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Abstract Book

3rd Global Webinar on Renewable and Sustainable Energy

June 17-18, 2025

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Prof. Dai-Yeun Jeong
Asia Climate Change Education Center & Jeju National University South Korea

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Dr. Richard Navarro
Renewable Ocean Energy, Inc., USA

Poseidon Hydroelectric System

Poseidon hydroelectric produces electricity on any water source 24/7 without a dam, sun, wind, or tides using proven technology for less than 5 cents per kWh. No batteries or distributive energy systems needed. Seventy percent of the Earth is covered with water and renewable energy is critical to reducing climate change. Every 100 MW of Poseidon power eliminates 50 tons of carbon emissions without harm to fish or marine life. Poseidon may be operated on a boat, oil platform, or on shore for reliable power when you need it. Modular construction accelerates installation and maintenance. Renewable energy is not green. It's Blue!.

Biography:

Dr. Richard Navarro, CEO of Renewable Ocean Energy, Inc, and inventor, has 14 inventions, 6 patents issued, 1 pending, 160 presentations, and authored Resurrection of the Blue Planet. He holds a Ph.D. from Vanderbilt U, School of Medicine, is a former professor, and serial entrepreneur with over 50 years of experience. He has a passion for protecting the Earth and finding innovative solutions to common problems and leads a team of engineers and business people.

Dr. Woo Hyoung Lee
University of Central Florida, USA

Smart Green – Bioelectrochemical Hydrogen Production Technology

Traditional hydrogen production relies heavily on fossil fuels, contributing to greenhouse gas emissions and environmental degradation. Biohydrogen production offers a sustainable alternative, using biological and electrochemical processes to convert organic waste into hydrogen with lower energy inputs. Microbial electrolysis cells (MECs) have emerged as an effective platform for biohydrogen production by leveraging the metabolic activities of exoelectrogenic bacteria. The research focuses on developing a sustainable biohydrogen production system using MECs with a novel molybdenum disulfide (MoS2)-nanocarbon (NC) coated cathode. This innovative cathode material enhances hydrogen production by lowering the cathode overpotential and boosting catalytic activity compared to traditional carbon cloth (CC) electrodes. MECs operate by utilizing exoelectrogenic bacteria to catalyze electrochemical reactions, generating hydrogen with low external voltage requirements. This study utilizes diluted urine as a feedstock, benefiting from its high conductivity and nutrient content, which supports both bacterial growth and hydrogen production. The MoS2-NC cathode, especially the version deposited at a higher current density (-200 μA cm^2), significantly outperforms conventional materials, achieving a hydrogen production rate of 0.152 m H2 m-2 d-1. The research highlights that MEC performance is sensitive to operational parameters, such as conductivity and applied voltage, which influence biofilm formation and microbial activity. This bioelectrochemical system represents a promising, eco-friendly approach to hydrogen production, providing dual benefits of wastewater treatment and renewable energy generation, with potential applications in sustainable energy and waste management.

Biography:

Dr. Woo Hyoung Lee is an Associate Professor in the Department of Civil, Environmental, and Construction Engineering at the University of Central Florida (UCF) in Orlando, FL, USA. He received his Ph.D. in Environmental Engineering from The University of Cincinnati, USA in 2009. Dr. Lee specializes in the development and application of electrochemical sensors for detecting water contaminants, as well as in advanced water and wastewater treatment and bioenergy production using nanotechnology and biotechnology. He is a registered professional engineer and currently serves as a member of the U.S. EPA's Board of Scientific Counselors' Social and Community Science Subcommittee.

Dr. Monica Aguado Alonso
National Renewable Energy Centre (CENER), Spain

Power System Flexibility: A Necessity for Achieving the Energy Transition Objectives

Terms such as energy transition, Green Deal, sustainability are commonplace and for the people who work in this field are concepts that are part of the end goals of our developments. Today, after all the problems we face, it can be said that a consensus has been reached around the idea that an energy transition based on renewable sources and technologies is the only solution to achieve the energy transition goals for the coming years. The goal of this complex transition process is to move to a model that includes not only cleaner and more efficient technologies, but also massive end-user electrification. This transformation poses some major challenges, as a high share of renewable and high levels of end-user electrification increase the requirements for balancing supply and demand. We can therefore say that the energy transition rests on two pillars: an increase in the share of renewable energies in the energy mix and a massive electrification of end users. We could conclude that the energy trilemma of security of supply, affordability and sustainability is the defining framework for the energy transition. The answer to these questions, and the most appropriate approach to solving the energy trilemma is flexibility. From a technological point of view, this transformation poses some important challenges, as a high share of renewable energies increases the demands on the system to balance supply and demand. The concept of FLEXIBILITY appears. A word that is repeated in the context of the energy transition. Power system flexibility ranges from more flexible generation to more robust transmission and distribution systems, more storage, and more flexible demand. The production of synthetic heat and gas (e.g., hydrogen) from renewable electricity is also key to the long-term decarbonization of the power system and, once deployed, can be an important additional source of power system flexibility. It is therefore necessary to understand and know how we can provide the flexibility into the system that will allow us to achieve the decarbonization objectives for the coming decades.

Biography:

Monica Aguado Alonso Doctorate in Industrial Engineering from the Public University of Navarra. With more than 27 years of experience, she has developed her career in both the private and public sectors. Her expertise is focused on all aspects related to the grid integration of renewable energies. She is a Full Professor in the Department of Electrical Engineering at the Public University of Navarra and since 2003 she has been the Director of the Department of Grid Integration, Storage and Hydrogen at CENER. Author of numerous scientific publications, she has participated in many national and international expert committees and conferences, as well as in numerous national and European R&D projects. She is an evaluator for the European Commission. In addition, she combines her professional activity with her participation in STEM career outreach work as a mentor in different programs.

Prof. Helena Belchior Rocha
ISCTE - University Institute of Lisbon (ISCTE-IUL), Portugal

Renewable Energy and Climate Justice: Empowering Vulnerable Communities

The transition to renewable energy is not only a technological and environmental imperative but also a pathway to achieving climate justice for vulnerable communities. As climate change disproportionately impacts marginalized populations, the deployment of renewable energy technologies offers a unique opportunity to address these inequities and promote social justice. Renewable energy sources such as solar, wind, and bioenergy provide clean, sustainable alternatives to fossil fuels, reducing greenhouse gas emissions and mitigating the adverse effects of climate change. For vulnerable communities, access to renewable energy can significantly improve living conditions by providing reliable and affordable energy, reducing energy poverty, and enhancing economic opportunities.

This presentation explores the intersection of renewable energy and climate justice, highlighting the potential benefits for vulnerable communities. It examines case studies where renewable energy projects have successfully empowered marginalized groups, providing them with the tools and resources to adapt to climate change and improve their quality of life. These projects demonstrate that renewable energy can be a powerful driver of social equity, fostering resilience and self-sufficiency.

However, achieving climate justice through renewable energy requires addressing several challenges, including financial barriers, lack of infrastructure, and the need for inclusive policies. It is essential for governments, industry, and civil society to collaborate in creating supportive frameworks that ensure equitable access to renewable energy for all communities.

By prioritizing renewable energy and climate justice, we can create a more sustainable and equitable future. This approach not only addresses the environmental impacts of climate change but also empowers vulnerable communities, promoting social justice and enhancing their resilience to future climate challenges.

Biography:

Helena Belchior Rocha, PhD in Social Work, is an Assistant professor at ISCTE- University Institute of Lisbon in the Department of Political Science and Public Policies and subdirector of the Soft Skills Lab and Director of the Transversal Competences Nucleos. Integrated researcher at CIES, Centre for Research and Studies in Sociology, linked to national and international research projects, namely 3 from Marie Curie Actions. She was pionner in Ecology and sustainability in Social Work creating the EcoSocial Model for intervention. Coordinator of the 1st year of Social Work Graduation,. Scientific Coordinator of the Cost Action Line - Digital Human Rights, and member of K-Peritia (culture expertize) Cost Action Line. Author of papers and communications at national and international congresses, in the areas of social work theory and methodology, environment, sustainability, community Intervention, ethics, human rights, social policies and Well-being, education and soft skills. Member of the Editorial Board of national/international journals. Member of Inclusive Policy Lab UNESCO. Award of the Development Networks Award - Project "Promotion of Education for Global Citizenship - UN17" (ISCTE-IUL / COI Foundation).

Prof. Mark Bomberg
Clarkson University, Potsdam, NY, USA

Passive, Thermo-Active Cluster, technology for new and retrofitted residential buildings

Today's world has excellent technology, but no vision. This paper is based on experience with passive housing since 1978. The pandemic revealed shortcomings in indoor air handling in both Europe and America. While details are to accommodate climate and technology differences but air redistribution in interior spaces is the key to health and comfort. Our small, virtual network addressed heating, cooling and ventilation aspects of housing developing a generic universal approach with:

1) Using two-stage construction process that modifies patterns of financing.

2) Using building automatics to control thermal mass and additional thermal storage in water tanks used for water-sourced heat pump, which in new construction is linked with solar panels.

3) Using adaptable indoor climate and HVAC integrated with the building structure through the monitoring and performance evaluation (MAPE) system to optimize energy and indoor environment during operation of the building. Merging decades of passive housing experience with thermo-active technology, we propose a new system of Passive, Thermally Active Cluster (PTAC), technology for new and retrofitting buildings.

PTAC is a result of improvements already applied in construction practice to reinforce the role of a triangle: occupant-controlled comfort, energy efficiency and interaction of buildings with smart energy grid as the driving force of progress. The objective of this presentation is to initiate a discussion on the public-private consortium linked with public education activities to develop the PTAC approach with a view to slow climate change. (Details are published in a book, now in the press).

Biography:

MARK BOMBERG, Technology D. (Lund U., Sweden 1974), D. Science in Engineering (Warsaw), technical coordinator of the virtual network Environmental Quality Management (EQM) Tech, U, Poland, 1965), is a Research Prof. at Mechanical Eng., Clarkson U, Potsdam NY, RD Manager of DFIE, Inc., Honorary Member of Building Enclosure Technology and Environment (BETEC) Committee of the National Institute of Building Science (NIBS) in Washington, DC. He worked at National Research Council of Canada (1975-2000) and was an Editor-in-Chief of J. Building Physics (1984-2018) He lives in Canada but works in the US and Europe. He was teaching in, the US, Canada, Mexico, Germany, Poland and China. He is a Guest Editor in Journals: Energies and Buildinngs (MPDI, Switzerland). Frontiers (Switzerland) and others. He received the highest awards in building physics in the US and Canada. His research is focused on popularization of science and includes heat, air and moisture, material science and durability of construction materials. He wrote more than 222 peer reviewed papers, 8 books, and 88,000 reads, with an Research gate scores of interest 1,200 (higher than 94% of environmental or architectural engineering but h index only 20).

C. Shah Kabir

Subsurface Consultants and Associates, LLC, Houston, Texas, USA

Power Generation with Two Complimentary Independent Sources: Solar Energy & Wellbore Closed-Loop Thermal Energy

This presentation unveils innovative solutions for reviving inactive geothermal wells for power generation. The proposed method involves circulating a highly efficient, heat-preserving refrigerant through a closed-loop system—down the well's annulus and up through the tubing—to produce steam or hot water at the wellhead. This approach enables power generation independently of the conventional geothermal resource. Over 20 years, R-134a and the eco-friendly R-1234yf refrigerants outperformed traditional working fluids like Pentane and water.

This hybrid system integrates closed-loop geothermal heat extraction at night with solar energy generation during the day, ensuring continuous electricity production. The circulating refrigerant extracts heat from the wellbore at night to generate power. During the day, solar energy reduces reliance on geothermal heat, allowing the reservoir to recover for subsequent nighttime operations.

Geothermal power plants achieve higher efficiency at night due to improved cooling system performance in lower ambient temperatures. Both net present value (NPV) and levelized cost of energy (LCOE) metrics establish economic viability. Four field case studies from two geothermal sites illustrate the overall value proposition. Across different well depths and geothermal gradient conditions, this hybrid thermal-solar approach generated 52 to 138 MWh of electricity per well over 20 years—enough to power 226 to 730 homes in Türkiye. This solution can pave the way for a sustainable energy future in the geothermal industry and beyond.

Biography:

C. Shah Kabir has over 40 years of experience in the oil & gas industry and about five years in academia. He has published extensively during his career, with a Google Scholar h-index of 52 and over 10,000 citations for over 135 journal articles and several books. Now, as a retiree, he focuses on continuing the investigative journey in renewable energy and carbon sequestration.

Prof. Amela Ajanovic
TU WIEN, Vienna, Austria

Perspectives of green hydrogen in the transition to a low-carbon transport system

The transition to a low-carbon transport system requires decarbonizing energy use while ensuring security and efficiency. Green hydrogen, produced from renewable sources, is often presented as a key energy carrier in this transition. This study evaluates the economic viability of hydrogen in the transport sector, focusing on cost trends in electrolysis, fuel cell vehicle deployment, and market dynamics. Despite its potential, hydrogen adoption faces major challenges, including high production costs, infrastructure constraints, and inefficiencies in conversion processes. The analysis explores the competitiveness of hydrogen-powered vehicles across various transport modes and assesses hydrogen's role in a market-driven energy system. While hydrogen may be essential for hard-to-electrify sectors, its large-scale adoption remains uncertain. It is likely to remain a niche solution, deployed only where no viable low-carbon alternatives exist. Its future as a cornerstone of Europe's sustainable energy transition will depend on technological advancements, well-designed policies, and long-term strategic planning.

Biography:

Amela Ajanovic is Associated Professor in Energy Economics at Vienna University of Technology (TU Wien). She is a lecture and faculty member of the postgraduate MSc Program "Renewable Energy Systems". She holds a master degree in electrical engineering and a PhD in energy economics at TU Wien. Her main research interests are alternative fuels and alternative automotive technologies as well as sustainable energy system and long-term energy scenarios. She has been involved in many research projects, and her work has been published in the leading scientific journals. She has also served as a guest editor on several occasions and is an associate editor of different scientific journals.

Prof. Mark Apperley
University of Waikato, New Zealand

Local Consumption of Locally Generated Renewable Energy: Smart Community Microgrids and their Key Role in Electricity Grids of the Future

New renewable sources of generation, particularly solar, but also wind, tidal, and micro-hydro, lend themselves to distributed location, close to loads. The concept of smart community microgrids, particularly in the context of significant load expansion resulting from a switch from carbon-based energy sources to new renewables, potentially enables much of the increased demand to be met without significant backbone grid expansion, without resulting grid losses for energy transferred over a distance, and with significantly improved resilience.

Biography:

Mark Apperley is Professor of Software Engineering at the University of Waikato. He has a background in electrical engineering, and in recent years his main research focus has been energy informatics, specifically the application of ICT in renewable and efficient energy utilization. His work in this area has included community energy systems, smart microgrids, and vehicle-to-grid technologies.

Dr. Friman Hen
H.I.T - Holon Institute of Technology, Israel

Engineering Education for Advancing Renewable Energy Awareness

As the global energy transition increasingly focuses on renewable sources, education, and community engagement play critical roles in supporting this shift. In Israel, the drive towards a hydrogen-based economy demands a concerted effort to raise environmental awareness and foster sustainable practices. This paper examines the "Green Ambassadors" program, a unique educational initiative at Holon Institute of Technology (HIT) that integrates academic learning with community engagement, promoting renewable energy—particularly hydrogen—among engineering students and elementary school pupils. The "Green Ambassadors" program provides a case study of how interactive, hands-on learning experiences can enhance knowledge and shape attitudes toward renewable energy solutions. HIT students engage in experiential education, where they teach sustainability concepts and renewable energy technologies to younger students, combining their academic knowledge with community outreach. This early interdisciplinary approach not only instills environmental consciousness in the next generation but also empowers engineering students to act as advocates for sustainable energy futures. This research seeks to assess the impact of the program on both HIT students and school pupils, focusing on their understanding of renewable energy and attitudes toward hydrogen as a sustainable energy source. Using a mixed-methods approach, the study employs both qualitative and quantitative data collection. To gauge the program's effectiveness, surveys and interviews were conducted with HIT students, elementary school pupils, and school staff. The findings demonstrate that the program significantly improves participants' knowledge of renewable energy and hydrogen technologies. Engineering students at HIT reported heightened environmental awareness, a stronger grasp of renewable energy concepts, and a sense of responsibility to foster sustainable practices in their future careers. School pupils exhibited an increased understanding of sustainability, energy efficiency, and hydrogen energy following the program's interactive lessons and practical demonstrations. School staff feedback further emphasized the

program's positive impact on the pupils' environmental literacy. The study argues that continued investment in educational programs like the "Green Ambassadors" is crucial to successfully adopting renewable energy technologies. The findings underscore the need for policies that promote interdisciplinary, action-based learning as a vital component of engineering education. By equipping students with both technical knowledge and the ability to engage with communities, initiatives like this can drive the shift toward a more sustainable, hydrogen-based economy.

Biography:

Hen Friman holds Ph.D. and Master's degrees from Bar-Ilan University. His master's thesis investigated the effect of Cyt1Aa on prokaryotes, and his Ph.D. research focused on energy production from aromatic chemical degradation of bacteria Using "Bio-Fuel Cells". Since 2012, Dr. Friman is research and lecturer at the Faculty of Engineering. He is currently the academic director at the Renewable Energy & Smart Grid Excellence Center at the HIT - Holon Institute of Technology. Dr. Friman developed an innovative teaching method for a "paperless" laboratory in the field of solar, wind, and water energy. He also managed the "Energy Supervisor" training program at HIT. He was part of the team responsible for developing "Pre-Project and Developing Soft Skills for Engineers" for the undergrad B.Sc. students. The purpose of the course is to define and improve the "toolbox courses" that will provide students with employability skills - Teamwork, effective management of time, risk and quality control, design excellence, and presentation excellence Dr. Friman's research interests include renewable energy, fuel cells, microbial fuel cells, water and wastewater treatment, chemical engineering, ecological education, and academic collaboration.

Prof. Tokeer Ahmad
Jamia Millia Islamia, India

Semiconducting Advanced Heterostructured Nano-Catalysts for Renewable and Sustainable Energy

Advanced materials based heterogeneous catalysis involving photochemical and photoelectrochemical water splitting is an ultimate source of hydrogen generation as renewable green energy for tackling the ongoing fuel crisis. Carbon based materials are ideal for overall water splitting as a result of the excellent alignment of its band edges with water redox potentials. However, a single catalyst with a limited number of active sites does not exhibit significant photo/electrocatalytic activity for hydrogen production. Therefore, we have developed the semiconductor heterostructures of carbon materials with oxides, sulphides, selenides, other TMCs/TMDs NPs and QDs as the highly efficient nanocatalysts for enhanced hydrogen evolution reactions. The monophasic heterostructures have been designed in different weight ratios with fairly uniform distribution of nearly spherical particles and high specific surface area which creates an interfacial charge transfer between two semiconductors. As prepared heterostructures showed significant hydrogen evolution which is evident by observing high apparent quantum yield, low onset potential, lower overpotential and high electrochemical active surface area that will be presented in detail.

Biography:

Prof. Tokeer Ahmad graduated from IIT Roorkee and Ph.D. from IIT Delhi. Presently, he is a full Professor at the Department of Chemistry, Jamia Millia Islamia, New Delhi since 2019. Prof. Ahmad has supervised 16 PhD's, 84 postgraduates, 10 projects, and published 209 research papers, one patent, and three books with research citations of 8500, h-index of 54, and i10-index of 167. Prof. Ahmad is an active reviewer of 188 journals, delivered 191 Invited talks, evaluated 67 external doctoral theses, and presented 133 conference papers. Prof. Ahmad is the recipient of CRSI Bronze Medal, MRSI Medal, SMC Bronze Medal, ISCAS Medal, Inspired Teacher's President of India Award, DST-DFG award, Distinguished Scientist Award, Maulana Abul Kalam Azad Excellence Award of Education, Teacher's Excellence Award, Elected Member of National Academy of Sciences India and Fellow of Royal Society of Chemistry (FRSC), UK. Prof. Ahmad has been figured in World's Top 2% of Scientists for consecutive five years since 2020 in both coveted lists including career-long by Stanford University, USA.

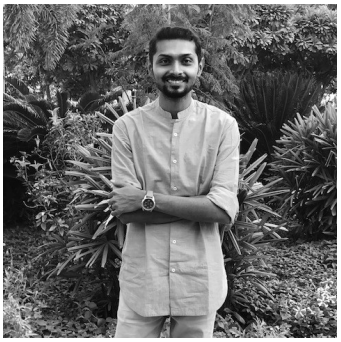
Prof. Maha Fawzy Anber
German International University (GIU), Egypt

Enhancing Renewable Energy Efficiency: The Impact of IoT-Based Automatic Solar Panel Cleaning

The efficiency of solar panels is a critical factor in optimizing renewable energy generation, particularly in regions with high dust accumulation. My recently published research investigates the impact of an IoT-based automatic solar panel cleaner on energy performance in buildings. In arid environments, solar panel efficiency can drop by up to 40% due to dust accumulation, significantly reducing energy output. Our study introduces an automated cleaning system that integrates IoT technology to monitor and maintain panel cleanliness, ensuring optimal efficiency with minimal human intervention. The system successfully improved panel power wattage by 89.33%, bringing it close to its peak performance. This talk will delve into the methodology, results, and implications of this technology, highlighting its role in sustainable urban development and renewable energy optimization.

Biography:

The efficiency of solar panels is a critical factor in optimizing renewable energy generation, particularly in regions with high dust accumulation. My recently published research investigates the impact of an IoT-based automatic solar panel cleaner on energy performance in buildings. In arid environments, solar panel efficiency can drop by up to 40% due to dust accumulation, significantly reducing energy output. Our study introduces an automated cleaning system that integrates IoT technology to monitor and maintain panel cleanliness, ensuring optimal efficiency with minimal human intervention. The system successfully improved panel power wattage by 89.33%, bringing it close to its peak performance. This talk will delve into the methodology, results, and implications of this technology, highlighting its role in sustainable urban development and renewable energy optimization.



Aritra Chakrabarty
Michigan Technological University, USA

Addressing energy equity in India's energy trilemma: All talk no Action

Energy access, depends on government policies and acts that are designed to fulfill energy security, use and conserve natural resources, improve economic condition of the economy, etc. in order to meet its pledge to the Paris Agreement (UNFCCC, 2015) and at the same time ensure economic development, the Indian central government created a model of economic development which is less carbon intensive, in the form of its Nationally Determined Contribution (NDC) document (2021-2030), where it pledged to achieve 50 percent of its electricity generation from non-fossil fuel sources by 2030 and net zero emission by 2070 through increase in renewable energy portfolio through solar and wind power (Birol & Kant, 2022). The central government aims to add 500 gigawatt (GW) of renewable energy capacity, while reducing emission intensity of its GDP by 35 percent compared to 2005 levels (Birol & Kant, 2022). The NDC became the guiding document for national level legal acts and policies to create and regulate an environment of renewable energy that led economic development in the country.

However, the economic development of India is not separate from rural development. According to the World Bank, 64 percent of the population was rural in India in 2023-24. Inclusive development is incorporated into India's economic development policy (Arvind Viramani, 2023), wherein, the term 'inclusive' has been defined as creating means for all round development of the society and empowerment of every citizen, to develop own capabilities & competence through application of mind and effort (Arvind Viramani, 2023). Now, the Ministry of Rural Development (MoRD), India defines rural development as the process that leads to economic betterment of people as well as greater social transformation through increased participation in programs, decentralization of planning, better land reforms, greater access to credit. Rural electrification is one of the essential conditions of rural development. Last mile connectivity of rural households

opens opportunities for economic and social betterment of rural communities. Electrification and energy access are determined by acts and policies that functionalize and facilitate generation, distribution and consumption of energy across the energy value chain.

My study objective is to determine to what extent the legal acts and policy objectives create conditions for meeting rural last mile connectivity and gender inclusivity in renewable energy-based development. The goal of the study is to contribute with an understanding of how laws and policies incentivize/hinder the implementation of development programs in the context of energy transition.. My study is based in 'Energy law and Policy' scholarship, and focuses on how formal, legal acts and policies help non-government organizations (NGOs) in contributing to meet last mile connectivity and gender equity in renewable energy-based programs.

Biography:

Aritra Chakrabarty a PhD student at Michigan Technological University (MTU) in the Environment and Energy Policy (EEP) program. My research focuses on analysis of energy justice and gender justice implications of renewable energy systems in the Global South, using an ethnographic methodology framework.

Cristina Alonso Egido
Spanish National Hydrogen Center (CNH2), Spain

Ammonia as an energy carrier. ARENHA Project ("Advanced materials and Reactors for ENergy storage tHrough Ammonia")

ARENHA is a Horizon 2020 European five-years project with global impact seeking to develop, integrate and demonstrate key material solutions enabling the use of ammonia for flexible, safe and profitable storage utilization of energy. Ammonia is an excellent carrier due to its high energy density, carbon-free composition, industrial know-how and relative ease of energy storage. In the current energy context, where distributed renewable generation coexists with increasingly larger wind or photovoltaic plants located further from consumption sites, the ability to seasonally store large amounts of energy in the form of a manageable energy vector is a key element. For this purpose, green ammonia, produced from H2 generated by electrolysis, emerges as a suitable green energy vector due to its higher energy density, as well as the relative ease of storage and transport compared to hydrogen. The use of ammonia as largescale energy storage will facilitate the integration of renewable electricity into the grid, increasing the use of renewable energy sources in final energy consumption. The ARENHA project aims at using ammonia as a green hydrogen carrier and for that purpose it develops its main activities around the green hydrogen production, ammonia synthesis, ammonia storage and ammonia dehydrogenation. Arenha´s main goal is to develop, integrate and demonstrate key material solutions enabling the flexible, secure and profitable storage and utilization of energy under form of green ammonia. ARENHA has demonstrated the full power-to-ammonia-to-usage value chain at TRL 5 and the outstanding potential of green ammonia to address the issue of large-scale energy storage.

Biography:

Cristina Alonso Egido holds a Chemical Sciences Degree from the University of Burgos. With over 15 years of experience as a Process Engineer, she has worked in the R&D, technology and production departments in various companies. She has been responsible for environmental management, quality control and activities in different laboratories. Since September 2023, she is part of the Engineering Unit at the Spanish National Hydrogen Center (CNH2), where she has had a leader role on the European Arenha Project. Her responsibilities include engineering, project management, commissioning and operation. Moreover, she has carried out validation of prototypes and test benches for hydrogen production, ammonia synthesis, ammonia storage and ammonia decomposition.

Prof. Dai-Yeun Jeong

Asia Climate Change Education Center & Jeju National University, South Korea

A Desirable Framework for Establishing Climate Change Policy

It has been scientifically proved that the human-induced greenhouse gases are the major constributor to climate change, and that about 85% of human-induced greenhouse gases are emited from energy at a global level. A variety of policies are being implemented to reduced the emission of human-induced greenhouse gases at a global, national and regional level. The theme of this conference, Renewable and Sustainable Energy, is a means responding to climate change.

There are four major agents responding to climate change at a national or local level. They are government, enterprises, citizens and civil organizations. Government responds to climate change by establishing policies, enterprises by green management for reducing ecological cost in the process of producing and distributing goods and services, citizens by eco-friendly behaviour in their everyday life, and civil organizations by environmental movement.

Among these responses by agents, this paper aims at presenting a desirable framework worth considering when government establishes climate change policy. In order to achieve the objective, this paper will be composed of three parts as below.

Part 1: There are similar and inter-related, but different terminologies in relation to policy. They are strategy, policy, and measure, etc. As an introductory part, the concepts and inter-related implications of these terminologies will be reviewed in order to understand more clearly what policy is.

Part 2: As the main content of this paper, a desirable framework for establishing climate change policy will be presented, following the four steps as below.

Step 1: Climate change policy is a strategy against vulnerable sectors to climate change. Therefore, how to identify the vulnerable sectors to climate change should be the first step for establishing a desirable framework.

Step 2: Climate change policy should be established by vulnerable sector, but all vulnerable sectors identified from Step 1 can't be the target of policy formation due to limitation of financial availability when implementing the policy. In this context, how to select the prior vulnerable sectors/how to set up the goal of policy/how to mobilize the means to achieve the goal will be presented.

Step 3: The policy that is not based on a social consensus among social organizations such as NGOs, citizens and stakeholders, etc. causes a social conflict when the policy is implemented. Therefore, the introduction of governance is necessary in the process of policy-making in order to absorb the social conflict in advance. In this context, what type of governance would be desirable will be presented.

Step 4: Most national and local governments are faced with the limitation of financial availability required for implementing the policies. This is the major cause to select limited number of policies to be launched among all policies established. Therefore, it is necessary to decide policy priority to be launched in terms of policy effect and amount of financial investment for each policy. In this context, the methodology of policy effect analysis will be presented. Two phases of policy effect analysis will be presented. One is efficiency analysis of financial investment, and the other is effect analysis of all policies as a whole set.

Part 3: As the concluding remarks, <what capacity should be built> will be discussed for government to implement successfully climate change policies. This is because there are many external factors determining the successful implementation of climate change policies.

Biography:

Dr. Dai-Yeun Jeong is presently the Director of Asia Climate Change Education Center and an Emeritus Professor of Environmental Sociology at Jeju National University (South Korea). He received BA and MA Degree in Sociology from Korea University (South Korea), and PhD in Environmental Sociology from University of Queensland (Australia). He was a Professor of environmental sociology at Jeju National University (South Korea) from 1981 to 2012. His past major professional activities include a Teaching Professor at University of Sheffield in UK, the President of Asia-Pacific Sociolog ical Association, a Delegate of South Korean Government to UNFCCC and OECD Environmental Meeting, etc. He has published 13 books including Environmental Sociology, and has conducted 95 environment-related research projects funded by domestic and international organizations.

Dr. Kennedy Muchiri

Jomo Kenyatta University of Agriculture and Technology, Kenya

Development of a Wind Solar PV for Small-Scale Power Generation in Low Wind Speed Regimes in Kenya

Machakos is an area characterized by low wind speeds in the range of 0.5 m/s to 5 m/s with an annual average wind speed of 3.5 m/s. Maximum power generation from wind requires the appropriate design of the conversion system. In this study, two HAWT rotor blades were fabricated using Styrofoam and aluminum with a pitching mechanism to maximize power. The system was tested in a wind tunnel environment at a wind speed range of 0 m/s-20 m/s. RPMs and torque were measured and then used to calculate the TSR and power coefficients at different pitching angles. Energy optimization was performed by varying the pitch angles from 0 to 40 degree and rotational speeds, blade shape, and also a variation of blade materials. The analysis of tip speed ratios showed positive skewedness implying high potential for significant energy generation at low wind speeds. At the rated wind speed of 5 m/s, Styrofoam blades performed optimally at a pitch angle of 20 degree with a tip speed ratio (TSR) of 2.1 corresponding to a Cp of 0.465. This translates to 238 W of power. Aluminum type performed optimally at a pitch angle of 15 degree with a TSR of 1.9 corresponding to a CP of 0.431, a power estimate of 220 W. These findings showed that Styrofoam blades were more effective and thus suitable for application in wind systems. e understanding gained from this study could be useful to the HAWT research community and can be extended to the turbine designs for small-scale micro-grids and utility applications.

Biography:

Kennedy Muchiri is a self-motivated and enthusiastic researcher specializing in renewable energy technologies and electronics. He holds a Ph.D. in Physics with a specialization in Renewable Energy from Jomo Kenyatta University of Agriculture and Technology (JKUAT) and a Master's degree in Electronics and Instrumentation from Kenyatta University, Kenya. Muchiri is a dedication researcher and a writer. He has made his publications in peer- reviewed journals, including the Scientific African Journal, Hindawi Journal of Renewable Energy, SciencePG – International Journal of Sustainable and Green Energy, and the Journal of Agriculture Science and Technology, among others. His Ph.D. research received funding from the Kenya National Research Fund (NRF/1/MMC/450), underscoring the significance of his contributions to the field. He also serves as a peer reviewer and has earned recognition for his commitment to maintaining high academic standards in research and publication. In addition to his research work, Muchiri is passionate about education. He is a part-time lecturer at JKUAT, Machakos University, Multimedia University of Kenya, and Mount Kenya University. Beyond academia, he serves as a Kenya National Examinations Council (KNEC) examiner in Physics and currently holds the position of Dean of Studies at his workplace, reflecting his leadership and commitment to academic excellence.

Dr. Pooja Parvathy Preetha
Alabama A&M University
USA

Advancing Sustainable Land Management Through Remote Sensing Enhanced Soil Erodibility Modeling for Resilient Coastal Watersheds

Sustainable energy futures depend on resilient land and water systems that support climate-smart agriculture and soil health. Soil erosion intensified by land cover change and hydrologic extremes undermines watershed sustainability. This study introduces a modified soil erodibility modeling framework that integrates high-resolution remote sensing data with pedotransfer functions (Kmlr) to better quantify sediment loss for sustainable land management. Using the Fish River watershed in Alabama, a dynamic coastal basin, the study applies a remotely sensed crop and cover management factor and surface moisture data to improve K-factor estimation within erosion models. Compared to the traditional Universal Soil Loss Equation (USLE) approach, the enhanced Kmlr-c model significantly improved sediment yield predictions (R^2 = 0.980), avoiding overestimations by up to 59.2 ton/ha. This work highlights how Earth observation technologies can support integrated soil water energy strategies and advance the renewable energy agenda through sustainable land use and resource conservation in watershed scales.

Biography:

Dr. Pooja Parvathy Preetha is a distinguished environmental and water resources engineer, currently serving as an Assistant Professor of Environmental and Water Resources Engineering at Alabama A&M University, USA, since 2020. With a deep commitment to advancing environmental sustainability, Dr. Preetha's academic and professional journey has been marked by significant achievements and contributions to the field of water resources engineering. Dr. Preetha holds a Ph.D. in Civil & Environmental Engineering, specializing in water quality modeling, from the University of Alabama in Huntsville (UAH). She also earned a Master's in Hydraulics and Water Resources Engineering from the prestigious Indian Institute of Technology, Madras (IIT), and another Master's in Civil Engineering from UAH, further strengthening her expertise in the field.

Lars Ling
CleanTech Region Impact Group,
UK

Decarbonization of Industries with AI and Solar Thermal Heat

Industrial heat, a major contributor to global greenhouse gas emissions, is a key area for decarbonization in the pursuit of net-zero goals. Breweries, in particular, rely on significant amounts of medium-temperature process heat for mashing, pasteurization, and cleaning. This paper examines how the integration of Artificial Intelligence (AI) and solar thermal heat can significantly reduce carbon emissions in breweries, with a particular focus on the pioneering case of the Peroni brewery in Italy. The brewery has integrated Absolicon Solar Collector AB's advanced concentrating solar collectors to produce high-temperature thermal energy on-site. These collectors efficiently convert solar energy into clean heat, replacing a portion of the natural gas traditionally used in brewing processes. To ensure maximum performance and cost-effectiveness, an AI-based energy management system has been implemented. This system forecasts solar availability, optimizes storage and heat distribution, and adjusts production schedules as needed. This innovative integration guarantees a stable and reliable heat supply that meets operational needs while reducing reliance on fossil fuels. The Peroni case demonstrates that the combination of AI and Absolicon's solar thermal technology can meet a significant portion of a brewery's heat needs, leading to a substantial reduction in both carbon emissions and energy costs. This model highlights the broader potential for decarbonizing heat-intensive industries worldwide through the intelligent integration of renewable energy. By leveraging advanced solar thermal solutions and AI-driven control, breweries and similar industries can make meaningful progress toward sustainability goals, inspiring the audience with the potential impact of the research. The success at Peroni illustrates a scalable pathway for transforming industrial energy systems toward a greener future with AI and Solar Thermal Heat.

Biography:

Lars is a serial entrepreneur, global Cleantech impact investor, and advisor with over 30 years of rich international business experience in the Cleantech sector, including the decarbonization of Industries with Solar Thermal Heat. His dedication to accelerating the growth of clean technology companies and solutions since 2006 has created remarkable benefits for people, the planet, and profit. These benefits include exponential growth for cleantech companies, increased awareness of environmental challenges, and showcasing leading Cleantech companies globally, resulting in faster green transition. Lars founded the Green Solutions Magazine and was awarded the most innovative initiative in the world by the CleanTech Region Impact Group, inspiring and influencing companies, entrepreneurs, cities, regions, and countries, thereby demonstrating the tangible impact of his work. As a respected strategic advisor, speaker, and moderator, Lars Ling has left an indelible mark on the Cleantech sector. His role as a mentor and panelist, guiding and supporting countless individuals, is equally significant and serves as an inspiration to many, underscoring the profound impact of his guidance. His innovative ventures, such as the transformative Green Solutions World Tour and founding Nordic Impact Week and Green Solutions Magazine, have not only motivated many but also instilled a sense of hope and optimism for the future of Cleantech and humanity. With an impressive collection of awards and accolades, Lars is crafting an enlightening book that explores the monumental $33 trillion potential of exponential clean technologies. This book, by Will, is poised to shape the future of Cleantech and the green transition and is expected to be a bestseller and a game-changer.

Prof. Ahmed Al-Salaymeh
Public University in Amman,
Jordan

Renewable Energy: Energy Storage and Smart Meter Deployment as Pillars for a Smart Grid in Jordan

Jordan is actively transitioning toward a sustainable energy future by leveraging its abundant solar and wind resources to reduce dependency on imported fossil fuels. A central focus of this transition is the integration of renewable energy with advanced energy storage systems and smart metering infrastructure. Energy storage solutions, such as pumped hydropower and lithium-ion battery systems, are critical to managing the intermittent nature of renewable sources and ensuring grid stability. In particular, pumped storage offers long-term reliability with operational lifespans exceeding 100 years, while battery technologies enable peak shaving and off-grid efficiency improvements. Parallel to storage development, the deployment of smart meters is reshaping energy management across the generation, transmission, and distribution sectors. Smart meters facilitate real-time data collection, improve billing accuracy, support demand response, and pave the way for dynamic pricing and consumer empowerment. However, the rollout in Jordan faces challenges, including limited funding, infrastructure constraints, and regulatory gaps. The Energy Sector Strategy aims for full smart meter deployment, recognizing its role in building a smart grid that enhances energy efficiency, lowers operational costs, and promotes sustainable consumption. The combined advancement of energy storage and smart metering forms the backbone of a resilient and intelligent energy system, aligning with national goals for energy security and climate mitigation.

Biography:

Prof. Ahmed Al-Salaymeh is a distinguished Jordanian expert in mechanical engineering, renewable energy, and sustainable development. A professor at the University of Jordan, he founded its Master's programs in Renewable Energy and in Environmental Technology & Climate Change. He served as President of the National University College of Technology (2020–2024) and held key roles including Director of the Water, Energy and Environment Center. Prof. Al-Salaymeh has led projects with GIZ, UNDP, and others, and has contributed to national energy policy, the WEFE nexus, and digital transformation. He has over 50 scientific publications and is a recognized regional and international speaker.

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