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Global Congress on

# Advances in Biofuel and Bioenergy Research and Technology

March 21-22, 2024

## Barcelona, Spain

**Theme:**

Innovations and breakthroughs in biofuels and bioenergy research; Commercialization and advancing sustainable and renewable bioenergy solutions

Adv. BBRT 2024

https://advanced-biofuels-bioenergy.peersalleyconferences.com/

2 DAYS WITH MORE THAN 45 SESSIONS, KEYNOTES & ORAL PRESENTATIONS

INNOVATIVE FEATURED SPEAKERS 12+

20+ HOURS OF NETWORKING EVENTS

INTERNATIONAL SPEAKERS 60+

125+ EDUCATIONAL SESSIONS

# WHO SHOULD ATTEND ?

Biochemists and Biophysicists | Agricultural Engineers | Chemical Engineers | Chemists | Microbiologists | Soil and Plant Scientists | Bioenergy Researchers | Biofuels Industry Professionals | Engineers in the Bioenergy Sector | Scientists Working on Renewable Energy Technologies | Policymakers and Regulators Interested In Bioenergy Policy | Sustainable Energy Experts | Environmentalists and Conservationists | Investors in the Biofuels and Bioenergy Sector | Renewable Energy Consultants | Agricultural Experts and Farmers | Government Officials and Policymakers Representatives From The Transportation Industry Interested In Biofuels | Renewable Energy Advocacy Groups | Academicians And Researchers | Waste Management Professionals | Non-Profit Organizations Focused On Renewable Energy And Environmental Sustainability | Energy Storage Professionals and Researchers | Venture Capitalists And Angel Investors Interested In Bioenergy Start-ups | Clean Energy Entrepreneurs | Chemical Engineers | Students and Young Professionals | Renewable Energy Associations And Trade Groups | Energy Consultants and Analysts | Researchers In Biotechnology and Genetics, Working On Improving Biofuel And Bioenergy Production

# PRESENTATION FORUM

## KEYNOTE FORUM / MINI-PLENARY SESSIONS

Presentations under Keynote Forum or Mini-Plenary Sessions includes abstracts with remarkable research value selected by the program committee. These significant speeches are delivered by globally recognized honorable speakers and it is open to all registrants.

## DISTINGUISHED SPEAKERS FORUM (ORAL ABSTRACT SESSIONS)

In this forum, speakers and experts of the research field gets an opportunity to showcase their noble research work that involves comprehensive research findings. These formal oral presentations include a wide range of talks covering basic research to advanced research findings in accordance to the theme and scientific sessions of the conference.

# STUDENT FORUM

## POSTER SESSION

This session is particularly introduced to encourage more number of student participation at international conferences, however it is not restricted only to students since it is also available for the participants with language barrier. There are specific guidelines to be followed to prepare the poster. Poster topic should be selected only from relevant scientific sessions with in-depth technical details.

## YOUNG INVESTIGATORS FORUM

An exclusive opportunity for students and young investigators to present their research work through a formal oral presentation. Young Investigators Forum provides a global platform for young researchers and scholars to showcase their valuable contribution to the scientific world and to get acknowledged by the global scientific community of experts. It is an excellent opportunity to recognize young scientific assets with promising research ideas. These oral presentations are of shorter time duration with 10-15 minutes of informative and precise presentations in relevant scientific sessions.

## EDUCATIONAL WORKSHOPS/ RESEARCH WORKSHOPS/ CORPORATE WORKSHOPS/MINI-SYMPOSIA

With an aim of transferring knowledge among the participants, workshops are introduced as a part of international conferences. These interactive and occasionally practical sessions gives an opportunity for participants to engage in detail discussion. Workshops are mostly scheduled for 60 to 90-minutes. It may range from learning about a specific topic relevant to international education, products and research which sometimes involves practical demonstration. It helps in enhancing skills, knowledge and understanding of the research field in depth through interactive discussions.

## HIGHLIGHTS OF THE DAY SESSIONS

"Highlights of the Day Sessions" is introduced to discuss and focus a ray upon previous day ORAL ABSTRACT presentations by experts to summarise the key findings. It helps in getting better insights into the various dimensions of the topic.

## MEET THE PROFESSOR @ NETWORKING SESSIONS

This session involves open discussion between the experts and session attendees, it gives enough time for getting answers to specific questions and doubts. It is an opportunity for attendees to increase their professional networking, sometimes also leads to an excellent collaboration opportunity.

## EDUCATIONAL SESSIONS/ TRAINING PROGRAMS

Educational Sessions or training programs are specifically designed for a better understanding of the latest findings and technologies. These are generally 45-minute sessions that gives an exposure to the multidisciplinary field, that provides in-depth learning experiences and address educational needs.

## TYPES OF ACADEMIC REGISTRATIONS

- Speaker Registration
- COMBO A (Registration + 2 Night Accommodation)
- COMBO B (Registration + 3 Night Accommodation)
- Delegate Registration

## TYPES OF BUSINESS REGISTRATIONS

- Speaker Registration
- COMBO A (Registration + 2 Night Accommodation)
- COMBO B (Registration + 3 Night Accommodation)
- Delegate Registration

## TYPES OF STUDENT REGISTRATIONS

- Registration
- YIF
- COMBO A (Registration + 2 Night Accommodation)
- COMBO B (Registration + 3 Night Accommodation)
- Posters

## TYPES OF ADDITIONAL REGISTRATIONS

- Accompanying Person
- E-Poster
- Virtual Presentation
- Workshops
- Start-Ups

# Register & Participate

in

**ADV. BBRT 2024**

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# TIME TO CONNECT WITH YOUR PEERS

# CONCURRENT EDUCATIONAL SESSIONS

THURSDAY
March 21
2024

- Algae Biomass Cultivation
- Biodiesel Production
- Bioenergy and Anaerobic Digestion

- Bioenergy and Food Security
- Bioenergy Engineering
- Bioenergy: Opportunities and Challenges

## GROUP PHOTO | COFFEE BREAK

- Biofuels
- Biogas Energy
- Bioheat
- Biomass and Bioenergy

- Biomass Energy
- Biomass for Renewable Energy
- Bioproducts
- Biorefineries

## LUNCH BREAK

- Bioscience
- Climate Change and Bioenergy Governance
- Buildings and Infrastructure
- Conservation

- Energy and Environment
- Green Chemistry
- Green Energy
- Fossil Fuels

## COFFEE BREAK

- Gaseous Fuels
- Electrification
- Ethanol Production

- Fatty Acids, Triacylglycerols and Biodiesel
- Forestry

# CONCURRENT EDUCATIONAL SESSIONS

FRIDAY
March 22
2024

- Gaseous Fuels and Biopower
- Hydrogen Energy
- Liquid Biofuels
- Plant Cell Wall Polymers

- Socio-Economic Aspect of Bioenergy
- Soild Biomass to Heat and Power

## GROUP PHOTO | COFFEE BREAK

- Solar Energy
- Sustainable Bioenergy
- Tidal Power

- Waste to Energy
- Wave Power
- Wind Power
- Wood Bioenergy

## LUNCH BREAK

- Industry and Manufacturing
- Pollution Control
- Public Health

- Recycling
- Renewable Chemicals
- Renewable Energy
- Rural Development

## COFFEE BREAK

- Solar Energy
- Sustainable Energy
- Transportation

- Waste Management
- Waste to Energy
- Wind Power
- Wood Bioenergy

FEATURED TALKS

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# Title: Using ANP Techniques to align public opinion with research needs in biofuel/bioenergy

**William J. L. Adams** | **Decision Lens Inc, USA**

Abstract:

Important biofuel and bioenergy research priorities need to be effectively communicated to the public at large and specific subgroups in order to garner support and funding for those issues. The question is, what communication would most effectively sway those opinions? We can give a precise answer to this by using the Analytic Network Process (ANP) and applying novel analysis techniques. ANP is a decision modeling technique that breaks up decisions into smaller components that can feedback into one another. The smaller decisions are easier to understand and communicate, and ANP theory provides the calculations to glue those pieces together into a coherent whole. This same analysis has been successfully applied as a tool to model public opinion. However, given a public opinion model, we can then use ANP Node Sensitivity Analysis, developed by the author, to further understand which components of the ANP model influence public opinion most effectively. Moreover, we can refine the analysis to specific structures in the ANP model to hone in on the exact needs and desires. We use tools we have developed in the open source pyanp Python library to perform the analysis and fine tune the results. With the pyanp library, researchers can use these same techniques to develop and analyze their own public opinion models to determine where best to focus their energies, so that they can effectively help others understand the significance of their research. Practitioners need not have expertise in all the details of Python and ANP theory in order to make use of this work as simple tutorials and a step-by-step guide are available

FEATURED TALKS

# Title: Cross River's "Belledune Model": A Phased Approach to Nuclear-Enabled Hydrogen Production

**Paul Murphy** | **Cross River Infrastructure Partners, USA**

Abstract:

This conference presentation will discuss the Belledune Model, a green hydrogen hub being developed by Cross River Infrastructure Partners, together with its strategic partners for the Project.

Cross River Infrastructure Partners specializes in the early development of complex projects and is particularly interested in sustainable "hubs" that require multiple integrated technologies to enable sustainable development and growth at industrial facilities. Cross River is developing a multi-phased green hydrogen hub at the Port of Belledune, NB, Canada. The second phase of this Project intends to install up to 2GWe of the ARC-100, a GenIV advanced Small Modular Reactor from ARC Clean Technologies for clean hydrogen (and derivative) production as well as for combined heat/power to new industrial facilities.

The Green Energy Hub – a development district for clean energy projects, along with complementary, low-carbon industries to support regional economic growth – is a key piece of the Belledune Port Authority's (BPA) long-term plans to transition away from declining traditional industries and toward a "more dynamic" and sustainable future. These plans were set out in its Master Development Plan 2022-2052, a 30-year roadmap published in October 2022.

The project is structured in two phases:

Phase 1: BPA and Cross River have already agreed to develop a hydrogen facility powered by green-certified energy that would produce ammonia fuel for export, which is to be located at the Green Energy Hub.

Phase 2: The SMR project would see the development of ARC-100 units to serve as an energy source for expanded hydrogen production and other industries based at the Port, such as metal fabrication and advanced manufacturing.

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# Title: Generating timely individualized feedback to support student learning of conceptual knowledge in Writing-To-Learn activities

**Yang Liu** | **Indiana University Kokomo, USA**

Abstract:

As a pedagogical strategy, Writing-to-Learn uses writing to improve students' understanding of course content, but most existing writing feedback systems focus on improving students' writing skills rather than their conceptual development. In this article, we propose an automatic approach to generate individualized feedback based on comparing knowledge representations extracted from lecture slides and individual students' writing assignments. The novelty of our approach lies in the feedback generation: to help students assimilate new knowledge into their existing knowledge better, their current knowledge is modeled as a set of matching concepts, and suggested concepts and concept relationships for inclusion are generated as feedback by combing two factors: importance and relevance of feedback candidates to the matching concepts in the domain knowledge. A total of 88 students were recruited to participate in a repeated measures study. Results show that most participants felt the feedback they received was relevant (78.4%), easy to understand (82.9%), accurate (76.1%) and useful (79.5%); they also felt that the proposed system made it easier to study course concepts (80.7%) and was useful in learning course concepts (77.3%). Analyses of students' submitted assignments reveal that more course concepts and concept relationships were included when they used the proposed system.

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# Title: Food Security And Power Struggle In China

**Tomaz Mefano Fares** | **SOAS University of London, UK**

Abstract:

This paper demonstrates through empirical-rich research that China's food security results from dynamic state-market relations (Fares 2022). It draws on the economic growth and political action of four crucial Chinese agrarian state-owned enterprises (SOEs) at the time they launched their first investments overseas in the mid-2000s. As they went abroad to secure global soybean supply, they changed their investment strategies in the sector, often pushing for reforms against food security policies. This paper argues that their association with foreign partners allowed the unprecedented growth of North Atlantic-based agribusiness transnationals in China's soybean downstream complex, known as the battle of the beans (Oliveira 2018). By interacting with state officials and influencing state departments, they reshaped Chinese policymaking and reinforced an uncritical nationalist discourse over food security based on a Sino-foreign dichotomy. Nevertheless, such change in discourse entails diverging expansion strategies and state-market relations in Chinese agriculture: While two SOEs (COFCO and Chinatex) took advantage of global soybean price fluctuations to grow in association with foreign agribusiness, the political reaction of two state-owned competitors (Jiusan and Sinograin), endorsed nationalist appeal of China's food security governance (discourse and policies). Overall, the paper questions the idea of a stable and homogenous political system in China in line with the literature on divisions within the Chinese state (Nogueira and Qi 2018). It also contributes to articulate debates on international relations with national economic strategies, as it considers the domestic impacts of Chinese agricultural internationalisation. The debate on food security also brings empirical and theoretical insights into the politics of agricultural-export economies in Africa and Latin America, which have become part of China's political and economic action abroad (McKay 2018).

# Title: Main long-term policy impacts of the Gotthard Base Tunnel construction on cross-border land consumptionand transformation

**Zaira Elizabeth Tello Toapanta | Universidad Politécnica de Madrid, spain**

Abstract:

The Gotthard transalpine base tunnel is located in Switzerland, it is considered the longest in the world. The purpose of this research is to detect the main effects of long-term policies on the occupation and transformation of cross-border land, in productive, industrial and commercial uses, due to the construction of the Saint Gotthard base tunnel, and the complementary works that enhance it. There are three levels of study proposed, three temporary scenarios (before, during and after the construction) and a comparative analysis with the future Lyon-Turin base tunnel. Maps are made with geodata from Switzerland, Italy and France and interviews with experts by class groups, this was essential to obtain a broader vision of the situation to be analyzed, it is concluded that the use of mixed methods proved to be useful for the stated objectives. A greater displacement of the impact at cross-border levels between Switzerland and Italy is demonstrated, with 43,776.6 hectares of productive, industrial and commercial use, in relation to the cross-border areas between Italy and France of 15,593.6 hectares related to the Lyon-Turin tunnel. Two types of compensation and empowerment works of the Gotthard System are identified and advantages in formulating long-term articulated policies and well-structured financing processes with participatory mechanisms. This research contributes to the current literature, aimed at researchers and policymakers on intermodal transport as a response to sustainable logistics.

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# Title: Extreme return and volatility connectedness between energy and BRIC markets

**Syed Mabruk Billah** | **Prince Mohammad Bin Fahd University, Saudi Arabia**

Abstract:

Using the quantile connectedness approach for the median, lower, and upper quantiles, we examined the return and volatility connectedness between energy and BRIC markets spanning October 1, 2005, to July 09, 2021. We find that uncertain economic activity and intense periods characterize energy and BRIC markets' return and volatility connectedness. A parallel return and volatility connectedness structure for upper and lower quantiles but average quantile revealed different results. Time-varying features are substantiated between energy and BRIC markets where significant distressing events such as Global Financial Crisis, European Debt Crisis, Shale Oil Revolution, and COVID-19 pandemic intensified the spillovers. We highlighted diversification avenues of energy and BRIC markets given the financial turmoil periods where investors' concerns are widely addressed to opt-in the investment opportunities with lower risk and greater diversification. Our study appeals beneficial implications for policymakers, regulators, investors, and financial market constituents to redevelop their existing strategies to avoid financial losses.

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# Title: Gibberellic acid interacts with salt stress on germination, growth and polyamines gene expression in fennel (Foeniculum vulgare Mill.) seedlings

Houneida Attia | Taif University, Saudi Arabia

Abstract:

The aim of this study was to rigorously test and integrate the underlying hypothesis that an enhancing effect of gibberellic acid (GA3, 3 µM) with increased growth actually leads to a modification of the physiological role of polyamines during salinity stress (NaCl, 100 mM) in fennel. These analyses concern both reserve tissues (cotyledons) and embryonic axes in growth. Physiological results indicate a restriction of germination, growth, mineral nutrition and damages to membranes of salt-treated seedlings. This effect was partly alleviated in seedlings subjected to an interaction effect of GA3 and NaCl. Peroxidase and catalase activities exhibited a decrease or an increase depending on treatments and organs. The level of three major polyamines (PAs): putrescine, spermidine, and spermine increased in fennel salt- treated seedlings. However, GA3 seed priming was extremely efficient in reducing PAs contents in seedlings stressed by salt compared to the control. Response of PAs genes to salinity was different. Up-regulation has been noted for SPMS1, ODC1, and ADC1 in hypocotyls and cotyledons (H + C) and down-regulation for SAMDC1 in radicle. Interaction salt/GA3 treatment revealed different results, only ODC1 in (H + C) and ADC1 in both radicle and (H + C) were overexpressed. Concerning other genes, no change in mRNA abundance was observed in both organs compared to salt-treated seedlings. All these results showed that fennel seedlings were sensitive to NaCl. This sensitivity was alleviated when GA3 was applied for seed priming and combined with NaCl resulting in a decrease in PA contents.

# Title: Recent Advances of Magnetic Gold Hybrids and Nanocomposites, and Their Potential Biological Applications

**Mirza Muhammad Faran Ashraf Baig** | **The Hong Kong University, China**

Abstract:

Magnetic gold nanoparticles (mGNP) have become a great interest of research for nanomaterial scientists because of their significant magnetic and plasmonic properties applicable in biomedical applications. Various synthetic approaches and surface modification techniques have been used for mGNP including the most common being the coprecipitation, thermal decomposition, and microemulsion methods in addition to the Brust Schiffrin technique, which involves the reduction of metal precursors in a two-phase system (water and toluene) in the presence of alkanethiol. The hybrid magnetic–plasmonic nanoparticles based on iron core and gold shell are being considered as potential theragnostic agents. Herein, in addition to future works, we will discuss recent developments for synthesis and surface modification of mGNP with their applications in modern biomedical science such as drug and gene delivery, bioimaging, biosensing, and neuro-regenerative disorders. I shall also discuss the techniques based on my research related to the biological applications of MGNP.

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# Title: Plausible impacts on crop production under climate change in Bangladesh: An analysis of the Denitrification-Decomposition (DNDC) model.

**Syed Shoyeb Hossain** | **The Chinese Academy of Agriculture Science, China**

Abstract:

This paper first analyzes the changing pattern of temperature and precipitation and then constructs a Denitrification-Decomposition (DNDC) model to better understand the climate change impact on crop yields in Bangladesh. In the DNDC model, historical daily precipitation and temperature data used for baseline scenario and projected data have been taken from general circulation model (GCM). Different general circulation models (GCM) have been employed to analyze and estimate future temperatures and precipitations. The result of the general circulation model (GCM) study finds that the overall temperature in Bangladesh tends to increase by 1.5 0C and 2.8 0 C in the years 2030 and 2050. Precipitation patterns are also projected to increase in 2030 and 2050. The result from the Denitrification-Decomposition (DNDC) model finds that overall rice, corn, winter wheat, potato, vegetable, and pulses yields decrease both in 2030 and 2050, and decrease more rapidly in 2050. In the year 2050, the output of rice, potatoes, and pulses falls by -33%, -35%, and -54%, respectively, while the production of corn and wheat falls by -22% collectively. Since rice is the main food consumed in Bangladesh, a decline in rice output will pose a serious threat to the country's ability to feed itself.

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# Title: (Bioremediation Potential of different Microalgae Strains form Contaminated Cadmium Water and Soil Environments)

**Shah Zada** | **Shenzhen University Shenzhen, China**

Abstract:

Currently researchers are taking a serious interest to find a sustainable way for remediation of contaminated environment. Bioremediation is a biological way to eliminate the pollutants with zero addition of chemicals. In different microorganisms were used, and demonstrated exciting outcomes. However it large-scale applications in aquatic system and disinfection of soil is still facing various hurdles. Here 21 different strains of microalgae were evaluated for their capability of cadmium (Cd) removal from aqueous solution concentration of 5 (mg/L). Five out of 21 strains were selected on their comparative tolerance towards Cd. Characterization of the selected strains and their Cd removal efficiency was measured using different techniques, such as ultraviolet spectrophotometers, inductively coupled plasma mass spectrometry, scanning electron microscope, and confocal microscopy. It was observed that the 5 selected strains can grow normally under the 10 (mg/L) of Cd. The microalgal growth was inhibited upon while concentration of Cd exceeds 10 (mg/L). After 12 days exposure to aqueous solution of Cd 10 (mg/L), the Cd removal efficiencies of Scenedesmus obliquus, Chlorella fusca, Chlorella saccharophila, Ankistrodesmusbraunii, and Leptolyngbya JSC-1 was found to be 96, 98.4, 99.5, 95, and 97%, while from soil these were 75.5, 77, 79, 75, and 76%, individually. Also, a slight increase in protein and nucleic acid leakage from cells was observed with time. From the results it is evident that the selected strains have potential to be open a new way for bioremediation of contaminate from soil & water.

# Title: Research of Resilience Streets based on the Person-environment Fit Theory

**Xinpeng Wang** | **Waseda University, Japan**

Abstract:

The street is the living room of the city and an important carrier of people's urban life. Whether it is the covid-19 epidemic or the economic recession, urban life has undergone drastic changes. Based on the person-environment fit theory, this research uses urban street objects to redefine the resilience of street space, in order to describe and analyze the mechanism behind the changes in urban life and the corresponding strategies.

In this study, especially taking architectural space as the main physical factor, discuss how it affects the overall urban living environment. Further, collect people's perception survey as a feedback mechanism, and analyze the important influencing factors and weights through person-environment fit theory.

We expect that this research will provide a basic research framework and evaluation criteria for the improvement of urban living space in the future.

# Title: Breeding Of The Red Californian Earthworms And Their Role In Decomposition Of Poliethilene

**Peyzulla Khydyrov** | **Turkmen State Pedagogical Institute, Russia**

Abstract:

With purpose of the peculiarities of the ecology of growth, development and feeding of these earthworms in the arid conditions, in 2021-2022 the research works were conducted by us in the farms, located in the outskirts of the city of Turkmenabat. According to the results of the experiments it was defined that in our conditions the optimal temperature of air for normal reproduction of these earthworms is 15-30°C. At its fall up to 5-10°C the intensity of their reproduction is reduced by several times, and at temperature from - 4 up to - 6°C they die. Besides that, even at slightest influence of light, the earthworms go deeper to manure.

It is revealed that red Californian earthworms wonderfully work out the polyethylene film in mixture with cow manure, used as a food substratum. This ability is unique because the polyethylene in nature does not decompose, and during burning emits dioxin to the atmosphere, which is a carcinogen. The industrial utilization of the polyethylene is a long and costly process, for this reason, the studying of the biological destructors requires particular attention.

The red Californian earthworms decompose different articles from polyethylene. For example, in mixing 0,01-0,02 mm thickness polyethylene film with manure during 10-14 days, the earthworm decomposes in average its 40-60%, and in full during 25-30 days. In 0,04-0,05 mm thickness film they form holes with 5-10 sm. diameter.

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# Title: Utilizing Polynomial Model to Analyse Transmission and Reflection of Electromagnetic Waves in Multilayer Thin Films with External Transverse Voltage.

**Mohammed K. M. Elhabbash** | **Universiti Sains, Malaysia**

Abstract:

The fundamental purpose of this paper is to create a comprehensive theoretical and computational framework for studying the complex interactions between electromagnetic waves and multilayer thin films when exposed to a transverse voltage. A polynomial method was used, with the refractive index and extension coefficient of each material being calculated as functions of wavelength. A propagation matrix describes the propagation of an electromagnetic wave in a thin film, whereas an interface matrix depicts the interaction between layers that happens at their interfaces. The multilayer thin film was modeled as an effective capacitor consisting of a series of interconnected capacitors, with each layer representing a capacitor coupled to the next layer, in order to model its function. The transverse voltage influences the accumulation of electric charges at the interfaces between adjacent capacitors. The model describes both nonmagnetic lossy and lossless materials. A simulation was performed to analyze the electrical and optical responses of a multilayer thin film that consisted of alternate layers of lossless and lossy materials.A custom code, Wave Tensor, was developed to implement the polynomial model, enabling the simulation of the reflection and transmission of multilayer thin films made of lossy material such as germanium (Ge) and lossless material such as magnesium oxide (MgO). By adjusting the transverse electric potential, as well as the geometrical and electrical parameters of an arbitrary lossy-lossless multilayer thin film, the code can predict significant optical responses, including transmission ($T$), phase of transmission ($\phi_T$), reflection ($R$), and phase of reflection($\phi_R$). The code serves as a valuable tool for the design and optimization of lossless-lossy or lossless-lossless multilayer thin films, allowing for the achievement of desired optical functions in bioenergy, solar cell applications, and finding biomaterial alternatives. This paper is expected to pave the way for the future by extending our understanding of the delicate interplay between light and matter/ bio-matter.

# Title: Investigation on Machine Learning Approaches for Environmental Noise Classifications

**Ali Othman** | **University Technology, Malaysia**

Abstract:

This project aims to investigate the best machine learning (ML) algorithm for classifying sounds originating from the environment that were considered noise pollution in smart cities. Sound collection was carried out using necessary sound capture tools, after which ML classification models were utilized for sound recognition. Additionally, noise pollution monitoring using Python was conducted to provide accurate results for sixteen different types of noise that were collected in sixteen cities in Malaysia. The numbers on the diagonal represent the correctly classified noises from the test set. Using these correlation matrices, the F1 score was calculated, and a comparison was performed for all models. The best model was found to be random forest.

# Title: Pra-Design Of Offshore Lng Plant

**Renanto | Institute Technology Sepuluh Nopember, Indonesia**

Abstract:

The prospect of the natural gas industry in Indonesia is very large, considering that Indonesia is a country that has large enough natural gas reserves of 62.4 trillion cubic feet, of which 43.6 trillion cubic feet are proven. However, some gas reserves in Indonesia have not been exploited due to unfriendly geographical conditions or the natural gas content of some sources that are relatively small so they cannot be processed commercially. Establishing an offshore LNG Plant is the solution to maximizing natural gas resource utilization. Offshore LNG plant uses a ship designed as a floating facility and the design procedure itself is not much different from the onshore terminal. The pre-designed offshore LNG plant is planned to start operating in 2025 with a production capacity of 2.5 MPTA. The location of the establishment of this plant is planned in the Masela block area because of the abundant and untapped availability of natural gas. In fulfilling the annual capacity, the plant operates continuously 24 hours/day for 330 days with raw materials of 315128 kg of natural gas/hour producing LNG products of 230768 kg/hour, LPG of 5800 kg/hour, and condensate products of 356 kg/hour. The production process of this offshore LNG plant can be decomposed into 4 processes, namely Acid gas removal, Dehydration Unit, Fractionation, and Liquefaction. In the acid gas removal process, absorption is used with a mixture of MDEA and MEA. Furthermore, TEG absorption and Molecular Sieve type 3A are used in the dehydration process. In the fractionation process, the deethanizer and debutanizer columns are used. To be able to establish a plant with a production capacity of 2.5 MPTA, a capital investment cost of Rp 43,361,669,823,565 is needed, with an estimated product sales of Rp 26,399,947,347,161 per year.

# Title: Driving Forces of Deforestation and Land Change in Riau Province, Indonesia

**Lila Juniyanti** | **National Research and Innovation Agency Republic of Indonesia**

Abstract:

Riau has experienced massive forest conversion and the highest deforestation rate in Sumatra and the world. International and local level deforestation and land cover change studies in Riau already exist. However, understanding the drivers and actors behind this land cover change remains challenging, partly because the studies are spread across many domains and disciplines. We provide a literature review of 101 studies identifying the causes and actors of land cover change in Riau Province. Our review shows that oil palm and timber plantation are the most prominent direct causes. The lack of capacity and policy failures were the most prominent underlying causes of deforestation and land cover change. Our review also shows that companies and smallholders are the main actors in the direct causes. Central and local governments are the main actors in the underlying causes of deforestation and land cover change. Our literature review shows knowledge gaps that can be filled by classifying the causes and roles of actors in deforestation and land cover change.

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# Title: Losses in the Grain Supply Chain: Causes and Solutions

**Akos Mesterhazy** | **Cereal Research Non-Profit Ltd, Hungary**

Abstract:

Global grain production needs a significant increase in output in the coming decades in order to cover the food and feed consumption needs of mankind. As sustainability is the key factor in production, the authors investigate global grain production, the losses along the value chain, and future solutions. Global wheat, maize, rice, and soybean production peaked at 2.102 million tons (mt) of harvested grain in 2018. Pre-harvest losses due to diseases, animal pests, weeds, and abiotic stresses and harvest destroy yearly amount to about 35% of the total possible biological product of

3.153 mt, with 1051.5 mt being lost before harvest. The losses during harvest and storage through toxin contamination are responsible for 690 mt, with a total of 1.741 mt or 83% of the total newly stored grain. Limited cooperation can be experienced between scientific research, plant breeding, plant protection, agronomy, and society, and in addition, their interdependence is badly understood. Plant breeding can help to reduce a significant part of field loss up to 300 mt (diseases, toxins, water and heat stress) and up to 220 mt during storage (toxin contamination). The direct and indirect impact of pest management on production lead to huge grain losses. The main task is to reduce grain losses during production and storage and consumption. Better harvest and storage conditions could prevent losses of 420 mt. The education of farmers by adopting the vocational school system is a key issue in the prevention of grain loss. In addition, extension services should be created to demonstrate farmers crop management in practice. A 50% reduction of grain loss and waste along the value chain seems to be achievable for the feeding 3–4 billion more people in a sustainable way without raising genetic yields of crop cultivars.

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# Title: A Comprehensive Approach to Addressing River Pollution in Developing Countries.

**Rudolf Wirawan** | **The University of Adelaide, Australia**

Abstract:

River pollution is a critical issue in many developing countries, impacting human health and the environment. Despite various attempts to tackle this issue, such as education, permaculture, and IoT monitoring, corruption, lack of transparency, and limited financial resources have hindered progress. This research proposes a holistic approach to addressing river pollution that involves leveraging ecovillage pathways, smart ecovillage communities, circular economy, multi-stakeholder steward-owned DAO (Decentralised Autonomous Organisation) CO-OPs and diaspora to promote sustainable waste management practices, community engagement, and transparency. The paper explores the potential of these approaches to mitigate river pollution in developing countries while measuring their impact using AI technology for Triple Bottom Line (TBL) assessment. The research highlights the challenges and opportunities associated with these approaches and provides recommendations for policymakers, businesses, and civil society organisations to create a more sustainable and equitable world.

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# Title: Bioelectricity generation using sweet lemon peels as anolyte and cow urine as catholyte in a yeast-based microbial fuel cell

**Vishal Mishra** | **Biochemical Engineering, IIT (BHU)**

Abstract:

Microbial fuel cell (MFC) is considered as a budding technology for organic waste treatment with simultaneous bioelectricity generation. The present investigation explores the potential of pretreated sweet lemon peel slurry as an anolyte with yeast and bacteria anode biocatalyst for bioenergy generation in MFCs. Sterilised cow urine was used as catholyte and Chlorella pyrenoidosa strain as cathode biocatalyst. Three H-shaped dual-chamber MFCs were fabricated using two plastic containers operating with no inoculum, Saccharomyces cerevisiae as only inoculum and co-culture of Saccharomyces cerevisiae with isolated cellulolytic bacteria in the anode chamber. The anode was prepared by using a rectangular stainless-steel mesh, cathode was a cylindrical graphite rod. The highest open-circuit voltage was generated from coculture of yeast-bacteria 792.33 ± 1.53 mV. The highest open-circuit voltage reached 481.33 ± 3.51 mV when only S. cerevisiae was inoculated. The maximum power density in these two MFCs reached 22.20±1.28 mW/m2 (at 210.66 ± 6.11 mA/m2) and 204.80±1.28 mW/m2 (at a current density of 640.0±2.0 mA/m2) respectively. Results noticeably disclosed that microorganisms consumed the carbon source available in sweet lime. Thus, sweet lime can be considered as an inexpensive alternative for the operation of MFCs.

# Title: Assessing environmental performance of service supply chain using fuzzy TOPSIS method

**Diya Guha Roy** | **Goa Institute of Management**

Abstract:

This paper aims to apply a multi-criteria decision-making (MCDM) framework to evaluate the environmental performance of the medical service supply chain using a case study in India. An application of MCDM method, the fuzzy TOPSIS (Technique for order of preference by similarity to ideal solution) model, is used for Medical Support Service Provide firms (MSSPF) environmental performance evaluation. We require multiple and conflicting criteria to fix real-life decision-making challenges, which in turn led to the inception of (MCDM). However, MCDM is contracted with various contradictory requirements in which the knowledge of decision-makers is generally vague and thereby more challenging. In this situation, inclusions of fuzzy set theory in MCDM Methods would be good to solve the MCDM problem. In this study, the authors used a fuzzy TOPSIS MCDM model to solve the evaluation framework. Data were collected from the experts from the MSSPF about the more perfect criteria to assess environmental performance using a questionnaire. Case assesses the environmental performance, based on defined criteria, of three MSSPF by the experts. Fuzzy TOPSIS Method ranks three MSSPF according to environmental performance in the following order: Firm B, Firm A and Firm C. The result suggested that 'Firm B' performed superior environmental performance followed by 'Firm A' and 'Firm C'. This evaluation framework will help MSSPF to identify potential areas of further and formulate new innovations.

# Title: Bio-fuel Towards a Greener and Securing the Future Energy Needs

**Pradip Lingfa** | **North Eastern Regional Institute of Science & Technology**

Abstract:

Energy play important role for economic growth of any country and is vital to the sustenance of modern economy. Future economic growth depends on the long-term availability of energy from sources that are affordable, renewable, and environmentally friendly. Most of the present primary energy requirements in countries are made through fossil fuel such as coal, oil and natural gas. But due to its increasing demands and uses there is depletion of the fossil fuel reserves coupled with the global environment problems which stimulated the search for alternative sources which are environmentally friendly. Among the various alternative energy sources, bio-fuel has become the emerging area of research due to its eco-friendly energy source and also offers opportunity for many people to have an improved quality of life. The transportation sector is one of the major consumers of fossil fuel and the biggest contributor to environmental pollutions, which can be reduced by replacing the petroleum fuel with bio-origin. Bio-fuel is the power behind a green tomorrow and a key future asset for sustainability.

# Title: Control strategy for frequency regulation in autonomous microgrid systems

**Pradeep Kumar** | **Deenbandhu Chhotu Ram University of Science &am**

Abstract:

This study proposes a novel control mechanism for the reliable and stable operation of isolated microgrid (MG) systems, which face higher operational complexity due to the involvement of intermittent and uncertain renewable energy sources. The proposed control approach is based on a scaling factor-based fuzzy proportional-integral-derivative with filter-(one plus integral) controller designed using the Prairie dog optimization algorithm. The MG system comprises a biodiesel engine generator, solar photovoltaic, wind turbine generator as distributed generation unit, ultra-capacitor, and flywheel are included as energy storage systems. The performance of the proposed controller by comparing it with other state-of-the-art control approaches in various real-time scenarios. In addition, the effectiveness of the controller during the integration of electric vehicles (EVs) into the MG has been analyzed. Furthermore, the efficacy of the proposed approach has been confirmed by testing various scenarios for robustness analysis.

# Title: Trio-Lattice Scheduling For Effective Resource Utilisation Of Solar Energy To Cater Plead Irrigation

**Kola Leleedhar Rao** | **Mohan Babu University (Erstwhile Sree**

Abstract:

In actual practice, most demanded agricultural loads (MDAL) are not being taken care of due to scheduled power supply methodology practiced by the present power distribution companies. Consequently, seasonal cultivations are affecting due to insufficient availability of power supply. In this session, the furnished result of a walk-survey performed within an agricultural predominant area located in the vicinity of 33kV/11kV 5 MVA substation sited at lat. 13.62ON, long. 79.24OE and alt. 256m confirms the above statement. i.e. about 62.12% of farming is affected due to insufficient availability of power supply. To address the concerns of the non-consideration of MDAL within the aforesaid expanse, solar power generator of appropriate size, 103kWp derived based on the level of mismatch power attained by using ETAP software is proposed to erect near the utility grid and feed MDAL. Also, as a contribution, trio-lattice load scheduling methodology is introduced and applied to effectively utilize the generated electricity by scheduling the agricultural load points countered in accordance with the possible solar energy generation. Performance assessment indices: ADI, ERoS and ARoS are introduced to reconcile the effective utilization of generated electricity by the proposed load scheduling methodology. The derived results and arrived performance assessment indices confirm that the proposed scheduling methodology could effectively utilize the solar energy resource and the concern system caters to the necessity of pleading irrigation.

PEERS ALLEY MEDIA

# Title: Effects of Eichornia biodiesel blends with TiO2 on the emission and performance characteristics of a DI diesel engine

**R.Jaya Madhuri** | **Sri Padmavati Mahila Visva vidylayam**

Abstract:

Concerns about the effect of activities that need the use of alternative fuels, as well as a growth in demand for clean energy, have made biofuels research more well-known, and so began the search for non edible plants that can be used to make biodiesel. Present research was carried out with Eicchornia oil which is used as a biodiesel in diesel engine. Because it is nonedible and its oil having higher calorific value compare to other sources. Potassium hydroxide catalyst was used for transesterification process, which has lesser cost and more availability. And also, in this work conducted diesel engine experiments using four different biodiesel blends (B20, B40, B60, B100) and diesel fuel. Additionally, to reduce the emission nano particles (TiO2) was blended with optimal biodiesel blend (B20). The performance and emission characteristics were conducted with different biodiesel blends. In this blends, B20+ TiO2 blend gives good performance and reduction in emissions compared to other biodiesel blends.

# Title: Artificial intelligence and Smart Sensor-based Monitoring, Prediction of Biofuel Properties and Performance

**Sivakumar Rajagopal** | **Vellore Institute of Technology**

Abstract:

A popular sustainable substitute for fossil fuels is bioenergy. However, difficulties with continuous monitoring, conversion costs, and supply chain stability prevent the widespread use of biomass-based energy products. In recent decades, bioenergy systems have used artificial intelligence (AI), a newly developed idea, to overcome these difficulties. To address bioenergy-related research difficulties and enhance the functionality of bioenergy systems, this presentation focuses on recognizing the distinctive capabilities of various AI methodologies. We specifically defined input factors, output variables, AI methodologies, dataset size, and performance for AI investigations. We looked at AI applications for bioenergy systems at various stages of development. We identified two major applications of AI: (1) the measuring parameters 24x7 monitoring using smart sensors, (2) the forecasting of biomass conversion process performance using machine learning techniques, According to the evaluation, AI and Smart Sensors are particularly useful in creating data that is difficult to measure directly, improving conventional models of biomass conversion and end uses for biofuels, and overcoming difficulties associated with conventional computer techniques for designing and optimizing bioenergy supply chains.

# Title: Biological Control Potential of Penicillium and Pseudomonas species in inducing systemic resistance

**Farhat Hafiza** | **Gomal University, D.I Khan**

Abstract:

The efficacy of three isolates of endophytic Penicillium species that have shown significant suppressive effect on root rotting fungi in our previous study were further evaluated in pots and field plot experiments for their effect on root diseases of okra, induction of systemic resistance and physiochemical properties of okra fruit. Aqueous suspensions of endophytic Penicillium and Pseudomonas monteilii were applied in pots and field plots using okra as test

Plant. Data on the fungal infection of roots, plant growth, and plant resistance markers like polyphenol, salicylic acid and antioxidant status of plant were determined. These isolates significantly suppressed root diseases and induced systemic resistance via increasing level of resistance markers, polyphenol and salicylic acid besides improving antioxidant activity of Penicillium and P. monteilii treated plants as compared to control plants. GC-MS analysis of nhexane extract of mycelium of P. nigricans revealed the presence of different volatile compounds viz; (R)-(-)-14-Methyl-8-hexadecyn-1-ol, 7 Octadecenoic acid, methyl ester, Columbin, Hexadecanoic acid, ethyl ester and 9,12-Octadecadienoic acid, ethyl ester which is reported for the first time from this sources. Endophytic Penicillium and P. monteilii have potential against root-infecting fungi of okra and can improve plant growth and yield. Significance and Impact of the Study: Endophytic Penicillium species and P. monteilii can suppress root rotting fungi by direct mechanism or induction of systemic resistance in plants.

# Title: Fostering Green Economy: Impact of Financial Development, Foreign Direct Investment and Inflation on Renewable Energy

**Muhammad Suhrab** | **Huazhong University of Science & Technology**

Abstract:

The effectiveness of renewable energy sources has been crucial in reducing environmental deterioration in view of the recent, rapid economic growth. Thus, it is necessary to focus on this phenomenon more intently. The current research investigated the influence of financial development (FD), foreign direct investment (FDI) and Inflation (INFL) on renewable energy productivity (REP) in CPEC economies, using monthly panel data from January 2004 to December 2020. The autoregressive distributed lag (ARDL) model, correlation analysis, and dynamic ordinary least squares (DOLS) were used to analyze the effects of the components. The findings demonstrated that each variable significantly affected the output of renewable energy sources. FD and FDI have significant positive relationship with REP while INFL having a negative correlation with REP. The findings suggest that financial development in both countries is crucial to avoid financial risks that could potentially damage the financial markets' stability and REP. Additionally the study discovered that long-term finance at low rates of return, risks of investment, and lack of market players (investors) are major obstacles to green energy projects.

# Title: Determination of WGS84 to Adindan Datum Transformation Parameters and Assessing its effect for Geospatial

**Melese Wondatir Sisay** | **Ethiopian Civil service University**

Abstract:

Datum transformation is the transformation of coordinate points from one known coordinate reference system into another. The recent practice of geospatial data collection, management, and analysis in Ethiopia is in geocentric coordinates of a point defined based on a global datum (WGS84). However, the Adindan clack 1880 datum is the locally known datum for Ethiopia. The currently recognized transformation parameters of Ethiopia are inconsistently integrated into deferent software. In addition to this, the rotation and scale changes are ignored in the transformation parameters. The main purpose of this study is to determine WGS84 to Adindan-Ethiopia datum transformation parameters. Five different models (block shift (geocentric), Bursa-Wolf (Helmert), Molodensky-Badekas, standard, and abridged Molodensky models) using ten collocated ground control points were used to define the transformation parameters by using five different height assumption scenarios like height-zero methods, orthometric height method (OHM), abridged Molodensky, EGM08, and iteration methods. In addition, the study evaluates the horizontal positional accuracy of orthophoto (x and y), second-order ground control points, and cadastral parcel corners for Addis Ababa City. A Molodensky-Badekas model is small residual (error), standard deviation and standard errors across the region of Ethiopia, within iterative height approach. The transformation parameters from WGS84 to Clarke1880 with inherent uncertainties of (168.8402 ± 0.09, 13.6708 ± 0.09, – 205.091 ± 0.09 in translation parameters in X, Y, and, Z, respectively, 3.27E−07±3.949E−07 of scale factor, and 1.39E−06±4.656E−07, 1.07E−06±5.1988E−07, 4.20E−07±5.4291E−07 in rotation parameters) parameters, with the standard deviation and residual of 1.06 m and 0.76 m, respectively.

PEERS ALLEY MEDIA

# Title: Woody Species Conservation, Management and Its Socioeconomic Importance of Agroforestry Practice

TseguEreso Denbel | Bule Hora University

Abstract:

The preservation of biodiversity is not at all a luxury. In many developing countries, the reduction in biodiversity caused by the conversion of primary forest to unsustainable agricultural landscapes has increased. Agroforestry provided habitat for various species of wildlife and had signi1cant social and environmental advantages. However, there is a lack of knowledge on the signi1cance of agroforestry in the management and conservation of woody species. The review's main goal is to emphasize the socioeconomic signi1cance of agroforestry in Ethiopia and the conservation and management of woody species. The most common agroforestry practices are typically carried out in di5erent parts of the country on homegardens, crops, woodlots, and co5ee farms. The most typical woody species utilized in agroforestry practices in southern Ethiopia are Cordia africana, Millettiaferruginea, Erythrina brucei, and Olea capensis. In Ethiopia's northern region, you can find Croton macrostachyus, Vernonia amygdalina, Faidherbia albida, Acacia nilotica, Acacia seyal, and Grewia bicolor. The central highlands of Ethiopia also have Albizia gummifera, Cordia africana, Croton macrostachyus, Ficus vasta, and Vernonia amygdalina. Agroforestry improves the environment and the socioeconomic system by producing tree products such as timber, firewood, food, and building materials (reduce soil erosion, increase soil moisture and fertility, coffee shade, and keep microclimate balance). Woody species in agroforestry are managed through pollarding, thinning, and pruning.

PEERS ALLEY MEDIA

# Title: Environmental tax and global income inequality: A method of moments quantile regression analysis

**Osman Babamu Halidu** | **University of Ghana**

Abstract:

Even though Environmental tax policy impacts inequality theoretically, empirical studies remain scanty not only in the context of volumes and the estimation approaches but are also focused on selected advanced countries, communities, households, and emerging countries, the neglect of the global or big picture effect, which is essential for measuring the overall effect of the collective and individual country-concerted efforts in addressing this global cancer. We provide empirical evidence in the global context using the novel method of moments quantile regression. We found that Income Inequality across the globe is sharply reduced by restrictive environmental tax policy, a finding that has ramifications for global sustainable development, particularly in dealing with the ravaging effects of Covid-19.

PEERS ALLEY MEDIA

# Title:Transcript expression level analysis of Phytoene genes Synthase associated with β-carotene content and genetic

**Labode Stevenson NAITCHEDE | Pan African University Institute for Basic**

Abstract:

Bitter melon (Momordica charantia L.) is a widely cultivated food and medicinal plant native to the world's subtropics and tropics. Constraints affecting the cultivation of Bitter melon affect the productivity of β-carotene. Knowing the mechanism that controls the transcription of the β-carotene biosynthesis genes in bitter melon will be of great value in improving the yield of this important metabolite. The expressions of β-carotene biosynthetic genes such as Phytoene Desaturase (PDS) and Phytoene Synthase (PSY) were evaluated in bitter melon accessions GBK027049', 'NS1026', 'Mahy-ventura', '453B' and 'Sibuka532'. Transcript expression level analysis of PSY and PDS, and the amount of β-carotene in leaf, stem, and fruit, were determined using quantitative polymerase chain reaction and high-performance liquid chromatography (HPLC). Root transcript expression was used as a negative control for determining the relative fold change in other tissues. Agrobacterium tumefaciens strain EHA105 harboring a plasmid with the β glucuronidase (GUS) reporter gene was used to test the transformability of bitter melon leaf, and the resulting calli were assayed for GUS activity. The expression of PSY in the fruit (6 to 27-fold compared to the control) was higher than in the other organs for all accessions. This was also the case of PDS expression (10 to 29-foldcompared to the control). Leaves had the highest β-carotene concentration (17.92-45.35 µg·g- 1); there as no difference between stems (5.67-12.75 µg·g-1) and fruit (6.18-12.53 µg·g-1)

PEERS ALLEY MEDIA

# Title: Mathematical modeling of a thermal converter with a cylindrical heat conductor and with a local heat

**Matyakubova P.M** | **Tashkent State Technical University**

Abstract:

The paper deals with the issues of the functional diagram and justification of the efficiency of thermal converters for controlling the moisture content of the flow of liquid materials. In addition, two main types of physical models were identified in the work based on a pipeline section with radial holes, in which cylindrical probes with heating and temperature-sensitive elements are located across the flow of liquid material: with concentrated and distributed heat sources.

1. Based on the analysis of a generalized functional diagram and justification of the effectiveness of thermal converters for monitoring the moisture content of liquid materials, as well as on the basis of a pipeline segment with radial holes in which cylindrical probes with heating and temperature-sensitive elements are located across the flow of liquid material, two main types of physical models are identified: and distributed heat sources.

2. A mathematical model of thermal converters of moisture content of liquid materials with cylindrical heat pipes with concentrated and distributed heat sources based on matrix methods of thermal quadripoles has been obtained and analyzed.

# Title: A Recap Of The Paper "Modelling Sustainability of A Demand-Based Biomass

**Victor Mmerichukwu Mbachu | Nnamdi Azikiwe University**

Abstract:

It is intriguing to note that biogas has been recognized as a necessary renewable energy option to tackle the environmental and economic difficulties linked to the utilization of fossil fuels. Also, the potential of producing biogas from almost all organic matter (especially bio-waste), when subjected to the right pre-treatment and digester's operating parameters, has been established alongside with the yield per unit of the chosen biomass. The sustainability of the supply of the chosen biomass for desired biogas production capacity is an important factor in the selection of biomass (feedstock). Unfortunately, this is not considered in the pre-production stage of most designs of biogas production systems, hence the rampant failure of such systems to consistently meet the biogas demand. The paper "Modelling sustainability of a demand-based biomass to biogas conversion system: a bio-mimicry feedstock inventory-based approach" presented robust model(s) usable at the design stage to ascertain the potential of having continuous biomass supply, such that meets the biogas demand for a given period.

# Title: Therodynamic mechanism of biomass chemical-looping gasification with Fe/CaO oxygen carriers

Xiaodong Zhang | Jimei University, China

Abstract:

Chemical looping gasification (CLG) proves to be effective route for biomass thermal conversion for quality gas production. Fe2O3 and CaO were applied in sawdust thermal decomposition as oxygen carrier and CO2 absorption agent to improve syngas composition and yield. The CLG process was investigated based on experiment and process model simulation. In the experiments with fixed bed reactor, the combined oxygen carrier demonstrated satisfactory activity for chemical looping gasification of biomass with the maximum syngas yield reached over 530 mL g−1 sawdust. Process model was developed based on thermodynamic equilibrium and kinetics of 22 representative reforming reactions in CLG, with the model applicability validated with experimental results. The effect of Fe2O3 and CaO addition on CLG process, including product distribution, gas composition, energy balance and exergy efficiency, was analyzed through extensive simulation under varied combination of reaction temperature, blending ratio conditions in order to clarify the effect of variables. The interaction between Fe2O3 and CaO addition on process performance was discussed to discover the potential synergetic effect. The blending of Fe2O3 or CaO changed the gas composition with improved oxidation and reforming reactions. And the blending ratio of oxidant was an important factor influencing the energy balance and exergy efficiency, with the equivalent point between CLG reaction heat and char combustion heat appeared at 0.4-0.45 Fe2O3 addition. The results achieved would be informative for CLG process mechanism understanding and efficient syngas conversion.

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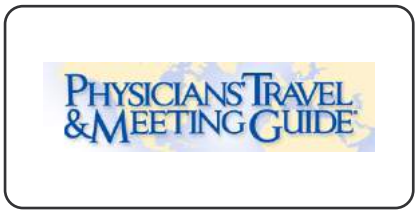



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