

2017 CONFERENCE PROGRAMME



IEEE PES & IAS

**POWERAFRICA
CONFERENCE**



THEME:

**Harnessing Energy, Information and Communications
Technology for Affordable Electrification of Africa**

June 27 - 30, 2017 (ACCRA, GHANA)





THEME: Harnessing Energy, Information and Communications
Technology for Affordable Electrification of Africa

Contents

3

4	MESSAGE FROM THE GENERAL CO-CHAIRS
5	WELCOME FROM TECHNICAL PROGRAMME COMMITTEE
6	PROGRAMME
9	IEEE EXECUTIVES
11	SPEAKER PROFILES
19	PANELS, TUTORIALS AND TOURS
22	REVIEWERS

MESSAGE FROM THE GENERAL CO-CHAIRS

Dear colleagues,

Akwaaba! It is with great pleasure that we welcome you to Accra, Ghana for the 2017 IEEE PES & IAS PowerAfrica Conference. We are honored to be the 4th edition of the PowerAfrica conference organized by Africans and friends of Africa, in Africa, and for Africa. The global outreach achieved by the PowerAfrica conference can be seen with participants representing 33 countries and, for the first time this year, a website in both English and French.

With 54 countries, Africa is a large continent filled with numerous civilizations, a myriad of inventions, colorful cultures, the fastest growing human capital, and abundant natural resources. Africa remains the second fastest growing economy in the world, at a rate of 3.6% compared to the 3.1% global GDP growth rate (2016 Africa Economic Outlook by AfDB, OECD, and UNDP). Indeed, Africa represents one of the fastest growing market for Information and Communication Technologies (ICT). Although Africa as a whole sees growth in many fields, the electrical infrastructure still needs improvement. The electrification rate of Africa as a whole is about 40% and it varies widely amongst each countries between 100% (Mauritius) to 9% (D. R. Congo). According to the African Development Bank, 640 million of Africans lack access to electricity. Electricity is a major factor of development because it allows better health services, education, generation of revenue through business, job creation, it helps increase the standard of living, and allows internet connectivity. This conference attempts to find solutions to the low electrification rate in Africa.

The 2017 PowerAfrica conference theme “Harnessing Energy, Information and Communications Technology for Affordable Electrification of Africa”.emphasizes the emerging opportunities to leverage ICT to build solutions for both on-grid and off-grid systems across the continent that are economically, environmentally, and socially sustainable. The conference will cover practical, solution-oriented topics, including case studies and lessons learned in the form of keynotes, plenary sessions, and oral presentations, tutorials and workshops, by worldwide experts on energy and information technology with focus on Africa. The purpose of the IEEE PES & IAS PowerAfrica Conference is to bring together investors, stakeholders, experts, professionals, researchers and students with engineering, finance, and social science backgrounds from companies, R&D organizations, academics, government and financial institutions from around the world in order to share and discuss advances in the development and deployment of technologies and business models for affordable electrification.

Thank you to all the supporters who made the 2017 IEEE PES & IAS conference possible. Our deepest thanks go to all the volunteers who worked tirelessly on this conference. It has been an honour and privilege volunteering with you. It is our hope that we will see you again at the next edition.

Sincerely,



Ngalula Sandrine Mubenga,
PE, PhD Cand., MSEE
Founder and CEO
SMIN Power Group
General Conference Chair



Onyi Nzimako, M.Sc.E.E, P.Eng
Senior Simulation Engineer
Renewable Applications
RTDS Technologies Inc.
General Co-Chair



Dr. Abraham Gebregergis
Chief Scientist of Motor Drives &
Control Systems, Hala Mechanics
General Co-Chair

WELCOME FROM TECHNICAL PROGRAM COMMITTEE

Our most sincere welcome to the 2017 IEEE PES & IAS PowerAfrica Conference taking place in Accra, Ghana! We hope our attendees will discover how financial, technical, and social functions of our energy systems can be enhanced through appropriate design and implementation.

The conference program features five separate tracks of paper presentations that have passed through review by at least three reviewers from an international pool of 200 experts. The papers accepted were flagged for their sound content, interesting topics, and practical viewpoints on problems relevant to the African context. This year, the conference submissions had a strong acceptance rate of 52%; 104 submissions were accepted out of the 201 entries that were received. Those papers presented by a registered participant will be submitted for publication to IEEE Xplore under the ISBN number 978-1-5090-4746-8.

We also have plenary session speakers who will exchange pertinent views, engage your questions, and widen your thinking. Consider attending our tutorials on the design of viable solar businesses, the enhancement of critical thinking in engineering training, and the design of cyber-secure microgrids- and join us on our technical tours of local renewable energy facilities, where you will witness some interesting technical innovations.

The technical program committee has had a lot of help from external reviewers, past conference organizers, and the colleagues who have offered to run tutorials and participate as panelists and speakers. Our sincere thanks go to all authors, our invited distinguished keynote speakers, our session chairs who provide the formal organization and collegial atmosphere of our sessions, and especially our fellow colleagues on the general and local organizing committee who have worked tirelessly to publicize, ensure financing, and lay the groundwork for the environment surrounding you here.

Last, but not least, we would like to thank you, the attendees, for being here. Your engagement and energy will ensure the success of this and future conferences.

We wish all the attendees an enjoyable conference and a wonderful time in hospitable Accra!

Yours sincerely,

Technical Program Committee

Kunle Adeleye, *Papers Co-Chair*

Kojo Sefah, *Panel/Tutorials Co-Chair*

Daniel Chowdhury, *Keynotes Co-Chair*

Eric Kuada, *Local Co-Chair*

Jonathan Okoronkwo, *Member*

Habib Kammoun, *Proceedings Co-Chair*

Bruce Krogh and Barry Rawn, *Coordinating Members*

Joseph Mutale, *Advisory Member*

Mr. Emmanuel Antwi-Boasiako (*handled all visa letter requests*)

Mr. Daniel Treku (*played a key role in negotiations and securing dinner venue*)

Mr. Kwasi Boaky-Boateng (*student volunteers coordinator*)

PROGRAMME

IEEE Power Africa 2017 27-30 June 2017 GIMPA Accra Ghana		Social	Plenary	General Info	Meeting	
		Paper/Presentation	Tutorial	Technical Visit		
DAY 0: Tuesday, 27 June 2017						
18:00	21:00	Opening Reception: Welcome and Opening Remarks Sandrine Mubenga and Onyi Nzimako, Conference Co-Chairs Frank Lambert- IEEE PES VP, Chapters Dr. Shay Bahramirad PES VP of New Initiative Ing. Samuel Boakye Appiah, Managing Director, Electricity Company of Ghana				
DAY 1: Wednesday 28 June 2017						
07:00	08:00	Registration				
08:00	09:30	Morning Plenary - Energy and ICT Research Introduction: Honourable Boakye Agyarko, Minister of Energy Electrification Keynotes: Prof SP Daniel Chowdhury , Tshwane University of Technology, Pretoria, <u>Microgrids and ust -Microgrids for energy poverty alleviation in Africa</u> Dr Tobias Bischof-Niemz , Center Manager: Energy, Council for Scientific and Industrial Research (CSIR), South Africa: (presented by Sengiphile Simelane , Program Manager, CSIR) <u>Bench -marking of sustainable affordable electrification from renewable resources</u>				
09:30	10:00	Tea & Coffee Break				
10:00	12:00	ICT 1	Solar 1	Devices & Components 1	National Grids & Power Pools 1	
12:00	12:10	Break				
12:10	13:30	Vision Lunch Session Innovation Keynote: Dr Reginald Parker (introduced by Abraham Gebregergis) The inventor of the SOLAR VIA uses a 15-min introduction to challenge and inspire the audience to think about disruptive tech shaping our climate and energy future.				
13:30	13:40	Break				
13:40	14:00	Afternoon Plenary IEEE Smart Village: Ray Larsen explains the promise and progress of the project. (introduced by Abraham Gebregergis)				
14:00	15:30	Panel Session: Social Implications of Electrification Moderator: Vera Asuamuzuah, Program Manager, Anansi International Speakers: Edwin Aryitey, Volta River Authority; Ebenezer Essilfie-Nyame, Conscious Collaborative; Ebenezer Kwarteng, Aboadze Youth Community Member; Lindsey Bacon, Conscious Collaborative				
15:30	15:40	Break				
15:40	17:40	ICT 2	Solar 2	Devices & Components 2	National Grids & Power Pools 2	
17:40	19:00	PES Meetings			Break	
19:00	21:00	Conference Banquet				

PROGRAMME

IEEE PES & IAS Power Africa Conference 2017

THEME: Harnessing Energy, Information and Communications
Technology for Affordable Electrification of Africa



IEEE Power Africa 2017 27-30 June 2017 GIMPA Accra, Ghana		Social	Plenary	General Info	Meeting
		Paper/Presentation	Tutorial	Technical Visit	
DAY 2: Thursday 29 June 2017					
07:00	08:00	Registration			
08:00	09:30	<p style="text-align: center;">Morning Plenary - Investment and Regulation for Renewables</p> <p>Introduction: Sandrine Mubenga and Onyi Nzimako, Conference Co-Chairs</p> <p>45 min: Legal Keynote:, Eyram A. Adadevoh, Centurion Law Group: “<u>Legal Frameworks for Renewable Energy Technology in Africa</u>”</p> <p>30 min: Policy Keynote: Monica Maduekwe: ECOWAS ECREE: <u>Renewable Energy Policy and Projects</u></p>			
09:30	10:00	Tea & Coffee Break			
10:00	12:00	Micro-Grids 1	Wind	Storage	System-level Control 1
12:00	12:10	Break			
12:10	13:30	<p>Lunch and Networking Session: Women in Power</p> <p>Moderator: Deborah Akuoko, Researcher, GIMPA School of Technology A career event showcasing interviews with <i>Eyram Adadevoh, Monica Maduekwe, Urenna Onyewuchi, Shay Bahramirad, and Anna Amankwah-Minkah.</i></p>			
13:30	13:40	Break			
13:40	15:10	<p>Afternoon Plenary - The Business and Workforce of Electrification</p> <p>Moderator: Dr. Chris Mensah Bonsu, Lead Regional Transmission Engineer California ISO Speakers: <i>Dr. Nii Darko Asante, Director of Technical Regulation, Energy Commission of Ghana, Kweku Awotwi, past Chief Executive, Volta River Authority; Liliane Kissimba, CEO World Growth Projects Inc, Co-founder Mahali Business Platform</i></p>			
15:10	15:20	Break			
15:20	17:20	Micro-Grids 2	Renewable Energy	Demand Management	System-level Control 2
17:20	17:30	Break			
17:30	17:45	Plenary Closing Session			
17:30	17:45	Farewell: Dr Urenna Onyewuchi, IEEE PES PowerAfrica Steering Committee Chair			
18:00	20:00	Future Conference Planning and Technical Group Meetings			



PROGRAMME

IEEE PES & IAS Power Africa Conference 2017

THEME: Harnessing Energy, Information and Communications Technology for Affordable Electrification of Africa



IEEE Power Africa 2017 27-30 June 2017 GIMPA Accra, Ghana		Social	Plenary	General Info	Meeting
		Paper/Presentation		Tutorial	Technical Visit
DAY 3: Friday 30 June 2017					
		Tutorials and Info Sessions		Technical Tours	Meetings
8:00	12:00	TU-1: Teaching Critical Engineering Thinking Skills	TU-2: Designing sustainable business models for energy access	Gomoa Onyeadze Solar Farm START: 08:00 RETURN: 11:00	Technical Group Meetings
12:00	13:00	Lunch Break (not conference sponsored)		Pediatorkope Island START 12:00 RETURN 17:00	
13:00	17:00	TU -3 Fundamentals of Micro-grid Operation and Management with Cyber Security Issues			





Ngalula Sandrine Mubenga is the founder and CEO of SMIN Power Group a company specialized in the design and installation of renewable energy systems based in USA and D.R. Congo (Africa) since 2011. In 2017, SMIN Power Group was recognized as one of the Top 5 Innovators for bringing renewable energy in DRC by Congo Na Paris Magazine. Mubenga is a Professional Engineer registered in Ohio, USA. She is passionate about finding renewable energy solutions so people can better their lives while fighting climate change. She has worked in the industry for 15 years during which she designed/interconnected/approved 50,000KW of solar PV mainly for utility scale solar fields. She also worked on distribution planning & protection (7KV- 315KV), energy management, and project management.

Mubenga is the former Electrical Engineering Manager at the University of Toledo, USA where she has helped manage a total of \$65million energy budget, saving over \$5million in utility costs. She

was a co-founder of the Sustainability Energy Efficiency and Design Initiative.

Mubenga has been an active IEEE member for the last 9 years. In 2010, she started and chaired the Toledo Section IEEE Graduate of the Last decade- now known as Young Professionals. Mubenga was the IEEE Toledo 2010 Young Engineer of the Year. Currently, she serves as the General Conference Chair for the 2017 IEEE PES PowerAfrica conference in Ghana.

Academically, Mubenga is a PhD candidate in Electrical Engineering at the University of Toledo where she earned both Bachelor and Master degrees in the same field with honors. For a MS research, she hybridized an electric vehicle by integrating a fuel cell and developed a solar powered hydrogen generating station. IN the process she earned the “University of Toledo EECS Department Most Outstanding Thesis Award”. For her PhD research, she is developing a patented battery management system for large Li-ion batteries energy storage that are used in electric vehicles and grid applications. Mubenga served as the Entrepreneurial Lead for the Icorps@Ohio program and helped her team earn a competitive research grant through the National Science Foundation based program.

Mubenga was nominated as 2017 African Most Influential Women in Business and Government by CEO Magazine based in South Africa. She was also nominated for the 2017 Clean Energy Education Empowerment (C3E) Award, a program from the USA Department of Energy in collaboration with MIT Energy Initiative and Stanford Precourt Institute for Energy. She was invited by the European Parliament S&D Group. She served as keynote speaker at the MREA 27th Annual Energy Fair(USA) and at the 2nd Sultani Makutano (DRC). She was featured in Forbes Afrique, AMINA , JeuneAfrique, the Toledo Blade, Portage County Gazette, Afrimpact, on France24, Congo WebTV.



Onyinyechi Nzimako received the B.Sc. and M.Sc. degrees in electrical engineering from the University of Manitoba, Winnipeg, MB, Canada, in 2010 and 2015, respectively. She joined RTDS Technologies Inc, Winnipeg, in 2010 and is currently a Senior Power System Simulation Engineer focusing on renewable applications. Her interests include real-time electromagnetic transient simulation of power systems, real-time testing of control and protection systems, power hardware in the loop simulations, integration of renewable energy sources, and microgrid applications. She is a registered Professional Engineer in the Province of Manitoba, Canada. She volunteers as a General Co-Chair for the 2017 IEEE PES & IAS PowerAfrica conference. She is passionate about the development of the power sector in Africa to drive sustainable economic developments and enhance quality of life across the continent.

10



Abraham Gebregergis (S'12-M'08-SM'06) received the B.Sc. from University of Asmara (UOA), Asmara, Eritrea, the M.Sc. degrees from University of Stellenbosch, Stellenbosch, South Africa, and the Ph.D. degree from the Clarkson University, Potsdam, New York, USA, all in electrical engineering, in 2001, 2004, and 2007 respectively.

From 2001 to 2002, he was with the electrical engineering department of UOA as an assistant lecturer. From 2008 to 2013 he has been working for Delphi Steering and Nexteer Automotive in Saginaw, Michigan as senior electrical engineer at the Innovation Center. He has also taught Advanced Motor Drives in Saginaw Valley State University as an Adjoint Professor for a semester in 2013. Currently, he has been working as a Chief Scientist at Halla Mechatronics, Bay City, Michigan, where he is responsible for Motor Drives and Control for automotive applications.

Dr Abraham has published several journal, conference papers and patents. His research interests include electric machines, adjustable speed drives, renewable energy systems and Autonomous vehicle development.

SPEAKER PROFILES

Day 1 Speakers

IEEE PES & IAS Power Africa Conference 2017

THEME: Harnessing Energy, Information and Communications
Technology for Affordable Electrification of Africa



Prof Daniel Chowdhury, Professor at Tshwane University of Technology

Prof SP Daniel Chowdhury is an NRF rated scientist in South Africa with 28 years' academic experience and has been Professor at Tshwane University of Technology since 2014. He has published more than 320 research papers in peer reviewed international journals and conferences, and has co-authored two textbooks and one research book, "Microgrids and Active Distribution Networks". He was previously Associate Professor at the University of Cape Town, was a senior visiting academic in the UK at Brunel University London and the University of Manchester, and has a 28-year academic career in the Electrical Engineering starting from the Jadavpur University, India. He has graduated 10 PhD, 36 MSc and about 50 senior UG students in electrical engineering and executed research projects of more than 14 million Rands. Besides supervising his more than 30 members' research team, he currently leads a team that runs matric mathematics projects to enhance mathematics pass-rate and thus enrich the pool of university intakes. He has been collaborating with renewable energy companies for the deployment of microgrids and just microgrids in South Africa and beyond. He is a fellow of the IET and Senior Member of the IEEE.



Sengiphile Simelane, Programme Manager at the Council for Scientific and Industrial Research (CSIR)

Sengiphile Simelane has worked for more than 15 years in the energy industry. He is currently leading the CSIR's energy autonomous programme. Prior to the CSIR, he was the CEO at the Swaziland Electricity Company, where he was instrumental in the introduction of renewable power to the Swaziland energy mix. Mr Simelane has also spent many years with Eskom, TFMC, and PBMR, where held various leadership positions. He has experience in the generation, transmission and distribution businesses as well as renewable energy development and energy services. He has worked in several key areas of the industry, including plant and field operations and organizational transformation. He has an MSc. Degree in Electrical Engineering

(UCT), a Certificate in Global Management (Insead) and is a Professional Engineer registered with the Engineering Council of South Africa.

Dr. Reginald Parker, Founder and President of 510nano.

Dr. Reginald Parker is an experienced business professional, entrepreneur, seasoned inventor, commercialization lead, and a solar energy technologist for over 20 years. Dr. Parker served as Chief Technology Officer at Nanotailor, a manufacturer of functionalized carbon nanotubes; a consultant at the Boston Consulting Group, an international management consulting firm; President of Business, Information and Technology Consulting, a boutique web consultancy; and a Senior Polymer Process Research Engineer at the Rohm and Haas Company, a specialty chemical company (acquired by Dow Chemical Company). Additionally, Dr. Parker has taught, research and managed programs in various academic institutions including Professor and Principal Investigator at the University of North Dakota, as well as Assistant Director of Tech Transfer, Chairman, and Professor at Florida A&M University. Dr. Parker holds a BS and Ph.D. in Chemical Engineering from MIT and Georgia Tech respectively, as well as an MBA from Florida State University.



SPEAKER PROFILES

Day 1 Speakers

IEEE PES & IAS Power Africa Conference 2017

THEME: Harnessing Energy, Information and Communications
Technology for Affordable Electrification of Africa



Ray Larsen, Co-Founder IEEE Smart Village

Ray Larsen received Bachelor's and Master's degrees in Electrical Engineering at UBC and a Degree of Engineer in EE from Stanford University while working as an instrumentation project engineer at the new Stanford Linear Accelerator Center (SLAC). He became Electronics Department Head overseeing instrumentation, controls, pulsed power and large experimental detectors. In 2009 he joined the Humanitarian Technology Challenge (HTC) and founded the Community Solutions Working Group, later IEEE Smart Village, dedicated to reaching millions of the global 1.3 billion without electricity. Ray has been inspired by Jeffery Sachs, Paul Polak, Amartya Sen and the IEEE visionaries who launched the HTC program that

global poverty is a soluble problem, a matter of the will of developed countries and not of economic means. He believes that IEEE Smart Village can help make important breakthroughs by focusing IEEE's enormous volunteer talent and resources on holistic sustainable community-owned initiatives.

Vera Asuamuzuah, Program Director, Anansi International

Vera Asuamuzuah is Program Director at Anansi International. She was born and raised in Tema, Ghana. She holds a Bachelor of Science Degree in Health and Exercise Science from Colorado State University and is currently a Master of Development Practice Candidate at Regis University in Denver, Colorado. Vera's water implementation project in Potomu, Ghana, birthed her passion to pursue a career in International development. She has worked as a Data Analysis and Outreach Intern for Africa Development Promise and is currently a program manager for a U.S company, Anansi International, is impacting disadvantaged communities in Ghana and around the world by creating digital jobs for marginalized youth.



12



Ebenezer Essilfie-Nyame, Leader of Research, Environment and Partnership Cluster, Abibiman Foundation

Ebenezer Essilfie-Nyame is a native of Tarkwa-Bompieso, a small mining community in the Western Region of Ghana. He has lived in a fishing community in Cape Coast, Central Region since 1999 until he moved to Accra in 2012. Being exposed at first hand to varied environmental impacts, Ebenezer developed a great passion for promoting sustainable environmental practices in communities. His multi-cultural and inter-disciplinary background in environment, communication and administration has led him to a number of opportunities and impacts with NGOs, government and international organizations, including the Environmental Protection

Agency of Ghana and the United Nations. He currently heads the Research, Environment and Partnership cluster of Abibiman Foundation, a distinguished socio-environmentally focused NGO in Ghana. Ebenezer studied Environmental Science at the University of Cape Coast, Ghana and Global Environmental Management from Oslo & Akershus University College of Applied Sciences, Norway. He also consults for Model United Nation conferences and related programmes as well as, several youth-centred activities around the world.

SPEAKER PROFILES

Day 1 Speakers

IEEE PES & IAS Power Africa Conference 2017

THEME: Harnessing Energy, Information and Communications
Technology for Affordable Electrification of Africa



Edwin Aryitey, Senior Manager, Volta River Authority (VRA)

Edwin Aryitey is a Senior Manager at the Volta River Authority (VRA). Mr. Edwin Aryitey has worked at VRA for 25 years and is currently the Senior Properties Manager in the Department of Real Estate where he oversees land acquisition and property management. Edwin holds a BSC in Land Economy and a Diploma in Estates Management from the Kwame Nkrumah University of Science and Technology. He holds a post-graduate diploma in Land Management from Erasmus University Rotterdam in the Netherlands and is currently pursuing a Masters in Public Administration at Ghana Institute of Management and Public Administration.



Ebenezer Kwarteng, Staff, Conscious Collaborative

Ebenezer Kwarteng is a staff member at Conscious Collaborative. Ebenezer Kwarteng was born in Inchaban, Ghana and was abandoned at the age of 9 by his widowed mother. Ebenezer was raised in an orphanage where he was a role model to other children and school prefect. He recently graduated from Adiembra Secondary School in Sekondi. Ebenezer plans to pursue a university degree in economics and has a passion for human rights law. Having known the hardships of poverty, Ebenezer aspires to help those in need in his community and works part time at Conscious Collaborative assisting in entrepreneurship workshops with widowed and marginalized women.

13

Lindsey Bacon Founder, Conscious Collaborative; Co-founder, Anansi International

Lindsey Bacon is founder of the Conscious Collaborative and Co-founder, Anansi International. She is a Master of Development Practice Candidate at Regis University in Denver, Colorado. She graduated summa cum laude from University of Massachusetts with a BA in Anthropology and Gender Studies. Out of her research in Ghana, Lindsey founded Conscious Collaborative, a nonprofit that provides educational and economic opportunities for women and youth in coastal fishing villages of Ghana. Lindsey and business partner, Sue Shalley, founded Anansi International, a US company that is impacting disadvantaged communities in Ghana and around the world by creating digital jobs for marginalized youth.



Eyram A. Adadevoh Esq., Senior Associate Attorney, Centurion Law Group

Eyram A. Adadevoh is an international oil & gas lawyer with experience in petroleum transactions and corporate legal compliance, as well as a certified compliance and ethics professional. She has authored publications on the topic of renewables investment, compliance, and anti-corruption frameworks. She is registered to practice law in Ghana and the State of New York. She is currently senior associate attorney at Centurion Law Group.

SPEAKER PROFILES

Day 2 Speakers

IEEE PES & IAS Power Africa Conference 2017

THEME: Harnessing Energy, Information and Communications
Technology for Affordable Electrification of Africa



Monica Maduekwe, Program Coordinator of the ECOWAS Programme

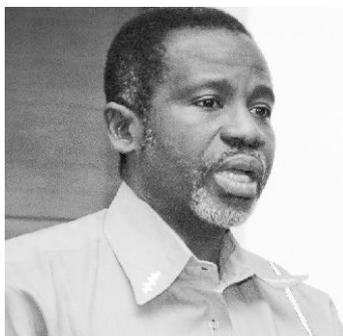
Monica Maduekwe is program coordinator of the ECOWAS Programme on Gender Mainstreaming in Energy Access, and has coordinated renewable energy and energy efficiency programmes at the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE). She has extensive experience in developing regional policies, regulatory and institutional reform instruments for renewable energy, energy efficiency and gender mainstreaming. At ECREEE, she has worked on several regional energy programmes and projects, serving as regional coordinator for the Global Environment Facility (GEF) Strategic Program for West Africa (SPWA), of the United Nations Industrial Development Organization (UNIDO), and the ECOWAS

Programme on Gender Mainstreaming in Energy Access (ECOW-GEN). She has a MSc. degree in Energy Studies with specialization in Energy and the Environment, from the University of Dundee, Scotland, United Kingdom, and is a member of the International Association for Energy Economics (IAEE). Ms. Maduekwe is an Ambassador/Mentor in the Women in Renewable Energy (WIRE) Network of the Clinton Climate Initiative.

Dr Chris Mensah-Bonsu, Lead Regional Transmission Engineer Market and Infrastructure Development at California ISO

14

Dr Mensah-Bonsu is co-owner of Mensah-Bonsu Energy Consulting, Inc. (dba. MB Energy), an energy consulting company based in California, USA and also serves as Principal Technical Consulting Advisor to the Ghana Grid Company Limited (GRIDCo) with responsibilities for electricity market development, energy policy and compliance, grid-connected renewable energy integration, real-time power system and energy control center operations, reliability standards and procedures development, staff capacity building and mentoring, as well as efforts with the cooperation of the regional electric utility industry, the West Africa Power Pool (WAPP). Chris has over 15 years of experience with California Independent System Operator, USA. He serves on the US Western Electricity Coordinating Council (WECC) Technical Studies Subcommittee. He is a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE), and Chair of IEEE Power & Energy Society PSACE Awards Working Group. He is a Part-Time Professor of Electrical Engineering at California State University, Sacramento, USA. Dr Mensah-Bonsu holds a Ph.D. degree in Electrical Engineering from Arizona State University, Tempe, USA.



Nii Darko Asante Director of Technical Regulation, Energy Commission of Ghana

Nii Darko Asante is a Chemical Engineer with over 20 years' experience in energy management and optimisation. In his current role, he heads the four core divisions of Ghana's Energy Commission which deal with the development and enforcement of regulations in the electricity, natural gas and renewable energy sectors, the promotion of Renewable Energy, and the development and execution of initiatives to promote the efficient use of energy. Dr Asante was previously the Technology Manager of the Energy Optimisation business of Aspen Technology Inc., where he developed tools and implemented solutions for Energy Management and Optimisation at Petrochemical plants all over the world.

SPEAKER PROFILES

Day 2 Speakers

IEEE PES & IAS Power Africa Conference 2017

THEME: Harnessing Energy, Information and Communications
Technology for Affordable Electrification of Africa



Kweku Awotwi Past Chief Executive, Volta River Authority

Kweku Awotwi is the immediate past Chief Executive of Ghana's Volta River Authority ("VRA"), Ghana's state electricity generation utility. During his four and a half years at the helm, he oversaw unprecedented improvements in VRA's operational and financial performance, as well as completed a \$330 million financing to expand a 220 MW thermal plant. He also introduced numerous innovations including the construction of Ghana's first, grid-connected solar plant; the operationalization of the Authority's distribution company; the use of financial derivatives to purchase its fuel requirements. Mr. Awotwi has spent twenty-five years in the energy and mining sectors in the United States and Africa, heading business development and strategic planning for Ashanti Goldfields Company Limited ("Ashanti"); serving as the Manager for Business Planning & Analysis for US Fortune 50 Kaiser Aluminum & Chemical Corporation ("Kaiser").



Liliane Kissimba, Founder and President of World Growth Projects Inc and co-founder of Mahali Business Platform

Liliane Kissimba, is founder and President of World Growth Projects Inc., co-founder of Mahali Business Platform and also co-founder and President of Electr'Af. While she was supposed to connect people to an energy business, she herself was connected, and went on to help found Electr'Af, which has been created to respond to the huge energy deficit in Africa and particularly in the Democratic Republic of Congo. Electr'Af challenges are to bring together, experts in green energy, investors, international & local partners to reduce the energy deficit and allow business and the economy to grow up. In 2010 she wrote "ET Dieu créa le Congo" a book which is an essay... She has

graduate degree in marketing and management. She has accumulated over 13 years of professional work in finance for a multiple multinational in the Netherlands and in Belgium. Born in DRC, she is a strong believer in the ability of people to give the best of themselves when they are in a position of being well prepared, trained and empowered. *"To become a citizen of change does not require complicated things but a profound desire to solve society's problems."* LK

Deborah Akuoko, Researcher at GIMPA School of Technology

Deborah Akuoko is a technology and innovation enthusiast. At GIMPA, she is involved in a design project to implement a robot that detects zero day bugs in software (running on electronic meters), and applies a fix using Artificial Intelligence. Deborah was awarded a Master of Science in ICT from the GIMPA School of Technology for the design and implementation of a persuasive game application proven to positively influence the fruits and vegetables' consumption of young adolescents. Deborah's industrial experience includes serving from 2014 - 2016 as a DevOps Engineer for the software development company DreamOval, handling testing, automation, and handling all issues related to software development operations. She also handled engineering and management of the DreamOval Network infrastructure.



SPEAKER PROFILES

Day 2 Speakers

IEEE PES & IAS Power Africa Conference 2017

THEME: Harnessing Energy, Information and Communications
Technology for Affordable Electrification of Africa



Anna Amankwah-Minkah: Lecturer, Civil Engineering Department, Bolgatanga Polytechnic

Anna Amankwah-Minkah has over 10 years of experience ranging from research in water resources and environmental sanitation in Ashanti and Eastern Regions, to leading field work to evaluate and refine technology relevant to enhancing the productivity of smallholder, dry season vegetable farmers in Northern Ghana. Anna Amankwah-Minkah has also been involved in capacity building and research in the area of shallow groundwater utilization in the White Volta basin. Currently she carries out teaching and training of tertiary students.



Urenna Onyewuchi, Division Manager, Corning Incorporated

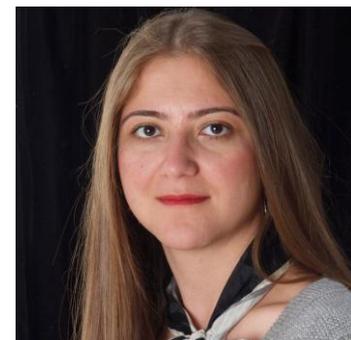
Urenna Onyewuchi specializes in applying power quality data analysis/ data science towards building resiliency into plant manufacturing and environmental processes; simulating and modeling electrical manufacturing processes for testing, optimization and process improvements; and power failure investigations. She studied electrical engineering at George Mason University in Virginia and graduated with a doctorate degree in the field of asset management from Georgia Institute of Technology's (GATech's) electrical and computer engineering program. Her work in asset management entailed developing algorithms for the maintenance and reliability of power equipment, infrastructural and other systems. She was General Chair of the

IEEE PES PowerAfrica 2016 conference held in Livingstone, Zambia, and is the Chair of the IEEE Power Africa Steering Committee.

16

Shay Bahramirad, Manager of Smart Grid and Technology at ComEd

Shay Bahramirad's responsibilities include leading the Smart Grid organization across ComEd; business case development and performance measures for Smart Grid technology deployments; and defining, developing, and implementing Smart Grid initiatives such as Microgrid, Data Analytics and Smart Cities in ComEd's service territory. She is also an Adjunct Professor at the Illinois Institute of Technology. Shay holds multiple advanced degrees, including a Ph.D. in Electrical Engineering from the Illinois Institute of Technology. She is a U.S. representative of power quality issues of the grid of the future in CIGRE (International Council of Large Electric Systems), leads the development of the IEEE P1815 Standard: Smart Distribution Application Guide, and serves as IEEE/PES T&D Committee, Technical Chair of several IEEE conferences such as T&D and the Great Lake Symposium. Shay is the committee chair for the PES Women in Power, a Senior Member of IEEE, and the Editor-in-Chief of the IEEE Transactions on Smart Grid, Special Issue on Asset Management.



PANELS, TUTORIALS AND TOURS

Plenary Session Day 1

IEEE PES & IAS Power Africa Conference 2017

THEME: Harnessing Energy, Information and Communications
Technology for Affordable Electrification of Africa



Panel Title: Social Implications of Electrification



Moderator:

Vera Asuamuzuah, Program Manager, Anansi International



17

Panelists:

- Edwin Aryitey, *Senior Properties Manager at Volta River Authority (VRA)*
- Ebenezer Essilfie-Nyame, *Leader of Research, Environment and Partnership Cluster, Abibiman Foundation*
- Ebenezer Kwarteng, *Aboadze Youth Community Member*
- Lindsey Bacon, *Founder of Conscious Collaborative, NGO in Aboadze, Ghana*

Purpose: The purpose of the panel is to engage various stakeholders on the implications of power production on local communities, areas for improvement, and potential actions companies can take to better fulfill their Corporate Social Responsibility programs.

Structure: Ninety-minute program with four speakers given 10-15 minutes each to speak. Moderator will summarize panel talks for the audience and have two to three planned questions to start the audience discussion. Fifteen to twenty minutes will be provided for questions and answers.

Content: This panel will address the social impacts of power production on local communities; both positive and negative effects of power production at the local level will be discussed. Edwin Aryitey will speak to the VRA's strategy for mitigating community and environmental impacts. Elvis Kyere-Gyeabour will discuss the environmental and social impacts for communities affected by the development of power projects. Ebenezer Kwarteng a youth community member from Aboadze, the site of Takoradi Thermal Power Plant, will present community perspectives towards the power plant. Lindsey Bacon will speak to the opportunities for companies to engage more deeply with communities to ensure positive impacts and the use of ICT initiatives to enhance their Corporate Social Responsibility programs.

PANELS, TUTORIALS AND TOURS

Plenary Session Day 2

IEEE PES & IAS Power Africa Conference 2017

THEME: Harnessing Energy, Information and Communications
Technology for Affordable Electrification of Africa



Panel Title: The Business and Workforce of Electrification

Moderator: Kojo Sefah, Transmission Asset Management, *Midwest Independent System Operator*

Panelists:

- Dr. Nii Darko Asante, *Director of Technical Regulation, Energy Commission of Ghana*
- Kweku Awotwi, *past Chief Executive, Volta River Authority*
- Dr. Chris Mensah Bonsu, *Lead Regional Transmission Engineer California ISO*
- Liliane Kissimba, *CEO World Growth Projects Inc, Co-founder Mahali Business Platform*

Purpose: The purpose of the panel is to bring out viewpoints from new and traditional actors in electrification, as well as development agencies and project developers, to understand the outlook for business models, investment, and needed workforce skills for the practical realization of electrification across rural and urban African contexts.

Structure: Ninety-minute program with three speakers given 10-15 minutes each to speak. Moderator will summarize panel talks for the audience and have two to three planned questions to start the audience discussion. Fifteen to twenty minutes will be provided for questions and answers.

Content: This panel will draw on diverse perspectives to give the audience access to the facets of the problem. Dr Nii Darko Asante will comment on the paradigm of electricity as viewed by investors, economists, providers, businesses, and users in Africa. Kweku Awotwi will deliver the factors that influence decisions on grid extension by a traditional utility, and give insight into how he sees priorities and pressures on the institution recently placed under his guidance. Lilliane Kissimba will relate the challenges and opportunities perceived by private project developers and offer a view on how business environments are evolving. All participants will reflect on the training and hiring prospects from their point of view.

18



PANELS, TUTORIALS AND TOURS

Tutorials Day 3

IEEE PES & IAS Power Africa Conference 2017

THEME: Harnessing Energy, Information and Communications
Technology for Affordable Electrification of Africa



1. Designing Sustainable Business Methods for Energy Access: 8AM-12PM

Instructor:



Silvia Emili is a researcher completing her Ph.D at Brunel University London. With a background in sustainable Product-Service System and strategic design, her research focuses on the design of sustainable business models for energy access in low-income and developing contexts. She has extensive experience in carrying out workshops and training activities with companies and practitioners in different African countries. She carried out research in Botswana, South Africa, and Kenya, working within the EU-funded LeNSes project and the EPSRC-funded project – Global Challenges Research Fund.

2. Teaching Critical Engineering Thinking Skills: 1PM-5PM

Registration for faculty & instructors from African Universities: **30 USD** Sponsored by the IEEE TAB Ad Hoc Committee on Africa

Instructor:

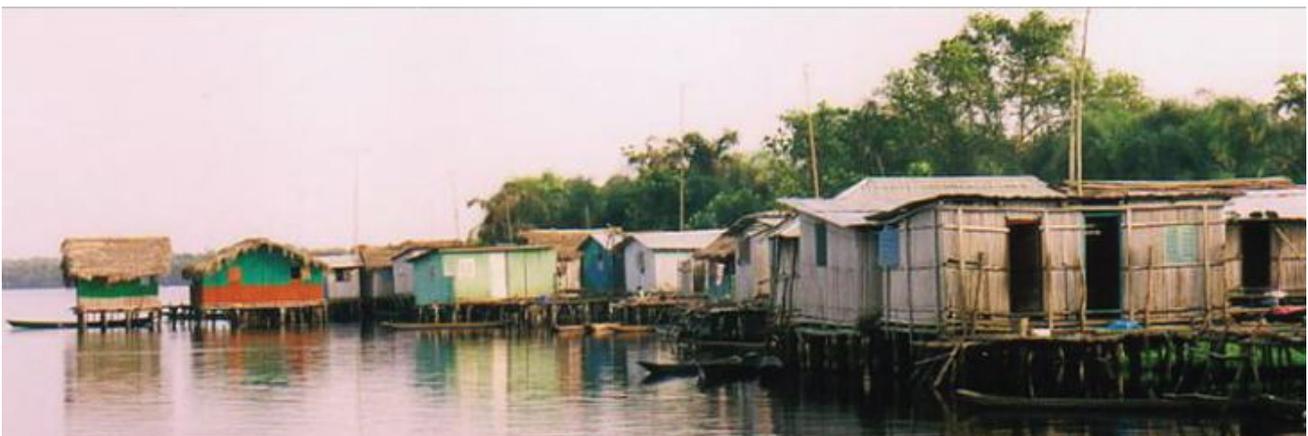


Prof Bruce Krogh is Professor of Electrical and Computer Engineering at Carnegie Mellon University in Pittsburgh, Pennsylvania, USA. In 2012, he moved to Kigali, Rwanda, as the founding director of Carnegie Mellon University Africa, where full-time resident faculty offer master's degrees in information technology (MIST) and electrical and computer engineering (MS ECE). He has contributed for over thirty years to the theory and application of embedded control systems in a number of areas, including power systems, robotics, manufacturing systems, automobiles, and aircraft.

Prior to joining Carnegie Mellon University, he was a systems engineer at the Energy Systems Division of Westinghouse Corporation where he developed control software for electric utility energy control centers. He has served on editorial boards of several journals and was founding Editor-in-Chief of the IEEE Transactions on Control Systems Technology.

He is a Fellow of the IEEE and a Distinguished Member of the IEEE Control Systems Society. His current research interests include new operating and business strategies for ICT-enabled microgrids in emerging markets.

19



PANELS, TUTORIALS AND TOURS

Tutorials Day 3

IEEE PES & IAS Power Africa Conference 2017

THEME: Harnessing Energy, Information and Communications
Technology for Affordable Electrification of Africa



3. Fundamentals of Micro-Grid Operation and Management with Cyber Security Issues: 1PM-5PM

Instructor



Prof James A. Momoh is a professor and former chair (1990-2000) of the Department of Electrical Engineering as well as the founder and director of the Center for Energy Systems and Controls at Howard University, Washington D.C. Dr. Momoh received the B.S.E.E. degree (1975) with honors from Howard University, Washington, D.C.; the M.S.E.E. degree (1976) in electrical engineering from Carnegie Mellon University, Pittsburgh, PA; the M.S.E.E. degree (1980) in systems engineering from the University of Pennsylvania, Philadelphia; and the Ph.D. degree (1983) in electrical engineering from Howard University, Washington, D.C.

Dr. Momoh has authored *Electric Power System Applications of Optimization*, a best seller book on Optimization and co-authored several others including *Smart Grid: Fundamentals and Application*, *Electric Systems, Dynamics and Stability with Artificial Intelligence Applications* (Marcel Dekker, Inc.) etc. He is an associate editor of the journals 'Power Letters' and 'Electric Machines and Power Systems'. Dr. Momoh is the Founder and Leader of US-Africa collaboration, widely known as International Conference on Power Systems Operation and Planning (ICPSOP), in research between US-Africa professors in energy and power sustainability. He was recently appointed the chairman of the Nigerian Electricity Regulatory Commission (NERC).

20

TECHNICAL TOURS

GOMOA ONYEADZE SOLAR FARM

The Gomoa Onyeadze Solar Farm is a private funded solar energy harnessing plant that was constructed by the BXC Ghana limited, a subsidiary of the BXC Beijing China and located in the Central Region of Ghana. The 30 million-dollar solar plant was commenced in 2012 under the Power Purchasing Agreement (PPA) with the Electricity Company of Ghana (ECG) to add 20 megawatts of power to the national grid to augment the power deficit the country was facing. The Company installed 80,480 pieces of poly crystalline silicon panels with 20 step-up transformers to create the output inverters to 33 kilo volts. The project was solely funded by the BXC Beijing without any government guarantees. *Friday, June 30, 2017*



PANELS, TUTORIALS AND TOURS

Tutorials Day 3

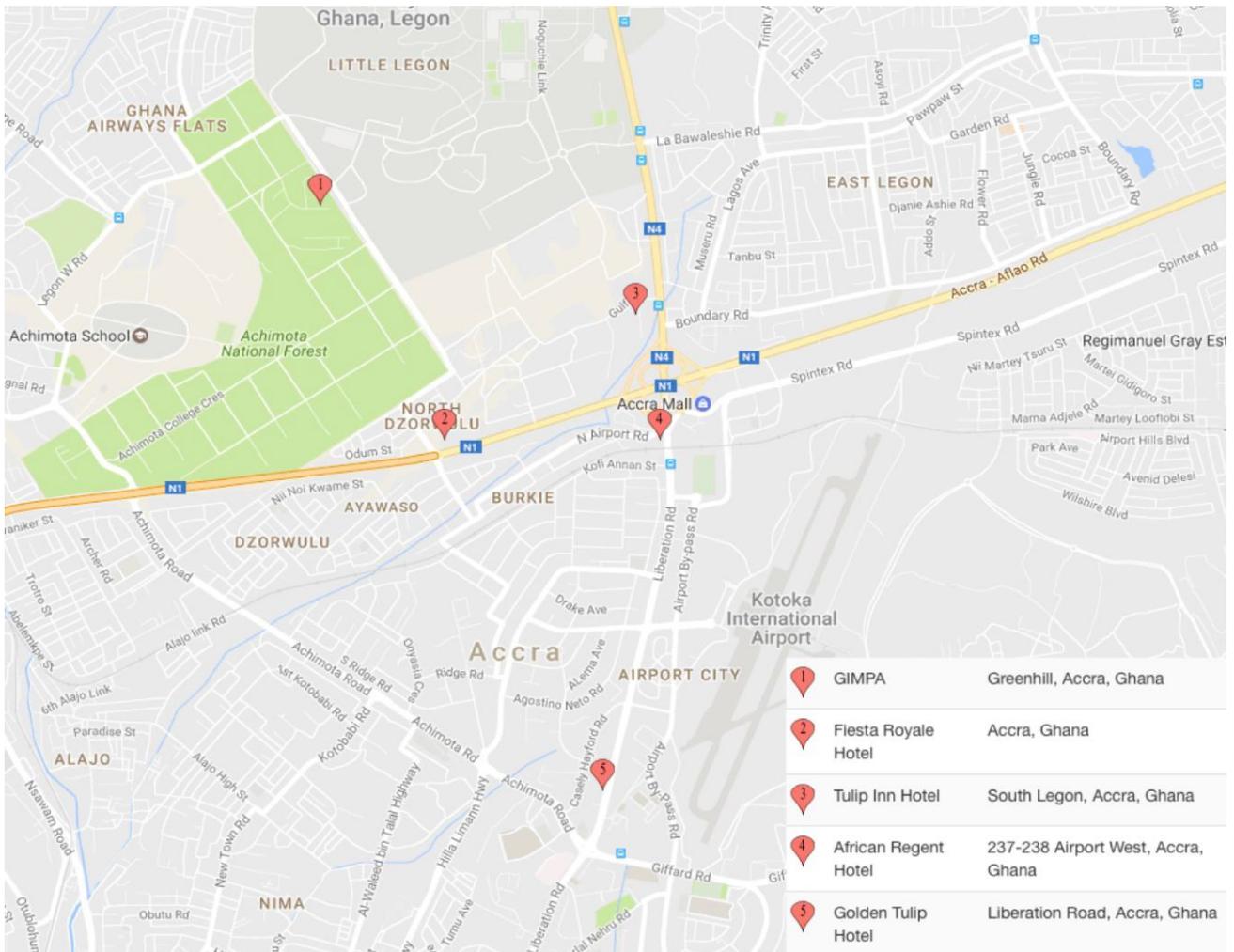
IEEE PES & IAS Power Africa Conference 2017



THEME: Harnessing Energy, Information and Communications Technology for Affordable Electrification of Africa

Pediatorkope Island Pediatorkope is situated in the Eastern Region of Ghana, next to Kpetsupanga. From Big Ada dock, a boat trip heads north & then bends around to Pediatorkope Island, the largest in the chain, where an impressive renewable energy effort can be seen. This island has become a testing ground for projects ranging from solar panels to electricity generating swing sets. *Friday, June 30, 2017*

Map of Key Conference Locations



21



REVIEWERS

Prasenjit Basak	Elyas Rakhshani	Tony Mcgrail	Remy Tiako	Dr.Senthil Krishnamurthy
Arup Sinha	Mehrdad Biglarbegian	Oscar Danilo Montoya Giraldo	George Eduful	Yubo Wang
Vedran Peric	Sandeep Nimmagadda	Jose Carlos M Vieira Jr	Hilary Chisepo	Choong-Koo Chang
Mohamed Elleuch	Zhaojun Meng	Claudionor Nascimento	Frede Blaabjerg	Innocent Davidson
Sanna Uski	Jesse Thornburg	Oscar Danilo Montoya Giraldo	Amevi Acakpovi	Dr.Senthil Krishnamurthy
Gang Huang	Choong-Koo Chang	Math Bollen	Atanda Raji	Akshay Kumar Saha
Jesse Thornburg	Gang Huang	Joe Chow	Dr. Prasenjit Basak	Kehinde Awodele
Wei Wu	Lei Fan	Iman Naziri Moghaddam	Arup Sinha	Atanda Raji
Germano Lambert-Torres	Ola Onifade	Sandeep Nimmagadda	Wei Wu	Dr.Senthil Krishnamurthy
Slobodan Petrovic	Dr.Senthil Krishnamurthy	Joe Chow	Amevi Acakpovi	Kehinde Awodele
Amirhossein Ghods	Jeremy Lin	Kirsch Mackey	Remy Tiako	Kehinde Awodele
Ayodele Adeleye	John T. Agee	Matin Meskin	George Eduful	Sunetra Chowdhury
Jonathan Okoronkwo	Inno Davidson	Khalil El-Arroudi	Hilary Chisepo	Dr.Senthil Krishnamurthy
Che Guan	Ebrahim Badran	Swaroop Gajare	Frede Blaabjerg	Neeraj Gupta
Joe Chow	Chen Yuan	Amirhossein Ghods	Che Guan	Nan Li
Che Guan	Dr. Prasenjit Basak	Yi Cui	Amevi Acakpovi	Shahab Shariat Torbaghan
Jesse Thornburg	Arup Sinha	Vedran Peric	Wei Wu	Sanjay Dambhare
Abel S. Tambatamba	Jesse Thornburg	Jose Carlos Vieira	Amevi Acakpovi	Saptarshi Roy
Abel S. Tambatamba	Jinlong Li	Claudionor Nascimento	Yubo Wang	Joerg Dickert
Jesse Thornburg	Jonathan Okoronkwo	Jose Carlos Vieira	Yuan Zhang	Nimesh Shah
Oghenov Okpako	Dr. Prasenjit Basak	Claudionor Nascimento	Amevi Acakpovi	Man Mohan Garg
Jidong Chai	Arup Sinha	Jeremy Lin	Issah Majeed	Nitin Saxena
Oghenov Okpako	Amevi Acakpovi	Yuan Zhang	Akshay Kumar Saha	Ebrahim Badran
Nathan Williams	Atanda Raji	Gang Huang	Akshay Kumar Saha	Kehinde Awodele
Oghenov Okpako	Yizhe Xu	Tao Chen	Hilary Chisepo	Innocent Davidson
Rafiq Raji	Emmanuel Frimpong	Dung Andu Nguyen	Jonathan Okoronkwo	Lin Zhang
Joe Chow	Prasenjit Basak	Math Bollen	Rudiren Pillay Carpanen	Jonathan Okoronkwo
Frede Blaabjerg	Arup Sinha	Dung Andu Nguyen	Dr. Prasenjit Basak	Juan Andrade
S G Bharathi Dasan	Yizhe Xu	Emmanuel Frimpong	Arup Sinha	Jidong Chai
Mario Ndreko	Emmanuel Frimpong	Joseph Essilifie	Akshay Kumar Saha	Ryan Lian
Umesh Chaudhary	Swaroop Gajare	Math Bollen	Rudiren Pillay Carpanen	M. Hadi Amini
Sanjay Dambhare	Jeremy Lin	Emmanuel Frimpong	Akshay Kumar Saha	Vipul Rajput
Man Mohan Garg	Germano Lambert-Torres	Joseph Essilifie	Issah Majeed	Thomas Wijnhoven
Emad Roshandel	Yizhe Xu	Innocent Davidson	Nimesh Shah	Nayeem Chowdhury
Shahab Shariat Torbaghan	Ben Lanz	Kehinde Awodele	Rudiren Pillay Carpanen	Umesh Chaudhary
Joe Chow	Jayesh Joglekar	David Oyedokun	Akshay Kumar Saha	Joerg Dickert
Emmanuel Frimpong	Mohammad Imran Azim	Yi Cui	Hilary Chisepo	M. Hadi Amini
Nitin Anand Shrivastava	Math Bollen	Emmanuel Frimpong	Issah Majeed	Glenn George
Muhajir Mekonnen	Matin Meskin	Joseph Essilifie	Rudiren Pillay Carpanen	Kehinde Awodele
Jeremy Lin	Ahsan Shahid	Atanda Raji	Issah Majeed	Choong-Koo Chang
Joerg Dickert	Mahdi Motalleb	Frede Blaabjerg	Rudiren Pillay Carpanen	Nimesh Shah
Sunetra Chowdhury	Mehrdad Biglarbegian	Akshay Kumar Saha	Dr. Prasenjit Basak	Trevor Bihl
Glenn George	Matin Meskin	Math Bollen	Arup Sinha	Nand Meena
Hasala Dharmawardena	Sanna Uski	Emmanuel Frimpong	Akshay Kumar Saha	Mohammad Amin Aghahassani
Joerg Dickert	Matin Meskin	Joseph Essilifie	Frede Blaabjerg	Dinesh Jain
Mohammed Shams	Math Bollen	Remy Tiako	Akshay Kumar Saha	Gang Huang
Lei Fan	Swaroop Gajare	Frede Blaabjerg	Rudiren Pillay Carpanen	Dr. Prasenjit Basak
Che Guan	Xingpeng Li	Ayodele Adeleye	Charan Teja S	Arup Sinha
Lei Fan	Elyas Rakhshani	Swaroop Gajare	Lucas Pereira	Yuan Zhang
Zhaojun Meng	Dr. Prasenjit Basak	Yuan Zhang	Kirsch Mackey	Sunetra Chowdhury
Germano Lambert-Torres	Arup Sinha	Yubo Wang	Akshay Kumar Saha	Joerg Dickert
Trevor Bihl	David Oyedokun	Felix Akpaglo	John T. Agee	Nayeem Chowdhury
Jidong Chai	Math Bollen	Remy Tiako	John T. Agee	Andu Nguyen
Zhaojun Meng	M. Hadi Amini	Hilary Chisepo	Mahdi Motalleb	Joerg Dickert
Zhaojun Meng	Hamed Pourgharibshani	Frede Blaabjerg	Dr. Prasenjit Basak	Tao Chen
Mohammad Imran Azim	Ahsan Shahid	Kiprono Letting	Arup Sinha	Thamer Alquthami
Ahsan Shahid	M. Hadi Amini	Remy Tiako	Mohamed Elleuch	Joerg Dickert
Nathan Williams	Kirsch Mackey	Felix Akpaglo	Akshay Kumar Saha	Tao Chen
Zhaojun Meng	Math Bollen	Remy Tiako	Atanda Raji	Mukul Dixit
Dr. Bhaveshkumar Bhalja	M. Hadi Amini	Yi Cui	Akshay Kumar Saha	Nand Meena
Dinesh Gurusinghe	Fiaz Ahmad	Hilary Chisepo	Remy Tiako	Sri Nikhil Gourisetti
Joseph Eminzang Essilfie	Jonathan Okoronkwo	Frede Blaabjerg	Rudiren Pillay Carpanen	Jackson John
Amirhossein Ghods	Sri Nikhil Gourisetti	M. Hadi Amini	Akshay Kumar Saha	Sebastian Rosado
Dr.Senthil Krishnamurthy	Dinesh Gurusinghe	Gang Huang	Dr.Senthil Krishnamurthy	Mohamed El-Hawary
Henry Louie	Mohammad Sadi	Atanda Raji	Sandeep Nimmagadda	Shahab Shariat Torbaghan
Dr. Prasenjit Basak	Dr. Prasenjit Basak	Mohammad Sadi	Dr. Prasenjit Basak	Umesh Chaudhary
Arup Sinha	Arup Sinha	Remy Tiako	Arup Sinha	Yuan Zhang
Henry Louie	Joe Chow	Joerg Dickert	Ayodele Adeleye	Mahdi Motalleb
Mohamed Elleuch	Yizhe Xu	Frede Blaabjerg	Akshay Kumar Saha	Charan Teja S
Ola Onifade	Dung Andu Nguyen	Joseph Attachie	Iman Kiaei	Iman Naziri Moghaddam
Inno Davidson	Oscar Danilo Montoya Giraldo	Frede Blaabjerg	Iman Naziri Moghaddam	Yuan Zhang
Henry Louie	Sri Nikhil Gourisetti	Atanda Raji	Dr.Senthil Krishnamurthy	
Ola Onifade	Joe Chow	Gaurav Khare	Akshay Kumar Saha	
Frede Blaabjerg	Vedran Peric	Kehinde Awodele	Jeremy Lin	
Iman Kiaei	Innocent Davidson	Amevi Acakpovi	Atanda Raji	

Thank You
FOR ATTENDING



EVENT MANAGEMENT

RICS Consult Limited
info@ricsconsult.com | www.ricsconsult.com