dimension lumber. The paper focuses on the electrical systems added to the site that enabled the mill to leverage existing fiber resources to produce 19.8 mega-watts of electrical energy, while reducing greenhouse gas emissions and also improving the end-use manufactured product delivered to their customers.

### **Speaker:**

**David B. Durocher** (IEEE SBM '77 M '97-SM '99) received a BSEE degree from Oregon State University, Corvallis, in 1978. He is currently Global Mining, Metals & Minerals Industry Manager, with Eaton Corporation in Wilsonville, Oregon USA. He has over 38 years of experience with Westinghouse and Eaton serving in a variety of product engineering, sales and global marketing roles, authoring numerous technical papers that have been presented at conferences around the world and published in IEEE Industry Applications, Plant Engineering, World Cement and EC&M Magazine. Dave is a Senior Member of the IEEE and served as IEEE IAS President 2015-2016. He presently serves on the Board of the IEEE IAS and the Board of the Washington Pulp & Paper Foundation. He is an active member of the IEEE IAS Mining Industry Committee, Cement Industry Committee, Pulp & Paper Industry Committee and the Association of Iron & Steel Technology.



## Utility-Scale Photovoltaics: Increasing Capacity Growth, Grid Penetration, and Grid Stability Challenges

**Ken Ekström**  
**Burns & McDonnell**

### **Abstract:**

Utility-scale photovoltaic (PV) projects continue to drop in cost and in 2016 represented the biggest increase in generation capacity in the US. On a levelized-cost-of-energy (LCOE) basis, utility-scale PV is now cost competitive with fossil fuel power plants in the southwestern US and is projected to be similarly cost competitive throughout much of the rest of the world in a matter of a few years. The rapid growth of PV installations have greatly increased grid penetration, notably in Germany, Italy, California and Hawaii. High levels of grid penetration have presented numerous challenges to the grid operators especially due to the current supply-side management approach. The most famous graphic representing some of these challenges is the CAISO “duck curve” which demonstrates the need for a large ramp down of conventional generation in the morning and an even larger and faster ramp up in the late afternoon and early evening. PV generation – especially in areas with high wind power concentrations such as Texas – presents additional grid stability issues with regards to voltage and frequency regulation. As a result PV systems are increasingly required to provide voltage and frequency regulation services and in certain markets have increasingly been subject to curtailment. Energy storage and natural gas peaking plants are being turned to assist with supply-side regulation. In addition, demand-side regulation offers perhaps even greater potential to promote grid stability.

### **Speaker:**



**Ken Ekström** received his BS in Engineering and Applied Science from the California Institute of Technology with a focus on Energy Engineering. He began working in the PV industry in the mid-80s and for the last seven years has been working as a lead project engineer and project manager for Burns & McDonnell supporting clients in implementing a wide variety of commercial and utility-scale PV projects mostly in the US southwest but also in other states and countries. He has had substantial involvement in more than 1 GW of utility-scale PV projects. As part of this work, Ken has dealt with the requirements of and, often the challenges faced by, the various independent system operators (ISO) as they experience increasing PV penetration. He is a an IEEE member and a registered professional engineer in Arizona (electrical and mechanical) and California (electrical).



## Environmental Panelist & Invited Speaker

**René Garello**  
**Professor, IMT Atlantique**

### Ocean Sustainability and Resources

#### Abstract:

Oceans are an essential element of the world humanity by their strong impact on everyday life as a driver of the climate. Three quarter of the Earth population is living within 20 miles of a Coast and is deeply dependent of ocean resources, not only for food but for energy as well. The global ocean economy, measured in terms of the ocean-based industries' contribution to economic output and employment, is significant. Preliminary calculations value the ocean economy's contribution in 2010 very conservatively at USD 1.5 trillion, or approximately 2.5% of the world gross value added (GVA). The very large ocean-related economical domains are generating constraints on the economic development itself (pollution, ocean warming, loss of ice cover, sea level rise, current shifts, biodiversity changes, overfishing and ocean acidification). In the coming decades, scientific and technological advances are expected to play a crucial role both in addressing many of the ocean-related environmental challenges mentioned above and in the further development of ocean-based economic activities. Innovations in advanced materials, subsea engineering and technology, sensors and imaging, satellite technologies, computerisation and big data analytics, autonomous systems, biotechnology and nanotechnology – every sector of the ocean economy – stands to be affected by these technological advances.

#### Speaker:

**Rene Garello** received the Ph.D. degree in Signal Processing at the Institut National Polytechnique de Grenoble (INPG) in 1981. From 1982 to 1984 he worked as a Research Associate at Aeronomy Lab, (NOAA) in Boulder, Colorado (USA). He joined the Ecole Nationale Supérieure des Telecommunications de Bretagne (ENST Bretagne), Brest, France in 1985. In 1988 he became Professor in this engineering school in the field of signal processing and image processing and in 1995, Prof. Garello obtained the Habilitation to Supervise Research.

His main research interests lie in Remote Sensing, 2D signal processing, statistical and spectral analysis applied to ocean surface features detection and characterization.



In 2005, he was elected VP Conference Operations for the IEEE Oceans Engineering Society (OES) and re-elected in 2006 and 2008. He was elevated to the grade of Fellow of the IEEE, class of 2006. He received the OES Service Awards in 2006. He was elected President in 2012 and 2014.

## Global Future of Water

**Mark Goldstein**  
**President, International Research Center**

**Abstract:**

Water remains an essential element for life that plays a central and critical role in all aspects of our national and global economies and environment. We are entering an era of immense water-related threats due to climate change and human actions bringing floods, droughts, reduced water availability, and degraded water quality that threaten communities, nations, and global sociopolitical and economic security.

This talk will cover water futures from a macro level as regions, governments, and industries prepare for and manage increasing water-related threats utilizing traditional and emergent technologies to resolve these issues and provide water and sanitation that address the needs of all. It also will cover water futures from at a more personal and community level featuring technological advances and rediscovery of appropriate technology of the past to forge a water-secure future.

**Speaker:**



**Mark Goldstein** is President of International Research Center and a technophile and technology visionary, activist, advisor, and entrepreneur with extensive experience and connections throughout myriad technology sectors. He has provided consulting, custom research, and strategic support for business, legal, and public policy clients across a variety of technology disciplines and arenas since 1992 following an engineering management career. He is involved with a number of policy, economic development, professional, and trade groups, and a frequent speaker and trainer.

## The Terawatt Challenge for Photovoltaics

**Stephen M Goodnick**  
**Professor and Senior Sustainability Scientist, Julie Ann Wrigley Global Institute of Sustainability,  
Arizona State University**

**Abstract:**

Energy supplied by solar photovoltaic technology has been on an exponential growth curve over the past decade, with high penetration into the electrical system beginning to occur in regions such as California. This growth has been a result of a commensurate reduction in cost of photovoltaics due to improvements in cell and module performance (in terms of efficiency and lifetime), and economies of scale due to reduced manufacturing costs with increased production volume. Led by increased deployment outside the US, most notably in China, the total installed capacity of solar electricity worldwide now exceeds 300 GW. While this represents significant progress, this level of production is still less than ten percent of the total world electrical generation capacity which is several Terawatts



(TW) of installed capacity from traditional sources such as coal, gas, nuclear, etc. The TW challenge for photovoltaics is how to maintain its steep upward trajectory to reach the TW scale of energy production, necessary to be a major component of clean energy generation for the future.

To maintain photovoltaic's upward slope, the solar to electrical energy efficiency is still a key metric, not only in reducing module costs, but also reducing the soft costs associated with the installation and connection to the grid, which now exceed the costs of modules themselves. The life-cycle of solar modules themselves is of increasing importance from the standpoint of sustainability, in terms of appropriate materials utilization, product lifetime and end of lifetime recyclability. Also, the increasing integration of an intermittent source of electricity such as solar poses a challenge to the energy grid itself, with new strategies for energy delivery needed together with increasing and diverse types of energy storage to mitigate such effects. In the present talk, we will overview the current research and achievements within the Quantum Energy and Sustainable Solar Technologies (QESST) Engineering Research Center led by Arizona State University in addressing these challenges to realizing TW levels of solar energy production.

**Speaker:**

**Stephen M. Goodnick** received his Ph.D. degrees in electrical engineering from Colorado State University, Fort Collins, in 1983, respectively. He was an Alexander von Humboldt Fellow with the Technical University of Munich, Munich, Germany, and the University of Modena, Modena, Italy, in 1985 and 1986, respectively. He served as Chair and Professor of Electrical Engineering with Arizona State University, Tempe, from 1996 to 2005. He served as Associate Vice President for Research for Arizona State University from 2006-2008, and presently serves as Deputy Director of ASU Lightworks, and is Hans Fischer Senior Fellow with the Institute for Advanced Studies at the Technical University of Munich. Professionally, he served as President (2012-2013) of the IEEE Nanotechnology Council, and served as President of IEEE Eta Kappa Nu Electrical and Computer Engineering Honor Society Board of Governors, 2011-2012. Some of his main research contributions include analysis of surface roughness at the Si/SiO<sub>2</sub> interface, Monte Carlo simulation of ultrafast carrier relaxation in quantum confined systems, global modeling of high frequency and energy conversion devices, full-band simulation of semiconductor devices, transport in nanostructures, and fabrication and characterization of nanoscale semiconductor devices. He has published over 400 journal articles, books, book chapters, and conference proceeding, and is a Fellow of IEEE (2004) for contributions to carrier transport fundamentals and semiconductor devices.



## Powering Innovation in Global Development

**Nathan Johnson**

**Assistant Professor and Director of the Laboratory for Energy and Power Solutions (LEAPS), Arizona State University**

### **Abstract:**

Engineers serve a vital role in confronting global energy challenges. Over the next 30 years, young engineers, especially, will be needed to create energy solutions that address climate change, world population growth, and foster economic development. This is no small task. Technical innovation is needed to keep the lights on and keep homes warm (or cool) with minimal environmental impact. Renewable energy generation is part of the solution, as is advanced power electronics, demand management, energy storage, emissions mitigation, and hybrid power systems. Yet a focus on technology alone is insufficient for success. Engineers that view and understand technology design within the context of dynamic social, economic, and environmental factors will be best suited to address the challenges ahead.

In this talk, Dr. Johnson will discuss his work designing energy systems to confront global energy challenges. Practical challenges and demonstrated outcomes will be introduced from Dr. Johnson's work completed in nine countries on topics including off-grid electrification, containerized microgrids for disaster relief, water treatment for refugee camps, workforce development programs, and critical infrastructure resilience. Dr. Johnson will indicate opportunities for early career engineers seeking global opportunities, and also provide examples for how to use US-based training and knowledge to address international energy challenges.

### **Speaker:**



**Dr. Nathan Johnson** is an Assistant Professor at Arizona State University and the Director of the Laboratory for Energy And Power Solutions (LEAPS). His 25-person research team takes energy innovations from concept to construction with a focus on distributed energy resources, smart networks, microgrid controls, and off-grid solutions. Dr. Johnson manages a one-acre microgrid test bed to combine simulation-based design with hands-on fabrication and testing to create next-generation solutions to current market needs. Before joining ASU, he spent ten years in industry and academia working in business development for the energy sector. He now helps start and advise small businesses. Arizona State University recognizes Dr. Johnson as a Senior Sustainability Scientist for his globally-focused sustainability efforts. He has spent over

two years working within developing countries to address energy needs of emerging economies and the rural poor. Dr. Johnson is also an active educator with training and capacity building programs both inside and outside standard university curricula. In his spare time, he runs marathons and regularly paces the Boston qualifying time to help individuals meet their personal goals.

## Sustain & Gain: Growing a business that multiplies your impact!

**Chris Ko**

**Owner and Managing Partner**

**ER2 – Electronic Responsible Recyclers**

**Abstract:**

ER2 is socially and environmentally responsible company that provides industry leading IT asset management and disposal services to organizations across the globe. We are focused on certified data destruction and the recirculation of electronic assets at valuable pricing for small businesses and charter school communities alike. Because of our innovative business model, we are able to bridge the technology gap by meeting the computer needs of students growing up in lower income families. In turn, these students are equipped with skills needed to be competitive entering the workforce as an active member of society.

**Speaker:**

**Chris Ko** co-founded ER2 in 2012 with his business partner, Rick Krug. Currently, ER2 has 2 locations, Phoenix and Memphis, and specializes in repurposing and recycling decommissioned computers, servers, networking equipment, and pretty much anything with a plug. ER2's vision is to BE RESPONSIBLE to its partners, team members, community and environment by making a positive impact through sacrificial living.

Chris has over 15 years of experience in growing and optimizing businesses for sustainable success. Prior to ER2 and Nationwide Surplus, Chris was a principal at Inlign Capital Partners, a growth-stage private equity firm focused on investing in emerging markets and technology. Before Inlign, he was a senior associate at Grayhawk Venture Partners, an early-stage venture capital firm investing in a wide-variety of industries including: biotechnology, semi-conductor, consumer products, business services, software, green technology and medical services. In his earlier career, Chris has worked for SmithBarney, Intel, and the Hilton Corporation.



## Sustainable Economic Development to Overcome Local Pollution and Global Climate Change Damages

**Roy McAlister, P.E.**

**McAlister Technologies, LLC**

**Abstract:**

Although the world's green plants have been increasingly stimulated by increased availability of atmospheric carbon dioxide and longer, warmer growing seasons for more than a century, all the world's green plants have not photosynthesized human caused carbon dioxide into storage as plant tissue rapidly enough to prevent greenhouse gas caused global climate-change damages. However as shown by the Keeling data regarding global carbon dioxide concentration, green plants can reduce

atmospheric CO<sub>2</sub> at the rate of about 5 μmol/mol per year if human activity provides preemptive removal of substantial amounts of carbon from substances that ordinarily rot or burn.

Humans can profitably participate with the green plant kingdom by converting substances that rot or burn into high-value carbon durable goods and low-cost hydrogen. The co-produced carbon can reinforce equipment for sustainably converting solar, wind, moving water and geothermal energy into hundreds of times more electricity, hydrogen, and heat every year for exponential energy gain without producing carbon dioxide by burning such carbon. Such carbon-reinforced energy conversion equipment enables far greater economic development compared to the enormous opportunity cost of wastefully burning such carbon one time to harmfully produce carbon dioxide greenhouse gas.

The co-produced hydrogen can be combined with nitrogen and carbon dioxide preemptively collected from the exhaust stacks of power plants, wastewater treatment plants, breweries, bakeries, ethanol refiners, mineral calciners, and decaying permafrost (or the ambient air or sea water) to produce “net-hydrogen liquid fuel” called “Metrol” that can be stored at ambient temperature and pressure in gasoline and diesel fuel tanks. In fuel cell and heat engine applications, such hydrogen produces condensable water vapor but the nitrogen and carbon dioxide can be endlessly re-utilized to continue production, storage, and delivery of sustainable supplies of net-hydrogen Metrol® liquid fuel.

Such net-hydrogen Metrol® liquid fuel can be transported by existing liquid fuel pipelines, marine tankers, rail cars, and tanker distribution trucks to local stations for refilling gasoline and diesel fuel tanks to enable 1.3 billion engines (soon to be 2 billion engines) in transportation, electricity-generation, farming and mining applications to actually clean the air during operation and overcome local pollution and thus global warming.

The co-produced carbon can be used to produce graphene, nano tubes, diamond plating, and carbon fiber for improved electronic, medical, transportation, construction, and renewable energy conversion products. With exponential energy gain and sustainable supplies of carbon to produce durable goods, profit-motivated businesses can provide highly desirable full employment opportunities in 10,000 peaceful communities throughout the world that can be expected to comprise more or less one million persons in the foreseeable future.

**Speaker:**



Roy McAlister is a professional engineer, author, entrepreneur and inventor. For more than forty-five years, he has worked to create solutions to the multiple problems associated with our dependence upon burning the carbon in fossil fuels: energy resource depletion, pollution, climate change, public health diseases, national energy insecurity, and economic stagnation.

In 2005, he published *The Solar Hydrogen Civilization: The Future of Energy is the Future of Our Global Economy* and “Hydrogen Car & Multi-Fuel DVD”. Roy’s book offers a constructive and uplifting social, environmental, and economic vision of a sustainable future that is technologically achievable now.

To usher in a **Revolution in Renewable Resources**, Roy McAlister has demonstrated new capacity for hydrogen fuel and for carbon as a 21<sup>st</sup> century manufacturing resource to overcome the limitations of

steel, aluminum, copper and silicon. With a new way to harvest hydrocarbons, the productive use of carbon changes the economic viability of hydrogen fuel.

## Autonomous Vehicles for a Sustainable World

### **Sergio Pacheco**

**ADAS Systems and Applications Manager, NXP Semiconductors**

#### **Speaker:**

**Sergio Pacheco** is the Advanced Driver Assistance Systems (ADAS) System & Applications Manager for the Business Line Infotainment and Driver Assistance of NXP Semiconductors, Tempe, Arizona (formerly Freescale). His current interest lies in the development of automotive radar products for driver assistance and autonomous driving systems. Prior to that, he led a multi-functional team developing mm-wave packaging technologies for automotive radar, resulting in the first packaged chipset suitable for scalable radar systems. He started in Motorola/Freescale as a Principal Research Engineer at the Emerging Technologies Group at Freescale with a focus on integrated passives and microelectromechanical structures (MEMS) and their application to RF and wireless communication systems.



He is a member of the IEEE Microwave Theory and Techniques Society (MTT-S) and member of its Administrative Committee. He also serves in the technical program and organizing committees of the annually held International Microwave Symposium and Radio and Wireless Symposium. Dr. Pacheco is a reviewer for the Transactions of Microwave Theory and Techniques, Microwave Magazine, IEEE Latin America Transactions, Journal of Microsystem Technologies, and Proceedings of the European Microwave Association. Locally, he served as the Treasurer of the Waves and Devices Chapter of the IEEE Phoenix Section from 2005-2012 and Vice-Chair from 2012-2014.

In 2007, he received the IEEE Phoenix Section Young Engineer of the Year Award. He has over 45 publications in internationally refereed journals and conferences and 7 patents. He also has authored a chapter on "Microelectromechanical Switches for RF Applications" in the book RF Technologies for Low-Power Wireless Communications. He is a member of the Omicron Delta Kappa, Eta Kappa Nu, and Tau Beta Pi Honor Societies. He received a B.S.E.E. and M.S.E.E from Auburn University, Auburn, Alabama and a Ph.D. in Electrical Engineering from the University of Michigan, Ann Arbor, Michigan.

## Green Incentives & Green Company Positioning for Funding and Growth

**Kathy Parker, CPA, MST**  
**Rodman CPAs**

**Abstract:**

A comprehensive overview for renewable energy and cleantech companies to address the following questions:

- What does this mean to me?
- What are the extenders?
- How should we utilize the tax credits?
- How can we attract investors, and what investment structures are investors looking for?
- What should we look for when modeling a project?

**Speaker:**



**Kathy Parker**, CPA, MST, a Partner at Rodman CPAs of Waltham, MA, is an active leader of the “Green Team,” the firm’s specialty practice in renewable energy and cleantech. Kathy has devoted much of her time over the past decade providing expert counsel and services to Solar, Wind, and Biogas companies. Kathy is a frequent guest speaker and panelist at renewable energy conferences and financial forums across the U.S. and is one of New England’s recognized experts in tax incentives and Solar Renewable Energy Credits. Kathy has devoted the last several years to helping these companies qualify for government grants, subsidies and tax incentives. She also helped these corporations and partnerships to structure themselves in ways that would optimize their chances of success. She holds an accounting degree from the University of Texas at Austin, and a Master’s in Taxation from Bentley University.



## Cloud-based Charging Management of Electric Vehicles and Democratizing Energy Trading in the Era of Blockchain

**Dr. Bhaskar Prasad Rimal**  
**University of New Mexico**

### **Abstract:**

Democratizing conventional energy market with the integration of distributed renewable energy sources in smart grid communications paradigm is one of the important aspects to realize more equitable and sustainable green societies for future. In this talk, we will discuss the potential benefits of cloud computing and edge (fog) computing in smart grid. Further, we will discuss the two-layered cloud-based EV charging system. Moreover, likewise other industries, the energy ecosystem has recently gain attraction with blockchain-based technology. Such applications would be capable of providing metering and billing of electricity consumption, decentralized energy transaction, and supply system, in many cases. In fact, peer-to-peer energy trading based on blockchain is one of the promising areas and this is prompting the industry to focus on it. In this talk, we will provide an overview of the blockchain in energy trading.

### **Speaker:**

**Bhaskar Prasad Rimal** received his M.Sc. degree in information systems from Kookmin University and the Ph.D. degree in telecommunications from the Institut National de la Recherche Scientifique at the University of Québec. He was a visiting scholar in the Department of Computer Science at Carnegie Mellon University, and he currently works at the Electrical and Computer Engineering Department at the University of New Mexico.



Dr. Rimal has been serving as an Editor of the *Internet Technology Letters*, an Associate Editor of the *EURASIP Journal on Wireless Communications and Networking*, and an Associate Editor of the *IEEE Access*. His current research has focused on various cutting-edge technologies for telecommunications, including Cloud Computing, Edge/Fog Computing, Cyber-Physical Systems (e.g., Internet of things (IoT), Smart Grid, Smart Cities), Mobile Crowdsensing, Networked Society, Next-Generation Broadband Access Networks and 5G and beyond. He has published in top journals such as *IEEE Transactions on Wireless Communications*, *IEEE Journal on Selected Areas in Communications*, and *IEEE Transactions on Smart Grid*, and at premier conferences such as *IEEE INFOCOM* and *IEEE PES*. Dr. Rimal is a Senior Member of the IEEE, a Professional Member of the ACM, and a Member of the OSA.

## Solar Nights: The Economics of Large Utility Scale Hybrid Solar Storage Systems

**Paul Siblingud**

**ViZn Energy Systems Inc.**

**Abstract:**

ViZn Energy Systems Inc. (ViZn), a leading provider of utility scale energy storage systems, is working to make the sun shine all night by integrating its zinc iron flow battery storage system for a record low price of 4¢/kWh. A ViZn 30 MW, 4-hour system added to a 100 MW solar plant can generate a seven percent internal rate of return (IRR) with a 4¢/kWh power purchase agreement (PPA) – 20 percent below the lowest published values. Now, utilities can add energy storage to a wind or solar farm at a lower price than coal-fired generation (6¢/kWh per Bloomberg New Energy Finance), paving a clear path toward 100 percent renewable penetration. This calculation is independent from any additional revenue streams derived from the ancillary services made possible by ViZn battery systems.

**Speaker:**



**Paul Siblingud** is the executive vice president of the energy storage company ViZn Energy Systems Inc. in Montana. Siblingud is pioneering the development and market adoption of energy storage using flow battery technology for applications behind the meter and utility scale. Previous to joining ViZn in 2013, Siblingud worked at Semitool Inc. for 20 years in engineering, product management and marketing specializing in capital equipment for interconnect electroplating and advanced Wafer Level Packaging. As VP of Marketing and Electroplating he managed a division of more than \$160M. In 2009, Applied Materials acquired Semitool and Siblingud assumed the position of CMO and GM of the new WLP division through 2012. During his tenure in semiconductor equipment industry, Siblingud started and managed two international consortiums promoting the technology of 3-D interconnect using Thru-Silicon-Via (TSV) and electroplated flip chip, EMC-3D™ and SECAP™ respectively. Prior to his semiconductor career, Siblingud worked at Biola University in LaMirada California as a system manager in the for the university computer center. Studies in Electrical Engineering at Pacific Lutheran University in a joint program in Bio-Medical Engineering with Stanford University.

## Wireless Power – Improving Lives and Our Environment

**Steven Tateosian**

**Director, IoT & Security Solutions, NXP Semiconductors**

**Abstract:**

Cutting the last cord for consumers has been talked about for years. Various technical and commercial challenges have slowed adoption. Now, that is changing rapidly. The impacts of this change will be felt far and wide from battery and cables to landfills. This talk will cover technical and commercial trends that are driving this change as well as potential impacts as the world truly goes wireless.

**Speaker:**

**Steve Tateosian** has held a variety of semiconductor industry roles, starting as an integration engineer and then serving in various technology, strategy, product development and marketing roles. Currently, he is the Marketing Director of NXP's IoT & Security Solutions organization, responsible for the solutions roadmap and portfolio.

