



# WREC 2023

WORLD RENEWABLE ENERGY CONGRESS XXII

# MALAYSIA

## JULY 16 - 20

Kuala Lumpur Convention Centre (KLCC)

# PROGRAM BOOK



Renewable Energy  
Technology



The Built  
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E-Mobility  
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# WREC 2023

WORLD RENEWABLE ENERGY CONGRESS XXII

KUALA LUMPUR, 16-20 JULY

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WORLD RENEWABLE ENERGY CONGRESS XXII

16<sup>th</sup> – 20<sup>th</sup> JULY 2023

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National Nanotechnology Centre (NNC) (previously known as Part of the National Nanotechnology Directorate) was founded on January 13, 2010 and began to operate officially in July 2010 as a division under MOSTI. NNC serves as the National Focal Point for the coordination of research, development and all related activities of nanotechnology in Malaysia. NNC also play the role of raising the level of awareness of science and technology by providing an environment that promote the activity of invention, innovation and technology development in the nanotechnology community.

## **National Nanotechnology Centre (NNC)**

### **Ministry of Science, Technology & Innovation (MOSTI)**

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# About Organizers



**WREC- WREN**

## WREC - WREN

The World Renewable Energy Congress (WREC) and Network (WREN) are prominent organizations dedicated to promoting and advancing renewable energy solutions globally. WREC serves as an international platform for scientists, researchers, policymakers, and industry professionals to collaborate and exchange knowledge on renewable energy technologies, policies, and practices. WREC organizes congresses that bring together experts from around the world to discuss the latest advancements, challenges, and opportunities in the field of renewable energy. These congresses provide a platform for participants to present their research findings, share experiences, and engage in meaningful discussions. The congresses cover a wide range of topics, including solar energy, wind power, bioenergy, hydropower, geothermal energy, and energy efficiency.

Among its eminent speakers have been H H Olafur Ragnar Grimsson (President of Iceland), Dr Romano Prodi (Prime Minister of Italy), Crown Prince Faisal of Jordan, H E Dr Abdulaziz Bin Othman Altwaijri (Director General of ISESCO, he is now WREN Honorary Chairman), Rt Hon Hazel R. O'Leary (US Secretary of Energy and US Secretary of Energy) and Prof Steven Chu (Nobel Prize Laureate), Mrs Monika Ghandi (Minister of Environment, India), Admiral Truly, Dr Charly Gay and Dan Arvisu Directors (General of NREL, USA), Rt Hon Alex Salmond (First Minister of Scotland), H E Ranil Wickremasinghe (Prime Minister of Sri Lanka), H R H Princess Victoria of Sweden. WREN worked with UN, UNESCO, WEC, UNIDO, UNEP, WMO, WHO, ESCWA, ISES, SER, EU, Commonwealth Science Council, and WB

## SERI UKM



The Solar Energy Research Institute (SERI) at Universiti Kebangsaan Malaysia (UKM) is a renowned research institution dedicated to advancing the development and utilization of solar energy in Malaysia and beyond. With a strong commitment to promoting sustainable energy solutions, SERI plays a vital role in driving the country's transition towards clean and renewable energy sources. Recognized for its cutting-edge research, innovative technologies, and multidisciplinary approach, SERI brings together experts from diverse fields such as engineering, physics, chemistry, materials science, and environmental science. SERI's research primarily focuses on enhancing the efficiency, reliability, and affordability of solar energy systems. Researchers at SERI delve into various aspects of solar energy, spanning advanced photovoltaic (PV) technologies, solar thermal systems, energy storage solutions, and grid integration strategies. SERI conducts both fundamental research to enhance the understanding of solar energy materials, devices, and systems, as well as applied research to develop practical solutions for real-world applications.

Equipped with state-of-the-art laboratories and research facilities, SERI empowers scientists and engineers to conduct experiments, analyse data, and test innovative solar energy technologies. The institute also actively collaborates with industry partners, government agencies, and international research institutions to foster knowledge exchange, facilitate technology transfer, and engage in collaborative research projects. As a leading research institute in solar energy, SERI plays a crucial role in driving sustainable development and promoting the adoption of clean energy solutions. Its significant research contributions and technological advancements position SERI as a prominent hub for solar energy research and innovation in the region. Along with its research and innovation, SERI also support science, technology, engineering, and mathematics (STEM) education through the offered postgraduate programmes for local and abroad students that are accredited by the recognised body.

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## FOREWORD FROM MINISTER

MINISTRY OF SCIENCE, TECHNOLOGY AND  
INNOVATION

On behalf of the Ministry of Science, Technology and Innovation of Malaysia, it is my great pleasure to welcome you to the World Renewable Energy Congress (WREC) 2023. This esteemed gathering brings together experts, researchers, policymakers, industry leaders, and stakeholders from around the world to explore the latest advancements and innovations in the field of renewable energy.

As the world faces the challenges of climate change and the need for sustainable development, the importance of renewable energy cannot be overstated. Malaysia recognizes the critical role that renewable energy plays in our transition towards a low-carbon future. We are committed to harnessing the power of renewable resources such as solar, wind, hydro, biomass, and geothermal energy to meet our energy needs while reducing our environmental impact.

I hope WREC 2023 serves as a platform for knowledge sharing, collaboration, and innovation. It brings together stakeholders from academia, industry, government, and civil society to exchange ideas, discuss challenges, and identify opportunities for transformative change. By facilitating the exchange of best practices, research findings, and technological advancements, we can collectively accelerate the deployment and adoption of renewable energy solutions worldwide.

At the Ministry of Science, Technology and Innovation, we are dedicated to creating an enabling environment for renewable energy innovation and adoption. We strive to foster collaboration between academia, industry, and government to drive technological advancements and policy frameworks that support sustainable energy solutions.

I encourage all participants to engage in meaningful discussions, explore potential collaborations, and identify tangible solutions. Together, let us capitalize on the immense potential of renewable energy to address global energy challenges, stimulate economic growth, create employment opportunities, and preserve the integrity of our planet for future generations.

I extend my sincere gratitude to the organizer, speakers, and delegates for their contributions to this conference and may this conference be a step-up for transformative change in the field of renewable energy.

**YB Chang Lih Kang**

Minister

Ministry of Science, Technology and Innovation Malaysia





## FOREWORD FROM VICE CHANCELLOR UNIVERSITI KEBANGSAAN MALAYSIA

Ladies and gentlemen, esteemed delegates.

As a part of Universiti Kebangsaan Malaysia (UKM), the organizer of the World Renewable Energy Congress XXII (WREC 2023), it is our utmost pleasure to extend our warmest greetings and sincere gratitude to each and every one of you. We would like to express our heartfelt appreciation to the World Renewable Energy Network (WREN) and Ministry of Science, Technology and Innovation of Malaysia (MOSTI) for their invaluable contributions and unwavering support in bringing this conference to fruition. Their assistance has been instrumental in making this event a reality. We are particularly grateful for the opportunity to host this conference in the magnificent city of Kuala Lumpur, Malaysia particularly in their iconic third-highest building and ninth highest in the world.

UKM holds a deep commitment to the well-being and advancement of our country, consistently playing a pivotal role as a catalyst for national progress. However, this progress must be achieved in harmony with the delicate balance of nature, without compromising it. In our pursuit of balanced progress, it is imperative for Malaysia, along with other like-minded nations worldwide, to take immediate action in substituting energy sources that contribute to carbon emission in the atmosphere. We believe that the time has come for us to make a wholehearted pledge and mobilize on a global scale, working towards the creation of a cleaner environment through the widespread utilization of renewable and sustainable energy sources. UKM stands at the forefront of this movement, actively promoting research, innovation, and education in renewable energy. Through collaborative efforts and knowledge exchange, we strive to contribute to the global transition towards a cleaner and more sustainable world.

We hope that during your stay here, you will not only have a fruitful and intellectually stimulating experience during the conference but also get the chance to immerse yourselves in the cultural richness and natural beauty that Malaysia has to offer. Once again, a warm welcome to WREC 2023. May this conference be a platform for meaningful exchanges, insightful discussions, and collaborations that will contribute to the advancement of renewable energy and a sustainable future for all.

**Prof. Dato' Gs. Ts. Dr. Mohd Ekhwan Hj. Toriman**  
Vice Chancellor  
Universiti Kebangsaan Malaysia



## MESSAGE FROM DIRECTOR GENERAL WORLD RENEWABLE ENERGY NETWORK

The World Renewable Energy Network (WREN) is a non-profit organization that was established in 1990 and registered in the United Kingdom as a charitable entity. WREN holds the status of being affiliated with UNESCO, and its honorary President is the Deputy Director General of UNESCO. The organization operates with a Governing Council, an Executive Committee and a Director General.

WREN actively maintains connections with numerous United agencies, governmental bodies and non-governmental organizations. Its primary objective is to facilitate the transfer of renewable energy technology from developed countries to developing countries. By focusing on this objective, WREN aims to contribute to the advancement and adoption of renewable energy solutions globally. Renewable energy is the key for every nation to achieve clean energy and mitigate the impacts of global warming and climate change. Over the past three decades, our mission has been to promote supportive policies and advance a wide range of renewable energy technologies and applications across various sectors. These sectors include heating and cooling, agricultural applications, water desalination, industrial processes, and transportation. Through our efforts, we aim to contribute to a better, cleaner, and safer world. During the past 30 years, the WREN has operated in over 50 countries. Notably, some of these nations have achieved milestones in renewable energy adoption, such as generating 40% of their electricity from renewable sources. WREN is committed to continuing its work and organizing congresses until all countries achieve 100% of their electricity supply from renewables.

WREN eagerly anticipates the gathering of scientists, engineers and policy makers from various nations worldwide at the World Renewable Energy Congress XXII (WREC 2023) to share their research papers encompassing the latest breakthrough in renewable energy sciences and technologies. Undoubtedly, these collective efforts will accelerate the transition towards clean energies, mitigate global environmental challenges, and enhance the quality of life for humanity.

I would like to extend my sincere congratulations to the organizers of this conference and extend my best wishes to all the participants for a successful meeting, filled with enriching discussions and enjoyable experiences in the picturesque setting of Kuala Lumpur, Malaysia.

**Prof. Dr. Ali Sayigh**

Director General

World Renewable Energy Network (WREN)



## MESSAGE FROM CHAIRMAN

### WORLD RENEWABLE ENERGY CONGRESS XXII (WREC2023)

It is a great pleasure for me to welcome all the delegates to the World Renewable Energy Congress XXII (WREC 2023) here in Kuala Lumpur City Centre, Kuala Lumpur, Malaysia. On behalf of the organizing committee, I would like to express our utmost appreciation and gratitude to The World Renewable Energy Network (WREN) for their confidence and support. We are also indebted to Solar Energy Research Institute (SERI), Universiti Kebangsaan Malaysia and Ministry of Science, Technology and Innovation of Malaysia (MOSTI), without their backing and excellent arrangement, this conference would have not been possible.

We are thankful to have the privilege of holding this event here in this beautiful skyscraper of Malaysia and the second of the conference series after the first one was in 1999 and was opened by former Prime Minister Tun Dr. Mahathir Bin Mohamad. For this year, we have opened four major topics, namely: Topic A: Renewable energy technology; Topic B: The built environment; Topic C: e-mobility, transport, new energy and hydrogen economy; and finally, Topic D: Renewable energy governance, policy, economy, education and social impact. I believe this conference is a platform for regional policy makers, researchers, academicians, industry players and enforcement agencies to jointly explore progress in technology, research and development in renewable energy. This is also a venue for them to exchange ideas and share aspiration towards sustainable and clean energy systems.

WREC 2023 offers the most outstanding academic symposia in the region and includes an exhibition where companies can showcase their products. Prominent players in energy sectors and technology providers are gathering here to participate in this event. The participation of companies in this event will greatly assist them in promoting their latest invention. The impact of organizing this event will be significant in various fields associated with the energy sectors, which serves as the backbone of the country's aspiration to become a fully developed nation. Policy makers would find this event valuable for addressing issues related to renewable energy. It will serve as an opportunity to enlighten them about the state-of-the-art technologies and assist in the drafting and amending existing regulations.

Lastly, congratulations to the organizing committee for having tirelessly working towards making this event a reality.

**Prof. Dato' Dr. Kamaruzzaman Sopian**  
Chair of WREC2023

16<sup>th</sup> – 20<sup>th</sup> JULY 2023

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# Organizing Committee

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Mohd Zahin Mohd Ashhar  
Nur Haziqah Binti Mohamad Zaidi

**PROGRAM BOOK**

**DESIGN & ARRANGEMENT**

Dr. Ahmad Fazlizan Abdullah  
Muhamad Fadhli Ramlee

**COVER DESIGN**

Ir. Ts. Dr. Mohd Faizal Fauzan

WORLD RENEWABLE ENERGY CONGRESS XXII

16<sup>th</sup> – 20<sup>th</sup> JULY 2023

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# Organizing Committee

## INTERNATIONAL TECHNICAL COMMITTEE

Prof. Ali Sayigh (UK)  
Prof. Lawrence Kazmerski (USA),  
Mr. Rainer Hinrichs-Rahlwes (Germany)  
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- Free Flow Coffee and Tea
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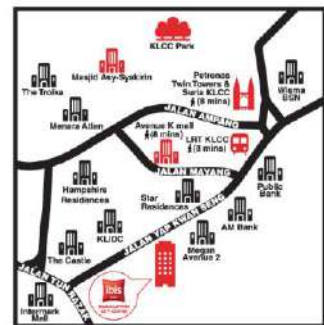
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# Speakers Biography



**Prof. Ali Sayigh**

*Chairman of WREC and Director General of WREN, Brighton, UK*

**Plenary 1 Speaker**

Professor Ali Sayigh, graduated from London University, & Imperial College, B.SC. DIC, Ph.D., CEng in 1966. He is fellow of the Institute of Energy, Fellow of the Institution of Electrical Engineers, Chartered Engineer, the Director General of WREN (World Renewable Energy Network) and Congress Chairman of WREC (World Renewable Energy Congress, UK). The All India Women's Conference (AIWC), a pioneering voluntary women's organization working for underprivileged women and empowering them in all spheres of their lives.



**Prof. Dato' Ir. Dr. Hj. Wan Ramli bin Wan Daud**

*University Malaya, Malaysia*

**Plenary 2 Speaker**

Prof. Dato' Ir. Dr. Wan Ramli Wan Daud FASc is Principal Research Fellow, Department of Chemical Engineering, Faculty of Engineering, University of Malaya. He was UKM-Petronas Professor of Sustainable Hydrogen Energy and Principal Research Fellow at Fuel Cell Institute, and Professor of Chemical Engineering at Department of Chemical & Process Engineering, Faculty of Engineering & Built Environment, Universiti Kebangsaan Malaysia. He is President of Malaysian Association of Hydrogen Energy, Fellow of Institution of Chemical Engineers, Academy of Science Malaysia and The World Academy of Sciences. He was the recipient of Merdeka Award 2016. His main research areas are green hydrogen energy, fuel cells technology and industrial drying technology.



**Prof. Lawrence L. Kazmerski**

*National Renewable Energy Laboratory (NREL), US*

**Plenary 3 Speaker**

Lawrence L. Kazmerski is Emeritus Research Staff Member of the National Renewable Energy Laboratory (NREL), Golden, Colorado, served as Executive Director Science and Technology Partnerships at NREL 2009-2013. Fellow with the Renewable and Sustainable Energy Institute (RASEI), University of Colorado Boulder. Kazmerski served as the founding Director of the National Center for Photovoltaics (NCPV) (1999-2008) He received his B.S.E.E. (1967), M.S.E.E. (1968) and Ph.D. (1970) in electrical engineering—all from the University of Notre Dame



**Prof. Dr Zainuddin A Manan**

*Universiti Teknologi Malaysia*

**Plenary 4 Speaker & Forum 1 Panelist**

Prof Zain is a Professor in the Faculty of Chemical Engineering, Universiti Teknologi Malaysia's (UTM) and Chairman, Energy Committee and Net Zero Task Force of The Academy of Sciences Malaysia. He was also the Founding Director of UTM-Process Systems Engineering Centre. Zain began his career as a process & product engineer in PETRONAS and Hume Industries. Prof Zain was the winner of Saudi Arabia's 2008 Prince Sultan International Prize for Water and was awarded as one of the Top Research Scientists of Malaysia in 2013. He was a vice-chairman of the Board of Judges for the Southeast Asia (ASEAN) Energy Awards program.

# Speakers Biography



**Prof. Martin Green**

*University of New South Wales, Australia*

**Plenary 5 Speaker**

Martin Green is Scientia Professor at the University of New South Wales, Sydney and Director of the Australian Centre for Advanced Photovoltaics. Major international awards include the 1999 Australia Prize, the 2002 Right Livelihood Award, the 2007 SolarWorld Einstein Award, the 2016 Ian Wark Medal, the prestigious Global Energy Prize in 2018, the 2021 Japan Prize, the 2022 Millenium Technology Prize and, with three former students, the 2023 Queen Elizabeth Prize for Engineering.



**Rainer Hinrichs-Rahlwes**

*Vice-President of EREF (European Renewable Energies Federation)*

**Plenary 6 Speaker**

Rainer Hinrichs-Rahlwes is an experienced renewable energy expert. In May 2014, he was elected Vice-President of EREF (European Renewable Energies Federation), the voice of independent producers of energy from renewable sources, after serving as EREF's President for four years (2010 – 2014) and as a Vice-President (2008 – 2010) and a Board Member (2006 – 2008). He also was the President of the European Renewable Energy Council (EREC) from June 2012 until EREC's dissolution in March 2014.



**Dato' Ir Muhamad Guntor Tobeng**

*Gading Kencana Sdn Bhd.*

**Forum 1 Panelist**

Dato' Ir Muhamad Guntor Tobeng founded Gading Kencana Sdn Bhd. Under Dato' Guntor Tobeng's leadership, Gading Kencana has grown from a company with a paid up capital of RM42, 000 in 1998 to RM17 million in 2014. Gading Kencana's achievements have also been recognized by numerous awards received including GreenTech Malaysia's Top 30 Catalysts award 2014; Frost & Sullivan Malaysia's Excellence Award for an Entrepreneurial Company 2013; and SME Corp Malaysia's Best Innovation Award for Engineering and Industrial Design 2013.



**Mr. Adlan Ahmad**

*Gentari Hydrogen Sdn. Bhd.*

**Forum 1 Panelist**

Head of Business Development & Commercial at Gentari Hydrogen Sdn. Bhd. Prior to that, Mr. Adlan was Head of Strategic Alliance, Corporate Strategy in Petronas. He also served as CEO in SESKL, Executive VP of Investment in AIM and COO for Iskandar Investment Berhad. He holds an MBA from MIT and a Bachelor of Science Degree in Natural Gas Engineering from Texas A&M University at Kingsville.

# Speakers Biography



**Mr. Hanif Siraf**  
*TNB Renewables Sdn. Bhd.*  
**Forum 1 Panelist**

Mr. Hanif Siraf is the Chief Operating Officer of TNB Renewables Sdn. Bhd. He has 21 years experiences in energy industry of various Power and Water plant development, design & engineering, construction, commissioning and O&M in Malaysia and Kingdom of Saudi Arabia. He is an expert in engineering and operation of Combined Cycle Power Plant, Conventional Steam Turbine, Desalination, Reverse Osmosis, Biomass and Solar PV technologies. He is responsible for starting up GSPARX from 0MWp to 120 MWp in 3 years.



**Mr. Kamaradzaman Bin Mohd Bakri**  
*Malaysian Green Technology and Climate Change Corporation (MGTC)*  
**Forum 1 Moderator**

En. Kamaradzaman is responsible for planning, directing and overseeing the operations of the Green Growth Group, keeping an eye on proper management of resources during the implementation of operational policies and plans. He is tasked with increasing the development and production of green products and services, expanding the availability and reach of suitable and sufficient green financing and targeted green incentives, and developing the required green workforce to support the transition to a green economy.



**Mdm. Sandra Liz Ai Ling Hon**  
*H2 Energy Sdn. Bhd.*  
**Forum 2 Panelist**

Mdm. Hon has been serving as the Executive Director of H2 Energy Sdn Bhd since its founding in 2017. H2 Energy is an integrated green solution provider for off-grid facilities and communities. Mdm Hon is an avid proponent of green energy in driving the Group towards achieving its goal of powering growth through renewables as an energy transition company. She passionately advocates the continued development and adoption of green hydrogen technology at forums, conferences, and industry events. Mdm. Hon holds an MBA from the University of Strathclyde.



**Dr. Rezal Khairi Bin Ahmad**  
*NanoMalaysia Bhd.*  
**Forum 2 Panelist**

Dr. Rezal Khairi Ahmad is the Chief Executive Officer of NanoMalaysia Bhd. since June 2013. He possesses a PhD. in Nanotechnology, Electronic/Electrical Engineering from London Centre for Nanotechnology, University College London and Master's degree in Electrical Engineering from Tenaga Nasional University. He is an Adjunct Professor of Universiti Teknologi Malaysia. Recently, Dr. Rezal has been designated as the Vice President of Asia Nano Forum for the term 2022-2024

# Speakers Biography



**Prof. Ir. Dr. Siti Kartom Kamarudin**  
*Universiti Kebangsaan Malaysia*  
**Forum 2 Panelist**

Prof. Ir. Dr. Siti Kartom Kamarudin is the Professor of Chemical Engineering at Department of Chemical & Process Engineering, Universiti Kebangsaan Malaysia since 2011. She is now the Director of Fuel Cell Institute of Universiti Kebangsaan Malaysia. She is a world expert in low carbon energy related to Fuel Cell and Hydrogen Technology. From 2016 to 2021, she is recognized as the 'Highly Cited Researcher' by Clarivate as top1% Cited Researchers in the field of Engineering.



**Mr. Colin Patrick**  
*General Manager, Hydrogen Delivery and Borneo Opportunities, Project Delivery & Technology, PETRONAS.*  
**Forum 2 Panelist**

25 years working in PETRONAS with experiences in Petrochemical production and marketing and in the last 10 years, focuses on technology upscaling and commercialization. Material Science background from UMIST (University of Manchester) and started his involvement in Hydrogen in 2018 on secondment to Sarawak Energy to develop the first H2 production and refuelling station in South East Asia and H2 economic blueprint for Sarawak. Since then, he has taken the role of General Manager of Hydrogen Delivery and Borneo Opportunities in PETRONAS.



**Dr. Yusrizam Bin Sharifuddin**  
*National Nanotechnology Centre, Malaysia*  
**Forum 2 Moderator**

Yusrizam Sharifuddin is a member of the Royal Society of Biology and currently serves as one of its Southeast Asia Branch committee members. Yusrizam also holds a Postgraduate Diploma in International Business Law and a Graduate Diploma in International Relations, both from the University of London, United Kingdom. A Senior Lecturer at the Institute of Biological Sciences, Faculty of Science, Universiti Malaya, Yusrizam is currently seconded to the Ministry of Science, Technology and Innovation (MOSTI) as Principal Assistant Director at the National Nanotechnology Centre (NNC).



**Mr. Zeth Lim**  
*Verdant Solar*  
**Scientific Forum Panelist**

Zeth is an engineer with a background in Electronics Engineering from Multimedia University. He has experience in coding for robotic arms and machinery, which has influenced his approach to running Verdant Solar. Despite starting with humble beginnings, Zeth successfully scaled Verdant Solar to become the holder of the Malaysia Book of Records for the Most Solar PV Installation this year. Zeth's goal is to ensure that every member of the team, known as Verdants, can lead an empowered life. In 2021, Verdant Solar has won the award of Best Employer for Soba Award.

# Speakers Biography



**Prof. Dato' Dr. Kamaruzzaman Sopian**  
*Chairman, WREC2023*  
**Scientific Forum Panelist**

Prof. Dato' Dr. Kamaruzzaman Sopian is currently a Professor in Universiti Teknologi Petronas (UTP). He graduated with the BS Mechanical Engineering from the University of Wisconsin-Madison, the MS in Energy Resources University of Pittsburgh and PhD in Mechanical Engineering from the Dorgan Solar Laboratory, University of Miami-Coral Gables. His main contributions are in solar radiation modeling and resource assessment, advanced solar photovoltaic systems and advanced solar thermal systems. A Fellow of the Malaysia Academy of Sciences and listed in the 2019 and 2020 Highly Cited Researchers by the Web of Science Group, Clarivate Analytics.



**Zamali Bin Zamin**  
*Energy Commission, Malaysia*  
**Scientific Forum Panelist**

Graduated from Universiti Teknologi Mara in Bachelor Engineering (Electrical) and holds a master's in business administration (MBA) from Arshad Ayub Graduate Business School from the same university. With 12 years' experience working in Energy Commission and currently holds a position as Deputy Director in Strategic and Policy Development Unit in Energy Commission, a statutory body established under Energy Commission Act 2001 (Act 610). The Energy Commission is responsible for regulating the energy sector, specifically electricity supply and piped gas supply industries in Peninsular Malaysia and Sabah.



**Prof. Ar. Dr. Lim Chin Haw**  
*Solar Energy Research Institute (SERI), Universiti Kebangsaan Malaysia*  
**Scientific Forum Moderator**

Prof. Ar. Dr. Lim Chin Haw is a Principal Research Fellow at the Solar Energy Research Institute (SERI), Universiti Kebangsaan Malaysia. He obtained Bachelor of Architecture (Hons.) from UTM, followed by Master of Science (Architecture) from University of Malaya and Ph.D. (Renewable Energy) from UKM. He is a corporate member of the Malaysian Institute of Architects (PAM) and a member of the Board of Architects Malaysia (LAM). He also served as the Board Member of the Malaysia Green Building Council (MalaysiaGBC) from 2017-2018.

16<sup>th</sup> – 20<sup>th</sup> JULY 2023

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# Speakers Biography

## KEYNOTE SPEAKER

**Prof. Dato' Dr. Kamaruzzaman Sopian**

*Universiti Teknologi Petronas, Malaysia*

**Assoc. Prof. Dr. Norasikin Ahmad Ludin**

*Solar Energy Research Institute (SERI), Universiti Kebangsaan Malaysia*

**Prof. Philip C Eames**

*Loughborough University, UK*

**Prof. Liwei Wang**

*Shanghai Jiao Tong University, China*

**Assoc. Prof. Dr. Ruslinda A Rahim**

*National Nanotechnology Centre, Ministry of Science, Technology and Innovation*

**Prof. Lawrence Kazmerski**

*University of Colorado Boulder, USA*

**Prof. Jason Challender**

*University of Salford, UK*

**Prof. Ar. Dr. Lim Chin Haw**

*Solar Energy Research Institute (SERI), Universiti Kebangsaan Malaysia*

**Prof. Ir.Dr. Haslenda Bt. Hashim**

*Universiti Teknologi Malaysia, Malaysia*

**Assoc. Prof. Dr. Adib Ibrahim**

*Universiti Kebangsaan Malaysia, Malaysia*

**Ts. Steve Anthony Lojuntin**

*Sustainable Energy Development Authority (SEDA) Malaysia*

**Prof. Manuel Correia Guedes**

*University of Lisbon, Portugal*

# Speakers Biography

## INVITED SPEAKERS

**Prof. Nfaoui Hassan**

*University of Rabat, Morocco*

**Dr. Athikom Bangviwat**

*King Mongkut's University of Technology Thonburi (KMUTT), Thailand*

**Prof. Runming Yao**

*Chongqing University, China*

**Prof. Hussein A Kazem**

*Sohar University, Oman*

**Prof. Ananda Amarasekara**

*Professor of Chemistry, Prairie View A&M University, Texas, USA*

**Mr. Furat Dawood**

*Murdoch University, Australia*

**Prof. Marta Szabo**

*Hungarian University of Agriculture and Life Sciences, Hungary*

**Prof. Karen Gambaryan**

*Yerevan State University, Armenia*

**Dr. Wong Woei Fuh**

*ACS Publication, Singapore*

**Prof. Anastasia Zabaniotou**

*Aristotle University of Thessaloniki, Greece*

**Mr. Zhai Gen Tan**

*Asia School of Business Malaysia*

**Prof. Marco Sala**

*IGD Italian Green Design, Italy*





# Speakers Biography

## INVITED SPEAKERS

**Dr. Antonia Sonia Diniz**

*Pontifical Catholic University of Minas Gerais, Brazil*

**Dr. David Goodfield**

*Murdoch University, Australia*

**Prof. Riadh Al-Dabbagh**

*Ajman University, UAE*

**Ts. Dr. Kosheela Devi Poo Palam**

*Malaysian Palm Oil Board, Malaysia*

**Prof. Ming Jun Huang**

*Ulster University, Northern Ireland*

**Profesor Ts. Dr. Shanti Faridah binti Salleh**

*Universiti Malaysia Sarawak*

WORLD RENEWABLE ENERGY CONGRESS XXII

16<sup>th</sup> – 20<sup>th</sup> JULY 2023

KUALA LUMPUR CONVENTION CENTRE



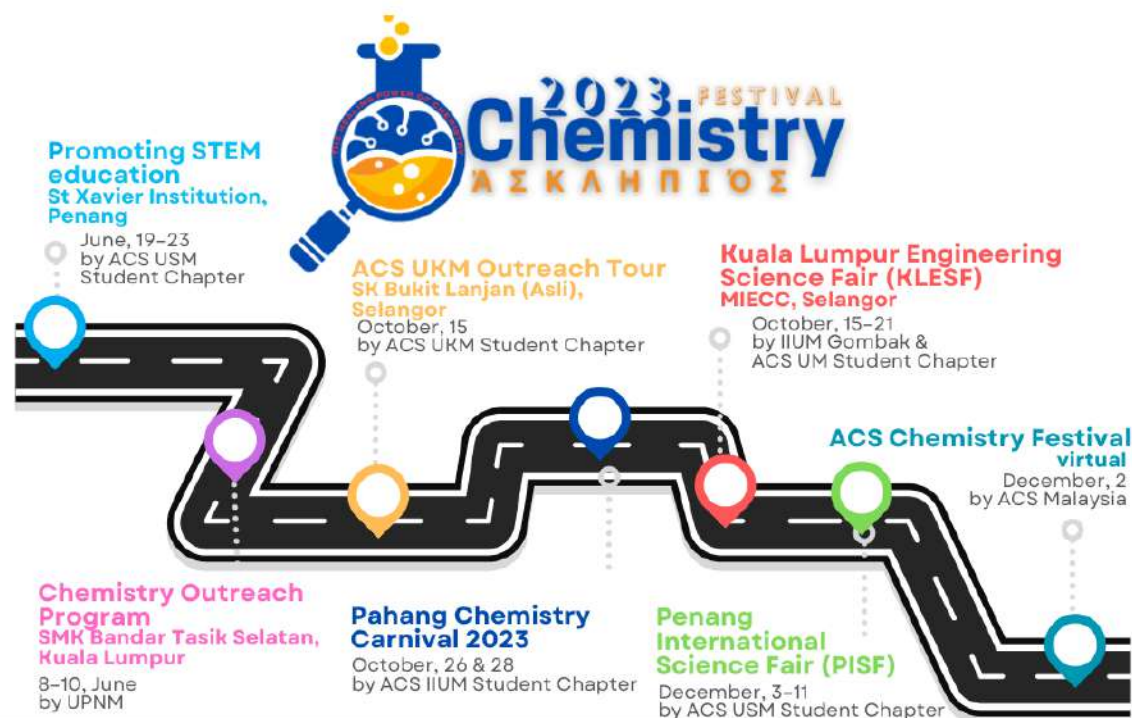
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# Program Schedule

## WORLD RENEWABLE ENERGY CONGRESS XXII (WREC2023)

Day 1 : Sunday (July 16<sup>th</sup>, 2023)

Venue	Kuala Lumpur Convention Centre, Malaysia	
09:00	<b>Participants Registration</b> Centre Core Registration Counter (09:00-16:00)  Venue: Level 3F, Centre Core	
14:00		<b>WREN Council Meeting</b> (Invitation only) (14:00-15:30)  Venue: Meeting Room 304 & 305, Level 3F
15:30		<b>Tea Break</b>
16:00	<b>Welcome Reception</b>	
	<b>Plenary 1</b> Will PV and Wind Energy supply more than 50% of Global Electricity by 2030  <b>Prof. Ali Sayigh</b> <i>Director-General of the World Renewable Energy Network (WREN)</i>  Chairperson: <b>Prof. Dato' Dr. Kamaruzzaman Sopian</b> <i>Universiti Teknologi Petronas (UTP), Malaysia</i>  Venue: Conference Hall 3, Level 3F	
18:00	<b>End of Day 1</b>	

WORLD RENEWABLE ENERGY CONGRESS XXII

16<sup>th</sup> – 20<sup>th</sup> JULY 2023

KUALA LUMPUR CONVENTION CENTRE

# Program Schedule

Day 2 : Monday (July 17<sup>th</sup>, 2023)

Venue	Kuala Lumpur Convention Centre, Malaysia
08:30	<p align="center"><b>Forum 1</b> Global Energy Scenario Net Zero Energy (NZE)</p> <p align="center"><b>Prof. Ir. Ts. Dr. Zainuddin Abd Manan</b> <i>Academy of Science Malaysia (ASM) / Universiti Teknologi Malaysia (UTM)</i></p> <p align="center"><b>Dato' (Dr.) Ir. Guntor Tobeng</b> <i>Gading Kencana Sdn. Bhd.</i></p> <p align="center"><b>Mr. Adlan Ahmad</b> <i>Gentari Hydrogen Sdn. Bhd., PETRONAS Subsidiary</i></p> <p align="center"><b>Mr. Hanif Siraf</b> <i>TNB Renewables Sdn. Bhd.</i></p> <p align="center">Moderator: <b>Mr. Kamaradzaman Bin Mohd Bakri</b> <i>Malaysian Green Technology and Climate Change Corporation (MGTC)</i></p> <p align="center">Venue: Plenary Theatre, Level 3F</p>
09:30	<p align="center"><b>Plenary 2</b> Unitized Regenerative Proton Exchange Membrane Fuel Cells: A Revolutionary and Sustainable Energy Storage Device for Renewable Energy</p> <p align="center"><b>Prof. Dato' Ir. Dr. Wan Ramli Wan Daud</b> <i>Universiti Malaya (UM)</i></p> <p align="center">Chairperson: <b>Prof. Ali Sayigh</b> <i>Director-General of the World Renewable Energy Network (WREN)</i></p> <p align="center">Venue: Plenary Theatre, Level 3F</p>
10:00	<p align="center"><b>Coffee Break</b> <b>Sharing Session by UDA Dayaurus Sdn. Bhd.</b></p> <p align="center">Venue: Conference Hall 2, Level 3F</p>
10:30 - 12:30	<p align="center"><b>Official Launching of World Renewable Energy Congress XXII (WREC 2023)</b> and</p> <p align="center"><b>Signing Ceremony Hydrogen Refuelling Station (HRS) Project PETRONAS-UMW-MGTC-MOSTI</b></p> <p align="center"><b>Officiated by YB Chang Lih Kang</b> Ministry of Science, Technology and Innovation Malaysia</p> <p align="center">Venue: Conference Hall 3, Kuala Lumpur Convention Centre</p>

# Program Schedule

Day 2 : Monday (July 17<sup>th</sup>, 2023)

13:00	<p style="text-align: center;"><b>Lunch</b>  <b>Sharing Session by TNB Renewables Sdn. Bhd.</b>            Venue: Conference Hall 2, Kuala Lumpur Convention Centre</p>	
14:00	<p style="text-align: center;"><b>Forum 2</b>            New Energy - Innovation in Hydrogen Technology</p> <p style="text-align: center;"><b>Mdm. Sandra Liz Ai Ling Hon</b>  <i>H2 Energy Sdn. Bhd.</i></p> <p style="text-align: center;"><b>Dr. Rezal Khairi Bin Ahmad</b>  <i>NanoMalaysia Berhad</i></p> <p style="text-align: center;"><b>Prof. Dr. Siti Kartom</b>  <i>Universiti Kebangsaan Malaysia</i></p> <p style="text-align: center;"><b>Mr. Colin Patrick</b>  <i>Petroleum Nasional Berhad (PETRONAS)</i></p> <p style="text-align: center;">Moderator: <b>Dr. Yusrizam Sharifuddin</b>  <i>National Nanotechnology Centre, MOSTI</i></p> <p style="text-align: center;">Venue: Plenary Theatre, Level 3F</p>	
	<p style="text-align: center;"><b>Session 1</b>  <b>Topic A: Renewable Energy Technology</b>            Chairperson:  <b>Prof. Hussein A Kazem</b>  <i>Sohar University, Oman</i>            Venue: Plenary Theatre, Level 3F</p>	<p style="text-align: center;"><b>Session 2</b>  <b>Topic C: Mobility Transport, New Energy and Hydrogen Economy</b>            Chairperson:  <b>Dr. Athikom Bangviwat</b>  <i>King Mongkut's University of Technology Thonburi, Thailand</i>            Venue: Conference Hall 3, Level 3F</p>
15:00	<p style="text-align: center;"><b>Keynote</b>            Recent Progress in Photovoltaic Thermal Solar Collectors</p> <p style="text-align: center;"><b>Prof. Dato' Dr. Kamaruzzaman Sopian</b>  <i>Universiti Teknologi Petronas (UTP), Malaysia</i></p>	<p style="text-align: center;"><b>Keynote</b>            Crafting a Hydrogen Roadmap for Malaysia: Challenges and Opportunities</p> <p style="text-align: center;"><b>Assoc. Prof. Dr. Ruslinda A. Rahim</b>  <i>National Nanotechnology Centre, Malaysia</i></p>
15:25	<p style="text-align: center;"><b>Invited</b>            Wind Energy in Morocco: Tangier And Lagouira In Comparative Perspective</p> <p style="text-align: center;"><b>Prof. Nfaoui Hassan</b>  <i>Mohammed V University of Rabat, Morocco</i></p>	<p style="text-align: center;"><b>Invited</b>            100% Renewable Energy: A Stand-alone Hybrid Solar PV -Hydrogen-Battery Power Systems Feasibility for Homeland Communities in Regional Western Australia</p> <p style="text-align: center;"><b>Furat Dawood</b>  <i>Murdoch University, Australia</i></p>

# Program Schedule

Day 2 : Monday (July 17<sup>th</sup>, 2023)

15:45	Design and Performance Evaluation of an Omni-Directional Deflector Integrated Cross-Axis-Wind-Turbine <b>Christopher Clement Rusli</b> <i>University of Malaya</i>	15:45	Towards Sustainable Energy Storage Technologies: Biomass of Oil Palm Mesocarp Fiber (OPMF) based Hard Carbon as anode for Na-Ion Batteries <b>Assoc. Prof. ChM. Dr. Siti Aminah Mohd Noor</b> <i>Universiti Pertahanan Nasional Malaysia</i>
16:00	Use of Deep Geothermal Energy to Supply Hot Water to a Village in Scotland <b>Dr. Firdaus Muhammad-Sukki</b> <i>Edinburgh Napier University, UK</i>	16:00	Techno-Economic evaluation of a hybrid power generation and green hydrogen production for AlMazyunah in Oman <b>Dr. Ahmed AlBusaidi</b> <i>Nizwa University, Oman</i>
16:15	<p style="text-align: center;"><b>Tea Break</b>  <b>Architecture Competition Award Presentation and Sharing Session by Isza Trade Sdn. Bhd.</b>            Venue: Conference Hall 2, Kuala Lumpur Convention Centre</p>		
17:00	<p style="text-align: center;"><b>ACS Publication Workshop</b> (by tickets) Venue: Secretariat Room 309</p>	<p style="text-align: center;"><b>EQ KL Gold Certified GBI Tour</b> (by tickets) Meeting Point: Registration Counter</p>	<p style="text-align: center;"><b>Sustainability Tour by KLCC</b> (by tickets) Meeting Point: Registration Counter</p>
18:00	<b>Free and Easy</b>		
19:00	<b>WREC2023 Gala Dinner (By tickets)</b> Venue: Conference Hall 2, Kuala Lumpur Convention Centre		
22:00	<b>End of Day 2</b>		

# Program Schedule

Day 3 : Tuesday (July 18<sup>th</sup>, 2023)

Venue	Kuala Lumpur Convention Centre, Malaysia	
08:30	<p><b>Plenary 3</b> Amazing Photovoltaics: From Research Curiosity to Technology Reality</p> <p><b>Prof. Lawrence Kazmerski</b> <i>University of Colorado Boulder, USA / National Renewable Energy Laboratory (NREL), USA</i></p> <p>Chairperson: <b>Mr. Rainer Hinrichs-Rahlwes</b> European Renewable Energies Federation (EREF) / German Renewable Energy Federation (BEE)</p> <p>Venue: Plenary Theatre, Level 3F</p>	
9:00	<p><b>Industry Talk 1</b> AMETEK: An Overview and Its Role in Renewable Energy</p> <p><b>Mr. Kumar Saravanan</b> <i>Interscience Sdn. Bhd.</i></p> <p>Chairperson: <b>Mr. Rainer Hinrichs-Rahlwes</b> European Renewable Energies Federation (EREF) / German Renewable Energy Federation (BEE)</p> <p>Venue: Plenary Theatre, Level 3F</p>	
9:30	<p><b>Coffee Break</b> Poster Presentation</p> <p>Venue: Conference Hall 2, Level 3F</p>	
	<p><b>Session 3</b> <b>Topic A: Renewable Energy Technology</b></p> <p>Chairperson: <b>Prof. Marta Szabo</b> <i>Hungarian University of Agriculture and Life Sciences, Hungary</i></p> <p>Venue: Plenary Theatre, Level 3F</p>	<p><b>Session 4</b> <b>Topic D: Renewable Energy Governance, Policy, Economy, Education &amp; Social Impact</b></p> <p>Chairperson: <b>Prof. Ananda Amarasekara</b> <i>Prairie View A&amp;M University, USA</i></p> <p>Venue: Conference Hall 3, Level 3F</p>
10:00	<p><b>Keynote</b> Thermal Energy Storage: A Key Technology for Achieving Net Zero</p> <p><b>Prof. Philip C Eames</b> <i>Loughborough University, UK</i></p>	<p><b>10:00</b> <b>Keynote</b> Regional Solar Photovoltaic Technologies and Applications Toward Net Zero Agenda</p> <p><b>Assoc. Prof. Dr. Norasikin Ahmad Ludin</b> <i>Universiti Kebangsaan Malaysia</i></p>



# Program Schedule

Day 3 : Tuesday (July 18<sup>th</sup>, 2023)

10:25	<p><b>Invited</b></p> <p>Impact of Dust on The Photovoltaic Performance: History, A New Prospect And Beyond</p> <p><b>Prof. Hussein A Kazem</b> <i>Sohar University, Oman</i></p>	10:25	<p><b>Invited</b></p> <p>Can Solar Energy Be Fully Exploited in Cities?</p> <p><b>Prof. Runming Yao</b> <i>Chongqing University, China</i></p>
10:45	<p><b>Invited</b></p> <p>Processing Cellulosic Biomass for Sustainable Fuel and Chemical Feedstock Applications</p> <p><b>Prof. Ananda Amarasekara</b> <i>Prairie View A&amp;M University, USA</i></p>	10:45	<p><b>Invited</b></p> <p>Determination of Technical Potential of Rooftop PV in Thailand</p> <p><b>Dr. Athikom Bangviwat</b> <i>King Mongkut's University of Technology Thonburi, Thailand</i></p>
11:05	<p>Experimental Investigation on Performance of Evacuated Tube Collector Using Thermal Oil for Cooking Applications</p> <p><b>Dr. Joseph Hassan Kihedu</b> <i>University of Dar es Salaam, Tanzania</i></p>	11:05	<p>Transitioning towards low carbon: challenges and opportunities from city and campus perspectives</p> <p><b>Prof. Ts. Dr. Shanti Faridah binti Salleh</b> <i>Universiti Malaysia Sarawak</i></p>
11:20	<p>Performance Comparison of a Low Power PV DC Electrical Cooker and a Parabolic Dish Solar Cooker</p> <p><b>Prof. Ashmore Mawire</b> <i>North-West University, South Africa</i></p>	11:25	<p>Understanding Stakeholder's perspective on the Socio-technical Factors that influence the Adoption of Solar Energy Storage in Western Australia</p> <p><b>Nikhil Jayaraj</b> <i>Curtin University, Australia</i></p>
11:35	<p>Optimal Sizing Techniques for Hybrid Photovoltaic Systems Using Artificial Neural Networks (ANN): A Review</p> <p><b>Asst. Prof. Dr. Ali H. A. Al-Waeli</b> <i>American University of Iraq Sulaimani, Iraq</i></p>	11:40	<p>Distributed Market Clearing Mechanism with Home Energy Management System Considering Peer-to-Peer Energy Trading</p> <p><b>Associate Prof. Dr. Marizan Mubin</b> <i>University of Malaya</i></p>
11:50	<p>Optimized Photovoltaic Ultra-short-term Forecasting: A Hybrid Algorithm Incorporating Improved Ant Colony Optimization and Neural Network</p> <p><b>Xinyi Liu</b> <i>Shanghai Jiao Tong University, China</i></p>	11:55	<p>Influencing Factors on Biogas Production Adoption Behaviour Among Palm Oil Mills</p> <p><b>Dr. Amizawati Mohd Amir</b> <i>Universiti Kebangsaan Malaysia</i></p>
12:05	<p>Numerical Modeling of a Novel PVT Collector Incorporated with PCM and CFM as a Cooling Method Compared with the Conventional One</p> <p><b>Mojtaba Dayer</b> <i>Universiti Kebangsaan Malaysia</i></p>	12:10	<p>Energy Transition: Dynamics And Prospects</p> <p><b>Dr. Muhammad Asif</b> <i>King Fahd University of Petroleum and Minerals, Saudi Arabia</i></p>

# Program Schedule

Day 3 : Tuesday (July 18<sup>th</sup>, 2023)

12:25	<b>Lunch</b> Venue: Conference Hall 2, Kuala Lumpur Convention Centre	
14:00	<b>Industry Talk 2</b> Fundamental principles towards achieving Net Zero (case study Plaza EQ)  <b>Mr. Nadaraja Sripragas</b> <i>EQ Kuala Lumpur</i>  Chairperson: <b>Assoc. Prof. Dr. Norasikin Ahmad Ludin</b> <i>Universiti Kebangsaan Malaysia</i>  Venue: Plenary Theatre, Level 3F	
	<b>Session 5</b>  <b>Topic A: Renewable Energy Technology</b>  Chairperson: <b>Prof. Philip C Eames</b> <i>Loughborough University, UK</i>  Venue: Plenary Theatre, Level 3F	<b>Session 6</b>  <b>Topic D: Renewable Energy Governance, Policy, Economy, Education &amp; Social Impact</b>  Chairperson: <b>Prof. Riadh Al-Dabbagh</b> <i>Ajman University, UAE</i>  Venue: Conference Hall 3
14:30	<b>Keynote</b> Performance of Bifacial PV Modules Under Different Operating Conditions in The State of Minas Gerais in Brazil  <b>Prof. Lawrence Kazmerski</b> <i>University of Colorado Boulder, USA / National Renewable Energy Laboratory (NREL), USA</i>	<b>Keynote</b> Case study analysis of improving environmental ethics using a collaboration toolkit  <b>Prof. Jason Challender</b> <i>University of Salford, UK</i>
14:55	<b>Invited</b> Solar Applications in Agriculture  <b>Prof. Marta Szabo</b> <i>Hungarian University of Agriculture and Life Sciences, Hungary</i>	<b>Invited</b> Learn-to-Story-Tell Your Discovery for World  <b>Dr. Wong Woei Fuh</b> <i>American Chemical Society (ACS)</i>

# Program Schedule

Day 3 : Tuesday (July 18<sup>th</sup>, 2023)

15:15	<p><b>Invited</b></p> <p>Photoconductive Cells Based on Type-II Conical Quantum Dots for Thermo-Photovoltaic and Other Mid-Infrared Applications</p> <p><b>Prof. Karen Gambaryan</b> <i>Yerevan State University, Armenia</i></p>	15:15	<p><b>Invited</b></p> <p>Organizational, societal, knowledge and skills capacity for a low carbon energy transition in a circular waste bioeconomy</p> <p><b>Prof. Anastasia Zabaniotou</b> <i>Aristotle University of Thessaloniki, Greece</i></p>
15:35	<p>The Compatibility of Water/Core-Shell Ag-SiO<sub>2</sub> Nanofluid as a Spectral Splitting Optical Filtration Fluid to Six Types Of Photovoltaic Solar Cells Under Concentrated Solar Conditions</p> <p><b>Dr. Ahmed Abdelrazik</b> <i>IRC-REPS, King Fahd University of Petroleum and Minerals (KFUPM), Saudi Arabia</i></p>	15:35	<p><b>Invited</b></p> <p>Centralised but uncoordinated – the political economy of coal in Malaysia</p> <p><b>Zhai Gen Tan</b> <i>Asia School of Business Malaysia</i></p>
15:50	<p>Efficient Solid State Natural Dye Sensitized Solar Cell with Eco-Friendly Activated Bamboo/MWNTs Based Counter Electrode</p> <p><b>Dr. Priyanka Chawla</b> <i>CMP Degree College University of Allahabad, India</i></p>	15:55	<p>Empowering the Next Generation: A Review of Solar PV Technology in Secondary Education</p> <p><b>Muhamad Kamarul Azman Sulaiman</b> <i>Universiti Kebangsaan Malaysia</i></p>
16:05	<p>Control Pyramid Height On P-Type Silicon Wafer Through Cyclic Voltammetry Assisted Texturization Approach</p> <p><b>Mohd. Norizam Md Daud</b> <i>Universiti Kebangsaan Malaysia</i></p>	16:10	<p>The Impact of Natural Disaster on Renewable Energy: The role of Foreign Direct Investment and Infrastructure in Asia</p> <p><b>Yessi Rahmawati</b> <i>Airlangga University, Indonesia</i></p>
16:20	<p>Evaluation of the Photodegradation in Organic Solar Cells</p> <p><b>Dr. Antonia Sonia Diniz</b> <i>Pontifical Catholic University of Minas Gerais (PUC Minas), Brazil</i></p>	16:25	<p>Gender Pay-Gap in The Nigerian Renewable Energy Sector</p> <p><b>Assoc. Prof. Amina Batagarawa</b> <i>Baze University, Nigeria</i></p>

# Program Schedule

Day 3 : Tuesday (July 18<sup>th</sup>, 2023)

16:40	<b>Tea Break</b> Poster Presentation Venue: Conference Hall 2, Kuala Lumpur Convention Centre		
17:00	<b>ACS Publication Workshop</b> (by tickets) Venue: Secretariat Room 309	<b>EQ KL Gold Certified GBI Tour</b> (by tickets) Gather at: Registration Counter	<b>Sustainability Tour by KLCC</b> (by tickets) Gather at: Registration Counter
18:00	<b>End of Day 3</b>		

WORLD RENEWABLE ENERGY CONGRESS XXII

16<sup>th</sup> – 20<sup>th</sup> JULY 2023

KUALA LUMPUR CONVENTION CENTRE

# Program Schedule

Day 4 : Wednesday (July 19<sup>th</sup>, 2023)

Venue	Kuala Lumpur Convention Centre, Malaysia
08:30	<p><b>Plenary 4</b> Building Resilience through Sustainable Energy Management</p> <p><b>Prof. Ir. Dr. Zainuddin Manan</b> <i>Academy of Science Malaysia (ASM) / Universiti Teknologi Malaysia (UTM)</i></p> <p>Chairperson: <b>Prof. Ar. Dr. Lim Chin Haw</b> <i>Universiti Kebangsaan Malaysia</i></p> <p>Venue: Plenary Theatre, Level 3F</p>
09:00	<p><b>Industry Talk 3</b> Building Sustainable Communities: The Role of Convention Centres</p> <p><b>Mr. John Burke</b> <i>Kuala Lumpur Convention Centre, KLCC</i></p> <p>Chairperson: <b>Prof. Ar. Dr. Lim Chin Haw</b> <i>Universiti Kebangsaan Malaysia</i></p> <p>Venue: Plenary Theatre, Level 3F</p>
09:30	<p><b>Coffee Break</b> Poster Presentation</p> <p>Venue: Conference Hall 2, Kuala Lumpur Convention Centre</p>

WORLD RENEWABLE ENERGY CONGRESS XXII

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# Program Schedule

Day 4 : Wednesday (July 19<sup>th</sup>, 2023)

	<p><b>Session 7</b></p> <p><b>Topic A: Renewable Energy Technology &amp; Topic B: Built Environment</b></p> <p>Chairperson: <b>Prof. Ir. Dr. Zainuddin Manan</b> <i>Academy of Science Malaysia (ASM) / Universiti Teknologi Malaysia (UTM)</i></p> <p>Venue: Plenary Theatre, Level 3F</p>		<p><b>Session 8</b></p> <p><b>Topic D: Renewable Energy Governance, Policy, Economy, Education &amp; Social Impact</b></p> <p>Chairperson: <b>Prof. Anastasia Zabaniotou</b> <i>Aristotle University of Thessaloniki, Greece</i></p> <p>Venue: Conference Hall 3, Level 3F</p>
10:00	<p><b>Keynote</b></p> <p>Hydrated Eutectic Electrolyte Engineering Enables High-Performance Redox Flow Batteries</p> <p><b>Prof. Liwei Wang</b> <i>Shanghai Jiao Tong University, China</i></p>	10:00	<p><b>Keynote</b></p> <p>Towards Net Zero Carbon Building</p> <p><b>Prof. Ar. Dr. Lim Chin Haw</b> <i>Universiti Kebangsaan Malaysia</i></p>
10:25	<p><b>Invited</b></p> <p>Evaluation of The Electrical Parameters and Performance of Floating PV Generators</p> <p><b>Dr. Antonia Sonia Diniz</b> <i>Pontifical Catholic University of Minas Gerais (PUC Minas), Brazil</i></p>	10:25	<p><b>Keynote</b></p> <p>Prospect of Green Hydrogen In Malaysia - Key for Decarbonising Industry</p> <p><b>Prof. Ir. Dr. Haslenda Hashim</b> <i>Universiti Teknologi Malaysia</i></p>
10:45	<p>Investigation on the fabrication of current collector with carbon nanotube paper for PEMFC</p> <p><b>Chong-Kai Wang</b> <i>National Chin-Yi University of Technology, Taiwan</i></p>	10:50	<p><b>Invited</b></p> <p>Development of a Circular Economy in Western Australia</p> <p><b>Dr. David Goodfield</b> <i>Murdoch University, Australia</i></p>
11:00	<p>A Brief Overview on The Relationship Between Electrochemical Techniques and Spectroscopy In The Evaluation Of The Performance Of Self-Charging Supercapacitors In Energy Harvesting Application</p> <p><b>Zishan Shaikh</b> <i>Universiti Kebangsaan Malaysia</i></p>	11:10	<p><b>Invited</b></p> <p>Waste strategy in Ajman - UAE</p> <p><b>Prof. Riadh AL-Dabbagh</b> <i>Ajman University, UAE</i></p>
11:15	<p>Modelling And Analysis Of A Solar Process Heating: A Case Study Of A Food Industry</p> <p><b>Laveet Kumar</b> <i>Mehran University of Engineering and Technology, Pakistan</i></p>		

# Program Schedule

Day 4 : Wednesday (July 19<sup>th</sup>, 2023)

11:30	<p>Performance of an Advance Solar-Assisted Heat Pump Drying System with Dual Condensers</p> <p><b>Rohaimi Abdullah</b> <i>Universiti Kebangsaan Malaysia</i></p>	11:30	<p>Promoting Sustainable Development and Renewable Energy Using Mobile Learning for Secondary Schools in Malaysia</p> <p><b>Prof. Dr. Ruhizan Mohammad Yasin</b> <i>Universiti Kebangsaan Malaysia</i></p>
11:45	<p>Space Based Solar Power for Sustainable Future</p> <p><b>Shivansh Tripathi</b> <i>Indian Institute of Space, Science and Technology, India</i></p>	11:45	<p>Reflective Analysis of a Volunteer Project to Install An Off-Grid PV System For A Remote Peruvian Community Centre</p> <p><b>Dr. Shashi Persaud</b> <i>Southern Alberta Institute of Technology, Canada</i></p>
12:00	<p>Hybrid Nanostructure of MoS<sub>2</sub>/ZnO on Graphene/Nickel Foam for Enhanced Photoelectrochemical Water Splitting</p> <p><b>Dr. Rozan Mohamad Yunus</b> <i>Universiti Kebangsaan Malaysia</i></p>	12:00	<p>Application of Low Energy Technology in the Construction Regulations of Mexico</p> <p><b>Dr David Carlos Avila Ramirez</b> <i>University of Guadalajara, Mexico</i></p>
12:15	<p>Experimental Study of a Small-Scale ORC System with the Module Driven by Thermal Energy and Gravity Potential</p> <p><b>Hanyu Zhu</b> <i>Shanghai Jiao Tong University, China</i></p>	12:15	<p>Exergy Process of PV-Based Electric Lighting</p> <p><b>Umi Nasrah</b> <i>Tokyo City University, Japan</i></p>
12:30	<p><b>Lunch</b></p> <p>Venue: Conference Hall 2, Kuala Lumpur Convention Centre</p>		
14:00	<p><b>Industry Talk 4</b></p> <p>Green Hydrogen for Off-Grid Energy Access</p> <p><b>Mdm. Sandra Liz Ai Ling Hon</b> <i>H2 Energy Sdn. Bhd.</i></p> <p>Chairperson: <b>Assoc. Prof. Dr. Norasikin Ahmad Ludin</b> <i>Universiti Kebangsaan Malaysia</i></p> <p>Venue: Plenary Theatre, Level 3F</p>		

# Program Schedule

Day 4 : Wednesday (July 19<sup>th</sup>, 2023)

	<b>Session 9</b> <b>Topic A: Renewable Energy Technology</b> Chairperson: <b>Dr. Antonia Sonia Diniz</b> <i>Pontifical Catholic University of Minas Gerais (PUC Minas), Brazil</i> Venue: Plenary Theatre, Level 3F		<b>Session 10</b> <b>Topic B: Built Environment</b> Chairperson: <b>Prof. Marco Sala</b> <i>IGD Italian Green Design Florence, Italy</i> Venue: Conference Hall 3, Level 3F
14:30	<b>Keynote</b> Perovskite Transparent Conductive Oxides - Progress Development, Challenges And Advantages In Optoelectronic Application <b>Assoc. Prof. Dr. Mohd Adib Ibrahim</b> <i>Universiti Kebangsaan Malaysia</i>	14:30	<b>Keynote</b> Towards Carbon Neutral Solutions for Sustainable Cities Program: Policies and Initiatives of Zero Energy Buildings <b>Ts. Steve Anthony Lojuntin</b> <i>Sustainable Energy Development Authority (SEDA) Malaysia</i>
14:55	<b>Invited</b> Novel Bio-Based Aliphatic Amides as Phase Change Materials for Thermal Energy Storage <b>Ts. Dr. Kosheela Devi Poo Palam</b> <i>Malaysian Palm Oil Board, Malaysia</i>	14:55	<b>Invited</b> Urban Forestation And Green Architecture For A Sustainable Built Environment <b>Prof. Marco Sala</b> <i>IGD Italian Green Design Florence, Italy</i>
15:15	Boosting Solar Cell Passivation Quality Via Double-Layer SiO <sub>2</sub> /SiO <sub>2</sub> :H <sub>3</sub> PO <sub>4</sub> In Reducing Charge Carrier Recombination <b>Muhammad Hatim Rohaizar</b> <i>Universiti Kebangsaan Malaysia</i>	15:15	<b>Invited</b> Analysis of the Performance of Underfloor Heating System with Advanced PCM Composite Driven by Air-Source Heat Pump <b>Prof. Ming Jun Huang</b> <i>Ulster University, UK</i>
15:30	Energy and Exergy Performance Analysis of a Double-Pass photovoltaic/thermal (PV/T) Asymmetric Compound Parabolic Concentrator (ACPC) Solar Collector <b>Wan Nur Adilah Wan Roshdan</b> <i>Universiti Kebangsaan Malaysia</i>	15:35	Reduction of CO <sub>2</sub> Emissions by Making Geopolymer Concrete from Industrial Tailings <b>Amitha Varghese</b> <i>Murdoch University, Australia</i>
15:45	Comparison of CLOT-Adjusted AHI-8/9 and FY-4A Solar Irradiance Products for Solar PV Output Forecasting Using LSTM <b>Engr. Ian Benitez</b> <i>University of the Philippines</i>	15:50	Decarbonising Australia Off-grid Mining via Hybrid Microgrid <b>Hanrong Huang</b> <i>The University of New South Wales, Australia</i>



# Program Schedule

Day 4 : Wednesday (July 19<sup>th</sup>, 2023)

16:00	Microwave Assisted Torrefaction of Sewage Sludge to a Valuable Fuel: Waste-To-Energy Technology  <b>Dr. Zia Ud Din</b> <i>Heriot-Watt University Malaysia</i>	16:05	Building Settlements and Their Relationship to Climate Change In Mexico  <b>Dr. Silvia Arias Orozco</b> <i>University of Guadalajara, Mexico</i>
16:15	Rectangular spiral opposing-flow polymer thermal collector for solar water heating system – a preliminary investigation  <b>Assoc. Prof. Dr. Taib Iskandar Mohamad</b> <i>Universiti Teknologi Petronas</i>		
16:30	<b>Tea Break</b>		
17:00	<b>ACS Publication Workshop</b> (by tickets) Venue: Secretariat Room 309	<b>EQ KL Gold Certified GBI Tour</b> (by tickets) Gather at: Registration Counter	<b>Sustainability Tour by KLCC</b> (by tickets) Gather at: Registration Counter
18:00	<b>End of Day 4</b>		

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# Program Schedule

Day 5 : Thursday (July 20<sup>th</sup>, 2023)

Venue	<p align="center"><b>Conference Hall 3, Level 3F</b> <b>Kuala Lumpur Convention Centre, Malaysia</b></p>
	<p align="center">Chairperson: <b>Prof. Lawrence Kazmerski</b> <i>University of Colorado Boulder, USA / National Renewable Energy Laboratory (NREL), USA</i></p>
08:30	<p align="center"><b>Plenary 5</b> Recent Developments in Photovoltaics <b>Prof. Martin Green</b> <i>University of New South Wales, Australia</i></p>
09:00	<p align="center"><b>Plenary 6</b> Renewable Energy for Climate Protection and Energy Security – Lessons Learned from the European Green Deal and RE Power EU <b>Mr. Rainer Hinrichs-Rahlwes</b> <i>European Renewable Energies Federation (EREF) / German Renewable Energy Federation (BEE)</i></p>
09:30	<p align="center"><b>Keynote</b> Energy, Comfort and Architecture in the Regeneration of Informal Settlements: Case Studies in Sub-Saharan Africa <b>Prof. Manuel Correia Guedes</b> <i>University of Lisbon, Portugal</i></p>
09:55	<b>Coffee Break</b>
10:15	<p align="center"><b>Scientific Forum</b> Game Changers in Renewable Energy: Trend and Innovation <b>Mr. Zeth Lim</b> <i>Verdant Solar</i> <b>Prof. Dato' Dr. Kamaruzzaman Sopian</b> <i>Chairman, WREC2023</i> <b>Mr. Zamali Bin Zamin</b> <i>Energy Commission, Malaysia</i> Moderator: <b>Prof. Ar. Dr. Lim Chin Haw</b> <i>Solar Energy Research Institute (SERI), Universiti Kebangsaan Malaysia (UKM)</i></p>
11:15	<b>Closing Ceremony</b>
12:00	<b>Lunch</b>
14:00	<b>City Tour (By tickets)</b>
18:00	<b>End of Day 5</b>

# GENERAL GUIDELINES FOR ORAL PRESENTATION

The conference accepts only PowerPoint (.ppt or .pptx) presentations. For those who prefer to use their MacBooks for their presentation, they should essentially bring their own laptop. In this case, the conference will also provide an adapter for connection to the AV equipment.

Except for those who are using their own laptop, all presentations should be emailed to the conference secretariat one day prior to WREC2023.

For those who wish to have their oral presentation accompanied by audio visual presentations, they should essentially inform the conference secretariat via email one day prior to WREC2023.

The Session Manager shall arrange a timing system with the following rules:

- i. A signal will be given at the beginning of the oral presentation.
- ii. A warning signal will be given five minutes prior to the end of the presentation period.
- iii. A stop signal will be given at the end of the presentation period.
- iii. The presenter should cease talking when the stop signal is given.

Oral presentations can be categorised as follow:

## **Plenary Speaker:**

Each Plenary Speaker will be allocated 30 minutes (Recommended Presentation Duration: 25 mins + Q&A: 5 mins) for their power point presentation. The time schedule will be strictly adhered to by the session chair. If the presentation exceeds 30 minutes, the session chair will interrupt.

## **Keynote Speaker:**

Each Keynote and Invited Speaker will be allocated 25 minutes (Recommended Presentation Duration: 20 mins + Q&A: 5 mins) for their power point presentation. The time schedule will be strictly adhered to by the session chair. If the presentation exceeds 25 minutes, the session chair will interrupt, and the question and answer session will be shortened.

## **Invited Speaker:**

Each Keynote and Invited Speaker will be allocated 20 minutes (Recommended Presentation Duration: 15 mins + Q&A: 5 mins) for their power point presentation. The time schedule will be strictly adhered to by the session chair. If the presentation exceeds 20 minutes, the session chair will interrupt, and the question and answer session will be shortened.

## **Oral Speaker:**

Each oral presenter will be allocated 15 minutes (Recommended Presentation Duration: 12 mins + Q&A: 3 mins) for their power point presentation. The time schedule will be strictly adhered to by the session chair. If the presentation exceeds 15 minutes, the session chair will interrupt, and the time of question and answer session will be shortened. Each oral presentation will be judged. Prizes will be awarded to the best three oral presentations. The decision of the conference is final.

# GENERAL GUIDELINES FOR ORAL PRESENTATION

## BEST ORAL PRESENTATION AWARD

The Best Oral Presentation Award aims to recognize scientific papers of exceptional quality delivered through oral presentations at the WREC2023.

FOUR (4) best oral presentations will be awarded based on a combination of excellent research, innovation, and oral presentation. Panel of judges will evaluate all oral presentations and select the winners. The best oral presenters will be recognized publicly at the end of the conference. The winners will receive a certificate and monetary award.

Please note that there is no need to apply for the Best Oral Presentation Award as the selection will take place during the conference.

## GUIDELINES AND CRITERIA FOR THE BEST ORAL PRESENTER AWARD

- 1) The paper must be presented by the recipient.
- 2) The PPT presentation should include the following contents which may be presented in a unique, creative manner and situational manner.

Title and Authors' Information (Author's Name, Recent Picture, School/Company, School/Company Logo, e-Mail Address)

Introduction (Background of the Study, Statement of the Problem/Objectives)

Theoretical/Conceptual Framework (If applicable)

Methods

Results and Discussion

Conclusions

Recommendations

References

Acknowledgment (Optional)

## EVALUATION CRITERIA FOR BEST ORAL PRESENTER AWARD

Content/Innovation	10
Methodology + Results/Discussions	10
Delivery/Presentation	10
Overall Impression	10

# Program Schedule

## POSTER PRESENTATION

### Poster Evaluation Schedule

Day/Time	Poster number
Monday 17 <sup>th</sup> July 2023 Tea break	6 Architecture Competition finalists
Tuesday 18 <sup>th</sup> July 2023 Coffee break	P-SC-002 P-SC-007 P-SC-010 P-SC-016 P-SC-018 P-SC-019
Tuesday 18 <sup>th</sup> July 2023 Tea break	P-WREC-001, P-WREC-002, P-WREC-003, P-WREC-004, P-WREC-005, P-WREC-006, P-WREC-007
Wednesday 19 <sup>th</sup> July 2023 Coffee break	P-SC-001 P-SC-003 P-SC-004 P-SC-005 P-SC-006 P-SC-008 P-SC- 009
Wednesday 19 <sup>th</sup> July 2023 Tea break	P-SC-011 P-SC-012 P-SC-013 P-SC-014 P-SC-015 P-SC-017

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# Program Schedule

## POSTER PRESENTATION

### WREC2023 Poster Presentation

No.	Name	Title	Reg. ID	Poster Code
1	Ain Amin	A review of Hydrogen Production for Energy	130	P-WREC-001
2	Yean-Der Kuan	Design and fabrication of a portable proton exchange membrane fuel cell module with carbon nanotube paper-based current collectors	118	P-WREC-002
3	So Jeong Lee	Enhancing Photovoltaic Performance of Perovskite Solar Cells through Bilayer Deposition of MAPbI <sub>3</sub> and FAPbI <sub>3</sub>	276	P-WREC-003
4	Hyunkyong Kim	Construction of bulk heterojunction with crosslinked polymer and non-fullerene acceptor for organic solar cell	275	P-WREC-004
5	Hyeong-Dong Park	Optimal Path Planning Algorithm with a Shadow Analysis for Smart Photovoltaic Land Mobility	279	P-WREC-005
6	Muhammed Ali Abdul Hameed	Review of Hybrid Perovskite Solar Cells: Properties, Fabrication Techniques, and Commercialization Challenges	113	P-WREC-006
7	Amina Batagarawa	Optimising The Performance Of Eco Pavers From Plastic Waste		P-WREC-007

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# Program Schedule

## POSTER PRESENTATION

### SERI Colloquium Poster Presentation

No.	Name	Title	Reg. ID	Poster Code	Group
1	Md. Ariful Islam	Metal organic framework derived NiOx nanoparticles for application as hole transport layer in perovskite solar cell	87	P-SC-001	A
2	Mirza Mustafurrahman	Growth of Magnesium-doped Zinc Oxide (MZO) Thin Film by RF Magnetron Sputtering Technique	82	P-SC-002	C
3	Bibi Zulaikha binti Bhari	Impact of Annealing Temperature on the Properties of MgZnO Thin Film Prepared by Sputtering	80	P-SC-003	A
4	Yoganash A/L Putthisigamany	Modeling the Interplay Between Molybdenum Work Function and MoSe <sub>2</sub> Interfacial Layer in CZTSe Thin Film Solar Cells	69	P-SC-004	A
5	Muhammad Amir Aziat bin Ishak	Energy Performance Validation of a Novel Circular Flow Jet Impingement Bifacial Photovoltaic Thermal PVT Solar Collector	46	P-SC-005	A
6	Muhammad Zahin Mohd Ashhar	Thermal Performance of Residential Building Roofs Insulated with Various Types of Insulations	56	P-SC-006	A
7	Zhang Jingdan	Nearly Zero Energy Building Simulations in different Climate Regions of China	236	P-SC-007	C
8	Mottakin	Electrodeposited Cu and Co Sulfide-Based Electrocatalyst design to Enhance Oxygen Evolution Reaction for Sea Water Splitting	92	P-SC-008	A
9	Norhasnan bin Sahari	Optimising Sago Bark Cellulose Recovery for Aerogel Production as a Thermal Insulator	86	P-SC-009	A
10	Nur Maizura binti Mustafa	Synthesis and Optimization of Bio-Based Tetraalkylammonium Salt in Perovskite Solar Cells Application	71	P-SC-010	C
11	Muhamad Fadhli bin Ramlee	Preliminary Investigation of the Performance of a Single-Bed Adsorption Cooling System Utilizing Composite Adsorbent/Water as the Working Pair	54	P-SC-011	B
12	Akmal Aizuddin bin Zulkifli	Durian Rind Potential as a thermal insulator	89	P-SC-012	B

# Program Schedule

## POSTER PRESENTATION

### SERI Colloquium Poster Presentation

No.	Name	Title	Reg. ID	Poster Code	Colloquium group
13	Syed Enamul Kabir	Status of solar energy expansion and preparedness for end-of-life management of solar PV modules in Bangladesh	74	P-SC-013	B
14	Nurul Jannah Yusaidi	Potential Size Reduction on Double Pass Solar Air Collector using Staggered-Triangular Fins	53	P-SC-014	B
15	Maryam Binti Hassan	Transition Metal Chalcogenide, $\text{Cu}_2\text{ZnSnS}_4$ (CZTS) as Microstructured Electrode in Capacitive Faradic Energy Storage Application	47	P-SC-015	B
16	Wan Norhisyam Abd Rashid	Investigating the Performance of $\text{Sb}_2\text{S}_3$ Thin Film Solar Cells: A Simulation Study	261	P-SC-016	C
17	Nur Haziqah Mohamad Zaidi	Mitigating energy consumption and carbon emissions of residential areas in a tropical city: case study Bertam, Penang	251	P-SC-017	B
18	Farizan binti Mohamad	Optical and electrical properties of flexible perovskite transparent conductive oxides using RF sputtering deposition	91	P-SC-018	C
19	Adamu Ahmed Goje	Optimisation of $\text{TiO}_2/\text{PCBM}$ Electron Transport Layer for Flexible Perovskite Solar Cells	Manual	P-SC-019	C

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# GENERAL GUIDELINES FOR POSTER PRESENTATION

Please prepare your poster in A1 size with dimensions of width 594 mm × height 841 mm (or 23.4 x 33.1 in).

The official language of the conference is English.

The poster presentation code will be listed on the upper corner of a board to guide you the location of board to mount your poster.

Make sure that the poster presentation code in the WREC2023 Programme Book matches the poster presentation code of a board before you mount your poster on the board.

Velcros/Pins will be supplied at the Registration or Secretariat Desk.

If you need any assistance, please contact the Secretariat Help Desk during the conference hours.

Please be present at your poster during your presentation time to maximize your chance of networking and presenting your valuable work to international and local attendees.

## **BEST POSTER AWARD**

The Best Poster Award is established to recognize the scientific merit exhibited on the poster presentation. The Best Poster Award is given to the FOUR (4) best posters presented at the conference. It rewards a combination of excellent research, innovation, and presentation. Panel of judges will select the best poster from the conference participants. Poster winners will be recognized publicly at the end of the conference. The winners will receive a certificate and monetary award.

Please note that there is no need to apply for the Best Poster Award as the selection will take place during the conference.

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# GENERAL GUIDELINES FOR POSTER PRESENTATION

## GUIDELINES AND CRITERIA FOR BEST POSTER AWARDS

Criteria:

- i. Background provides appropriate perspective/context for the subject
- ii. Objectives/research questions are clearly stated
- iii. Research design/methods/modeling is appropriate and transparent {scores on this will determine winners in case of ties}
- iv. Data sources and/or sampling procedures are clear and appropriate
- v. Research objectives are met/addressed
- vi. Factual information is kept separate from interpretations or implications
- vii. Abstract is presented in an unbiased manner
- viii. Clarity of presentation

## EVALUATION CRITERIA

<b>Content/Innovation</b>	<b>Sub-Total = 20</b>
Originality of topic	5
Clear and concise message	5
Clarity of writing	5
Unique or innovative aspects	5
<b>Methodology + Results/Discussions</b>	<b>Sub-Total = 30</b>
Clear research question/hypothesis	5
Appropriate methodology	5
Adequate sample size/thematic scope	5
Accurate data analysis	5
Thorough interpretation of results	5
Clear implications for future research	5
<b>Delivery/Presentation</b>	<b>Sub-Total = 30</b>
Confidence in presentation	5
Eye contact with audience	5
Clear and articulate speech	5
pacing and timing	5
Engaging visual aids	5
Overall presentation quality	5
<b>Overall Impression</b>	<b>Sub-Total = 20</b>
Coherent and cohesive presentation	10
Overall effective communication	10
<b>Overall Total Mark</b>	<b>100</b>

# PAVEGEN



When somebody walks across the tiles, their weight turns a rotary generator. This converts kinetic energy into 2.2 joules of electricity per footprint.



PHYSICAL OUTPUT: ENERGY

LOW POWER APPLICATIONS



DIGITAL OUTPUT: DATA

INTERACTIVE SOFTWARE

## PHYSICAL OUTPUT



LED LIGHTING



JOB CHARGING BENCHES



GREEN WALL IRRIGATION



E-LINK SCREENS

## STEP. POWER. CONNECT.

Every step generates a powerful connection.

**GLOBAL REACH**

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## DIGITAL OUTPUT



ENERGY BAR-BOARDS



COMMUNITY REVIEWS



GAMIFICATION



QR CODE REVIEWS



Bridging Science, Inspiring Possibilities..

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### LAB ESSENTIALS

**inert**

**CHEM SPEED**

**MILESTONE**

**MICROTRAC 7M3B**

**ramé-hart instrument co.**

**elementar**

**C-THERM**

**AMETEK**

### SPECTROSCOPY

**AMINO ACID ANALYZER**

**REACTORS**

**HITACHI**

**INSPIRE THE NEXT**

**serstech**

**BUCHER MÜLLER HILB**

### ANALYTICAL & MATERIAL CHARACTERIZATION

**FABRICATORS**

**Bioinicia**

**xplore**

**microlight3D**

### LABORATORY & INDUSTRY SOLUTIONS

**SUPERCHEMICAL FLUID TECHNOLOGIES, INC.**

**BRUKER**

**EXTRACTORS**

**MILESTONE**

# Additional Program

## ACS Publication Workshop



### SHORT COURSES

#### American Chemical Society (ACS) Publication Workshop

<https://wrec2023.com/short-courses/>

Learn-To-Story-Tell Your Discovery for World Renewable Energy



- Slot 1 (July 17<sup>th</sup>):** Harnessing the power of graphical abstracts and mastering the art of creating engaging slides for research presentation
- Slot 2 (July 18<sup>th</sup>):** Improving visibility and the citation via video abstract for scientific publication
- Slot 3 (July 19<sup>th</sup>):** Research outreach using social media

**Trainer**  
Dr. Wong Woei Fuh



WORLD RENEWABLE ENERGY CONGRESS XXII

16<sup>th</sup> – 20<sup>th</sup> JULY 2023

KUALA LUMPUR CONVENTION CENTRE

# Additional Program

EQ HOTEL GBI GOLD CERTIFIED TOUR

The graphic features a dark blue background with a faint world map. On the right side, there is a photograph of the Petronas Towers in Kuala Lumpur at dusk. The EQ logo is prominently displayed in the center, with the text 'KUALA LUMPUR' and 'GOLD CERTIFIED GBI TOUR' below it. A paragraph of text describes the certification, and a box at the bottom contains event details.

**EQ**  
KUALA LUMPUR

**GOLD CERTIFIED  
GBI TOUR**

EQ Kuala Lumpur has been awarded a Gold rating certification under Malaysia's Green Building Index (GBI). Join us to learn how EQ Kuala Lumpur achieve the green building certification

**Date: 17 - 19th July 2023**  
**Time: 17:00 - 18:00 pm**  
**Commitment fee: USD10/RM50 per person**  
Register now!! Limited seats available

# Additional Program

## KLCC SUSTAINABILITY TOUR



KUALA LUMPUR  
CONVENTION CENTRE



## Sustainability Tour

Hydroponic Farm

Zero Energy Rainwater Harvest System

Food Composter

Smart Food Waste Management Technology

Reverse Vending Machine

Public Old Shoe Recycling Station

and many more

DATE : 17th - 19th JULY 2023

TIME : 5.00PM - 6.00 PM

COST : USD 10 / MYR 50



# Additional Program

## KUALA LUMPUR CITY TOUR



WREC 2023

# KUALA LUMPUR *City Tour*

DATE: 20TH JULY 2023

TIME: 2:30 P.M.

COMMITMENT FEE: RM100/PERSON

Come and join us. Limited seats available!



WREC2023 is organized by Solar Energy Research Institute (SERI), Universiti Kebangsaan Malaysia, and will be hosted at Kuala Lumpur Convention Center (KLCC).

## CONTACT US

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