

Global Webinar on
RENEWABLE ENERGY AND
SUSTAINABLE ENERGY

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ABSTRACT BOOK



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Fred Schwartz

York University, Canada

Title: Retooling the Canadian Forestry Industry

Abstract

The Canadian Forest sector faces a critical challenge stemming from its current centralized, large scale and single commodity-based model. Built around large Pulp & Paper and Sawmill plants, this model is structurally unstable, leading to recurrent economic volatility and profound social erosion in forest-dependent communities. This reliance on traditional products (paper and lumber) fails to take advantage of a more diverse bioeconomy and maximize the climate mitigation potential of Canada's vast forest land. Furthermore, the increasing amount of underutilized biomass poses a heightened risk of catastrophic forest fires. Past solutions failed to capture the complexity and specificities of the forest sector ecosystem. In this presentation I describe the attributes of small to medium scale plants deployed closer to wood sources.

Biography

Fred Schwartz is an Adjunct Professor in the Faculty of Environmental and Urban Change at York University in Toronto, and is Executive Director of York's International Renewable Energy Academy. He is also Executive Director of the Solar Valley Consortium at the Center for Environmental Research and Technology at the University of California, Riverside. He has worked in the field of renewable energy since the late 1970's, and has received awards from the President of the United States, US EPA, and the United Nations.



Richard Navarro, Ph.D.

*Renewable Ocean Energy, Inc.
United States of America*

Title: Poseidon Hydroelectric System

Abstract

Statement of the Problem: Climate change impacts everyone while the need for more electricity is expanding exponentially with electric vehicles, artificial intelligence, and cryptocurrency. Low-cost, reliable electricity without sun, wind, waves, tides, currents, or batteries is needed. This report describes how Poseidon Hydroelectric System produces electricity on any water source without a dam to reduce climate change by eliminating carbon emissions, reducing transmission line costs, and expand the opportunity to provide electricity to people of the world.

Methodology & Theoretical Orientation: Three proven technologies used for hundreds of years have been blended in a new way using a siphon to lift water from any source, a hydraulic ram pump to capture the kinetic energy of flowing water and deliver pressurized water to an electric generator for less than .002 of a penny/kWh. Controlled operation provides efficiencies for minimizing water waste, eliminating fish kill, noise control, and dam hazards while allowing controlled 24/7 electricity production.

Conclusion & Significance: Renewable Ocean Energy, Inc.'s working prototype will be described with an operational video of the generator. Power may be generated on or offshore with an aesthetically pleasing modular generator without harm to fish, birds, marine life, or the environment. Vetted by the Texas Environmental Quality Board and the National Atmospheric Administration Agency.

Biography

Formerly Consultant Breast Surgeon at Imperial College Healthcare Trust (at Charing Cross Hospital 2006 -2014) London SW6 .Previously Consultant Breast Surgeon at Royal Marsden Hospital ,Fulham Road, London SW3.



Stephen Fitzpatrick*

Biofine Technology LLC, USA

Title: The Biofine Process: Carbon Negative Fuels and Commodity Chemicals from Cellulosic Biomass

Abstract

The Biofine process offers an innovative pathway for transforming lignocellulosic and cellulosic waste into valuable fuels and commodity chemicals. Through acid hydrolysis under mild conditions, the process efficiently converts feedstock carbohydrates while largely preserving lignin. Core intermediate products—including levulinic acid, formic acid, furfural, and humic hydrochar—are generated in high yields. Low-cost levulinic acid enables the economical production of levulinate esters tailored for diverse fuel applications, most notably ethyl levulinate (EL), which serves as an oxygen-rich clean-burning additive for heating fuels and gasoline blends. Additional esters such as butyl levulinate are under development for diesel applications.

The process also yields useful byproducts in the form of formate salts (potassium, sodium, calcium), which have wide-ranging applications in drilling muds, concrete production, and as environmentally friendly de-icing agents. The high-energy ligneous hydrochar produced (28,000 Kj/kg) may be utilized for process self-sufficiency or further converted into stable biochar, creating opportunities for carbon sequestration and the sale of carbon dioxide removal credits on well-established international carbon exchanges.

Biofine's approach maximizes biomass valorization, effectively capturing carbon that would otherwise enter the atmosphere during waste decomposition. Independent lifecycle analysis using Argonne National Laboratory's GREET-2 model indicate that

commercial-scale production of EL and hydrochar is highly carbon negative, achieving atmospheric reduction of 20 kg CO₂ per gigajoule of biofuel. Broad adoption could support major sustainability initiatives such as the “Trillion Tree Initiative” promulgated in 2020 by the World Economic Forum. Under a reasonable projected development scenario, annual biomass utilization could reach 100 million dry metric tons, producing nearly 35 billion liters of fuel and reducing atmospheric CO₂ by more than 16 million metric tons each year.

The company’s first commercial facility, scheduled for construction start in Q2 2027 at a former mill site in Lincoln, Maine, will process 100,000 dry metric tons of feedstock annually, with plans for larger future plants. Successful pilot-scale demonstrations have been conducted at the University of Maine (Orono), validated by independent consultants, and multi-year offtake agreements are secured with major fuel distributors and users. This presentation will discuss the process technology, products, feedstocks, financial forecasts, and details concerning the first commercial plant.



Jorge Costa*

*Instituto Superior de Educação e Ciências, ISEC Lisboa,
Portugal*

Title: Biorefineries as Hubs for Cross-Sectoral Industrial Symbiosis

Abstract

This work presents Subtask 7, "Biorefineries as Hubs for Cross-Sectoral Industrial Symbiosis", undertaken within Task XI of the IETS (Industrial Energy-related Technologies and Systems) Technology Collaboration Programme of the International Energy Agency, coordinated by ISEC Lisboa and the Portuguese Working Group on Process Integration. Task XI, launched in 2008 as Annex XI, has evolved from foundational, multi-disciplinary studies on biorefineries integrated within industrial complexes towards increasingly applied work. Building directly on the preceding Subtask 3, which established the conceptual and analytical basis for Biomass-Oriented Industrial Symbiosis by linking circular-economy principles to biorefinery systems and proposing initial circularity metrics, Subtask 7 addresses the remaining implementation gap by moving from conceptual mapping towards demonstration and validation under real technical, regulatory and economic constraints.

Process industries currently face a dual and intensifying challenge: an urgent mandate to decarbonise, alongside growing constraints on critical resources such as freshwater and sustainable biomass. Industrial symbiosis, understood as the physical exchange of materials, energy and water among traditionally separate industries, has emerged as a key strategy for improving resource efficiency and enabling the transition from linear to circular industrial systems. Within this framework, the "Bio-IS Hub" concept reframing the biorefinery not as a standalone production facility but as a bidirectional infrastructure node, simultaneously a recipient of industrial by-products, such as

emissions, saline wastewater and organic sludge, and a supplier of critical utilities, such as biogas, heat and recycled water, to neighbouring, non-bio-based industries. Particular emphasis is placed on the Water-Energy-Biomass Nexus, including fit-for-purpose water reuse, microalgae-based dual-role systems for water recycling and carbon capture and utilisation, and Bioenergy with Carbon Capture and Storage as a scalable route to negative emissions.

The main objective is to demonstrate and validate technical and non-technical pathways enabling Biomass-Oriented Industrial Symbiosis, with four specific objectives: nexus integration and optimisation, scalability and resilience assessment, regulatory barrier removal, including a proposed legal "passport" for industrial waste as feedstock, and economic viability. The scope encompasses core technologies such as anaerobic digestion, microalgae cultivation, hydrothermal liquefaction and advanced membrane separation, assessed through Life Cycle Assessment, Techno-Economic Assessment and Symbiosis Readiness Levels, across five cross-sectoral demonstrator projects located in nine countries. The three-year work plan progresses from inventory and case-study definition, through techno-economic and lifecycle analysis, to a roadmap and dissemination phase, delivering a state-of-the-art report, a mid-term white paper, a best-practice guide, technical brochures and a final synthesis report.

Biography

Dr Jorge Costa holds a PhD in Energy and Bioenergy. He began his career in the environmental sector, focusing on industrial waste management, wastewater treatment, and stormwater drainage. Since 2000, he has served as an Adjunct Professor, dedicating his research and academic work to the fields of environmental engineering and bioenergy. In addition to these roles, he coordinates the degree program in Renewable Energies and Environment at ISEC Lisboa. For the past three years, Dr Costa has also co-managed Subtask 3 (Circular Bioeconomy and Biomass-Oriented Industrial Symbiosis) of Task XI (Industry-Based Biorefineries Towards Sustainability). This work falls under the Industrial Energy-Related Technologies and Systems (IETS), a Technological Collaboration Programme (TCP) of the International Energy Agency (IEA).



Botero Bolivar Laura*

Universidad Industrial de Santander, Colombia

Title: Underwater Noise from Offshore and Tidal Turbines: Prediction, Comparison, and Environmental Impacts

Abstract

Offshore renewable energy technologies, particularly wind and tidal turbines, are rapidly expanding as part of the global transition toward low-carbon energy systems. While these technologies offer significant environmental benefits, their interaction with marine ecosystems remains an important area of investigation. Among the potential impacts, underwater noise generated by turbine operation is a critical yet often underrepresented factor. Sound plays a fundamental role in the life of marine organisms, governing communication, navigation, foraging, and predator avoidance. As a result, anthropogenic noise from offshore energy devices may interfere with these processes and affect ecosystem dynamics. This keynote presents a computationally efficient and physically grounded framework to predict underwater noise generated by both offshore wind and tidal turbines. The framework is applied to representative case studies, including a 10 MW offshore wind turbine and a 1 MW tidal turbine and their arrays. Predicted noise spectra are evaluated against hearing thresholds and temporary of key marine species such as cetaceans, pinnipeds, fish, and elasmobranchs. The results highlight distinct spectral characteristics and propagation behaviours between technologies, showing that marine mammals are more susceptible to turbine noise, while fish are comparatively less affected. Spatial noise maps further reveal the distances and frequency bands over which biological impacts may occur.

By enabling direct comparison between offshore and tidal energy systems on a consistent acoustic basis, this work provides new insights into their relative

environmental footprints. The proposed methodology offers a practical tool for early stage design, environmental assessment, and policy development, supporting the sustainable deployment of marine renewable energy technologies.

Keywords:

Offshore wind energy, tidal energy, aeroacoustics, Amiets's theory, wind turbine noise..

Biography

Laura Botero-Bolívar is an aeronautical engineer with a Master's degree in Aerodynamics and Aeroacoustics from the University of São Paulo. She obtained her PhD from the University of Twente as part of a Marie Skłodowska-Curie Innovative Training Network (ITN), followed by a postdoctoral position at the Polytechnic University of Madrid. She is currently a professor at the Universidad Industrial de Santander in Colombia. Her research focuses on the prediction and quantification of noise generated by offshore wind and tidal turbines, with an emphasis on understanding their environmental impact. She has collaborated with leading industrial partners including Embraer, Boeing, and Siemens, contributing to the development of advanced aeroacoustic methodologies. She has authored peer-reviewed publications in the field and holds a patent related to aircraft noise reduction techniques.



Sharon B. Megdal*

University of Arizona Water Resources Research Center,
USA

Title: Wicked Water Problems and Water-Energy Connections in the Colorado River Basin

Abstract

The presentation frames issues related to surface water and groundwater availability as wicked water problems. After exploring the potential solutions to address the imbalances in water supply and demand, the presentation discusses some “hot topics” in the Colorado River Basin, including hydropower generation and the water-energy trade-offs associated with data centers. Finally, the presentation discusses factors that contribute to successful identification and implementation of solutions.

Biography

Sharon B. Megdal, Ph.D. is Director of the University of Arizona Water Resources Research Center (WRRRC), a Cooperative Extension center and a research unit in the College of Agriculture, Life & Environmental Sciences. Other primary titles are Professor and Specialist in the Department of Environmental Science, C.W. & Modene Neely Endowed Professor, and Distinguished Outreach Professor. Sharon Megdal bridges the academic, practitioner, and civil society communities through water policy and management research, education, and engagement programs. The geographic scope of Dr. Megdal’s work ranges from local to international. Applied research projects include analysis of water management, policy, and governance in water-scarce regions and transboundary aquifer assessment. Sharon Megdal is the lead editor of the book, Shared Borders, Shared Waters: Israeli-Palestinian and Colorado River Basin Water Challenges, and she has guest edited several special journal issues. Dr. Megdal teaches the graduate course “Water Policy in Arizona and Semi-arid Regions”. In

2020, she was awarded the Warren A. Hall Medal for lifetime achievement in water resources research and education by the Universities Council on Water Resources, and in 2024 she was named a fellow of the American Water Resources Association. Sharon Megdal serves on the Board of Governors for the Kasser Joint Institute for Food, Water, and Energy Security, the Leadership Team for the Colorado River Basin Water & Tribes Initiative, the Women in Water Diplomacy Network's Global Leadership Council, and Governor Hobbs' Water Policy Council. Past public service includes serving for 12 years as a popularly elected Director for the Central Arizona Project. Other past service includes serving as a member of the Arizona Corporation Commission, the State Transportation Board, and the Arizona Medical Board. Sharon Megdal holds a Ph.D. degree in Economics from Princeton University.



Rampelli Manojkumar

*Department of Electrical and Electronics Engineering,
BVRIT Hyderabad College of Engineering for Women,
Hyderabad, India*

Title: Sustainable Energy Management for Renewable Integrated Distribution Systems

Abstract

The increasing integration of renewable energy sources requires efficient energy management to ensure reliable and economical distribution system operation. This talk presents optimized rule-based energy management strategies for renewable-integrated distribution systems using photovoltaic, battery energy storage systems, and smart power converters. The proposed methods focus on peak shaving, price-based demand response, and voltage control to improve renewable energy utilization and reduce grid dependence. Case studies on residential microgrids, institutional campuses, and isolated distribution systems demonstrate significant reductions in peak demand, energy costs, and improved voltage profiles. The presented solutions provide practical and computationally efficient approaches for developing sustainable, resilient, and smart distribution networks.

Keywords

Renewable Energy Integration; Energy Management; Battery Energy Storage System (BESS); Peak Shaving; Demand Response; Smart Distribution Systems.

Biography

Dr. Rampelli Manojkumar received his Ph.D. in Power Engineering from the Indian Institute of Technology Guwahati in 2023 and his M.Tech in Power and Energy Systems from the National Institute of Technology Karnataka, Surathkal, in 2015. He is currently an Assistant Professor

in the Department of Electrical and Electronics Engineering at BVRIT Hyderabad College of Engineering for Women, India. His research focuses on sustainable energy management, renewable integrated distribution systems, hybrid AC DC networks, battery energy storage, and smart grid technologies. He has authored 31 Scopus indexed publications with over 449 citations and an h index of 11. His research significantly contributes to the United Nations Sustainable Development Goals including Affordable and Clean Energy, Industry Innovation and Infrastructure, Sustainable Cities and Communities, and Climate Action. His work also involves strong international collaboration, with about 40 percent of his publications co authored with global research partners. He serves on the Editorial Board of Scientific Reports, is an Early Career Editor for the International Journal of Ambient Energy, and Guest Editor for PLOS ONE.



Michail Karyotakis

*School of Aerospace, Transport and Manufacturing,
Cranfield University, Athens, Greece*

Title: Safety Metrics Development for Unmanned Aircraft Systems Operations - The Cases of People transportation and Package Delivery

Abstract

The Urban Air Mobility (UAM) concept has gained a lot of attention from aviation experts globally. While the UAM concept is envisaged to be materialised over the next decade, there are aspects that dictate immediate actions. This research aims at proposing a new safety management framework for the UAM operations of People transportation and Package delivery. One main gap is that safety metrics are missing from Unmanned Aircraft Systems (UASs) operations safety management. In this presentation, Safety Performance Indicators (SPIs) utilisation is proposed. These safety metrics are customised for every phase of UAS flight. Six distinct flight phases are analysed and safety metrics proposed for each. Finally, the concept of a Total Safety Performance indicator is proposed, derived from a process starting with the establishment of certain operational safety objectives. This assures a minimum level of Safety Performance taking into account not only the UAS and its operator but also the performance of the involved stakeholders.

Keywords: Unmanned Aircraft Systems, Safety Performance Indicators, Stakeholders, Flight phases.

Biography

Michail Karyotakis is a distinguished Hellenic Air Force fighter pilot, instructor, and aerospace researcher with over 20 years of aviation experience and more than 2,800 flight hours. He has flown F-16 fighter aircraft since 2009, served as an Instructor Pilot, Test Pilot, and Flight Commander, and was among the first two Greek pilots to fly the upgraded F-16V (Viper) aircraft in 2022. He currently serves at the Hellenic Air Force General Staff while remaining an active-duty pilot. Mr. Karyotakis holds a BSc in Aeronautical Studies from the Hellenic Air Force Academy and an MSc in Air Safety Management from City St George's, University of London. He is currently pursuing doctoral research in Aerospace and Unmanned Aircraft Systems at Cranfield University, United Kingdom. His expertise spans flight safety, human factors, pilot training, and unmanned aircraft systems. He has also lectured at the University of West London and the Hellenic Air Force Academy, contributing to the advancement of aviation education and research.



Saint Bickolard MABICKA IWANGOU

Laboratoire de Recherche et de Valorisation du Matériau Bois (LaReVa Bois), Institut de Recherches Agronomiques et Forestières (IRAF)/CENAREST, BP 2246, Libreville (Gabon)

Title: Impact of Salinity on the Growth of Avicennia Germinans in Gabon

Abstract

Mangroves grow in saline environments. Salinity is an important factor in mangrove growth. *Avicennia germinans* thrives in areas with low salinity; conversely, in areas with high salinity, stunted *Avicennia germinans* trees are found. This difference in the growth of *Avicennia germinans* trees is explained by changes in the wood tissue. In areas with high salinity, for example, salinity increases the density of the vessels, reduces their diameter, and narrows the spacing between growth rings. This slows the growth of *Avicennia germinans*.

Keywords: Mangroves, salinity, vessel density, vessel diameter, growth rings, growth.

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