Joint Event

4TH EDITION OF INTERNATIONAL CONFERENCE ON

OIL, GAS, AND PETROLEUM ENGINEERING

&

2ND EDITION OF GLOBAL CONFERENCE ON

BIOFUELS AND BIOENERGY

SEPTEMBER 11-13, 2025

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BOOK OF ABSTRACTS

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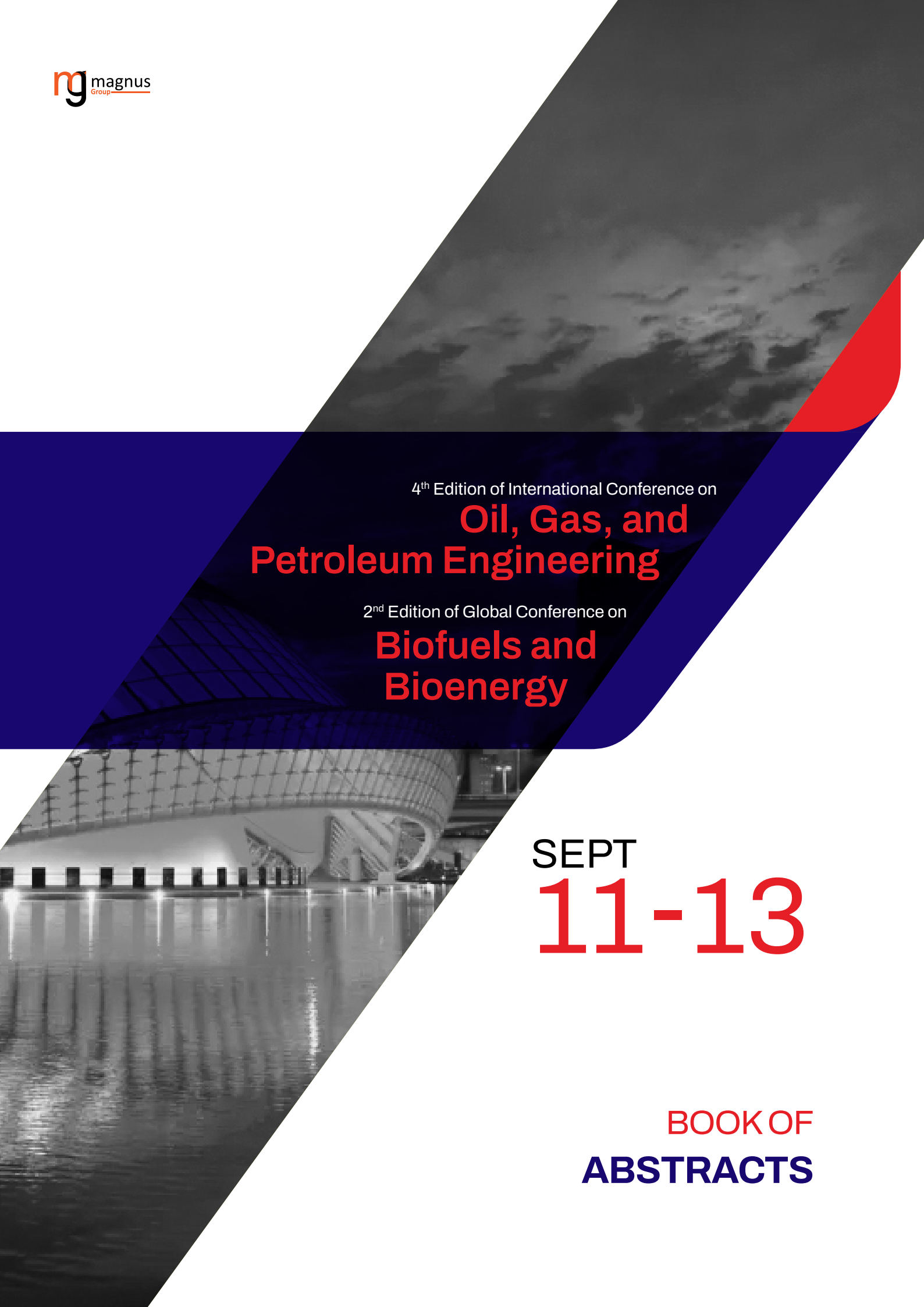
4th Edition of International Conference on

Oil, Gas, and Petroleum Engineering

2nd Edition of Global Conference on

Biofuels and Bioenergy



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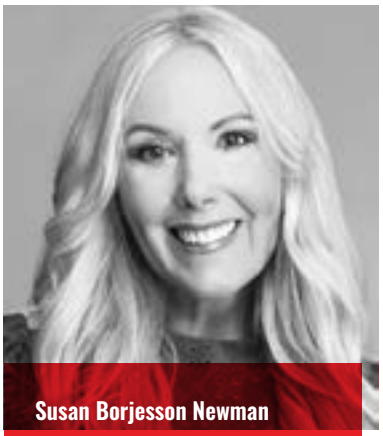
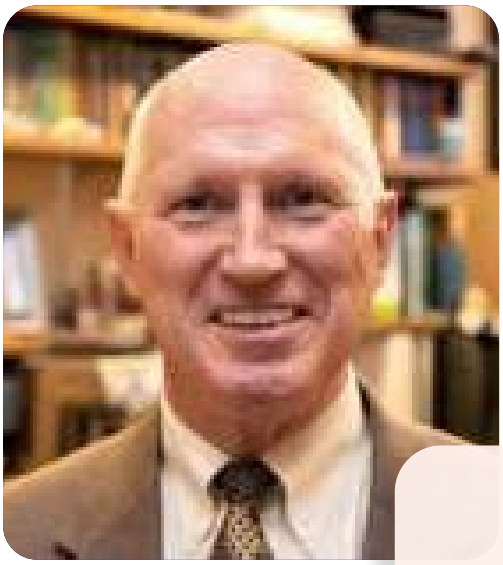


Susan Borjesson Newman
Integrated Lipid Biofuels, United States

Thank You All...



Welcome Message

On behalf of the Scientific Committee for 4th Edition of International Conference on Oil, Gas, and Petroleum Engineering, it is my pleasure to invite you to participate in this hybrid meeting taking place in Valencia, Spain and virtually. Don't miss this exceptional opportunity to explore and discuss the sustainable future of the oil and gas industry with experts from across the globe.

As the past president of the International Association for Hydrogen Energy, I know that decarbonization across the petrochemicals and refining industries will be challenging. Currently, hydrogen is produced at most oil refineries using technologies such as steam methane reforming using vast amounts of natural gas as the feedstock and thus producing large CO2 emissions. Hence, industry leaders in oil refining are moving forward with decarbonizations plans to install on-site green hydrogen production from utility-scale electrolyzers powered by excess renewable electricity. While in Valencia, take time to visit the BP Castellón refinery to learn about their new green hydrogen production plant.

John W. Sheffield, PhD

Professor of Engineering Technology, Purdue University, United States

Past President, International Association for Hydrogen Energy

Welcome Message

It is my honor and pleasure to invite you to a wide spectrum presentations, ideas and innovations from highly qualified multinational scientists and engineers. The 4th Edition of the International Conference on Oil, Gas and Petroleum Engineers hybrid convention will delve into explore the hydrocarbon potentials and future. The long human history of using oil and gas as an energy source still prevails in spite of the opposing calls.

Salt and Oil are two raw materials that have advanced mankind from living in caves to the current majestic cities. Salt for good health and early food preservation and oil for heating and transportation. Therefore, salt and oil are inherently rooted. The interaction between the sedimentary reservoir beds and the salt mass sheds light on the exploration risk and drilling challenges.

We are in a crossroad situation, of producing oil and on the other hand fighting CO2 effect. Green energy is in the infant phase and cannot suddenly replaces hydrocarbon as an energy source and petrochemical manufacturing.

Selim Sanad Shaker

Geopressure Analysis Services, United States

Welcome Message

Oil, they say is very unevenly distributed in the world. It is also said that some countries and geographies are endowed with rich oil fields and other areas are nearly barren of oil... however my experience in several parts of the world proves that oil is distributed somewhat evenly in the world, it is just the tenacity and the will of people to find it. Over 30 years I had the opportunity to work on different continents and carefully analyzed several fields. I am presenting some of the common lessons I learned. I use these lessons to find hidden oil in mature fields and also find new oil in new geographies. My name is Sharma Dronamraju, I live in Houston, Texas, USA. I welcome you to GOPE 2025, Valencia is a beautiful Mediterranean city.

Sharma Dronamraju, MS, MBA, P.Geol.

Director AKD Professional Solutions, Inc., United States

Welcome Message

Welcome, Energy Innovators! It is my absolute honor to welcome you to this year's Bioenergy Conference, where we gather under the theme of fostering a sustainable circular economy. The challenges facing our planet have never been greater, but as pioneers in biotechnology and energy innovation, we have the tools and vision to redefine our future. Together, we can develop solutions that not only meet the growing global energy demand but do so in ways that reduce the burden on our planet. The world needs us, now more than ever, to harness the power of bioenergy for a sustainable and thriving tomorrow. Thank you for being here and for your commitment to driving change. Let's work together to lead this vital transformation.

Dr. Susan Borjesson Newman

Integrated Lipid Biofuels, Spokane, Washington, United States

Welcome Message

I am happy to offer a warm welcome to all for the 4th Edition of International Conference on Oil, Gas, and Petroleum Engineering - GOPE 2025. This hybrid event will be held between September 11 and 13, in Valencia, Spain, and will allow virtual participation.

With a scientific committee composed of leading international experts from academia and business, and respected speakers and presenters, GOPE 2025 will be an opportunity to learn about, and showcase, new developments, technologies and trends in the petroleum industry.

The sessions, workshops, and interactive panels of GOPE 2025 are a must for professionals involved in the petroleum industry, as well as for all stakeholders. The extensive networking opportunities will surely benefit all participants.

I am looking forward to meeting you and sharing valuable petroleum industry experiences at GOPE 2025!

Prof Cleveland M. Jones, DSc

Technical & Innovation Director, Fronteira Energia Ltda. (Brazil)

Researcher, Instituto Nacional de Óleo e Gás/CNPq/Brazil

Scientific Committee Member, GOPE 2025

Welcome Message

Dear GOPE 2025 attendees, it is truly an honor to have been asked to write a welcome note for the Magnus Conference's 4th Edition of the International Conference on Oil, Gas, and Petroleum Engineering. Although the demand for energy continues unabated, it is juxtaposed with the environmental, societal and generational impacts of greenhouse gas expression. The theme of the conference, "Innovations in Oil, Gas, and Petroleum Engineering for a Sustainable Future" is both an acknowledgment of what has been achieved and a rallying cry for what is yet to come. The employees, practitioners and researchers that comprise the petroleum sector are all stakeholders in a sustainable and ecologically progressive future. Although having made amazing strides, the need for industrial acceptable technologies that help, rather than hinder commercial growth are sorely needed. It is with great anticipation; we look forward to hearing about the inventive, inspirational and innovative offerings of all the speakers and presenters.

Michael Radicone

Lead, Specialty Products
HTRI, United States

Welcome Message

Dear Colleagues

It is my great honor and privilege to welcome you to this multidisciplinary conference, Biofuels 2025 to be held from September 11-13, 2025, Valencia, Spain.

In physics, energy is defined as the ability to exert a force causing displacement of an object. However, from the perspective of human society, energy is a resource necessary for the survival of humans and society. This definition implies what energy and how to use is a factor determining the existence mode of human life and societal system.

Biofuel is a type of energy by the classification criterion of <existence mode of energy in nature. The importance and significance of the biofuel as a factor determining the existence mode of human life and societal system are being proved by the various challenges such as natural disasters and climate change, etc. with which we are faced.

In such a context, the significance of this conference does not end as a new and renewable energy, but is linked to an issue determining the direction and content of present and future human life and societal system.

Please join us at the Biofuels 2025 for contributing to the transformation to a new human life and societal system in the context between humans and nature through discussing and exchanging your ideas with colleagues from both academy, industry and government.

Prof and Dr. Dai-Yeun Jeong

Director of Asia Climate Change Education Center, South Korea
Emeritus Professor at Jeju National University, South Korea

Welcome Message

Dear Attendees of the Biofuels 2025 Conference,

It is both an honor and a pleasure to welcome you to this significant event. Bioenergy technology has established its permanence and boasts a diverse range of applications across various industries. It serves not only in the heating and cooling of homes but also as a sustainable fuel option for transportation, among other uses.

Currently, we are witnessing a global integration of both woody and herbaceous raw materials, particularly in the production of pellets. This practice is notably prevalent in numerous African nations, where pellets are not only employed for heating but also play a crucial role in food preparation, with the industry experiencing swift evolution.

One of the forward-looking solutions that is already making an impact is the substitution of charcoal with efficient wood fuel pellet stoves. This innovation represents a significant stride towards a sustainable future.

Every day, we hear of new triumphs in the realm of bioenergy, and I am filled with enthusiasm at the prospect of meeting each one of you at the conference to engage in discussions about the promising future of bioenergy.

Associate Professor. Magnus Ståhl

Karlstad University, Sweden

Welcome Message

Dear Fellow Conference Attendees,

It is a great honour to welcome you to the session entitled “Renewable Energy.” As scientists and researchers, we are united by a shared commitment to the betterment of society. This Renewable Energy session, within the broader context of Oil, Gas, and Petroleum, plays a vital role in advancing critical areas such as carbon capture, energy generation, smart automation, and energy-saving technologies. These innovations are essential in our pursuit of net-zero energy infrastructure. In this session, we will explore a diverse range of renewable energy sources, including biomass, geothermal, solar, water, and wind. This is a valuable opportunity for scholars from around the world to share their scientific discoveries, discuss progress, offer critical insights, and gain knowledge from the latest research in renewable energy. Let us embrace this opportunity to learn from one another and work together toward a sustainable future.

Professor Dr. Saim Memon

CEO & Industrial Professor of Renewable Energy Engineering

Department of Industrial R&D in Vacuum Insulation Energy Technologies, Sanyou London Pvt Ltd, Level 18, 40 Bank Street, Canary Wharf, London, E14 5NR, United Kingdom

Welcome Message

Dear Delegates,

Welcome to Biofuels and Bioenergy 2025. When Rudolph Diesel first invented his eponymous engine, he envisaged it being powered primarily by biofuels. Since then, we have been on a century-long detour via fossil fuels, which has led us to an atmosphere with over 420 parts per million and a growing problem of climate change. Weaning ourselves off fossil fuels will require their cost to increase, or be increased via taxation and regulation, but also alternative fuels to scale as markets to fulfil growing demand. This demand is likely to grow globally for many years, despite the increasing penetration of electric vehicles and heating systems. This conference will take a close look at the potential not just for scaling existing biofuels, but innovation to develop new concepts. Throughout, it will ne necessary to keep and keen eye on the integrity of the market, ensuring that biofuels lead to reduced emissions in reality, and that quality standard can be assured through effective monitoring.

We hope you enjoy the event.

Nick Molden

Chief Executive Officer, Emissions Analytics,
United Kingdom

Welcome Message

It Is a pleasure to welcome you to this important scientific event entitled “Biofuel 2025-2nd Edition of Global Conference on Biofuels and Bioenergy”. It is now clear that Biofuels are playing an important role to protect environment from dangerous consequences of fossil fuels. Biofuels 2025 is a transformative conference that shall showcase ground breaking researches by the scientists from across the globe in the field of BioHydrogen, Sustainable Aviation Fuels, Renewable Natural Gas, Renewable Diesel and all the next generation Biofuels.

We are in an important historical period in which we have the scientific knowledge that allows us to think of a cross talk between mother earth and cleanfuels. This conference shall address critical issues such as environmental impact of Biofuels and how to move towards a carbon neutral world.

All participants, scientists, investors, corporate and political leaders shall chalk out a road map to switch from petroleum fuel base red economy to Biofuel based circular green economy.

You can forge collaborations with technologists and investors to set up new businesses to enter this trillion dollar ESG opportunity.

I welcome all of you to meet us at this very innovative conference.

Looking forward to work together to make this world a better place to live.

Atul Saxena

Founder & CEO,
Growdiesel Ventures Limited,
India, UK and New Zealand

Welcome Message

Dear Colleagues and Fellow Innovators,

It is my pleasure to welcome you to Biofuels 2025, a pivotal gathering at the forefront of sustainable energy innovation. As we come together to address the pressing challenges of our time, we stand united in our commitment to creating a sustainable future for aviation and beyond.

With over two decades of experience in renewable energy and sustainable aviation fuel development, I am honoured to chair this conference and share insights into the transformative potential of green hydrogen in decarbonising our skies. My upcoming presentation, ‘Green Hydrogen: Driving Sustainable Aviation’s Future,’ will explore cutting-edge advancements in electrolysis methods, cost reduction strategies, and critical infrastructure development necessary for aviation’s sustainable future.

Biofuels 2025 offers a unique platform for us to delve into the latest innovations, from sustainable aviation fuels to green hydrogen technologies. Our collective expertise, spanning research, commercialisation, and policy implementation across multiple continents, will be instrumental in navigating the complexities of transitioning to a low-carbon future.

I encourage all attendees to engage actively in discussions, challenge conventional thinking, and forge partnerships to accelerate our journey towards net-zero emissions. Together, we can shape the future of aviation and drive meaningful progress in sustainable energy solutions.

Let us seize this opportunity to share knowledge, inspire new ideas, and catalyse the innovations that will define the next generation of biofuels and green energy technologies. I look forward to our enlightening exchanges and the groundbreaking ideas emerging from Biofuels 2025.

Welcome to a conference that promises to be intellectually stimulating and profoundly impactful.

Sanjeev Gajjela, PhD

Director of Sustainables

Tomato Sustainables Ltd. United Kingdom

Welcome Message

Dear colleagues and friends, it is an immense honor and pride to present few lines in front of you. Welcome to this insightful session on biofuels and the circular economy. As the world confronts the twin challenges of climate change and resource depletion, biofuels emerge as a pivotal solution—offering renewable, low-carbon alternatives to fossil fuels. Rooted in the principles of sustainability, biofuels not only reduce greenhouse gas emissions but also enable the productive use of agricultural residues, industrial by-products, and organic waste. When integrated within a circular economy, biofuels contribute to a regenerative system where resources are reused, waste is minimized, and economic value is continually recirculated. This synergy presents a powerful opportunity to decarbonize energy, drive rural development, and foster innovation. Let us explore how biofuel technologies and circular economic models can together redefine energy production and resource management for a sustainable future.

Arindam Chakraborty

Mectech Process Engineers Pvt. Ltd., India

ABOUT
MAGNUS GROUP

Magnus Group, a distinguished scientific event organizer, has been at the forefront of fostering knowledge exchange and collaboration since its inception in 2015. With a steadfast commitment to the ethos of Share, receive, grow, Magnus Group has successfully organized over 200 conferences spanning diverse fields, including Healthcare, Medical, Pharmaceutics, Chemistry, Nursing, Agriculture, and Plant Sciences.

The core philosophy of Magnus Group revolves around creating dynamic platforms that facilitate the exchange of cutting-edge research, insights, and innovations within the global scientific community. By bringing together experts, scholars, and professionals from various disciplines, Magnus Group cultivates an environment conducive to intellectual discourse, networking, and interdisciplinary collaboration.

Magnus Group's unwavering dedication to organizing impactful scientific events has positioned it as a key player in the global scientific community. By adhering to the motto of Share, receive, grow, Magnus Group continues to contribute significantly to the advancement of knowledge and the development of innovative solutions in various scientific domains.

ABOUT

CPD Accreditation

Continuing Professional Development (CPD) credits are valuable for GOPE & Biofuels 2025 attendees as they provide recognition and validation of their ongoing learning and professional development. The number of CPD credits that can be earned is typically based on the number of sessions attended. You have an opportunity to avail 1 CPD credit for each hour of Attendance.

Some benefits of CPD credits include:

Career advancement: CPD credits demonstrate a commitment to ongoing learning and professional development, which can enhance one's reputation and increase chances of career advancement.

Maintenance of professional credentials: Many professions require a minimum number of CPD credits to maintain their certification or license.

Increased knowledge: Attending GOPE & Biofuels 2025 and earning CPD credits can help attendees stay current with the latest developments and advancements in their field.

Networking opportunities: GOPE & Biofuels Conference provide opportunities for attendees to network with peers and experts, expanding their professional network and building relationships with potential collaborators.

Note: Each conference attendee will receive 29+ CPD credits.

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KEYNOTE PRESENTATIONS

Arindam Chakraborty

Vice President–Business Development, Mectech, New Delhi, India

Multi bio-fuel complex – An intrinsic concept for adopting circular economy

A multi bio-fuel complex is a facility that produces multiple types of biofuels from various feedstocks designed to embody the principles of the circular economy by efficiently converting biomass and organic waste into renewable fuels and other valuable products to create a more sustainable and resilient future. This type of complex offers several advantages, including:

- **Diversification of Feedstock:** A multi bio-fuel complex can utilize a variety of feedstocks, such as agricultural residues, municipal solid waste, and dedicated energy crops. This diversification reduces the risk of feedstock shortages and price volatility.
- **Flexibility in Product Output:** The complex can produce a range of biofuels, such as ethanol, biodiesel, and biogas. This flexibility allows the facility to adapt to changing market demands and regulatory requirements.
- **Economies of Scale:** By integrating multiple biofuel production processes in one location, a multi bio-fuel complex can achieve economies of scale and reduce production costs.
- **Environmental Benefits:** Multi bio-fuel complexes can contribute to reducing greenhouse gas emissions and dependence on fossil fuels. They can also help to manage waste and create new economic opportunities in rural areas.

Biography

Mr. Arindam Chakraborty studied Chemical Engineering at the West Bengal University of Technology, Kolkata, India and graduated as B.Tech in 2007. He then pursued his career in major O&G EPC players like Engineers India Limited and Fluor Daniel. He received an MBA degree in 2014 with specialization in Operations Management. Later he transitioned his career into circular economy and is contributing in the areas of ethanol, biogas, biodiesel, bioplastics etc. He has is a certified PMP by PMI and Six Sigma Black Belt holder.

Multi bio-fuel complexes are a promising approach to producing sustainable transportation fuels and promoting rural development. However, there are also challenges associated with these facilities, such as the need for complex infrastructure and the potential for environmental impacts.

For the said complex, steam & bio-power is being generated utilizing agro-residues which is otherwise left in the field.

A case study of such a complex utilizing 1000 TPD Corn grains has been discussed in this presentation.

In the Presentation, I would like to take the opportunity to introduce Mectech Group and its contribution in the field of biofuels and bio-energy. I would also discuss how Mectech's commitment as a company to delivering turnkey solutions and high quality equipment is at the core of Mectech's operation in biofuel and bio-energy sector.

In the current abstract it has been captured how this novel business idea of producing multiple fuels promises to improve production, reduce costs, and increase value to the customers and society at large. This concept of multi-fuel complex will make significant near-term impacts in the area of biofuels especially in a developing nation where focus is to shift towards renewable energy in its entirety.

Biography

Atul Saxena*, Ms. Ruchi Saxena

Growdiesel Climate Care Council, India

Ultra modern patented technology to convert agriwaste/ MSW/ slaughter house effluent/ lake waste/ high COD distillery spent wash to 99% pure renewable hythane (hydrogen+methane)

Effluent coming from distilleries is have very high COD that is dangerous to climate. Disposal of liquid effluent from distilleries is a very big challenge. We have developed a technology to extract cleanfuel like Renewable Natural Gas and very high quality liquid Biofertlizer from Raw Spent Wash of distilleries. Our innovative solutions helps distilleries to meet ZLD (Zero Liquid Discharge) norms of pollution boards.

Objective of the Study: Waste to Wealth.

Conclusion: Our findings indicate that all kind of wastes can be converted to cleanfuels and Biofertilizer and our environment can be protected from harmful methane emissions.

Atul has been a hard core hands-on person with a natural instinct and flair to visualize the market or societal needs of times to come and can therefore foresee the changes and evolvement of the business landscape that is yet to happen. His Bachelor's degree from NDRI, Karnal, India provided him with an integrated education base and insights into agri-business starting from process engineering & equipments manufacturing to project management. His early stint with Parle Agro can itself boast of a major achievement as he was instrumental in giving shape to large scale Maaza Mango manufacturing projects from concept to commissioning. Subsequently, before he founded Growdiesel, he had an impressive and busy tenure with United Nations, during which he handled cross-border technology collaborations, large-scale project implementations, new venture and program launches. Atul spent over two decades as an International Project consultant with a client list of leading blue chip business houses. Atul has always been fascinated by imagination and can endeavor relentlessly to pursue a new found direction or idea. At Growdiesel he feels fortunate to practice his passion of innovation and pursue it as business too. He has been intensely involved in biofuel technology development since year 2001. In his quest for innovation, he practices the rarer route of 'learning by doing'. While most of the R&D happens in labs first, he follows a nonconventional route to start with real life projects on a pilot scale. This approach provides a deep insight into real challenges as they would occur when technology is actually implemented in field. Though it might sometimes be a lesser economical way of learning but it saves lot of time and most importantly provides invaluable experience. Atul is currently considered as the most experienced person in Indian Biofuel arena with extensive as well as expansive practical knowledge in this highly specialized field. Atul has served on many technical committees, panels and boards and has been a keynote speaker and invited faculty at several national and international Biofuel forums, events and workshops. He has co-authored India's first publication on 3rd generation biofuels–'Algae Biofuels', and it is finding immense acceptance globally.

Cleveland M. Jones

Fronteira Energia Ltda., Rio de Janeiro, TJ, Brazil

New exploration technologies to keep the O&G industry competitive

Despite exceptional profitability in recent years, the Oil & Gas (O&G) industry is facing several challenges that threaten its viability in the face of an increasing share of available investment capital flowing to renewables and other sectors, and a much more uncertain future for oil prices. Furthermore, at the same time that societal pressures and multinational and government rules are forcing O&G companies to offer ever-cleaner energy, they know that if they fail to keep the world supplied with oil and gas, they will suffer dire political consequences for failing to adequately meet continuing demand. That is a significant enough risk to warrant a renewed industry focus on core O&G business, to ensure that markets will be adequately supplied, since the costs of overreaching towards net zero objectives could well be greater than those associated with falling short on mandates for climate change, renewables and decarbonization. The O&G industry can no longer rely on its historical profitability to overcome inefficiencies and other fundamental industry problems. In order to remain competitive in a world where societal, political, environmental and shareholder pressures impose a difficult multi-dimensional objective, the industry must significantly improve the cost effectiveness of its operations and major projects. Many strategies are appropriate for the O&G industry to improve its competitiveness. Analysts have pointed to the need for a renewed focus on core oil and gas business, prioritizing low cost, safe, prolific, durable and price-resilient plays, leveraging existing efficiency-improvement technologies (standardization, AI, digital modelling, etc.), balancing the portfolio of conventional and unconventional assets, pursuing even more industry consolidation, and being

Biography

Prof. Jones Graduated from Cornell University (Physics/Economics) and has a post-graduate degree (O&G Engineering/UERJ/Brazil), a masters (Basin Analysis/UERJ) and doctoral degree (Geology/UERJ). Prof. Jones is Director of Technology and Innovation at Fronteira Energia/Brazil, researcher at INCT/CNPq/Brazil, and an international consultant on oil and energy geopolitics and new technologies. Prof. Jones is a member of the Geosciences Advisory Board of NXT Energy Solutions/Canada, and board member of Waste to Power South Australia Pty. Prof. Jones was founder and director of several environmental and biotech firms, coordinated the Post-Graduate Program in Environmental Management (FUNCEFET/Brazil) and a major Knowledge Management project (Petrobras/UERJ).

more conservative in diversification initiatives and in allocating investments to renewables and other sectors. However, the upstream sector, and especially exploration activities, have absorbed the lion's share of industry investments while delivering results that have not kept up with efficiency improvements in other areas. Since exploration involves extremely large and long-maturation projects, the risks of future changes in oil prices and in operating demands are also high. Given that scenario, it is proposed that exploration activities are the key area in which the O&G industry must seek efficiency gains to keep the O&G industry competitive. To this end, new exploration technologies and concepts for exploration campaigns must be adopted, which reduce costs and exploration risks, and significantly shorten the exploration cycle, from initial geophysical investigations to confirming successful discoveries.

Dai-Yeun Jeong

Asia Climate Change Education Center, Jeju City, Jeju Special Self-Governing Province, South Korea

Emeritus Prof. at Jeju National University, Jeju City, Jeju Special Self-Governing Province, South Korea

Human impact on natural environment and its implications

Industrialization being advanced from the 18th century has improved a lot of material affluence, and has polluted and/or destructed the original quality of nature in the processes of extracting resources from nature, and producing/distributing/consuming goods and services. The current status of nature being polluted/destructed is termed the crisis of nature. The crisis of nature does not end in itself, but is linked to the crisis of human survival on the earth in that nature can exist without humans, but humans can't survive without nature.

A wide range of human activities from lots of sources such as government, academia, enterprise, and NGO, etc. are promoting to continue the improvement of material affluence while maintaining the original quality of nature. In a word, this is the human activity toward co-existence between humans and nature being promoted in the name of sustainable development. In a broad sense, CCET 2025 is also one of them.

In such a context, this paper aims at explaining human impact on nature and its implications. In order to achieve the objectives, this paper will be composed of four parts as below.

Part 1: Humans is a species living with other species on the earth. The position of humans on the earth will be explained in relation to other species in order to identify what humans is on the earth.

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 in South Korea. He received BA and MA degree in sociology from Korea University (South Korea), and PhD in environmental sociology from the 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 the University of Sheffield in UK, the president of Asia-Pacific Sociological Association, a delegate of South Korean Government to United Nations Framework Convention on Climate Change (UNFCCC) and OECD environmental meeting, and a member of Presidential Commission on Sustainable Development Republic of Korea, etc. He has published 60 environment-related research papers in domestic and international academic journals and 13 books including Environmental Sociology. He has conducted 100 unpublished environment-related research projects funded by domestic and international organizations.

Part 2: The effect of nature on humans will be explained. This is for understanding why humans can't survive without nature. Two effects of nature on humans will be explained. One is the ecosystem services nature provides to humans, and the other one is how nature determine the mode of human existence on the earth.

Part 3: As the main component of this paper, human impact on nature will be explained. This is the explanation about the emergence of environmental problems leading nature to be polluted and/or destructed. Two issues will be explained. One is the mechanism of nature being polluted and/or destructed by human activities in the process of improving material affluence. The other one is the current status of nature being polluted and/or destructed in terms of individual indicator and synthetic indicator.

Part 4: As concluding remarks, the implications of polluted/destructed nature will be examined in terms of two aspects. One is to review the implication of industrialization. The other one is to review the concept and implications of sustainable development.

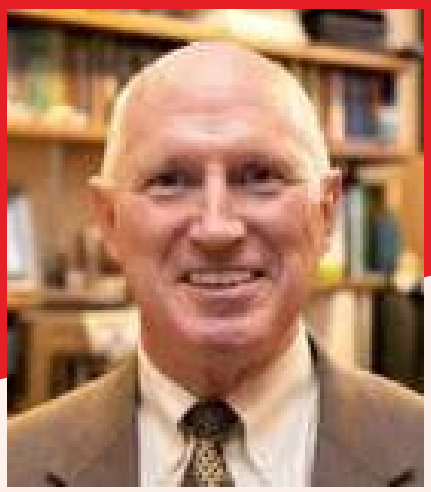
Prof. Dr. John W. Sheffield

Purdue University, West Lafayette, IN, United States

Green hydrogen pathway to decarbonize oil refining

The green hydrogen is becoming an important pathway in decarbonizing oil refineries. First, it is important to define that green hydrogen is produced by use excess renewable electricity from solar PV, on-shore, and off-shore wind sources to power the electrolysis of water. Refineries use large quantities of hydrogen in the de-sulfurization of crude oil to produce liquid petroleum products and other chemicals. Traditionally, the so-called grey hydrogen is produced at oil refineries via steam methane reformation using natural gas as the feedstock, resulting in high CO2 emissions. One green hydrogen project at an oil refinery, which recently received a Final Investment Decision (FID), is the BP Castellón Refinery located about 80 km northeast of València, Spain. The BP Castellón refinery has a crude processing capacity of 110,000 barrels per day. BP also led the establishment of the Hydrogen Cluster of the Valèncian Community (HyVal) initiative based on public private collaboration between different key actors covering the entire green hydrogen value chain from energy and technology companies, to research and development institutes.

Biography



Dr. Sheffield is a Professor of Engineering Technology at Purdue University. He is the past President of the International Association for Hydrogen Energy and has served for more than 40-years as an editor of the International Journal of Hydrogen Energy published by Elsevier. He previously served as a Founding Associate Director at the United Nations Industrial Development Organization - International Centre for Hydrogen Energy Technologies in Istanbul. He was selected for the 2022 Outstanding Leadership in Globalization Award from Purdue University and appointed as a 2023 Energy Scholar at the Institute for Resilient Environmental and Energy Systems at Oklahoma University.

Jorge A. Hilbert[1]*, Ariana Camardelli[1], Patricio Geretto[1], Karen Ponieman[2], Jonatan Manosalva[2]

[1]Energy and Environmental Consulting, Martines Buenos Aires, Argentina

[2]Instituto de Ingeniería Rural INTA Castelar Buenos Aires, Argentina

Approach to carbon neutral electricity and heat in a bioethanol biorefinery

The environmental benefits of biogas technology are often highlighted as a valid and sustainable alternative to fossil fuels. Together with the reduction of Greenhouse Gas (GHG) emissions, biogas can improve energy security, thanks to its high energy potential. As a renewable energy source. Three biogas plants (BG1, CGY y BG2) integrated into a cornstarch bioethanol biorefinery located in the province of Córdoba, Argentina, which receive manure from a feedlot and other agro-industrial residues from the dairy industry and recovered cooking oil were studied. For the calculation of energy emissions, the methodology present in Annex VI of the European Directive RED II "rules for the calculation of greenhouse gas emissions from fuels from biomass and its reference fossil fuels" was used as a guide and provides the opportunity to be certified in the future. A proprietary methodology was used to calculate the digestate emissions. A credit of 45 gCO_2/Mw was granted to plants that receive manure from the feedlot in accordance with the provisions of European regulations. Fugitive emissions were estimated according to the ISCC at 1%. The total annual production of the complex reached 24,137,469 m3 of biogas, 57,202 MWh of electricity injected into the national grid and 26,316 MWh as thermal energy used in the biorefinery. A total of 320,000 m3 of digestate were produced and used in fertigation in surrounding fields and partly reinjected into the biorefinery. The input that presents the highest emission in the three units considered

Biography

Jorge Hilbert is an Agronomical Engineer UBA, Master Degree Farm Mechanization. He has been National Coordinator Bioenergy program (2006-2014), director of Rural Engineering Institute INTA (2001-2006). He is presently Director of Energy and Environmental Consulting. In the international area has been participant of biogas done right initiative, Cochair of biogas committee Global Methane Initiative EPA, Steering committee member of the Pan American Biofuels and Bioenergy Sustainability Network (RCN). Author of seven books, 81 research papers and 218 articles. He participate in several EU projects Global Biopact, Babethanol, Babetreal5 and Dibicoo projects. Recently he has been auditor as verifier and validator of carbon footprint studies at project product and organization level.

is ferric chloride by a wide margin, representing 74% of the emissions in the industrial stage. The incorporation of vinasse from BIO4 represents a great reduction in emissions, taking into account that it is a "waste" and therefore has no associated carbon footprint and that it is the main input of the biodigestion process in the three plants, representing between 80% and 90% of the total raw materials that enter the biodigesters. An average emission of 8,29 $gCO_2eq/kWh_{electric}$ and 0,82 $gCO_2/MJ_{thermal}$ were obtained, with an average reduction of 99% compared to the Argentine electric interconnected grid (338,52 gCO_2eq/kWh). Comparing thermal energy production, the reduction was more than 98,9%, very close to carbon neutrality. Emissions associated with digestate, which consider transport, application and fertilization, reached 1.57 $kgCO_2eq/m^3$. The impact over the bioethanol plant considering the bioethanol carbon footprint as en indicator was very important, reducing it in 23%. The future inclusion of undergoing studies on fossil fertilizer reduction, yield increase and possible carbon capture on the fertiirrigated fields may result in carbon negative emissions for the complex.

Magnus Ståhl*, Jonas Berghel

Environmental and Energy Systems, Department of Engineering and Chemical Sciences, Karlstad University, Karlstad SE-651 88, Sweden

Combustion performances of advanced cooking stoves using woody and herbaceous pellets as fuel

In Africa, biomass is primarily used in the form of wood and charcoal for heating and cooking (WBA, 2020). South of the Sahara Desert, wood fuels and charcoal account for more than 90% of the traditional biomass used in energy production (*Smeets et al., 2012*). In 2019, Africa was responsible for 65% of the global production of charcoal (WBA, 2020). The population in Zambia relies on charcoal. It is the only option for those without access to electricity. Approximately 85% of the rural population and 55% of the urban population use charcoal as their main source of energy (*Matkala et al., 2015*). The demand for charcoal has led to deforestation on the order of 250,000–300,000 hectares per year (Day et al., 2014). The production is done in primitive kilns where only about 10–20% of the energy present in logs is utilized (*Kassam, 2012*). Continuous and prolonged exposure to volatile particles and CO-emissions from cooking causes an estimated 4.5 million deaths each year (*WHO, 2019*). One solution is to convert to sustainable advanced cooking stoves with biomass pellets as the fuel.

A testing facility has been designed to analyze the combustion of pellets in cooking stoves at Karlstad University. The facility includes measurements of carbon monoxide, nitrogen oxides, particles, as well as the temperature and velocity of outgoing flue gases. Throughout the entire combustion process, fuel consumption of the stove and water temperature are monitored. The test unit and its design satisfy most of the requirements outlined in ISO 19867-1, making it suitable

Biography

Associate Professor Magnus Ståhl is a Senior Lecturer at Karlstad University, Sweden. Dissertation 2008, "*Improving Wood Fuel Pellets for Household Use - Perspectives on Quality, Efficiency and Environment*". He Published about 20 papers on wood fuel pellets focusing quality issues, energy efficiency, environmental aspects and additives in pellets. Magnus is a member of the working group of an Advanced pellet cooking at WBA (World Bioenergy Association. He has been a reference group as an expert in "Analysis of factors affecting the Swedish pellet market" performed by IVL (Swedish Environmental Research Institute). He is a Chairman at the 6th International Symposium on Energy Challenges & Mechanics–towards the bigger picture, 2016 in Inverness, Scotland, UK. He Performed distance education of operators at pellet mills etc. He teaches in Environmental and energy sciences since 1999.

for conducting tests on the combustion of various types of pellets in different cooking stoves.

The study investigated the impact of wood pellets, straw pellets, alfalfa pellets, elephant grass pellets, as well as pellets made from coconut shells, rice husk and Zambian pine, on combustion emissions from cooking stoves. Results indicate that higher moisture and ash content lead to increased emissions of CO and particles. Ash content also impacts NOx-emissions and reduces thermal efficiency, while moisture content significantly affects ignition. Rice husk and straw pellets exhibit both the highest moisture content and ash content, resulting in high emission factors for CO and particles per kg of fuel. The study further reveals that excessive turbulence within the combustion chamber can result in elevated CO-and particle emissions during ignition and extinguishing. Conversely, achieving a more uniform velocity distribution in the chamber can reduce emissions of CO and NOx, particularly during extinguishing. However, it is essential to avoid excessive turbulence during ignition and extinguishing, especially in stoves where airflow is regulated by a single fan.

To enhance the performance of cooking stoves, it is advisable to produce pellets from biomass with low ash and moisture content, like wood. This ensures efficient combustion, leading to higher efficiency and reduced emissions, with mitigating health risks and environmental impact. If more herbaceous materials, like elephant grass and rice husk, should be used then the stoves need improved design regarding the primary and secondary air flow especially during ignition and extinguishing.

Michael Radicone

President, I2 Air Fluid Innovation, Inc, Huntington Station, NY, United States

Lead, Specialty Products, HTRI, Navasota, Texas, United States

Maintaining heat transfer functionality with vapor infusion nano bubbles

HHeat exchangers are foundational devices used in many industries. Biological, organic, or inorganic matter in the cooling water stream may collect and adhere to heat exchange surface thus diminishing heat transfer or disrupting water flow. These foul formations may render exchangers inefficient, and in the extreme, ineffectual, thus requiring increased energy demand to operate even marginally.

- Nanobubbles can be used to enhance heat transfer through varying means such as.
- Increasing the thermal conductivity of a fluid.
- Creating wake zones that moves cooler fluids against heat transfer surfaces.
- Disrupting insulating foul formations.
- Increasing turbulence.

Nano bubbles will allow for more efficient heat transfer in applications like heat exchangers, where, due to their ability to disrupt boundary layers and create micro-convection within the fluid. When presented on a continual basis into a fluid, can lead to improved heat transfer rates compared to a fluid without nanobubbles. It will naturally reduce or eliminate the need for mechanical or chemical heat exchanger cleaning.

This presentation will describe the nano bubble creation technology, previously performed studies and representative commercial applications. It will also discuss how this technology compares with currently available nano bubble generation techniques

Biography

Michael Radicone is president and chief science officer of I2 Air Fluid Innovation and Specialty Product Lead for HTRI. At I2 Air Fluid Innovation, he has developed and patented technologies that address heat exchange fouling, toxic mercury presence in fluids, flue gas scrubber enhancement, medical and dental waterline microbial fouling and aortic catheter disinfection. As specialty Product Lead for HTRI, he oversees development and integration of the Vapor Nano Bubble Infusion technology. The recipient of seven governmental grants and numerous patents, he is published, peer reviewed and has presented the technology worldwide.

Nick Molden[1]*, Ime Use[2]

[1]Chief Executive Officer, Emissions Analytics Ltd, Oxford, United Kingdom

[2]Applications Chemist, Oxford Indices Ltd, Oxford, United Kingdom

Quality variation in market biofuels and the effect on tailpipe emissions

Biofuels come in many different forms, with different chemical compositions and, consequently, create different emissions when they are burnt in an engine. Variations in chemical composition may be natural effects of the feedstocks within legal standards, or evidence of non-compliance. Any effects of the biofuel on in-use fuel efficiency of a vehicle needs to be weighed against upstream carbon dioxide savings.

Variations in the quality of biofuels goes beyond technical compliance. Emissions Analytics and Oxford Indices collaborated to use two-dimensional gas chromatography and time-of-flight mass spectrometry to perform a comprehensive speciation of organic compounds on multiple samples of fuel sold as the same product in Europe; this was repeated across around five different fuels. This technique allows advanced separation of compounds up to at least C44, identification of the compounds using specialist spectral libraries, and quantification using known standards. From this, it is possible to quantify both the within-fuel variability and the between-fuel variability.

The fuel with the greatest variability between samples was then submitted to real-world, on-road testing in a vehicle using a Portable Emissions Measurement System (PEMS) adapted to also sample onto thermal desorption tubes. The PEMS system records real-time quantification of regulated pollutants, while the desorption tubes give a detailed organic speciation of unregulated pollutants on an integrated basis. Using these results, it is possible to show the effect on regulated and unregulated pollutants of the variations in the fuel in the engine. From this, it is possible to conclude whether the fuel variations are material to air quality and greenhouse gas emissions, and whether that warrants any changes in fuel regulations.

Biography

Nick founded Emissions Analytics in 2011 to understand real-world emissions and fuel economy and emissions from vehicles, which evolved into understanding the holistic environmental impact of vehicles on air, soil and water, from tyre wear rates to volatile organic compound emissions. Nick is chairman of the European standardisation CEN Workshop 90 on collecting real driving tailpipe emissions data, which led to the publication of the AIR Index. He is also chairman of CEN Workshop 103 on standardising the measurement of vehicle interior air quality, and is an Honorary Senior Research Fellow at Imperial College London.

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Advancements in vacuum insulated technologies for energy efficiency and sustainable temperature sensitive logistics

Vacuum insulated energy materials, such as Vacuum Insulated Wallpaper (VIW), Vacuum Insulation Panels (VIP), and Decorative Integrated VIP, represent pivotal industrial R&D developments aimed at reducing heating (in cold-arid regions) or cooling (in hot-arid regions) energy requirements in buildings. Their superior thermal efficiency and space-saving attributes make them invaluable for minimizing heat transfer, thereby significantly lowering the energy needed for maintaining indoor comfort. These technologies align with sustainability goals by reducing buildings' carbon footprints, with VIW and VIP offering superior insulation in extreme climates while requiring minimal material thickness compared to traditional

Biography

Prof. Dr. Saim Memon, CEO and Industrial Professor of Renewable Energy Engineering, unifies academic research, industrial manufacturing, and global product distribution. A Chartered Engineer and Fellow of the Higher Education Academy, he holds Qualified Teacher Status from the General Teaching Council for Scotland. Prof. Memon boasts multidisciplinary expertise in Electrical, Mechanical, and Renewable Energy Engineering, with over 120 research publications and 50+ speakerships, engaged in research with 40+ countries worldwide. He taught 41 modules, supervised numerous PhD and MSc/MEng projects, and collaborated with researchers in 40+ countries. His work has acquired 1600+ citations, a 23+ h-index, and a 52+ i10-index.

insulation options like XPS, EPS, mineral wool, or polyurethane. As a result, they reduce both the space required and overall energy consumption, effectively supporting stringent building regulations and contributing to a sustainable, energy-efficient future. Expanding the applications of VIP technology beyond building insulation, the Vacuum Insulated Bag-or-Box (VIBB) introduces a next-generation solution for sustainable, temperature-sensitive transport and storage across critical sectors such as medical, food, agriculture, and chemicals. This innovative system, utilizing flexible VIPs, is segmented into four types—medical box, deep cold box, rolling cart cover, and fresh bag—each tailored to meet specific industry demands. For example, the medical box maintains an internal temperature of 2-8°C for up to 147 hours at ambient conditions of 25°C, while the deep cold box achieves the same temperature range for 72 hours at 30°C ambient temperature. The rolling cart cover and fresh bag offer further specialized solutions for maintaining low temperatures in dynamic environments, contributing to more efficient and eco-friendly logistics operations. Together, these vacuum insulated technologies—both for building energy efficiency and sustainable logistics—represent groundbreaking advancements that not only enhance operational efficiency but also minimize environmental impact by reducing energy consumption and waste. This keynote will address the global challenges of achieving a sustainable, net-zero energy future, exploring the transformative potential of vacuum insulation technologies across diverse sectors.

Dr. Sanjeev Gajjela

Tomato Sustainables LTD, United Kingdom

Green hydrogen: Driving sustainable aviation's future

Green hydrogen is emerging as a vital solution for decarbonising the aviation industry, showcasing significant potential to reduce greenhouse gas emissions. This study examines the latest advancements in green hydrogen technologies and their applications for sustainable aviation.

The research focuses on cutting-edge electrolysis methods, including low-temperature alkaline/PEM electrolysis (Technology Readiness Level 9) and high-temperature solid oxide electrolysis (Technology Readiness Level 8). These methods have achieved efficiencies exceeding 80% while reducing energy input to 40 kWh/kg. These innovations are crucial for scaling up production to meet aviation's stringent energy density requirements.

The study analyses strategies for reducing costs in electrolysis. Due to automation and material innovations, Capital Expenditures (CAPEX) for electrolysers are projected to decrease by 30-40% by 2025. It also examines infrastructure development, highlighting projects such as Saudi Arabia's NEOM plant and Louisiana's St. Gabriel facility. These projects demonstrate the integration of large- scale renewable energy with hydrogen production.

Results indicate that while the production costs of green hydrogen currently range from €1.7 to €10.2/kg, depending on technology and project specifics, there is significant potential for further cost reduction. The study also addresses challenges related to aviation integration, including airport refuelling infrastructure and cryogenic storage solutions.

In conclusion, this research suggests that green hydrogen has the potential to transform aviation towards a sustainable future, aligning with global efforts to achieve net-zero emissions by 2050. However, overcoming economic barriers and developing supportive policy frameworks are critical for widespread adoption.

Biography

Dr. Sanjeev Gajjela is a scientific professional with over two decades of experience in the renewable energy sector, particularly in sustainable aviation fuel. He has filed more than 37 patents in the US and UK and has collaborated on securing over $30 million in grants. One of his patented processes for SAF is currently being commercialised in the USA and is valued at over $100 million. Currently, Dr. Gajjela serves as the Director of Sustainables at Tomato Energy in the UK, where he leads the development and commercialisation of innovative sustainable energy products.

Selim S. Shaker PhD

Geopressure Analysis Services (G.A.S),
Houston, TX, United States

Salt basins exploration risks: The good, bad and ugly

For the last three decades the conventional exploration for oil and gas has mostly engaged with sedimentary columns associated with rock-salt basins build up. The Gulf of Mexico's subsalt exploration success was an intriguing endeavor for opening new plays in South America, West Africa, Mediterranean etc. In the last two decades, the subsalt and pre-salt exploration prospects have yielded prolific hydrocarbon traps especially in deepwater worldwide. For example, in the Gulf of Mexico, frontier overthrust subsalt deepwater added 2 million barrels/day of oil to the USA energy needs. The presence of the salt intrusions in the sedimentary columns has a great impact on creating potential hydrocarbon traps of different large forms in the host stratigraphic column and inversely causing several exploration and drilling challenges.

The unique petrophysical properties of the salt and its impermeable lithology, relative to the surrounding rocks, create optimum habitat for hydrocarbon generation, migration, entrapment in sealed containments. The salt's lower density relative to the host rocks creates a vertical buoyancy effect. Moreover, it's exceptional density reduction with burial generates extra up-lift with increasing depth. Salt's ductile nature becomes more pronounced with increasing depth and temperature. The emplacement and displacement of salt within the host beds plays a crucial role in trapping and breaching of hydrocarbons. Emplacement can be simultaneous with the host rock sedimentation process or post sediments lithification as intrusive mass. The intrusive salt chances of breaching the trap are high and consequently increase the risk of exploration success.

Biography

Dr. Selim Shaker is a Principal Consultant for Geopressure Analysis Services (G.A.S). He has over 40 years in the oil industry with worldwide exploration experience in North America (in particular the Gulf of Mexico), South America, Egypt, NW Australia, Algeria, North Sea and China. He established G.A.S after retiring from Phillips Petroleum after 20 years of service as a Senior Exploration Geologist. Dr. Selim Shaker has published over 50 papers and articles regarding pressure predictions and its impact on exploration success or failure and drilling challenges. He received his Ph.D. from Assiut University, Egypt and Diploma in Hydrogeology from Prague University/UNISCO.

Some of the challenges during the exploration phase is the subsurface seismic imaging processing and interpretations. The drastic seismic velocity contrast between the salt and the host sediments exacerbates the seismic driven imaging results of the subsurface prospective trap configuration. An additional challenge in the frontier areas is increasing water depth. This results in a narrowing safe pressure drilling window between the subsurface formation and the fracture pressures profiles. Potential drilling hazards such as Shallow Water Flow (SWF) and hard kicks can turn to blowouts, and setting extra casing strings are common.

The perturbating of stress fields within these structural traps leads to relative complex geomechanical settings. Therefore, most of the conventional normal geopressure modeling driven by overburden has to be adapted to the altered new geomechanical setting created by the salt intrusion.

In a nutshell, finding and producing oil and gas from salt basins is a double-edged sword. It is lucrative, however some of the wildcats can turn to a cost burden for the operators. Life threatening and serious property damages can result as well if the technical safety procedures are not followed. Building the geological framework and salt emplacement and displacement history of the potential trap during the prospect generation phase can help predict the exploration risk and the possible drilling hazard. The costs of deepwater exploring and producing facilities have increased exponentially. However, the potential of finding a highly rewarding oil reserves is worth taking the big gamble.

Sharma Dronamraju, MS, MBA, PG

AKD Professional Solutions Inc., United States

Mature field evaluation and redevelopment case histories and lessons

Mature fields meet one or more of the following criteria: Fields that have produced for more than 25 years, fields that have produced water cuts of around 95%, fields that have been neglected during low demand such as now, fields that are currently in operation with obsolete technology, poor facilities, and market access. According to the U.S. Energy Information Administration, these mature oil fields are contributing up to 80% of world production, which could translate to 89 million barrels of oil per day. Often poor infrastructure and poor state of record keeping pose steep hurdles in monetizing these assets. A surprising fact is that in many of these fields, the oil is in very low-risk plays, often very shallow reservoirs, with a low cost of recovery. In this low-price environment, a 1% increase in recovery factor and enabling reduction of a fraction of lifting costs could make all the difference in the breakeven price of oil. Conservative estimates of reserves are about 15-30 billion barrels in some of these basins. Unfortunately, some of these fields are poorly managed, through various EOR techniques, relying on antiquated subsurface geology. Some of these fields did not benefit from the technology growth in the last 20 years. These fields could see new life with 3D seismic data, interpretation based on sound regional and prospect level geology, chronostratigraphic mapping, fit-for-purpose reservoir modeling to guide the appropriate recovery program, and a new breed of entrepreneurial spirit, for substantial rewards in these fields.

The subsurface heterogeneity (complexity) of an oil field is the single, most challenging aspect with a dominant influence on-field productivity. Chances are with increased

Biography

Sharma Dronamraju is a Geoscientist and Director, AKD Professional Solutions in Houston, Texas, USA. He worked for Petrobras USA, Marathon Oil, Halliburton, Landmark Graphics, Fugro, and ONGC for over 30 years of upstream oil and gas. His expertise lies in rejuvenating mature fields. He was associated with several deep-water developments and exploration appraisals in GoM, the Gulf of Thailand, Indonesia, deep-water Nigeria, Equatorial Guinea, and the South China Sea. Sharma's recent work includes Geomodeling for EOR in mature oil fields in Miocene Syn-rift clastics and carbonates and regional prospectively of Gulf of Suez, Egypt, heavy oil development in Powder River Basin in Lower Cretaceous incised valley fills (Newcastle Fm.), addressing subsurface heterogeneity of Mishrif Carbonates in Southern Iraq and reservoir modeling of HPHT fields in offshore East Malaysia and Borneo, and sub-salt interpretation, appraisal, and reservoir delineation of Lucius Field, GoM. Sharma's current focus is continental rift basins and their

knowledge of the field, one is better equipped to deal with the challenge, provided one uses the right geology model to start with and has an improved understanding of the subsurface data.

Detained case histories of several well-documented mature oil field revivals from different parts of the world, with varied geology and economic criteria, using 3D seismic data and state-of-the-art reservoir modeling are presented. The lessons learned could be useful in motivating and finding ways enhance production in several mature oil and gas fields of the world.

Target Audience: Geoscientists, Petrophysicists, Reservoir Engineers, and Production Engineers with at least 5 years of experience.

contribution to geoscience. Sharma earned his Master's degrees from the Indian Institute of Technology, Texas A&M University, and an MBA from Rice University. Mr. Sharma is State Registered and Certified in Texas USA, Vice Chair of International Explorationists Committee, Houston Geological Society, and a Member of AAPG House of Delegates. He held several trainings for target audiences, and clients, in the US, Middle East, and Asia; HGS and AAPG Technology Workshop in the US.

Susan Newman

Integrated Lipid Biofuels, United States

Revolutionizing bioplastics with yeast cell factories

Welcome to the future of sustainable food packaging! Integrated Lipid Biofuels introduces a groundbreaking innovation in the biotech world with our novel yeast cell factory, designed to produce biodegradable and compostable PHB bioplastic. This isn't just any bioplastic—it's born from mixed organic waste, proving that even cafeteria leftovers can transform into eco-friendly packaging solutions.

Why It Matters: Our innovative yeast cells are not picky eaters. They thrive on a diet of diverse biomass, turning what would otherwise be waste into higher yields of PHB bioplastic. Imagine the impact of converting organic waste from places like Washington State University cafeterias into valuable, earth-friendly materials!

The Science Behind the Innovation: This groundbreaking technology produces biopolymers designed to replace petroleum-based products, tackling the critical issue of plastic pollution. Our primary focus is on developing biodegradable films for packaging applications. Despite their high desirability and significant market potential, the production of biodegradable bioplastics is limited by the high cost of starch as a feedstock compared to the low cost of fossil-based options. ILB's technology addresses this challenge by substituting starch with organic waste as feedstock, which not only slashes production costs but also provides a more sustainable solution for disposing of organic waste.

Limited Commercialization Challenges: Although the bacterial biopolymer poly(3-hydroxybutyrate), or PHB, has been known for over a century, its commercialization has been hampered by high production costs and suboptimal performance.

Biography

Dr. Susan Borjesson Newman received her PhD from the University of Idaho in Physiology. While rooted in research and development, Dr. Newman is passionate about connecting science with people. Dr. Newman is a Stanford University d.school coach and the CEO of Integrated Lipid Biofuels (ILB). ILB leverages two key technologies: Yeast Cell Factories and Sequential Hydrothermal Liquefaction to valorize mixed organic waste streams and produce bioplastics, biofuels, and high-value intermediates. ILB is the recipient of several Small Business Innovative Research Grants through the United States Department of Agriculture and the Department of Energy.

Engineered Yeast Cell Factory: Our solution lies in converting low-cost feedstocks such as food waste into biopolymers with high carbon efficiency. This is achieved through an integrated process using our highly efficient engineered yeast cell factory.

Multi-Layer Products: By diversifying polymer structures through process fine-tuning and pathway engineering, we enhance performance and use the resulting biopolymers to manufacture multi-layer products with the desired properties. This approach not only broadens the application of bioplastic materials but also aligns with our goal of creating sustainable, high-performance alternatives in the marketplace.

Key Benefits:

- **High PHB Production:** Our yeast cell factory surpasses traditional methods, offering significantly higher PHB production. This means more bioplastic for less input, enhancing efficiency and sustainability.
- **Versatile Biomass Utilization:** Unlike other processes that require specific feedstocks, our yeast can work with various organic wastes. This flexibility reduces costs and promotes the use of readily available waste materials.
- **Eco-Friendly Solution:** The PHB bioplastic produced is both biodegradable and compostable, making it an ideal choice for reducing plastic pollution in our environment.

Join the Movement: Whether you're a sustainability enthusiast or a biotech innovator, this advancement opens new doors for creating greener, cleaner packaging solutions. Let's turn waste into a resource and lead the way in sustainable innovation.

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4th Edition of International Conference on

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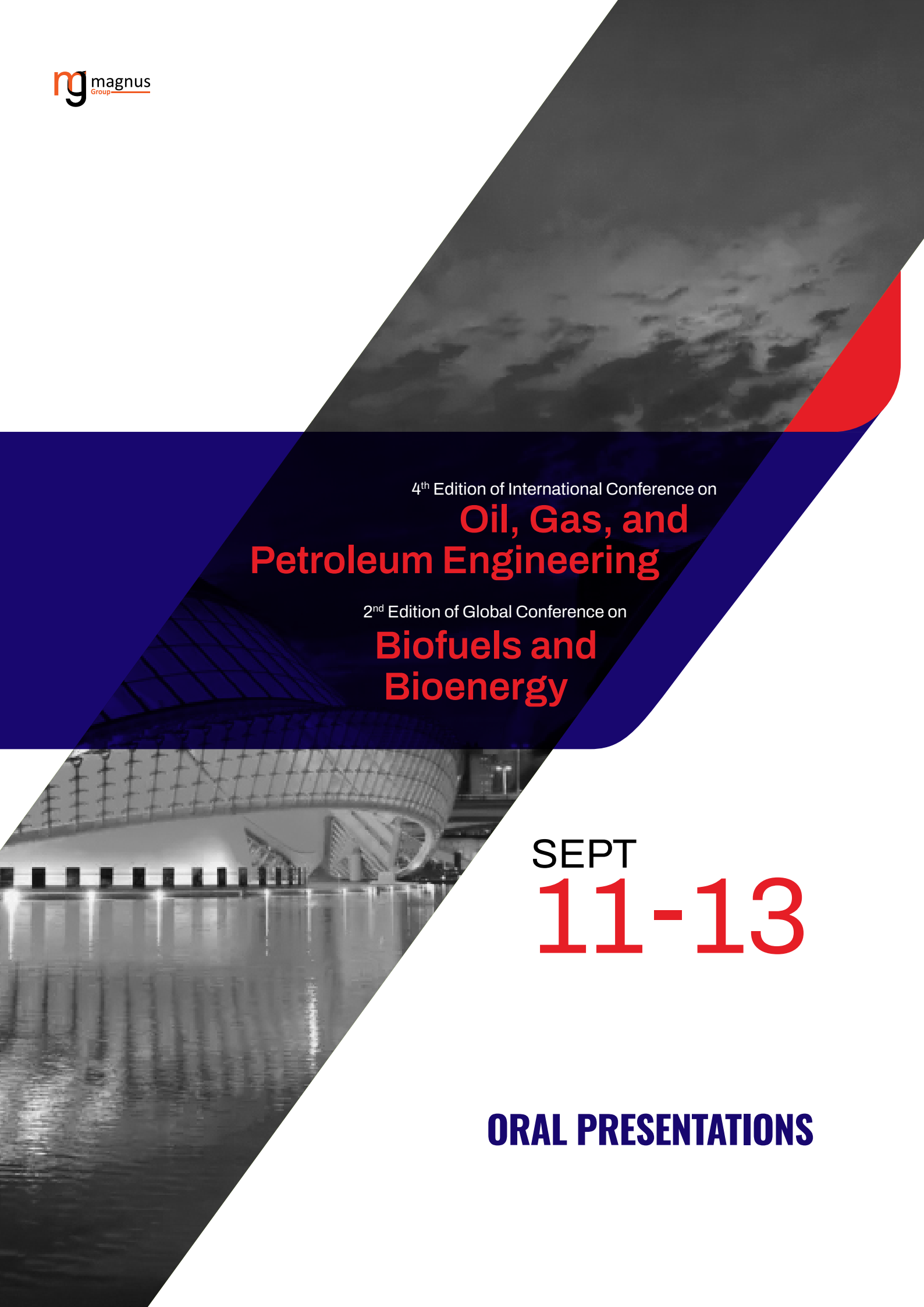
Biofuels and Bioenergy



SEPT

11-13

ORAL PRESENTATIONS

Abdalla Ali Estuti
National Oil Corporation, Libya

Simulation and experimental verification of pump stoppage transients in oil and gas pipeline systems using PEM

Sudden pump stoppages in oil and gas pipeline systems pose significant operational challenges, leading to pressure surges, cavitation, gas release, and transient instabilities. These events can cause mechanical failures, reduced operational efficiency, and safety risks, particularly in high-pressure environments such as offshore pipelines, crude oil transport systems, LNG facilities, and refinery networks. Accurately predicting transient hydraulic behavior is crucial for pipeline integrity management, surge protection design, and real-time operational monitoring.

Traditional numerical methods, including the Method of Characteristics (MOC) and the Finite Difference Method (FDM), often suffer from interpolation errors, numerical diffusion, and stability issues, making them less effective for complex transient events. Advanced techniques such as Smoothed Particle Hydrodynamics (SPH) and the Lattice Boltzmann Method (LBM) offer higher accuracy but are computationally expensive and impractical for real-time industrial applications.

This study introduces and experimentally validates the Post-Extrapolation Method (PEM), a novel numerical approach designed to eliminate interpolation errors, enhance computational efficiency, and improve numerical stability in oil and gas pipeline simulations. The method is tested against experimental data obtained from a centrifugal pump-driven pipeline system, where sudden stoppage conditions were induced to observe pressure transients, cavitation effects, and gas release phenomena. High-frequency pressure transducers and real-time Data Acquisition Systems (DAQs) were used for validation.

The results demonstrate that PEM achieves an accuracy exceeding 98%, with deviations of less than 2% compared to experimental results, significantly outperforming MOC and FDM. Furthermore, PEM reduces computational time by over 40%, making it ideal for real-time predictive maintenance and transient event analysis in oil and gas pipelines. A detailed assessment of gas release dynamics highlights its impact on pressure wave attenuation, cavitation severity, and multiphase flow stability, underscoring the need for accurate two-phase flow modeling in transient simulations.

This study provides a validated, computationally efficient framework for transient flow modeling in onshore and offshore oil and gas pipeline networks. The findings offer direct industrial applications in:

- Pipeline surge protection and transient control in crude oil, natural gas, and LNG transport systems.
- Optimizing Emergency Shutdown (ESD) procedures to mitigate sudden pump failures.
- Real-time monitoring and predictive maintenance for oil and gas infrastructure.
- Enhancing offshore pipeline integrity by improving transient flow prediction and cavitation modeling.

Biography

Dr. Abdalla Ali Estuti is a Senior Engineering Consultant at the National Oil Corporation (NOC), Major Projects Department, with over 39 years of experience in mechanical and nuclear engineering. He holds a Ph.D. in Mechanical Engineering from the Budapest University of Technology and Economics, where he also earned his M.Sc. in Cooling and Air Conditioning. His academic journey began with a B.Sc. in Nuclear Engineering from the University of Tripoli. Throughout his career, he has held key positions in various organizations, including serving as Chairman of the Unified Tender Committee at Mellitah Oil & Gas Company and as General Director of Technical Affairs and Project Feasibility at the Ministry of Planning. His expertise spans project management, contract evaluation, and technical consulting in the oil, gas, and energy sectors. He has also contributed to major projects such as the New Tripoli Airport Project and has held leadership roles at the National Safety Authority and the Civil Aviation Authority. With a strong background in operational planning and engineering consultancy, he continues to provide strategic guidance and technical solutions for critical projects in the industry.

Abdullah Alasmari*, Yousef Alshammari*

Producing Projects Management Department, Saudi Aramco, Dhahran, KSA

Water injection laterals replacement project: Execution optimization

Objective: The objective of this paper is to represent an optimized execution strategy for the replacement of Water Injection (WI) laterals in offshore oil fields. The primary aim is to enhance the efficiency of the replacement process, reduce risks and improve the overall execution through schedule optimization while maintaining the integrity and reliability of water injection systems.

Methods: The study compares a base execution approach with an optimized methodology. The optimized strategy involves installation of new risers, flexible pipelines and subsea valve skids using strategic parallel installation techniques. This approach enables continuous reliable operations throughout the project timeline. A detailed activity breakdown and vessel deployment strategy are analyzed to reduce offshore intervention time.

Results: The implementation of this optimized execution approach techniques resulted in significant improvements in operational efficiency, cost savings and overall project safety. The optimization strategies successfully reduced operational impact, ensuring that water injection system operations were maintained reliable without disruption, while also improving the project's execution timeline by 90%.

Novel: This work introduces an innovative project execution methodology that emphasizes minimizing the impact of offshore operations through parallel installation strategies. Unlike traditional methods that involve systems downtimes, this approach demonstrates how optimized sequencing and vessels utilization can achieve substantial time and cost savings, all while ensuring the integrity of water injection systems.

Keywords: Water Injection, Offshore Pipeline Replacement, Project Execution Optimization, Flexible Pipelines.

Biography

Abdullah Alasmari is an electrical engineer graduated in 2017 from King Abdulaziz University 207 in Jeddah. Engr. Abdullah has then joined Saudi Aramco up to date covering various position from technical, operations, maintenance and project management. Engr. Abdullah is certified in many fields as a maintenance and reliability professional, project management professional, risk management professional and professional business analysis. He is also holding a Fundamental of Engineering passing certificate.

Yousef Alshammari is an accomplished Onshore & Offshore Projects Engineering Unit Head with over a decade of experience in the oil and gas sector. A 2013 graduate of Arizona State University, USA, with mechanical engineering. He has excelled in roles across maintenance, operations, administration and project management. Yousef specializes in project planning, risk management, process optimization, and team leadership, consistently delivering high impact results through strong technical expertise and strategic decision making with his team.

Ahmed Shehab Al Dashti
Kuwait Oil Company, Kuwait

Automating maintenance override switch report for upstream facilities

The presentation will include idea and methods of implemented an Auto Maintenance Override Switch (MOS) report for upstream facilities in Kuwait oil company, leveraging existing software that was not originally designed for this purpose. This innovative solution was developed without incurring any additional costs to the company. The auto report is generated in network L4 that can viewed and accessed by different teams within the company.

By enhancing the existing system, we enabled real-time monitoring of overrides at gathering centers without the need for human intervention. This improvement provides better tracking, enhanced analysis, and more informed decision-making, ultimately strengthening facility integrity and personnel safety.

This initiative showcases how we can repurpose existing technology to create value-added solutions that improve operational efficiency, enhance safety measures, and optimize monitoring capabilities—all while maximizing the company's existing resource, enhanced compliance and reduced incident rates, strengthened safety culture, safer work environment leading to higher morale.

Angel Buendía Esparcia*, Lina Montuori, Manuel Alcázar-Ortega

Institute for Energy Engineering, Universitat Politècnica de València, Valencia, Spain

Innovative technologies and artificial intelligence to decarbonize the shipping industry and measures to control pollution

Global shipping industry represents one of the biggest contributors to greenhouse gas emissions and environmental degradation. In this study, we explore innovative technologies and Artificial Intelligence (AI) protocols to decarbonize the maritime industry and implement effective pollution control measures.

The research study will address the current challenges within the maritime sector. It will include the need to quantify diverse carbon emissions, together international and local regulations, and mitigating the adverse environmental impacts of conventional shipping practices. The technical and operational limitations that orientate the industry's transition toward sustainability will be assessed emphasizing the urgent need for a digital transformation.

A data analysis about how AI solutions are transforming the operations, by reducing fuel consumption and minimizing greenhouse gas emissions will be presented. Moreover, how advanced algorithms can optimize daily operations process through predictive analytics and real-time monitoring emissions through integrated sensor networks and the benefits of an optimal use of big data and IoT technologies to achieve a lower footprint on maritime industry will be shown.

Finally, different successfully case studies and pilot projects will be discussed in order to provide practical examples of how the use of AI-based innovative strategies can help to improve the sustainability and cost efficiency, monitoring maritime pollution and reducing carbon footprint in the shipping industry.

Biography

Ángel Buendía Esparcia graduated in Industrial Engineering from UNED in 2016. He is a professional with over 20 years of experience in industry leading multiple and diverse R&D projects in energy and manufacturing systems. Moreover, he is researcher at the Institute for Energy Engineering (IIE-UPV) of Valencia in the research group of Energy Markets and Systems. Currently he is pursuing a PhD candidate at the Polytechnic University of Valencia. His research focuses on applying artificial intelligence to engineering, with an emphasis on optimizing energy use in maritime ports. Moreover, his work aims to contribute to sustainable energy innovation and digital transformation in the maritime sector.

Anthony J. Sadar[1*], Susan Z. Forney[2*]

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Environmental risk communication for the oil, gas, and petroleum industries

If you manage environmental issues for your industry, it's not a matter of if, but when you will be faced with risk communication challenges. Planning to meet these challenges means more than preparing for emergencies and dealing with contentious issues. With public trust on the decline and ever-changing news dynamics, sound strategy increasingly relies on the following foundational principles:

- Walk the talk—act with integrity and humility and know how and when to stand firm
- Set goals—gear every investment of time and money toward achieving your definition of success
- Know you audience—understand your stakeholders so that your messages hit home
- Deal with emotional elements first—facts can be irrelevant until stakeholders' emotional needs are met

The presenters will walk through each of these key principles in depth, sharing practical advice and hard-hitting, real-world examples and solutions in this overview of environmental risk communication focused on the oil, gas, and petroleum industries.

Biography

Mr. Sadar has more than 40 years of technical experience in government, private industry and academia, focused on the communication of science and engineering information. He is also a co-author of Environmental Risk Communication: Principles and Practices for Industry and a Certified Consulting Meteorologist. Mr. Sadar has advised industry and governments regarding numerous high-profile and controversial projects involving communications on facility operations, regulatory compliance, environmental impacts, and emergency release planning. Mr. Sadar recently retired from his position as an Air Pollution Administrator and meteorologist for a large public health department in Pittsburgh, Pennsylvania, USA and remains an Adjunct Associate Professor at Geneva College, Beaver Falls, PA.

Ms. Forney has more than 30 years of experience in environmental communications and compliance. She is co-author of Environmental Risk Communication: Principles and Practices for Industry. As founder of EHS Communication Partners, Inc., she provides expert communications counsel, quality training programs, and professional communication products to clients dealing with environmental, health and safety concerns. Her approach provides a unique blend of technical knowledge and principled communication strategies that position clients for success in stakeholder communications and engagement.

Feliu Sempere[1*], Rubén Hervás-Martínez[1], Núria Oliver[1], Berta Ferrón[1], Ramón Jiménez-Robles[2], Vicente Martínez-Soria[2], Marta Izquierdo[2], Tatiana Montoya[1]

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Anaerobic digestate centrate as a key resource to improve sustainability in biogas purification and upgrading to biomethane

This work aims to foster the deployment of biogas valorisation technologies by decreasing operating costs (OPEX) treating anaerobic digestate and biogas, as well as to decrease their pollutant emission. A disruptive circular approach that intensifies the biowaste-water-energy nexus focusing on resource recovery and valorisation in anaerobic digestion plants is proposed. The concept avoids the usage of chemicals, proposes a nature-based solution for centrate treatment valorising a solid waste from the water cycle, and decreases the impact of current biogas purification strategies based on ferric salts consumption supplied to the anaerobic digester and activated carbon filters for the removal of Hydrogen Sulphide (H_2S) and methyl volatile siloxanes.

Nitrification of centrate by innovative intensified constructed wetlands (CWs) using alum sludge from drinking water treatment plants as reactive substrate has been carried out. The CWs remove phosphorous, mainly adsorbed into the substrate and provides nitrite+nitrate as an electron acceptor source for anoxic biogas desulphurisation in Suspended Biomass Bioreactors (SBBs). This combined integration of biotechnologies is totally disruptive in the scientific literature, being characterised by its very low OPEX. The SBBs favours elemental sulphur recovery from partial H2S oxidation (compared to fixed bed bioreactors), as well as the recovery of dissolved CH4 from the SBB liquid effluent using a membrane contactor. Non-treated centrate is also valorised as absorbent in a membrane contactor for biogas enrichment to biomethane quality, replacing chemical absorbents such as amines. The 3-stage-CW showed a nitrification capacity of 13-41 gN/m3/day outperforming conventional CW using gravel, in addition, the innovative CW obtained 100% phosphorous removal. The nitrified stream was successfully used in the SBBs, achieving >90% H2S removal efficiency at gas residence time down to 3 min. In the SBB, 70% of the dissolve methane was recovered by means of a commercial membrane contactor operating at sweep gas mode. A membrane contactor was also used for biogas upgrading to biomethane using the rich ammonium centrate as absorbent. A CH4 concentration >91.7% was obtained at an optimal biogas flow rate of ≤1.2 L/min and centrate flow rate ≥2 L/min (G/L maximum of 0.3). As G/L increased CH_4 concentration decreased.

These results prove the technical feasibility of integrating centrate and biogas treatment in these two innovative biological processes.

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Biography

Feliu Sempere is a chemical engineer from the University de València with a PhD and a postdoc secondment based on the development of a marketable biotechnology for the elimination of solvents in air emissions, work carried out at laboratory, pilot, and industrial scale. He has experience as process and R&D engineer since 2006 in different sectors related to environmental engineering with a clear approach on upscaling biological, physical, and chemical processes. In 2019 he joined Global Omnium, where he received a postdoc contract from the Spanish Ministry of Science and Innovation to develop a biological biogas purification process. This research line aims to foster downstream biogas valorisation into biomethane and other biofuels or chemicals.

Felix Koshy

Operation Department Hindustan Petroleum Corporation Limited (HPCL)-Mumbai Refinery Mumbai, Maharashtra State, India

Burners performance improvement of interheater furnaces in catalytic reforming unit

In the current era of energy optimization and performance enhancement across all industries, Refiners are always challenged to exploit the maximum out of the installed equipment capacities. The limitations of equipment become more prominent in most of the revamp facilities as there would not be any considerable margin considered for practical cases of operation. HPCL-Mumbai Refinery has a Heavy Naphtha Catalytic Reforming Unit (CRU), licensed by M/s UOP. The unit revamp was completed in Sept-2021 for 30 % capacity enhancement.

Post Revamp Heaters Performance: The CRU unit has four fuel gas-fired heaters to achieve the desired reforming temperature. The heater configuration is consisting of one charge heater and three inter-heaters. All the inter-heaters were undergone modifications during revamp. Under-performance of these heaters were observed during the post revamp operation.

Heater limitations observed post revamp: The major limitations observed during the commissioning and initial operation of the heaters were higher flame height, higher arch temperatures, lower differential temperature across the heater, Improper flame pattern, refractory damage and firing controllability issues

Improvement Action Plan: Burner problems study in micro detail is carried out and thus concluded that the only easiest and faster way to minimize the heater issues is to reduce the angle of firing port in the fuel-gas tips.

Implementation: Modified sample burner tips were developed for various port angles and trial run was taken in one of the heater burners and performance evaluation is done. Subsequently final modified burner tips are developed based on the trial run outcome and completed the on-the run installation of the modified fuel gas burner tips in the heaters.

Performance Post Modification: The data and physical checking revealed that the modification achieved the following targets.

1. Flame Pattern Stability improvement
2. Flame height improvement

3. Heater Duty has improved
4. Better controllability over the Arch temperature
5. Load increment at same Arch temperature

This paper provides an insight into all the study, action plan, implementation and comparative performance evaluation and key issues addressed at the CRU fuel-gas heaters in an economic way.

Biography

Mr. Felix Koshy studied Bachelor of Technology in Chemical Engineering at Government Engineering College Thrissur, Kerala, India and graduated in 2008. He then joined as Trainee Engineer at HPCL Mumbai Refinery in Green Fuels and Emission Control Project Commissioning Team. He is currently working as Operations Senior Manager and has 17 years of refinery work experience that involves in-depth experience of Commissioning, Operation, Technical, Project-Process, Revamp, Reliability Improvement, Optimization and Value-creation in the various units of clean-fuel project of Mumbai Refinery such as Naphtha Hydro-treaters, Naphtha Splitter, Platformer, Isomerization, Prime- G+, Hydrogen PSA, Fuel-Gas Preparation, Gasoline Blending, Amine Regeneration and Sour Water Stripping Units. He has NSAT-Oil and Gas Certification in Excellent Category and is a certified M/s UOP Graduate in CCR Platforming Process.

Fuad Rahimov
Kuwait Energy Basra Limited, Iraq

Use of eigenvalue stability analysis for liner inflow test interpretation

Objective/Scope: Liner inflow testing ensures pressure containment throughout well life cycle as part of secondary barrier envelope. This paper aims to re-evaluate the current methodology used for Inflow Test interpretation by analyzing the underlying equations and introducing an eigenvalue-based framework. This approach assesses stability by determining if the function converges to zero, indicating cessation of fluid flow. In mathematical terms, inflow test interpretation aligns with examining system stability in Ordinary Differential Equations (ODE) through eigenvalue analysis.

Methods, Procedures, Process: The transient heat equation, solved using separation of variables, introduces an exponential decay function. By calculating decay rates (eigenvalues) from observed fluid volume over elapsed time during inflow testing, system stability can be assessed. In ODEs, negative eigenvalues ensure stability by forcing the function to converge to zero. Similarly, for the reservoir-well system, positive eigenvalues in exponential decay function drive stability, as the exponent in the transient heat equation solution is inherently negative. This method treats the reservoir-well system holistically and evaluates its stability based on observed decay rates and eigenvalue trends.

Results, Observations, Conclusions: During inflow testing, fluid volume should exhibit an exponential decay pattern, with a consistently positive decay rate. To confirm thermal diffusion as the dominant mechanism, a non-linear exponential decay function was fitted to field inflow test data using Python. A good match on the model was evaluated based on initial fluid volume, evolution of eigenvalues, and residuals between predicted and observed fluid volume. While eigenvalues remained positive, their gradients were still evolving, and residuals stabilized only after 140-160 minutes. A strong match was achieved after 200-220 minutes, accurately predicting fluid volume and ensuring consistent positive decay rates. Positive decay rate indicated flow convergence in the direction of fields, whereas negative rates led to divergence, blowing out from origin, leading to instability.

Applying excel trendline for exponential function yielded a good R2 score but failed to match initial

fluid volumes, even after 300 minutes of test data. This highlights the limitations of traditional methods compared to the proposed eigenvalue-based framework.

Novel/Additive Information: This paper introduces a stability analysis framework distinct from the Horner technique. Stability analysis evaluates the direction of fields where solutions of original function converge to zero, whereas the Horner technique pseudo-mathematically makes prediction of original non-linear function from a Y-intercept after linearization of exponential decay function. Unlike pressure diffusion equations, thermal diffusivity equations do not equate the asymptote to the Y-intercept on a Horner plot, making stability analysis a more accurate alternative.

Biography

Fuad Rahimov, born on 24th January 1990 in Baku, Azerbaijan, currently splits his time between Azerbaijan and Canada. As an Azerbaijani citizen holding Canadian Permanent Residency, he resides in Calgary, Canada. He is presently employed by Kuwait Energy Basra Limited as a Senior Well Services Engineer in Basra, Iraq, where he is responsible for Well Intervention, Completions, and Well Integrity. Fuad Rahimov holds both Bachelor's and Master's degrees in Petroleum Engineering from Azerbaijan State Oil Academy in Baku. Additionally, he earned a Master of Science degree from Middle East Technical University in Ankara, Türkiye. For his Master's thesis, titled "Use of Voronoi Gridding in Well Test Design," he demonstrated how using non-structured grids in reservoir engineering models can better represent complex well geometries compared to conventional grids. With nearly a decade of experience in the oil and gas industry, Fuad Rahimov has served in various roles, with his core area of expertise being Well Integrity Management. He co-authored an SPE paper titled "Case Study in Well Integrity Assurance with Enhanced Ultrasonic Technology for a Highly Attenuative Environment." Prior to his current position, he served as the Well Integrity Engineering Team Lead, managing a team of four Well Integrity Engineers in the offshore Caspian Sea.

Hani M. Al-Jeddani

Northern Region Distribution Department, Engineering Division, Saudi Aramco, Jeddah, Saudi Arabia

A comparative study for enhanced truck loading measurement and plant safety: Weigh scale vs. Coriolis meter

In the realm of custody transfer measurement, the traditional reliance on weigh scales for determining truck loading mass poses considerable challenges. One of the primary concerns is the heightened safety risk associated with maneuvering trucks within facility confines, which can lead to accidents and injuries. Furthermore, weigh scales often suffer from limitations in terms of measurement uncertainty and resolution, which can result in inaccuracies and discrepancies in mass measurements.

This study proposes an alternative approach by exploring the potential of Coriolis meters for custody transfer applications. Coriolis meters have been shown to offer superior measurement uncertainty and resolution compared to conventional weigh scales, making them an attractive option for industries where accuracy and precision are paramount. By piloting the use of Coriolis meters, this investigation aims to assess their feasibility and effectiveness in enhancing both measurement accuracy and operational safety.

The Coriolis meter's ability to provide direct mass flow measurements, rather than relying on indirect calculations, is a significant advantage. This direct measurement capability reduces the potential for errors and inaccuracies, thereby increasing the reliability of the measurement process. Additionally, Coriolis meters are less susceptible to external factors that can affect weigh scales, such as changes in temperature, humidity, and vibration, which can further contribute to their superior performance.

A key aspect of this study is the comparative analysis of Coriolis meters and traditional weigh scales. By evaluating the advantages and limitations of each method, this investigation seeks to inform best practices in custody transfer processes. The findings of this study are intended to provide valuable insights into the potential benefits of transitioning to Coriolis meters, including enhanced measurement accuracy, improved operational safety, and increased efficiency.

Ultimately, the goal of this research is to contribute to the development of safer and more reliable operations in the industry. By adopting Coriolis meters for custody transfer measurement, companies can mitigate risks associated with traditional weigh scales, reduce the potential for errors and inaccuracies, and improve overall process efficiency. As the industry continues

to evolve and prioritize safety and accuracy, the findings of this study are expected to play a significant role in shaping best practices and standards for custody transfer measurement.

Biography

Hani Al-Jeddani holds a Bachelor of Science degree in Mechanical Engineering from King Abdulaziz University in Saudi Arabia, which he earned in 2008. Shortly after, he joined Saudi Aramco in December of the same year. Since 2016, he has served as the primary regional hydrocarbon measurement engineer. In addition to his academic credentials, Hani has obtained the Fundamental of Engineering (FE) certification. He has also expanded his expertise in petroleum measurement by earning certifications in fundamentals, intermediate, and advanced levels from the Petroleum Extension (PETEX) program at The University of Texas at Austin.

Hany Osman
Subsurface Insight, United Kingdom

Unlocking subsurface value through digital transformation

In an era marked by increasingly complex reservoirs and the urgent need for cost-effective, low-carbon solutions, the oil and gas industry faces mounting pressure to extract greater value from subsurface data. This presentation introduces a comprehensive digital transformation framework aimed at unlocking insights from both legacy and real-time subsurface data using advanced analytics, cloud computing, and AI-driven workflows.

A central theme is the digitalisation of physical subsurface assets including hard copy maps, well logs, surface and subsurface markers, and seismic volumes stored on magnetic tapes. By converting these analog resources into structured digital formats, they can be seamlessly integrated into modern geological and structural models, reducing uncertainty and enhancing interpretative accuracy.

This transformation extends beyond individual datasets. It emphasizes cross-disciplinary data integration bridging geophysics, geology, petrophysics, reservoir engineering, drilling, and production to break down silos and enable end-to-end workflows. The framework is technology-agnostic, ensuring interoperability across platforms and vendors such as Schlumberger, Halliburton, and others.

We showcase how integrated digital solutions from data aggregation and cleansing to machine learning-enabled interpretation can significantly enhance reservoir characterization, accelerate decision-making, and reduce cycle times. Real-world case studies demonstrate tangible benefits, including improved seismic interpretation, optimized well placement, and more predictive reservoir models.

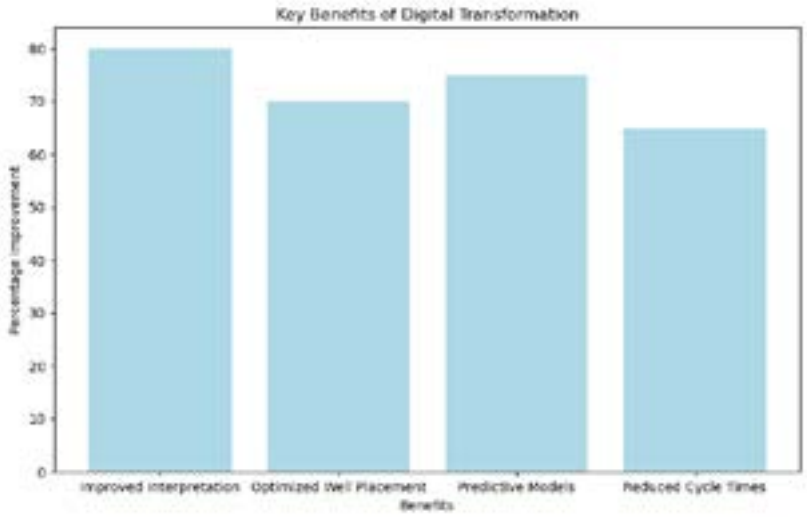
This presentation offers actionable insights for operators, service providers, and technology developers seeking to modernize their subsurface asset strategies and transition toward a fully integrated, data-driven exploration and production model.

Digital Transformation Workflow

1. Data Collection
2. Data Digitalisation
3. Data Integration
4. Advanced Analytics
5. AI-driven Workflows
6. Enhanced Decision-Making

Data Integration Across Disciplines

- Geophysics
- Geology
- Petrophysics
- Reservoir Engineering
- Drilling
- Production



Biography

Hany Osman is a seasoned Subsurface Geoscience and Data Management Consultant with over 23 years of experience in the global oil and gas industry. With a strong foundation in seismic interpretation and geoscience workflows, he has built a career spanning technical consulting, application support, and digital transformation leadership. Hany is the founder of Subsurface Insight, a boutique consultancy that provides strategic guidance on exploration workflows, data governance, and cloud-based subsurface data integration. He has advised national oil companies and international operators across Africa, the Middle East, and Europe, helping to optimize their use of platforms like Schlumberger Petrel and Landmark OpenWorks. Prior to founding Subsurface Insight, Hany held senior roles at Halliburton, where he led technical sales for Landmark's geoscience technologies, and Schlumberger, where he was a certified Petrel instructor and worked on R&D initiatives, presales engagements, and client workflow optimization. He also served as a Workflow Geophysics Team Lead supporting BG Group and played a key role in the successful deployment of advanced QI and velocity modeling solutions. Hany holds an MSc in Research Geoscience from Keele University and a BSc (Hons) in Geophysics from Assiut University. He is bilingual in English and Arabic and is an active member of SEG, EAGE, and PESGB.

Ili Bazilah Abd Razak*, Elya Masya Mohd Fishal, Peer Mohamed

FGV R&D Sdn Bhd, PT 35377 Lengkuk Teknologi 71760 Bandar Enstek, Negeri Sembilan, Malaysia

Bioenergy generation by optimizing biogas production – FGV's commitment towards amplifying environmental and operational efficiency

Malaysia ranks as the world's second-largest producer of palm oil, significantly contributing to the global supply of edible oil. The industry generates substantial volumes of Palm Oil Mill Effluent (POME), which presents considerable potential for bioenergy production. FGV Holdings Berhad, a leading Malaysian agribusiness entity, spearheads this initiative by operating 28 biogas plants that convert POME into a sustainable energy source. As one of the foremost producers of Crude Palm Oil (CPO) globally, this initiative enables FGV to enhance waste management, bolster energy security, and adhere to Environmental, Social, and Governance (ESG) principles by mitigating greenhouse gas emissions. Within FGV's palm oil mills, biogas is harnessed to generate heat for boilers, electricity, and biomethane for compressed natural gas production. This process results in cost savings from reduced diesel consumption and generates additional revenue from electricity exports to the national power grid. The generated electricity is distributed to thousands of households, neighboring towns, clinics, mosques, offices, and small shops within a radius of the biogas power plant, generating annual revenue of up to RM5 million. This system also fosters a circular economy by creating employment opportunities within industry. Extensive research is currently underway to optimize biogas production at FGV's biogas plants, which would further amplify FGV's positive impact on both the environment and its operational efficiency.

Keywords: Palm Oil Mill Effluent (POME), Bioenergy, Biogas Plants, Waste Management, Energy Security, ESG, Greenhouse Gas Emissions, Circular Economy.

Biography

Ms. Ili Bazilah was graduated with a Bachelor of Science degree from Universiti Malaysia Sarawak in 2006, followed by a Master of Science degree from Universiti Putra Malaysia in 2010. Subsequently, she joined the research group at FGV R&D as a junior researcher. With 15 years' experience, she is currently the Lead Researcher of Green Technology Unit, specializing in research on bioenergy, bioremediation, wastewater treatment, and biocompost, exploiting oil palm waste into valuable resources.

Jeri Al-Jeri*, Abdullah Mousa Ali*, Hamad Al-Kaabi*
Kuwait Gulf Oil Company, Kuwait

The reservoir productivity evaluation by utilizing flow jet pump and bottom hole pressure gauges in a horizontal oil well of Wafra Joint Operations

Wafra Joint Operations (WJO) is the operator for exploration & production of hydrocarbon resources from the onshore partitioned zone located between Saudi Arabia & Kuwait on behalf of Kuwait Gulf Oil Company & Saudi Arabian Chevron. Some of the wells in this area are completed by 7 in casing (horizontal) and they are produced by progressing cavity pumps. There was uncertainty in the formation productivity index due to the small size, high doge leg (DLS), and shallow setting depth of the PCP in addition to the lack of measuring the Flowing Bottom Hole Pressure (FBHP) and representative Shut-in Bottom Hole Pressure (SBHP) for the average reservoir pressure measurements.

Methods, Procedures, Process: In this case study, Flow Jet pump (FJP) artificial lift technology helped in achieving the objective of this exercise. As this pump is a hydraulic technology, it is doable to set it in the horizontal section close to the OH section to create maximum pressure drawdown. BHP gauges can be combined with the FJP to perform PBU and record continuous BHP data during the long flow.

Results, Observations, Conclusions: It was managed to set the FJP & BHP gauges in the horizontal section close to the casing shoe. Identifying productivity index and converting the lifting method from PCP to ESP. Well has been consistently producing since December 2023 without any failures. It currently producing 150 BOPD with a 45% water cut. The previous run-life for this well was 20 days. SRP and PCP were run in this well and failed due to high DLS±14.

Novel/Additive Information: The flow jet pump technology enabled the production during flowing conditions. The application of this technology will positively influence reservoir management and well-work plans. This combination of the flow jet pump with BHP gauges and setting the pump in the horizontal section made a big difference in evaluating the productivity of the open hole section which is useful for the further development by drilling horizontal wells. The flow jet pump is a successful alternative to the Y-tool in case difficult to run the Y-tool with SPR and PCP artificial lift system.

Biography

Jeri Aljeri Graduated from the Arab Academy for Science, Technology and Maritime Transport as a Mechanical engineer in 2006. Joined Kuwait gulf oil company in 2007until now. Senior rig supervisor (workover & drilling department) at Wafra Joint operations.

Abdullah Mousa is the Team Leader for Rigless Operation & Technical Support at Kuwait Gulf Oil Company, based in Wafra Joint Operations, a collaboration between KGOC and Saudi Arabia Chevron. He began his career in 2007 as a Rig Supervisor and has accumulated over 18 years of experience in upstream oil and gas operations. He holds a Bachelor's degree in Mechanical Engineering, with a professional focus on rigless well interventions, production optimization, and ensuring safe, cost-effective field operations. Over the years, he has also completed several certifications in well services, HSE, and leadership development. Abdullah is deeply passionate about continuous improvement, knowledge sharing, and contributing to the growth of Kuwait's energy sector.

Jingqiang Tan[1]*, Qiao Lyu[1,2], Xin Liu[1]

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The mechanisms and effects of CO_2-brine-rock interaction during supercritical CO_2 fracturing for shale reservoirs

The development of hydraulic fracturing and horizontal drilling techniques has promoted the exploitation of shale gas/oil resources. Supercritical Carbon Dioxide (SC-CO_2), with its special physical properties, has shown potential to enhance shale gas/oil recovery replacing water as the stimulation fluid. This presentation reports on the current status of shale gas/oil recovery, the potential role of SC-CO_2 as a working fluid for shale gas recovery, and CO_2 geological sequestration in shale reservoirs. SC-CO_2 has a better rock-breaking capability than water, which is useful when drilling through shale formations. SC-CO_2 fracturing creates rougher and more complex fracture networks than hydraulic fracturing, leading to higher permeabilities. Some of the injected CO_2 for shale gas recovery could also be safely sequestered in shale reservoirs, thereby lowering carbon emissions and accessing CO_2 tax credits. However, shale–CO_2 or shale–water/brine–CO_2 interactions during & after shale gas/oil recovery and sequestration can affect reservoir properties. The implied shale–CO_2 imbibition process from available data generally persists for several years, far more than the several days assumed for most laboratory tests. A more detailed understanding is required for SC-CO_2 injection on the efficiency of shale gas/oil recovery and the cost and environmental concerns of this technology. This will support the development of safe sequestration methods, supported by suitable laboratory and field tests, especially those focusing on geochemical, petrophysical, geomechanical and hydraulic properties.

Biography

Jingqiang Tan is a Professor in Energy Geology and Deputy Dean of School of Geosciences and Infophysics at Central South University, China. He received his PhD degree from the Technical University of Berlin in Germany in 2014. He joined Central South University as a Full Professor in January 2017. He is an Associate Editor of Marine and Petroleum Geology and Energy Geoscience and has co-authored more than 120 articles. His primary research interests are unconventional shale resources and CO_2 geological utilization/sequestration.

Marcelo D. Mrtvi[1], Johannes Kritzinger[1], Louise McCulloch[2], Jochen Naef[2*]

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Biobased specialty chemicals for the mineral slurries

Minerals play a fundamental role in modern society, providing essential raw materials for infrastructure, technology, and everyday products. From the metals in our smartphones to the minerals used in renewable energy systems, nearly every aspect of modern life depends on these resources. However, this necessity comes with a dilemma—while the minerals support economic development and technological progress, this also needs to be balanced with society's increased environmental concern and new legislations that turn these concerns into actions. Balancing the need for these resources with sustainable practices is crucial to minimizing harm while ensuring a steady supply of critical materials for the future. The chemicals used in the processing of minerals are one aspect of this industry that makes this dilemma evident. This work focusses on the replacement of fossil-based specialty chemicals commonly used by bio-based specialty chemicals. Our most recent efforts tackle the development of alternative chemicals for the replacement of polyacrylates, which are widely used fossil-based dispersants. More than a dozen samples have been tested, these bio-based alternatives were derived from a variety of sources, such as, CMC-Based (Carboxymethyl Cellulose) dispersants. Standard industry trials were conducted, which include dispersant demand curves and slurry stability tests. Most of the samples failed the initial trials, but the alternatives that showed promising results were submitted to another set of standard trials from the Pulp and Paper industry, our intended final customer for these bio-based mineral slurry alternatives. The results of the two set of trials showed that there are viable bio-based dispersant alternatives to fossil-based polyacrylates. Further work will continue to have these minerals slurries as a standard commercial product.

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Development of a mathematical model and information system for predicting technological paramters of anaerobic fermentation bioreactor

Aggravation of environmental problems and growth of prices for energy resources have caused considerable interest in the technology of bioconversion of organic waste for energy production. In addition, the transition of livestock and poultry farming to an industrial basis and the associated high concentration of animals on large farms and complexes have led to a sharp increase in manure waste and effluents. One of the methods of rational use of organic waste from livestock farms is their anaerobic fermentation in biogas plants, which neutralizes liquid manure and turns it into fertilizer with simultaneous production of an energy resource-biogas. Efficient using of agricultural waste is a global and important world problem. Therefore, the development of a technology for the disposal of cattle waste in the current environmental situation, ensuring not only environmental safety, but also contributing to the creation of a closed energy-saving production with the production of mineralized organic fertilizer, which allows increasing the yield of agricultural crops; feed additives; especially an additional source of energy in the form of biogas, is becoming relevant. The main objective of the study is to create an intelligent system for assessing and predicting biogas yield, which is especially relevant in the context of the growing need for renewable energy sources and sustainable development of the agro-industrial complex. The relevance of the research is due to the insufficient applicability of existing mathematical models (Mono, Konto, Chen-Hashimoto, ADM1, etc.) to large-scale production conditions. These models were developed for laboratory conditions and require parameters that are difficult or impossible to measure in a real production process (e.g., bacterial concentration or inhibition coefficients). In response to this challenge, these studies propose a new regression model adapted to the specifics of production scale, using measurable physicochemical parameters. Within the framework of the work:

- A comparative analysis of existing models of anaerobic fermentation was carried out;
- 26 parameters influencing the biogas yield were determined, including macro- and microelements (Fe, K, Na, Zn, Cu, etc.), carbon, nitrogen concentrations, pH, temperature, humidity, acidity, substrate weight, degree of grinding, etc.;
- A linear regression model of biomethane yield was formed, allowing for real-time forecasts;
- A computer program with a user interface and a database for storing static information were developed;

- The foundations for creating an expert system for monitoring and visualizing the potential of biogas plants in Kazakhstan were laid.
- The practical significance of the study lies in the versatility of the proposed model: it can be used both in livestock farms and poultry farms, provided that initial measurements are available.

Biography

Dr. Kapan Shakerkhan graduated from Shakarim University in Semey city at the 2008 y. with a bachelor's degree in technical physics. Then, in 2014, he was awarded the academic degree of Master of Technical Sciences in the specialty of Computer Engineering and Software at the International IT University in Almaty. In 2022, he completed his doctoral studies at Alikhan Bokeikhan University in the specialty of Computer Science. In 2025, he successfully defended his doctoral dissertation at the Seifullin University in Astana for receiving the degree of PhD. In addition, he has published more than 22 research articles in SCI(E) journals.

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Environmental governance and ESG alignment in the petroleum sector: Advancing net-zero strategies through carbon accountability and climate risk integration

Advancing net zero strategies requires a comprehensive approach that includes accurate carbon accounting and integrating climate risks into business processes and investment decisions. This involves not only reducing emissions, but also managing the risks associated with climate change, as well as using renewable energy sources and improving energy efficiency. Accurate measurement and tracking of greenhouse gas emissions is needed at all stages of operations, including direct and indirect emissions. Companies should assess and consider physical risks (e.g. floods, droughts) and transition risks (e.g. changing legislation, new technologies) in their operations and investment strategies. Strategies for achieving zero balance:

- Reducing emissions: Switching to renewable energy sources, increasing energy efficiency, optimizing production processes.
- Emissions offsetting: Investments in carbon capture and storage projects or forest conservation projects.
- Mitigation: Developing products and services that are adapted to climate change.

Today, more than three billion people live in areas highly vulnerable to climate change, and more than one billion urban dwellers live in informal settlements. The impacts of climate change not only increase urban populations through displacement and migration caused by climate crises, but also exacerbate the socio-economic problems associated with urbanization. At the same time, cities are major contributors to climate change, as urban activities are the main source of greenhouse gas emissions. In 2020, Kazakhstan announced its goal to achieve carbon neutrality by 2060. In its updated Nationally Determined Contribution (NDC), Kazakhstan set a target to reduce GHG emissions by 25 percent by the end of 2030 compared to the 1990 baseline. The country aims to facilitate access to international technology transfer mechanisms, stimulate climate investment financing and participation in global research, promote the development of promising low-carbon technologies, and support initiatives to train local specialists. Most CO_2 emissions from the energy sector come from the combustion of fossil fuels such as coal, oil and natural gas to generate electricity or to fuel transport and machinery. As part of the decarbonization strategy, it is planned to bring utility tariffs closer to a level that ensures cost recovery, while the state will provide targeted assistance to vulnerable families. This will help

the country achieve its climate goals by stimulating private investment in renewable energy and energy efficiency technologies.

Biography

Dr. Kapan Shakerkhan graduated from Shakarim University in Semey city at the 2008 y. with a bachelor's degree in technical physics. Then, in 2014, he was awarded the academic degree of Master of Technical Sciences in the specialty of Computer Engineering and Software at the International IT University in Almaty. In 2022, he completed his doctoral studies at Alikhan Bokeikhan University in the specialty of Computer Science. In 2025, he successfully defended his doctoral dissertation at the Seifullin University in Astana for receiving the degree of PhD. In addition, he has published more than 22 research articles in SCI(E) journals.

Kelly Jenkins[1*], Jeremy Patterson[1], Evan Thompson[2], Paul Groth[1*], Tomas Bieda[1], Jake Carter[1]

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Embracing alternative technologies in well logging: A collaborative path

As the oil and gas industry addresses escalating safety, environmental, and operational challenges, there is an urgent need for innovative solutions that drive efficiency and sustainability. Traditional well logging methods, which depend heavily on radioactive sources such as Cs-137 and Am-241, not only pose health and regulatory complications but also hinder operational effectiveness with their complex handling and transportation requirements. This presentation invites industry stakeholders to collaborate with the Office of Radiological Security (ORS) within the US Department of Energy's (DOE's) National Nuclear Security Administrations (NNSA) and Oak Ridge National Laboratory (ORNL) to advance alternative technologies in well logging that can enhance operational benefits.

The longstanding reliance on radioactive instruments for data acquisition has significant drawbacks, including health risks to personnel and regulatory hurdles that can slow operations. However, emerging alternative and source-less technologies are proving effective for data collection, potentially providing broader insight into the makeup of potential and existing wells, eliminating the associated hazards and complexities of radiation, and presenting a transformative opportunity for industry advancement.

In this poster session, we will engage the industry in a dialogue about promising alternative technologies and discuss challenges, needs, and gaps in current practices. By reducing reliance on radioactive sources, we can improve operational safety and security, streamline compliance processes, and foster a more efficient working environment. The resulting discussions can also aid in aligning the requirements for adoption of alternative technologies, including new research and development opportunities.

We welcome professionals, researchers, and innovators from various sectors to share their insights and experiences related to alternative technologies in well logging during the poster sessions and invite them to inquire about the well logging working group currently under development. This session aims to facilitate an open discussion about the benefits and challenges of these innovations and highlight the collective needs that could shape future efforts.

Join us as we explore the transformative potential of alternative technologies in the well logging

sector. We will address the critical need for innovation, enjoy the advantages of collaboration, and forge pathways for effectively implementing these advanced methodologies across diverse operational settings. Your expertise and engagement are crucial as we work together to redefine the future of well logging, emphasizing key factors such as safety, operational efficiency, and environmental responsibility.

We look forward to your participation in this important conversation following a brief overview of the activities of ORS and ORNL as we strive to support the industry in achieving a new era of efficient, safe, and sustainable resource management.

Biography

Kelly Jenkins is a nuclear nonproliferation technical specialist at Oak Ridge National Laboratory, with 10 years of experience in the nuclear industry. Before joining ORNL, she served as a Nuclear Security Officer at the International Atomic Energy Agency. Her experience spans US Department of Energy complex including Pacific Northwest and Argonne National Laboratories, working in radiation detection for nuclear security and arms control, adversarial vulnerability assessments, and safeguards technology. She holds a master's degree in nuclear engineering, a bachelor's degree in mechanical engineering, and a bachelor's degree in applied physics.

Paul Groth is a subject matter expert in high-voltage design and accelerator physics, with a focus on high-voltage direct current designs, pulsed power, and cold cathode field emitters. He has more than 10 years of experience designing and building neutron and X-ray generators. He specializes in multiphysics simulation and manages multimodal sensor deployments and data pipelines for monitoring electrical substations across multiple sites in east Tennessee. He has a master's of science degree in electrical engineering and a bachelor's degree in mechanical engineering.

Lina Montuori
Institute for Energy Engineering, Universitat Politècnica de València, Valencia, Spain

Biomass-based technologies for the sustainable development of energy communities

Worldwide growing concern about the increase in total CO_2 emissions due to industrial and human activities is leading the way to the adoption of new sustainable strategies. International Energy Agency (IEA) has defined bioenergy derived by biological material as crucial for future low carbon energy system and a pivotal driver to meet European decarbonization targets. Biomass is attracting a great interest especially due to its versatility as renewable energy for energy applications ranging from traditional heat production for cooking, space heating to modern combined heat and power generation or biofuels production. Concurrently, energy communities have been recognized, under the clean energy for all Europeans package, as determining entities in achieving a more secure, affordable and cleaner energy system for the on-going energy transition by means of collective and citizen-driven energy actions able to increase public acceptance of renewable energy projects and attract private investments. In this framework, the present research study will show an overview of the latest advances in bioenergy production technologies and their possible integration in Hybrid Energy Systems (HES) as flexible resource for both energy supply and energy storage. Case studies about the use of biomass-based renewable systems within off-grid and grid-connected energy communities will be discussed. Several scenarios will be analyzed including organic rankine cycle biomass-based cogeneration plant cooperating with mini-hydro plant and a distributed photovoltaic system. Additionally, the significance of biomass in circular economy as renewable energy will be analyzed. Opportunities and challenges about its role as feedstock for bio-based energy production will be evaluated. Finally, new perspectives about trends, energy system modelling and multidisciplinary cooperation across nations to promote biomass-based energy communities will be provided.

Biography

Lina Montuori obtained her Ph.D. cum laude in Industrial Engineering and the MBA from the Polytechnic University of Valencia (Spain). Previously, she received her B.Sc. and M.Sc. cum laude in Industrial Engineering from the University of Naples “Federico II” (Italy) and then, an Executive Master in Digital Marketing and Analytics from the Catholic University of Avila (Spain). She worked at the Power Center for Utility Explorations of the State University at Buffalo (USA) and she has more than 15 years of a demonstrated track record of successful projects led at international top brand companies (Enel, Solaer Group, Toshiba Mitsubishi-Electric Industrial Corporation). At present, she holds the position of Professor at the Department of Applied Thermodynamics at the Polytechnic University of Valencia. Furthermore, she is senior researcher at the Institute for Energy Engineering (IIE) and Author, and Editor with multiple and relevant publications in high-impact journals.

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Biologically active compositions of humic acid copolymers and plant-based sorbents for remediation of oil-contaminated soils

This study is devoted to the evaluation of the efficiency of using composite compositions of biologically active polymeric forms of humic acid and carbonised rice husk (biochar, biochar) in the processes of oil-contaminated soil remediation.

High-quality sorbent of plant origin biochar 'Nanocarbosorb ERSH-1' on the basis of rice husk was developed by LLP NPTC 'Zhalin' (Republic of Kazakhstan, Almaty).

Due to its composition biochar improves soil structure, microorganisms viability, enriches the soil with nutrients, increases water capacity, water permeability and provides strong and healthy growth of plants. Due to its silica content it has a favourable effect on the growth of agricultural crops, is effective in preventing salt accumulation in the soil and harm from repeated sowing of one crop. Biochar, having high sorption capacity, effectively retains petroleum products, preventing their migration into plant tissues.

Polymeric forms of humic acids stimulate growth and development of plants, increase their resistance to various factors and non-specific stress effects.

Experimental studies were conducted on soils with oil content in the range of 0.2-20% mas. The efficiency of using carbonised rice husk as a purifying sorbent in complex with developed polymeric forms of humic acids and seed treatment with different components was revealed.

It was found that the joint treatment of soil with biologically active compositions accelerates the mass germination of seeds of perennial grasses of legume family (alfalfa, sainfoin) up to 4 days, promotes the formation of developed root system and ground systems of plants, increases the intensity of shoot growth. number and mass of leaves.

Grasses were distinguished by high stem growth and bright colour of leaves. The root system of alfalfa developed faster than the aboveground mass, with plant roots reaching 50 cm. The highest plant height values were observed in sainfoin (plant height reached 67 cm, root system length 28-50 cm), which is important for increasing forage crop yields.

The work was performed at the expense of the program-targeted funding of the Ministry of Science and Higher Education of the Republic of Kazakhstan for 2024-2026 [BR24992868].

Biography

Madina studied Chemical and Biochemical Engineering at Satbayev University and graduated with a bachelor's degree in 2023. In the same year, she continued her studies in a master's program specializing in Chemical Engineering of Hydrocarbon Compounds. During her undergraduate studies, she actively participated in scientific research and won first place in a student competition with her project on "Ionic Liquids in Motor Fuels." In 2022, she was awarded the Fleur scholarship. As part of her master's studies, she completed a research internship at Istanbul Gedik University, Turkey. She gained laboratory experience working as an assistant at the Engineering Profile Laboratory of Satbayev University. Currently, she holds the position of a chemist-laboratory assistant and junior researcher at the university’s research laboratory. Her research focuses on petroleum studies, oil purification technologies, and the remediation of biogeocenoses in Kazakhstan's ecology.

Manuel Alcázar-Ortega
Institute for Energy Engineering, Universitat Politècnica de Valencia, Valencia, Spain

Deployment of the concept of smart grid to the natural gas system: Management strategies and demand response applications

Power systems have been involved in the last years in a transformation in order to adopt the architecture of smart grid, where IT technologies are used to monitor, control and manage the different elements of the grid to turn it more efficient and cost effective. However, the concept of smart grid can be applied not just to the electrical system, but also to similar environments like the natural gas grid. Indeed, it is possible to stablish many analogies between the operation strategies of both energy networks. Here, this analogy is established according to some parameters in order to make possible applying management techniques that resulted successful in power systems to the operation of natural gas systems. In this context, mechanisms based on the flexibility of consumptions and the active participation of demand will be considered, identifying services where consumers would be able to participate in order to improve the efficiency of natural gas networks.

Biography

Dr. Alcázar-Ortega holds a PhD in Industrial Engineering (Polytechnic University of Valencia, UPV, Spain) and a PhD in Electrical Engineering (University of South Florida, USA). At present, he is an Associate Professor and Deputy Director of the Department of Electrical Engineering at UPV. Previously, he was also a professor at the State University of New York at Buffalo (USA). Within the Institute for Energy Engineering at UPV, he works on various lines of research related to the study of smart grids and microgrids, the characterization of energy consumer demand patterns, and the active participation of demand in electricity markets.

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Co-digestion of steam pretreated wheat straw and municipal sewage sludge at varying concentrations of solids

Wheat straw is one of the most abundant agricultural residues in the world and can be used for production of energy carriers, e.g. methane through Anaerobic Digestion (AD). In previous studies, stable co- digestion of steam-Pretreated Wheat Straw (PWS) and Combined Sewage Sludge (cSS), composed of Primary Sludge (PS) and waste activated sludge, was demonstrated for over 200 days. The aim of the study presented here was to explore if the specific methane production can be increased by using more concentrated PWS, through removal of part of the liquid after steam pretreatment. Further on, the aim was to evaluate if the Organic Loading Rate (OLR) can be increased by concentration of PS and if co-digestion of PWS and concentrated PS (PSc) results in a higher process stability than mono-digestion of PSc. By removal of water from the PS it would be possible to add PWS, with maintained substrate flow, to existing AD reactors at wastewater treatment plants. Wheat straw was ensiled with acetic acid for two weeks, steam-pretreated at 180°C for 10 min and fractionated. Four parallel anaerobic processes in completely stirred tank reactors were evaluated: A control reactor (R1) fed only with cSS (with an OLR of 2.1 gVS L^{-1} day^{-1} and HRT of 19 days) and three co-digestion reactors (R3, R4 and R5). Specifically, R3 was supplied with cSS and the Solid Fraction (SF) of PWS, (with an OLR of 2.1 gVS L^{-1} day^{-1} and HRT of 27 days); R4 received cSS plus PWS (with an OLR of 2.1 gVS L^{-1} day^{-1} and HRT of 25 days); and R5 was fed with PWS and PSc (8.8% TS) with an HRT of 47 and 35 days. In R5, the OLR was gradually increased from 2.1 to 2.8 gVS L^{-1} day^{-1}. All reactors started at room temperature (around 22°C) and were then gradually raised to 37°C. Preliminary results (after 2 sludge retention times) indicate a significantly higher specific methane yield from co-digestion of PWS and cSS, than previously reported. Like in previous studies the co-digestion of PWS and cSS is stable, with low concentrations of volatile fatty acids, without the use of any additives. Further on, co-digestion of PSc and PWS gives the highest specific methane production and methane productivity, so far. Co-digestion of PWS and cSS is a promising possibility for increased production of renewable methane from residues, using the existing infrastructure.

Biography

Maria Esther Medina Villafuerte earned her degree as a Chemical Engineer from Universidad Mayor de San Simón (UMSS) in Cochabamba, Bolivia, in 2015. She obtaining a Master's degree in Natural Gas Engineering in 2021 at UMSS. She is currently enrolled in the doctoral program in Energy, a collaboration between UMSS and the Swedish International Development Cooperation Agency (ASDI) that offers research cooperation programs. As part of this program, one of the requirements is to complete a study period at Lund University in Sweden. At present, she is working in the Division of Biotechnology at Lund University.

Masum Akter
Rystad Energy, Bangalore, India

Global lease rounds in 2025: A balanced outlook on frontier and mature exploration

Global oil and gas lease round activity in 2025 is poised to maintain a balanced focus between frontier and mature regions, as countries strive to either revive waning exploration or unlock underexplored basins to sustain long-term production. Approximately 47 licensing rounds across 33 countries are expected to conclude this year, despite a slight year-on-year decline due to geopolitical uncertainties and evolving policy landscapes. Early 2025 activity has already seen the conclusion of nine rounds and the award of over 96,000 km² of acreage, underscoring sustained investor interest.

Notable awards in early 2025 reflect the continued appetite for both onshore and offshore opportunities. Mongolia led frontier activity with a 40,000 km² onshore award in the Gobi Desert, while mature provinces such as Norway's APA round and Egypt's Mediterranean offerings saw consistent licensing. Onshore blocks made up nearly 68% of total acreage awarded in early 2025, though offshore areas—particularly in Malaysia, Turkiye, and Bulgaria—also attracted meaningful interest.

Asia has emerged as the most active region in terms of lease rounds, both in number and block size. India's OALP Bid Round X—the country's largest ever—spans nearly 192,000 km² across 25 blocks, while Malaysia's MBR 2025 and Pakistan's dual rounds reflect a broader push to unlock new reserves. In parallel, South America leads globally in total blocks offered, with Brazil dominating activity through the bulk of 374 blocks available across the region.

Meanwhile, Egypt, Indonesia, and the US are leading in frequency and scale of lease round execution. Egypt, for instance, is managing six rounds this year alone, bolstered by PSA offerings in the Mediterranean and Nile Delta. Indonesia continues to attract interest through direct offers and regular tender rounds, with the Kojo, Binaiya, and Gaea blocks under evaluation. The US maintains a steady schedule of lease rounds in Alaska and the Gulf of Mexico.

While global lease activity has faced disruptions from policy shifts and geopolitical tensions, several rounds remain under evaluation, including India's OALP IX, Guyana's offshore round, and Greece's long-awaited offshore tender. Africa's average block size remains high, driven by Algeria's offerings, while Asia continues to dominate by both volume and acreage.

The outlook for the remainder of 2025 indicates steady momentum in lease round activity, shaped by a blend of strategic upstream revitalization, favorable fiscal frameworks, and the pursuit of energy security. Despite cautious investor sentiment in some quarters, high-impact frontier acreage and re-emerging mature basins offer attractive exploration potential for companies seeking competitive advantage in a transforming energy landscape.

Biography

Masum Akter is an Energy Analyst at Rystad Energy, specializing in upstream oil and gas exploration with a focus on licensing rounds, frontier basins, and offshore activity trends. With over four years of experience in energy research and market intelligence, he has contributed to strategic insights for global E&P companies and national oil ministries. Masum holds a Master's degree in Applied Geology and is passionate about uncovering high-impact exploration opportunities, particularly across the Atlantic Margin. His work bridges data-driven analysis with industry foresight to support informed investment decisions in the evolving energy landscape.

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Hydrothermal carbonization of contaminated sorghum: Solid/Liquid product characterization

The safe valorization of Heavy Metals (HMs)-contaminated biomass from phytoremediation sites is challenging because it necessitates a certain strategy for the safe disposal of the contaminants. Hydrothermal Carbonization (HTC) presents a promising thermochemical method to treat HMs-contaminated biomass by converting it into hydrochar, which can then be used as a solid biofuel. This study focuses on producing clean Hydrochar (HC) by determining the optimal conditions for transferring HMs from Contaminated Sorghum (CS) to the liquid phase of HTC, while also characterizing the liquid phase, which may require further treatment. The main parameters studied were HTC temperature (180-200-220-240˚C) and exposure time (0.5-2-4 hours). Main results show that the High Heating Value (HHV) of Hydrochars (HC) increases from 20.6 to 25.5 MJ/kg as the reaction temperature rises from 180 to 240˚C. Conversely, the yield of HC decreases from 80% to 62% within this temperature range. Combustion parameters (Comprehensive Combustibility Index (CCI), ignition index (Di), Flammability index (F)) indicate that HC 200-0.5 is the most suitable hydrochar for solid fuel applications. The HTC Liquid Phases (LP) have an acidic pH of 3.96±0.08 due to the presence of carboxylic acids, which make up 56-89% of the composition at temperatures between 180 and 240˚C. Phytotoxicity evaluation of the HTC liquid phase reveal high toxicity, attributed to the elevated concentrations of phenolic compounds and heavy metals. The study concludes that efficient HMs transfer from CS to the HTC liquid phase can be achieved at a reaction temperature of 200˚C with exposure times between 0.5 and 2h. This offers promising potential for upgrading sorghum contaminated with heavy metals into a biofuel that meets international standards.

Keywords: Contaminated Sorghum, Heavy Metals, Hydrothermal Carbonization, Hydrochar, Liquid Phase, Parametric Study.

Biography

Mehrez Karima is a Ph.D. candidate at the Cyclann Research Unit, Unilasalle Rennes, University of Rouen Normandy, under the supervision of HDr. Nathalie LEBLANC, HDr. Hayet DJELAL, and Dr. Lydia FRYDA. Her research focuses on advancing sustainable solutions in the field of environmental sciences, with a particular interest in enhancing waste management and resource recovery processes. Karima has authored a review article, contributing to the current understanding of cutting-edge technologies in her field. In addition to her research, she actively participates in the governance of her research unit as a member of the Research Unit's Advisory Board. Karima is dedicated to integrating fundamental scientific research with practical applications to promote environmental sustainability.

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The impact of slow pyrolysis bio-oil as co-processing load in delayed coking unit based on chemical characterization of light gas oils via GC×GC-TOFMS

Bio-oil presents a significant opportunity to reduce fossil carbon emissions by up to 70 % during the production of renewable products. Co-processing bio-oil in fossil refining processes can diversify the energy matrix, aligning with the goals set forth by the Paris Agreement for energy transition, without the need to alter existing industrial facilities. This study investigates the effects on diesel/light gas oil composition, after co-processing slow pyrolysis bio-oil with vacuum residue in a delayed coking unit. A comprehensive chemical characterization was performed at the molecular level using comprehensive two- dimensional Gas Chromatography Coupled to Time-Of-Flight Mass Spectrometry (GC×GC-TOFMS). The analyses included a 100% fossil-based Light Gas Oil (LGO) and light gas oils obtained from co-processing with 5% (LGO5) and 10% (LGO10) slow pyrolysis bio-oil. GC×GC-TOFMS injections were performed using DB- 5/DB-17 column set and samples were diluted in a mixture of deuterated standards to internal standardization. Data acquisition and processing were performed with ChromaTOF® software, considering only compounds with a similarity above 80% and a 100:1 signal-to-noise ratio. LGO5 and LGO10 naturally separated into two phases due to density differences and were analyzed separately. The less dense fractions of LGO5 and LGO10 presented profiles similar to LGO, containing predominantly paraffins, olefins and non-aromatic and aromatic cyclic hydrocarbons. Among these classes, alkylcyclopentanes that were observed in the C9-C17 range in LGO (30.9 $mg.g^{-1}$), increased to C9-C20 in LGO5 (40.5 $mg.g^{-1}$) and to C8-C26 in LGO10 (64.9 $mg.g^{-1}$). This demonstrates the biogenic contribution to the LGO composition after the addition of bio- oil. In contrast, the denser fractions of LGO5 and LGO10 contain aromatic hydrocarbons such as alkylbenzenes and alkylnaphthalenes, but are mostly composed of oxygenates, including cyclic ketones (such as cyclopentenones), which are used as diesel additives to improve the cetane number of diesel. Phenols, benzenediols and sugars were also identified. These fractions can be reintroduced into the delayed coking unit or can be co-processed with other heavier petroleum-derived streams in hydrotreating units, as Fluidized Catalytic Cracking (FCC), to transform these compounds into products of greater economic interest or can also be used as a source of chemical inputs in future biorefinery plants. The application of the GC×GC-TOFMS technique to elucidate the individual molecular chemical composition of the samples revealed that the two fractions formed after the inclusion of bio-oil in delayed coking have potential application in refining processes. While the less dense fraction allows the inclusion of green carbon in light gas oil, the denser fraction can be reintroduced as a feedstock in delayed coking or in other refining processes such as catalytic cracking and

hydrotreating, offering new insights for the industry to convert the generated products into higher value-added compounds, with significant biogenic contributions.

Biography

MSc. Nathália Pontes completed her undergraduate studies in Chemistry at the Federal University of Rio de Janeiro, Brazil, and obtained a Master's degree in 2019. She subsequently joined the research group of Prof. Debora A. Azevedo at the Institute of Chemistry, specifically in the Environmental and Molecular Organic Geochemistry Laboratory (LAGOA) working with chromatography and mass spectrometry for the bio-oil and petroleum characterization and understanding.

Neeraj Singh
Hindustan Petroleum Corporation Limited (HPCL), India

Successful maximization of the feed rate of a diesel & VGO integrated unit from its original design operating capacity of 326 m^3/hr to 400 m^3/hr with the help of operational changes & innovations

This paper demonstrates the maximization of the feed rate of a distillate union fining process-based unit from 326 m^3/hr to 400 m^3/hr (122% of the design feed rate) without using any additional capex in terms of new equipment or new process. The study focuses on the integrated unionfining unit, which includes Diesel and VGO sections operated as a single unit. The unit operates in two modes: Co-processing and Diesel only. In Co-processing mode, it processes both VGO and Diesel, while in Diesel only mode, it processes diesel range feedstock. The reaction section consists of a VGO hydro treating section integrated with a Diesel hydro treating section in a high pressure loop. VGO reactor effluent provides heat for the DHT reactor feed, and a hot separator provides a clean, hydrogen-rich stream for DHT inlet gas. Diesel from diesel unionfining meets a sulfur specification of less than 10 ppm, while VGO is expected to meet less than 500 ppm. The unit processes feed mainly from FR/FRE CDU's and Light Cycle Oil (LCGO) streams from FCCU/New FCCU. The original plant capacity was 2.2 million tons per year with 8000 hours operating per year, revamped to an integrated unit without any change in capacity. The VGO section processes 176 m^3/hr of feed and the diesel section 150 m^3/hr in diesel only mode. The paper highlights constraints addressed to achieve the increased feed rate without compromising sustainability. It discusses strategies to optimize performance, improve efficiency, and ensure long-term operability. The results demonstrate the feasibility of scaling up the feed rate while maintaining operational integrity.

The maximization faced challenges, including high frequency of auto backwash filters and pre-filters' plugging. Strategies were developed to mitigate these issues. High auto backwash frequency spiked diesel product sulfur, leading to off-spec conditions. This was resolved by maximizing hot feed from upstream units, increasing preheat temperatures in both DHT trains and reducing fuel gas consumption in the furnace.

Operational challenges included flaring from the fractionator and flooding in the VGO Stripper. Strategies were developed to minimize flaring and prevent flooding. Fractionator overhead temperature was reduced from 153 Deg C to 130 Deg C, and stripping steam was reduced to prevent flooding in the VGO stripper.

Diesel product density and viscosity were adjusted by increasing XVGO and reducing DHT

operating pressure from 86 to 63 kg/cm^{2}g, leading to reduced hydrogen consumption and preventing quality giveaway. Increased LCGO addressed low diesel viscosity issues.

Recycle gas flow to REAC was maintained to keep velocity above 3m/s. With the increased feed to 400 m^3/hr, a new strategy was adopted to manage flow through REAC based on feed rate.

In summary, the paper details strategies developed to overcome challenges and optimize performance while maintaining mechanical integrity and sustainability.

Biography

Neeraj Singh, a seasoned chemical engineer, boasts 17 years of refinery acumen, adept at managing grassroots projects and operations. With extensive experience in Crude and Vacuum Distillation Units, notably at Bharat Petroleum Refinery at Bina for six years, he transitioned to HPCL Mumbai, excelling in Diesel Hydrotreating. Neeraj's pivotal role in pre-commissioning, commissioning, and leading the Diesel Hydrotreating Unit revamp underscores his technical prowess and leadership abilities. Neeraj Singh is also a certified Refinery Manager and BEE (Bureau of Energy Efficiency India)certified Energy Manager.

Neeraj Singh
Hindustan Petroleum Corporation Limited (HPCL), India

Reduction of CO_2 emissions in integrated VGO & diesel hydrotreater with energy reduction strategies & innovations

The Diesel Hydrotreater Unit (DHT) plays a crucial role in producing high-quality diesel by removing impurities and improving feedstock properties. As sustainability and cost-effectiveness become priorities, refineries are actively exploring strategies to enhance energy efficiency and minimize carbon emissions.

The DHT at HPCL (Hindustan Petroleum Corporation Limited) is uniquely complexed as an Integrated VGO & Diesel Hydrotreater Unit, processing both Vacuum Gas Oil (VGO) and diesel in separate reactors. There are two parallel trains of operation, one is having Vacuum Gas Oil as feed and the other one having Raw Diesel as feed. This integration increases operational intensity and energy consumption, making efficiency improvements particularly impactful.

This paper presents a set of impactful operational optimization initiatives undertaken in the Integrated Diesel Hydrotreater (DHT) unit, aimed at improving energy efficiency, reducing operating costs, and minimizing environmental impact. Key measures included hot feed maximization to reduce cold feed dependency, and the successful shutdown of one furnace through strategic operational adjustments without compromising throughput. Additional steps such as gas-to-oil ratio optimization, significant flare reduction, and stripping steam optimization were implemented to further enhance system efficiency. Export naphtha reduction was achieved by optimizing fractionator overhead conditions, while operational changes in the Sour Water Stripper (SWS) and Fractionator led to a substantial reduction in steam consumption—by nearly 80 tons per day.

Importantly, these improvements were realized without incurring any additional capital expenditure, making them highly cost-effective and immediately impactful. The absence of investment requirements enhances the attractiveness of these measures, especially from an operational sustainability standpoint. While this abstract highlights some of the most significant actions taken, it is important to note that several other optimizations were also implemented across the unit, each contributing cumulatively to the enhanced performance, energy conservation, and environmental responsibility of the DHT.

By implementing these changes—without any capital investment in new equipment or pipelines—annual savings of over 6,000 SRFT and CO_2 reduction of around 19000 kg/hr were

achieved annually. Beyond cost reduction, these initiatives align with broader sustainability goals by minimizing environmental impact while maintaining high operational performance.

In conclusion, optimizing energy usage in an Integrated DHT unit through strategic operational changes not only strengthens cost leadership but also advances sustainability in refining. These initiatives highlight the importance of continuous improvement and innovation in driving more efficient and environmentally responsible refinery operations.

Biography

Neeraj Singh, a seasoned chemical engineer, boasts 17 years of refinery acumen, adept at managing grassroots projects and operations. With extensive experience in Crude and Vacuum Distillation Units, notably at Bharat Petroleum Refinery at Bina for six years, he transitioned to HPCL Mumbai, excelling in Diesel Hydrotreating. Neeraj's pivotal role in pre-commissioning, commissioning, and leading the Diesel Hydrotreating Unit revamp underscores his technical prowess and leadership abilities. Neeraj Singh is also a certified Refinery Manager and BEE (Bureau of Energy Efficiency India)certified Energy Manager.

Nguyen Viet Quang Hung[1*], Nguyen Van Nha[2], Chu Thi Thanh[3], Nguyen My Quang Dzung[4]

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Vietnam coal and underground coal gasification in Red River Delta Coal Basin

Vietnam has abundant reserves of various types of coal. Coal in Vietnam is concentrated mainly in the Quang Ninh province. Quang Ninh coal sample is anthracite. Thai Nguyen coal sample is bituminous coal. Lang Son coal sample is brown coal. Thanh Hoa coal sample is brown coal. Ha Tinh coal sample is lignite. Nghe An coal sample is bituminous coal.

This paper also reports the Map of the Red River Delta coal Basin. The Red River Delta coal basin has an area of over 3,500 km2 located in the Hanoi trough stretching from Viet Tri (Phu Tho province) to Tien Hai (Thai Binh province), with a depth of (-) 3,500m an reserve is estimated about 210 billion tons of coal. Total in-situ coal gas reserves in Kien Xuong area (Thai Binh province) calculated to a depth of 1,500m is more than 2 billion m3. Hung Yen coal sample is brown coal. Thai Binh coal sample is brown coal.

In particular, the drilling results in the Pacific coastal area (outside the breakwater) found coal shallower than expected. The analysis results show that the coal is of good quality, low ash content (average 13.26%), high calorific value (average 6,890cal/g), high volatile matter (average 48.15%), low sulfur content (average 1.54%) (General Department of Geology and Minerals of Vietnam). Vietnam will apply Underground Coal Gasification (UCG) technology for Red River Delta coal Basin in the future.

When mining the water flows from the Quaternary layer to the Neogene layer. In addition, the soil and rock in the Red River Delta coal basin are very soft and porous, making excavation easy, but the ability to support the coal furnace is very difficult. In the Red River Delta coal basin, when digging a furnace, it is necessary to support the roof, the two sides and the ground.

This paper has drawn a panoramic picture of Vietnam coal and situation of underground coal gasification technology in the Red River Delta coal Basin.

Biography

Nguyen obtained bachelor's degree of Chemistry at Hanoi University of Science, Vietnam in 1995. He worked in Institute of Materials Science - Vietnamese Academy of Science and Technology (VAST) from 1995. He obtained Master 's degree of Hanoi University of Science, Vietnam in 1998. He was the only VIP of Petro Vietnam Conference in 2000. From March 2006 he worked in Centre of Severe Materials and Environment (CSME) – IFTECH – Institute of Mechanics (VAST). From April 2019 he became Director of CSME. He obtained Dr's degree of Mie University, Japan in 2023. He has published more than 37 research articles.

Nguyen Viet Quang Hung[1*], Nguyen Van Nha[2], Chu Thi Thanh[3], Nguyen My Quang Dzung[4]

[1]Centre of Severe Materials and Environment, Hanoi, Vietnam

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Potential and using geothermal, solar and wind energies in Vietnam

Vietnam is a tropical country in Southeast of Asian. The potentials of geothermal, solar and wind energies in Vietnam are large. This paper reports the potential and using situation of geothermal, solar and wind energies in Vietnam.

The first part of this paper reports a potential of geothermal is 14.6GW and 269 sources in Vietnam. It also reports a potential of geothermal in Vietnam by data about hot water sources by temperature and region in Viet Nam, summary of geothermal potential by regions in Vietnam, potential geothermal energy sources for electricity production in Vietnam (Institute of Energy). And situation for using of geothermal energy are 15 hot mineral streams in Son La, Tuyen Quang, Quang Ninh, Hai Phong, Ninh Binh, Hoa Binh, Binh Dinh, Quang Binh, Quang Nam, Da Nang, Ba Ria – Vung Tau, Lam Đong, Nha Trang, Phu Tho and Quang Ngai provinces of Vietnam.

The second part of this paper reports the potential of solar energy in Vietnam is about 1,677.5GW. Solar radiation intensity ranges from 897–2,108 kWh/m2/year (MOIT & AECID, 2015). It also reports the data about average sunshine hours monthly and yearly in some areas of Vietnam, average total radiation monthly and yearly in Vietnam, average sunshine hours monthly and yearly in coastal areas of Vietnam, average sunshine hours monthly and yearly in ocean areas of Vietnam, Daily variation of sunshine in Da Nang city of Vietnam, highest air temperature monthly and yearly in coastal areas of Vietnam, number of foggy days monthly and yearly in coastal areas of Vietnam.

Our research group manufactured the invertor of solar lights for pupils in areas without electricity grid and solar lights for agriculture of Vietnam, and the large size hot water-tank with PU layer to keep heat.

The third part of this paper reports a potential of wind energy in the mainland is 42GW and in the ocean is 609.8GW of Vietnam (Energy Association of Vietnam). It also reports power of wind energy in Vietnam during this time, Wind statistics for the North Sea area of Vietnam, Wind statistics in the Central Sea area of Vietnam, Wind Statistics in the Southern Sea area of Vietnam, Wind Statistics in the ocean of Vietnam.

Our research group created the global with small generator for making electric on the proof of houses by wind energy.

By these results this paper reports potential of geothermal energy, solar energy, wind energy and using of these energies in Vietnam.

Biography

Nguyen obtained bachelor's degree of Chemistry at Hanoi University of Science, Vietnam in 1995. He worked in Institute of Materials Science - Vietnamese Academy of Science and Technology (VAST) from 1995. He obtained Master 's degree of Hanoi University of Science, Vietnam in 1998. He was the only VIP of Petro Vietnam Conference in 2000. From March 2006 he worked in Centre of Severe Materials and Environment (CSME) – IFTECH – Institute of Mechanics (VAST). From April 2019 he became Director of CSME. He obtained Dr's degree of Mie University, Japan in 2023. He has published more than 37 research articles.

Noreddin Issa A. Mousa
Petroleum Research Center, Libya

Estimate for which type of clay minerals that more effect on electrical parameters of fluvial reservoir Sirte Basin Libya using petro-typing approach Global Hydraulic Elements (GHEs)

The main objective of this study is to estimate which type of clay minerals that more effect on electrical Parameters of Reservoir such as resistivity, saturation exponent, cementation and wettability using Petro typing approach Global Hydraulic Elements (GHE) in Sirte Basin Libya. Ther are many types of clay minerals effect on reservoir such as Illite, kaolinite, Smectite and Chlorite. The major clay mineral that more effect on electrical parameters of reservoir is Chlorite because the chemical composition of Chlorite is containing iron, and the iron is conductive also the resistivity log in well logging does not response when we have chlorite that means can not to be identify the Oil Water Contact (O.W.C) in the reservoir. One wells x1 have been selected from Sirte Basin Libya and seven core samples have been selected from various (GHEs) for detailed study. Petro typing (GHE) has been applied to identify the rock type distribution during the hole of reservoir, the special Core analysis properties have been used to identify the electrical parameters of reservoir also the petrography is very important to study the mineralogy and texture using Thin Section, SEM and XRD to identify the clay minerals during the hole of reservoir. The results showing excellent relation between electrical parameters. The type of clay minerals which was observed showing that the Global Hydraulic Elements GHE-2 and GHE-5 which are containing Chlorite is more effect on resistivity parameters such as saturation exponent, cementation, wettability and water saturation comparing with the other GHE's.

Keywords: GHE, Clay Minerals, Chlorite, XRD, Petro Typing, Reservoir.

Biography

Noreddin Issa A. Mousa received his BSc in Geological Engineering from faculty of Petroleum and mining engineering, Tripoli university Libya in 1985 and Master of philosophy (MPhil) in petroleum engineering from Institute of Petroleum Engineering Heriot Watt University Edinburg UK in 2008. Noreddin Mousa has 37 years' experience covered data interpretation including reservoir characterization, special core analysis, well logging, the integration between static and dynamic in reservoir simulation, several joint venture studies, familiar with the new technique of Global Hydraulic Elements Approach (Petro-typing) for sandstone reservoir which was development in institute of Petroleum Engineering Heriot Watt University Edinburg UK this technique is very important to integration between geology and engineering and some publication one of them is in SPWLA, PETROPHYSICS, VOL. 51, NO. 4 (AUGUST 2010); P. 264-270; 9 FIGURES; 5 TABLES and university teaching.

Pooriya Motevakel*, Daniel Dasí-Crespo Carlos Roldán-Blay, Carlos Roldán-Porta, Guillermo Escrivá-Escrivá

Institute for Energy Engineering, Universitat Politecnica de Valencia, Valencia, Spain

Integration of a biogas pilot plant in a Spanish rural environment: Challenges and opportunities

Rural communities can significantly benefit from biogas plants as sustainable solutions for waste management and local energy generation. The Micro4Biogas project, a collaboration between Universitat Politecnica de Valencia (UPV) and the municipality of Aras de los Olmos, investigates innovative microbiome management strategies in anaerobic digestion systems to enhance biogas production efficiency.

This presentation discusses the detailed analysis and integration of a pilot-scale biogas plant specifically designed to assess microbiome augmentation's effects on biogas quality, production efficiency, operational stability, and electricity generation. The plant includes two anaerobic digesters, each with a 3.4 m^3 capacity: A control digester operating with native microbiomes and a test digester enriched with external microbiomes. Key metrics such as Methane (CH_4), Carbon Dioxide (CO_2), and Hydrogen Sulfide (H_2S) concentrations were systematically monitored throughout multiple weeks of experiments.

Results highlighted that bioaugmentation significantly improved biogas quality by increasing methane content and reducing overall biogas consumption required for electricity production. However, the higher H_2S concentration introduced challenges related to equipment corrosion, necessitating advanced purification solutions. Additionally, tests involving incremental electrical loads demonstrated stable operation up to 725 W yet revealed practical limitations at higher loads, particularly around 1200 W, reflecting real-world constraints compared to the generator's nominal rating.

The presentation will explore operational challenges encountered, solutions implemented, and economic feasibility, emphasizing crucial issues such as substrate selection, operating temperature control, and effective H_2S management. Furthermore, it will discuss the potential replicability of this model in other rural communities, highlighting economic and environmental benefits and outlining considerations for broader implementation within distributed, sustainable energy systems.

Biography

Pooriya Motevakel is a Ph.D. candidate at Universitat Politecnica de Valencia (UPV), specializing in hybrid renewable energy and power systems operation. He holds a master's in electrical engineering from Amirkabir University of Technology, Iran. With over three years of experience designing high-voltage electrical substations, Pooriya has actively contributed to various industrial projects. His practical experience helps him address real-world issues in renewable energy integration. His current research focuses on optimizing biogas integration into hybrid systems to enhance rural energy reliability and sustainability. He has published a few articles in peer-reviewed journals and presented his findings at international conferences.

Prateek Upreti
Independent Researcher, United States

Carbon pricing: Challenges in upstream oil and gas economics

Nations worldwide are on a mission to decarbonize. Higher carbon pricing is now certain for any upstream project, which raises serious questions for investors. Carbon charges will transform the hydrocarbon sectors, affecting asset values and project economics. Therefore, upstream oil companies have already anticipated these changes and are building carbon costs into their financial models.

Mitigating the impact of carbon charges will be difficult to achieve. Businesses will need to take steps like adopting new technologies to reduce carbon cost. These costs will influence the project's economics and the ability to raise financing for the hydrocarbon producers. A high carbon price could discourage investment in upstream projects, pushing companies towards developing cleaner alternatives or more efficient extraction methods. Carbon pricing could also incentivize upstream companies to prioritize projects with lower carbon emissions, like natural gas, or even invest in carbon capture and storage technologies. This can also lead to investments in cleaner extraction technologies and a shift towards lower-emission sources.

In a global market with carbon pricing, companies with lower emissions will gain a competitive advantage. Carbon pricing can drive innovation in the oil and gas sector by encouraging the development of new technologies to reduce emissions. Upstream investments may also decline due to the uncertain future of rising carbon pricing as companies become more cautious about investing in projects that could incur higher costs in the future.

The carbon credits will add a cost to high-emitting operations, pushing businesses to seek ways to minimize emissions to avoid the need to purchase additional credits. To reduce emissions and lower the need for carbon credits, upstream projects may invest in new technologies like carbon capture, enhanced oil recovery methods with lower emissions, or develop cleaner energy sources.

Corporations might prioritize extracting and processing lower-carbon oil and gas reserves to naturally reduce their emissions footprint. Projects with lower emissions can gain a competitive

edge by selling carbon credits to higher-emitting competitors, or by commanding higher prices for their cleaner products. Carbon credit systems can stimulate research and development into new technologies and practice for reducing emissions.

The upstream sector faces several challenges and opportunities related to carbon pricing. A project that can adapt to a world that involves carbon pricing will have a greater chance of succeeding in the future energy transition. As the regulatory and economic landscape changes, businesses will need to focus on reducing emissions, innovating new technologies, and reinventing their business strategies.

Biography

Prateek Upreti studied Biotechnology at the G.B. Pant University in India where he graduated with Bachelor of Technology, after that he studied Master of Business Administration from the University of Arkansas at Little Rock in United States. He then worked for GTL Americas, an Oil and Gas company focused on producing liquid fuel from natural gas in the United States. He has published various peer reviewed papers.

Preeti Mehta Kakkar[1*], A. S. Mathur[2]

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Enhanced lipid production in *Schizochytrium* sp. Via synergistic chemical modulation

The study investigates methods to enhance the production of biomass, lipids, and Docosahexaenoic Acid (DHA) in *Schizochytrium* sp. MTCC 5890 using chemical modulators. Three modulators—sesamol (Ses), 6-Benzylaminopurine (6-BAP), and Ethylenediaminetetraacetic Acid (EDTA)—were tested for their effectiveness. The results showed that individually, 6-BAP and Ses improved biomass, lipid, and DHA production significantly. When combined, 6-BAP and Ses further increased these yields substantially, especially in continuous culture conditions, making it a promising approach for efficient production in a single reactor.

Biography

Dr. Preeti Mehta Kakkar is an Assistant Professor of Centre of Bioprocess and Biochemical, at Amity University, Noida, India. She worked as research leader for more than 10 years at DBT-IOC, Indian Oil Corporation Limited, Faridabad, India. She and her lab integrated gas fermentation with aerobic process and developed novel two stage integrated pilot scale bioprocess approaches for the production of green, sustainable biobased fuels, nutraceuticals i.e. omega 3 fatty acids, carotenoids, antioxidants etc using renewable bioresources such as waste raw materials, waste flu gas, algae, yeast, bacteria, protists, in the “Circular Bioeconomy” concepts. They work closely with industries worldwide and their R&D work has now ready for scale up for demonstration. With her experience and background skills, she had been privileged to work at international labs under award of prestigious Endeavour Post Doctoral by Australian Government in the year 2018. She has 28+ publications in peer reviewed journals with 4 granted international patents, several awards/fellowships to her credit.

Qi Wei*, Zhongyang Luo, Haoran Sun, Liwen Du, Jingkang Shi, Qian Qian

State Key Laboratory of Clean Energy Utilization, Zhejiang University, Hangzhou 310027, PR China

Process simulation and comparative techno-economic analysis of enhanced biomass-to-aviation fuel pathways: Pyrolysis and gasification strategies

Bio-based fuels are increasingly recognized as crucial solutions for mitigating carbon emissions and facilitating the transition to sustainable energy systems. This study focuses on enhancing two prevalent thermochemical biomass conversion pathways and establishes a comprehensive comparative framework. The first pathway involves an advanced pyrolysis-upgrading system that incorporates two-stage catalysis with mid-process methanol supplementation. The second pathway is a modified gasification-Fischer-Tropsch process that integrates olefin oligomerization to enhance aromatic content. The comparative analysis indicates that both pathways exhibit similar energy conversion efficiencies, with pyrolysis achieving 40.53% and gasification achieving 39.96%. The slightly lower efficiency of the gasification pathway is primarily due to its suboptimal olefin selectivity. From an economic perspective, the gasification pathway demonstrates a 17.2% cost advantage, with a Minimum Fuel Selling Price (MFSP) of €1,250.38 per ton compared to €1,510.79 per ton for the pyrolysis pathway. The high methanol consumption in the pyrolysis system is identified as the main factor contributing to its elevated MFSP. Further analysis on process scaling reveals that a biomass throughput of 1,200 tons per day is the critical threshold for both pathways to minimize scale-related cost penalties. The sensitivity analysis highlights that reducing methanol prices is crucial for improving the economic viability of the pyrolysis technology, while catalyst optimization is essential for enhancing the gasification system. These findings provide valuable insights for the selection and optimization of biomass-to-fuel conversion routes. The study offers a robust methodological framework for process comparison and offers practical recommendations for the technological development and commercial-scale promotion of bio-aviation fuels produced through pyrolysis and gasification. By addressing key technological and economic challenges, this research contributes to the advancement of sustainable energy solutions and supports the broader goal of reducing carbon footprints in the aviation sector.

Biography

Qi Wei is a Ph.D. candidate at the National Key Laboratory of Energy Efficient and Clean Utilization, Zhejiang University, supervised by Prof. Luo Zhongyang. Her research centers on advanced biomass energy utilization technologies, aiming to enhance the efficiency and sustainability of bio-based energy systems. She has co-authored 6 SCI-indexed papers and 1 EI-indexed publication, highlighting her contributions to cutting-edge research. Additionally, she has actively shared her findings at three domestic academic conferences. With a focus on bridging fundamental science and practical applications, Wei strives to advance renewable energy solutions for a low-carbon future.

Raquel Vieira Santana da Silva[1*], Nathalia dos Santos Pontes[1], Vitor Loureiro Ximenes[2], Adriana Moret Borges[2], Andrea Rezende Pinho[2], Débora de Almeida Azevedo[1]

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Co-processing bio-oil in conventional refineries: A pathway to sustainable energy transition

The insertion of biogenic raw materials into conventional refineries is a promising option to increasing the green carbon content of traditional fuels and products. Co-processing low carbon footprint bio-oils with petroleum derivatives can be a faster way to decrease greenhouse gases emissions through small modifications in the oil refining existing infrastructure. However, the influence of bio-oil inclusion in the typical processes of conventional oil refineries is still understudied. This work aimed to perform individual chemical structural elucidation via comprehensive two-dimensional Gas Chromatography Coupled to Time-Of-Flight Mass Spectrometry (GC×GC-TOFMS) of liquid products from wood pyrolysis Bio-Oils (BO) co-processed with Vacuum Residue (VR) in two units: the delayed coking process and the pentane solvent deasphalting process. Effluents from delayed coking were obtained using three batch loadings: (A) 100% VR, (B) 95% VR and 5 % BO; and (C) 90% VR and 10 % BO. The effluents were then distilled, and three cuts were obtained: naphtha (up to 150˚C), light gasoil (150-380˚C), and heavy gasoil (+380˚C). The solvent deasphalting process was made by liquid-liquid extraction of BO and VR blend (1:1) with pentane at 65˚C and 200 psi, and two fractions were produced: deasphalted oil and asphaltic residue. Using GC×GC-TOFMS, an advanced analytical tool, it was possible to identify at the molecular level the contribution of bio-oil in different traditional fossil streams. The biomass-derived carbon inclusion in the delayed coking batch promoted the reduction of alkane, olefin, and alkyl-thiophene concentrations in the effluents. Biogenic C1-alkyl-cyclopentenones (42.7 µg g^{-1}) and C1-C3 alkyl- cyclopentenones (392.3 µg g^{-1}) were detected in effluents B and C, respectively. These cyclic ketones from BO can be a good additive for fossil fuels, due to their high resistance to auto-ignition characteristics. After distillation, a greater BO contribution was observed in light gasoils. The pentane solvent deasphalting process extracts mainly the apolar compounds as aliphatic and aromatic hydrocarbons, whereas the mid-polar to polar ones are partitioned in both phases, with the low molecular mass polar compounds observed in a greater proportion in deasphalted oil. Thus, coprocessing BO with the VR inserted renewable molecules in the deasphalting fraction, which aims to recover lower molecular-weight fractions that can be used to produce valuable byproducts. Deasphalted oil containing green (or biogenic) carbon can be readily co-processed in FCC units, whereas the presence

of renewable molecules in the asphaltic residue demonstrated an improvement in bioasphalt stability compared to petroleum asphalt cement. Thus, co-processing biomass-derived carbon in conventional oil refining steps increases the green carbon content and represents a viable pathway for a sustainable energy transition.

Biography

Dr. Raquel Vieira Santana da Silva is a researcher at the Federal University of Rio de Janeiro (UFRJ), specializing in analytical and organic chemistry. She holds a Ph.D. in Chemistry from the Federal Fluminense University (UFF) with a research period at the Polytechnic University of Valencia, Spain. Her expertise includes chromatography and mass spectrometry for bio-oil and petroleum analyses. She has contributed to sustainable processes for biomass, urban and industrial waste valorization. Dr. Silva is actively involved in research on renewable energy sources and the integration of bio-oil into conventional refining.

Rishiraj Goswami*, Debanuj Khound*, Partha Protim Saikia

Oil India Limited, Digboi, Assam, India

Proactive sand management using machine learning: A predictive approach to well intervention optimization in a major brownfield of upper Assam Basin

Sand production in oil and gas wells leads to equipment erosion, increased maintenance costs, and production inefficiencies. Traditional sand control methods are reactive, resulting in unplanned shutdowns and high intervention frequency. This study leverages Machine Learning (ML) techniques to identify high-risk wells and forecast sand accumulation trends, enabling predictive intervention planning. By integrating data-driven insights with field validation, this research aims to optimize well interventions, reduce downtime, and enhance production efficiency in a major brownfield of Upper Assam Basin.

This study applies a structured ML framework to analyse sand production trends and optimize intervention strategies. The process begins with feature selection, incorporating key production parameters such as oil rate, water cut, gas rate, well age, depth, and historical sand production data. Wells are categorized into low, medium, and high sand production risk using unsupervised clustering techniques, enabling risk-based intervention prioritization.

To complement clustering, a regression-based predictive model is employed to estimate sand fill-up rates, allowing operators to anticipate sand accumulation trends and schedule cleanouts before production losses occur. Validation is performed using historical intervention records and field data. The effectiveness of clustering is assessed using the Silhouette Score and Davies-Bouldin Index, while regression models are evaluated with standard error metrics.

The ML-driven classification aligns well with historical intervention records, validating its reliability in identifying sand-prone wells. The clustering model successfully differentiates wells based on sand accumulation risk, forming the basis for a data-driven intervention matrix. Regression-based forecasting provides accurate predictions of sand fill-up rates, enabling operators to schedule proactive cleanouts and optimize resource allocation. Early field implementations in a major brownfield of Upper Assam Basin have demonstrated that timely, data-driven interventions can substantially improve maintenance scheduling, reducing the frequency of unplanned shutdowns and mitigating production losses. This integrated framework, continuously refined through real-time field data feedback, leads to improved well performance, extended equipment lifespan, and overall operational efficiency, thereby supporting sustainable asset management.

Biography

Rishiraj Goswami is a petroleum engineer with a master's degree in petroleum engineering and eight years of experience in the oil and gas industry. He is currently a Superintending Engineer (Production) at Oil India Limited and has previously worked with Reliance Industries Limited and Essar Oil and Gas Exploration and Production Limited. His expertise spans production optimization, well completion, and workover operations. With a keen interest in AI and machine learning, he is exploring their applications in upstream oil and gas, focusing on predictive analytics, production enhancement, and flow assurance challenges. Rishiraj is passionate about integrating data-driven solutions to improve operational efficiency and is actively involved in research and innovation in petroleum engineering.

Mr. Debanuj Khound is a Mechanical Engineering graduate with over 13 years of experience in the oil and gas industry. His professional journey covers well intervention, well stimulation, surface production facilities' operation and maintenance, production optimization, and HSE compliance. In addition to his operational expertise, he has received specialized training in crisis management. He brings with him a strong blend of technical knowledge, hands-on experience, and a commitment to safety and efficiency.

Rukiye Oztekin
Dokuz Eylül University, Turkey

Photocatalytic decontamination petrochemical wastewater via ZnO/TiO_2/GO nanocomposite: Operational conditions and electrical energy consumption

ZnO/TiO_2 anchored on a Reduced Graphene Oxide (rGO) ternary nanocomposite heterojunction was synthesized *via* the multi-step method including hydrothermal, solvothermal and sol–gel methods. XRD, Raman, FESEM, EDX, Dot Mapping EDS, BET, FTIR, UV-VIS, TGA, and EIS techniques were utilized for characterizing as-synthesized catalysts. The XRD and Raman data proved the formation of anatase phase TiO_2 and wurtzite phase ZnO in the prepared samples. Further, the UV-Vis spectrum confirmed that the band gap value of ZnO/TiO_2 diminished on introduction of graphene oxide. Photocatalytic performance of the fabricated catalysts was investigated by decontamination of Polychlorinated Biphenyl (PCBs), Perfluorinated Compounds (PFCs), Brominated Compounds (BFR), dioxins and furans in petrochemical wastewaters. The effect of different operational factors such as pH, catalyst dosage, phenol concentration, and light illumination was investigated to find the optimum decontamination conditions. According to the results, complete degradation of Polychlorinated Biphenyl (PCBs), Perfluorinated Compounds (PFCs), Brominated Compounds (BFR), dioxins and furans were achieved at pH=4, catalyst dosage of 0.6 g L–1, light intensity of 150 W, and initial pollutant concentration of 400 ppm at 40 min under visible light illumination. With the addition of graphene oxide to the composite, a significant increase was detected in the photocatalytic performance due to the higher available surface area and lower electron/hole recombination rate. In addition, the scavenging experiments revealed that the ·OH is responsible for the degradation of all pollutants during the reaction. The degradation mechanism, economic performance, mineralization, and recyclability were also investigated. Kinetic studies confirmed that photocatalytic degradation process followed the pseudo-first-order kinetic model. A case of real wastewater treatment was used to examine the performance of the catalyst for real case studies.

Biography

Dr. Rukiye Öztekin is currently working as a Researcher at Dokuz Eylül University, Department of Environmental Engineering, İzmir/Turkey. She completed her undergraduate education at Ondokuz Mayıs University, Department of Environmental Engineering, Samsun/Turkey. [B.S. (Eng)]. She studied her master education at Dokuz Eylül University, The Graduate School of Natural and Applied Sciences, Department of Environmental Engineering, İzmir/Turkey. (MSc.). She completed her doctorate education at Dokuz Eylül University, The Graduate School of Natural and Applied Sciences, Department of Environmental Engineering, İzmir/Turkey. (Ph.D.). She completed her post-doctorate education at The Scientific and Technological Research Council of Turkey (TUBITAK) the Department of Support for Scientists (BİDEB) 2218-Domestic Postdoctoral Research Scholarship Program with a scholarship postdoctoral researcher, (Post-Dr.) at Natural (World) Sciences Program. She has many international publications

Selim S. Shaker Ph.D.
Geopressure Analysis Services, Houston, TX, USA

Drilling challenges worldwide due to the geomechanics misconception

Safe drilling operation is contingent on the mud weight tolerance to the permissible drilling window. Usually, the drilling window is dictated by the difference between the fracture pressure and the subsurface formation pressure. Pore Pressure Prediction (PPP) is the foundation of estimating the drilling window especially in Deepwater Wildcats. The limits of this window are subject to scrutiny by governmental and safety agencies especially with Deepwater regulators. PPP takes place before drilling the exploratory wildcat. Applying the effective stress modelling technique is the most successful and common method to predict subsurface pressure (derived from extracting seismic velocity).

Geomechanics is the backbone of forecasting and calculating PPP. Most of the PPP estimations and software settings are designed based on the general assumption that the principal stress (S1) is equal to the Overburden. Applying the conventional geomechanical setting of S1> S2 > S3 in non-extensional geologic structural setting can lead to unintended PPP calculation pitfalls. This can take place in Salt basins, tectonics plates, shale diapirs, compressional tectonic areas where the stress vectors exchange their positions. Some of the wide-ranging drilling challenges related to misinterpreting the PPP profile are:

- Assuming the subsurface pressure column is divided into normal hydrostatic and abnormally pressured (geopressured). This can cause PPP modelling defect. The recent subsurface research considers the presence of four compartments instead of two. This is proven worldwide especially in clastic active sedimentary basins where shallow water and mud flow takes place.
- Geopressure compartmentalization causes the sudden pressure increases between seals and reservoirs. This should be incorporated in PPP modelling process. It is a common cause of kicks and blow outs especially in HC bearing formations.
- Calibrating PPP models in real time utilizing measured pressure in reservoir beds (RFT, MDT .etc.).
- The Narrow safe drilling window in deep water can cause serious loss of circulations, stuck-drill pipes, side tracks and bypasses. These challenges are widespread in the Deepwater Salt Basins. Adding extra casing shoes and liners, as a result, is costly and leads to NPT (Non-Productive Time).

To overcome some of these issues and avert the unsought surprises:

- Geomechanical–Pore pressure prediction models should be tailored to the geological building blocks as their basic numerical output.
- Sequence Stratigraphy in collaboration with seismic velocity shed light on high versus low Pressures Gradient (PG) areas. Kicks, flows and mud cuts take place in high PG sections, whereas Loss of Circulations (LOC), sticking and stuck pipes take place in low PG section.
- Real time modification of mud weight against the bore-hole breathing is important for drilling a successful safe bore hole.
- Dual Gradient Drilling is designed to reduce the drilling mud pressure in the annulus zone to avoid LOC, formation break-down and reduces the number of casing seats needed to reach TD in Deepwater.
- Managed Pressure Drilling requires additional equipment to be assembled and synchronized with the drilling rig mud life line. It has its pros and cons as well.

Biography

Dr. Selim Shaker is a Principal Consultant for Geopressure Analysis Services (G.A.S). He has over 40 years in the oil industry with worldwide exploration experience in North America (in particular the Gulf of Mexico), South America, Egypt, NW Australia, Algeria, North Sea and China. He established G.A.S after retiring from Phillips Petroleum after 20 years of service as a Senior Exploration Geologist. He has published over 50 papers and articles regarding pressure predictions and its impact on exploration success or failure and drilling challenges. He received his Ph.D. from Assiut University, Egypt and Diploma in Hydrogeology from Prague University/UNISCO.

Shankar Lal Dangi*, Shruti Malik, Mayur Pal
Department of Mathematical Modelling, Kaunas University of Technology-KTU, LT-51368 Kaunas, Lithuania

Improving oil recovery in Lithuanian hydrocarbon reservoirs using methods like surfactant and CO_2 injection

This study explores improved and enhanced oil recovery methods aimed at addressing production decline and improving injection efficiency in Lithuania's hydrocarbon reservoirs. These reservoirs, characterized by an oil-wet nature, suffer from limited water-flooding efficiency, which hinders oil recovery. The analysis is based on field data from a depleted Hydrocarbon reservoir located in the Baltic Basin, at a depth of approximately 2 km. This field has been in production since the early 1990s and under water-flooding for pressure maintenance since the 2000s. However, production has steadily declined over time. Wettability assessments, including the water droplet method and calcite plate tests, confirmed the oil-wet nature of the reservoir rocks, with the Amott Wettability Index (IAH) for rock plugs showing values of –0.723 and –0.741, indicative of a strong oil-wet condition.

CO_2 has already been identified as a method of EOR for the field with lab and field testing conducted. In this study we further investigate improving recovering using a combination of analytical screening and machine-learning approaches for most viable EOR methods. Based on these analyses, in addition to CO_2 injection, techniques such as Low Salinity Water (LSW) flooding, Surfactant-Polymer (SP) flooding, and Alkali-Surfactant-Polymer (ASP) flooding were identified as potential candidates. Several surfactant formulations were tested to evaluate their impact on fluid injectivity, with a focus on understanding the mechanisms of wettability alteration. Surfactant injection was found to alter the wettability of the reservoir rock from oil-wet to water-wet, significantly improving water-flooding efficiency and oil mobilization. Experimental results showed that, on average, for every 6 barrels of water injected, 1 additional barrel of oil is produced. A 10% improvement in injectivity through surfactant injection could potentially replace the need for additional water injection wells, leading to significant operational cost savings.

Given the promising results from screening and experimental testing, it is recommended to proceed with core flooding experiments to further investigate the potential of surfactant-based EOR methods. Field trials, including Single-Well Tracer Tests (SWCTT) and log-inject-log techniques, will provide further insights into the efficiency of surfactant injection for improving injectivity, recovery, and cost-effectiveness in this heterogeneous, oil-wet reservoir. This research offers a practical solution to improve recovery rates and reduce operational costs in challenging oil-wet reservoirs. Additionally, the use of machine learning for EOR selection provides a robust, data-driven framework for optimizing oil recovery strategies, benefiting both

field operators and researchers seeking to apply advanced methods to similar reservoirs.

Biography

Mr. Shankar Lal Dangi, a Ph.D. researcher in Mathematical Modelling at Kaunas University of Technology, Lithuania, holds an M. Tech. in Petroleum Engineering from IIT (ISM) Dhanbad, India. His work explores hydrogen production and storage in Lithuania, focusing on depleted hydrocarbon deposits and saline aquifers, with interests in CO_2 sequestration, AI in reservoir simulation, EOR, and geothermal energy.

Sivakaman Ganapathy
Hindustan Petroleum Corporation Limited (HPCL), Mumbai, Maharasshtra, India

Addressing NSU/NHT/CCR light naphtha cooler leak without production downtime: A strategic approach to unit asset integrity, emissions mitigation, and cooling tower safety at HPCL Mumbai refinery

Objectives/Scope: This paper presents a strategic, environmentally conscious response to a critical leak in the light naphtha cooler (101E1002) within the NSU/NHT/CCR unit at HPCL Mumbai refinery. The incident posed significant risks not only to operational continuity but also to environmental emissions and cooling tower integrity. The objective was to implement an innovative mitigation plan that preserved continuous production, prevented hydrocarbon ingress into the cooling water system, and minimized environmental emissions, all without requiring a unit shutdown or feed rate reduction.

Methods/Procedures/Process:

Operational Context and Leak Diagnosis

The GFEC section of HPCL Mumbai Refinery, including NSU/NHT/CCR, NHT/ISOM, and PRIME G units, plays a vital role in Motor Spirit (MS) production. In the NSU, straight-run naphtha is fractionated into light and heavy cuts. The excess light naphtha (~35 TPH) is typically routed to storage via the seawater-cooled exchanger 101E1002.

Detection of a hydrocarbon leak in 101E1002 raised immediate concerns regarding environmental emissions and cooling water contamination. Given the lack of isolation mechanisms, conventional corrective measures—such as unit shutdown—were not viable without incurring high operational and environmental costs.

Strategic and Environmentally Focused Mitigation

A process-engineered solution was implemented by rerouting excess light naphtha through the benzene reduction side draw stream using the alternate cooler 101E2001. This eliminated dependence on the leaking exchanger and enabled immediate emission control and environmental protection. The approach involved:

- Management of Change (MOC) with detailed engineering validation to ensure emission-safe operation and process integrity.

- Real-time adjustments in side draw flow rates to balance benzene levels and avoid process inefficiencies or additional emissions.
- Continuous environmental and operational monitoring to ensure emissions compliance and system stability.

Results/Observations/Conclusions: The rerouting strategy was successfully implemented within a seven-day window, achieving the following outcomes:

- Uninterrupted MS production, avoiding estimated losses of INR 123 crores.
- Prevention of hydrocarbon ingress into the cooling tower, effectively eliminating a potential source of Volatile Organic Compound (VOC) emissions.
- Maintenance of air and water quality compliance by mitigating unplanned hydrocarbon release into environmental streams.
- Enhanced operational flexibility and reduced emissions through optimized benzene management.

This case demonstrates how proactive engineering and environmental stewardship can converge to resolve refinery integrity issues without sacrificing production or sustainability goals.

Novel/Additive Information: The intervention highlights a replicable, emissions-conscious framework for managing equipment integrity failures in hydrocarbon facilities. By strategically realigning flow paths and maximizing existing infrastructure, the solution not only ensured process safety but also supported HPCL's broader environmental performance targets. The methodology offers valuable insights for refineries seeking to align reliability initiatives with emissions mitigation and environmental compliance imperatives.

Biography

Sivakaman Ganapathy completed his graduation in Chemical Engineering and currently working as the Section Head for the NHT/CCR unit at HPCL Mumbai Refinery., India. Previously, I was associated with Essar Ltd., overseeing operations in the MS block, and also gained experience at SPIC. I bring a total of 18.5 years of expertise in the industrial sector.

Sivakaman Ganapathy
Hindustan Petroleum Corporation Limited (HPCL), India

Resolving NHT separator LCV block valve issue online without impacting production while achieving energy savings through flaring mitigation

Objectives/Scope: This paper presents an advanced online troubleshooting methodology to resolve a malfunction in the NHT Separator Level Control Valve (LCV) block valve at HPCL Mumbai Refinery. The primary objectives are to optimize flaring control, maintain pressure stability, and mitigate operational disruptions without necessitating a unit shutdown. By deploying a temporary bypass scheme and a structured valve replacement strategy, the approach ensures continuous production while achieving substantial cost savings and environmental benefits.

Methods, Procedures, Process: The troubleshooting strategy involved a multi-stage approach to execute the valve replacement under live plant conditions. A detailed risk assessment and technical feasibility analysis were conducted to evaluate the operational impact and safety constraints. A strategic temporary piping configuration was designed to facilitate controlled fluid diversion and maintain system stability. The malfunctioning upstream block valve was replaced in a methodical stepwise manner during a low-feed window, ensuring minimal process disturbances. Post-replacement, separator pressure regulation mechanisms were fine-tuned to restore optimal performance. This methodology leveraged precision engineering and real-time process control adjustments to mitigate risks while maintaining refinery throughput.

Results, Observations, Conclusions: The implementation of this troubleshooting methodology resulted in a significant reduction of hydrogen flaring by 500 kg/hr, translating into annual cost savings of approximately ₹95 crore. Enhanced separator pressure control minimized level fluctuations, improving overall process stability and operational reliability. By eliminating uncontrolled passing through the separator pressure control valve bypass block valve, energy losses were mitigated, and emissions were significantly reduced, aligning with environmental compliance requirements. The success of this intervention underscores the efficacy of proactive maintenance strategies in preventing unplanned shutdowns and optimizing refinery performance.

Novel/Additive Information: This paper introduces a novel approach to online troubleshooting and component replacement in high-pressure refinery systems without interrupting operations. By integrating advanced engineering solutions with a structured execution methodology, this approach provides a benchmark for enhancing process reliability and sustainability in

petroleum refining. The insights gained from this study contribute to the evolving best practices for operational excellence in refinery troubleshooting and flaring control.

Biography

Sivakaman Ganapathy completed his graduation in Chemical Engineering and currently working as the Section Head for the NHT/CCR unit at HPCL Mumbai Refinery, India. Previously, He was associated with Essar Ltd., overseeing operations in the MS block, and also gained experience at SPIC. He bring a total of 18.5 years of expertise in the industrial sector.

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Processing of advanced bioenergy crops using Natural Deep Eutectic Solvents (NADESs) for sustainable biorefinery developments

Continuous exploitation of fossil resources and increasing energy consumption have urged the worldwide scientific community to look for a new alternative renewable feedstock for the production of bio-based materials, fuels, and chemicals. In view of this, a newly developed transgenic crop, i.e., oilcane, has been genetically engineered to accumulate vegetative lipids and carbohydrates in their plant tissues, thus can be considered as an alternative feedstock to cater for the enhanced biofuel yield by providing lipids along with cellulosic sugars for largescale biodiesel and bioethanol production. However, these components are entrapped in a highly recalcitrant lignin-carbohydrate matrix, which limits the efficient recovery of these components from transgenic crops for their downstream processing. Thus, Natural Deep Eutectic Solvents (NADES), a combination of Hydrogen Bond Donor (HBD) and Hydrogen Bond Acceptor (HBA), have demonstrated exceptional solvent characteristics, an alternative to conventional organic solvents and benefited with easy preparation, low toxicity, high biodegradability, and high fractionation efficiency. NADES can act as adjuvants for weakening the lignin-carbohydrate recalcitrance matrix at the desired temperature of 100 to 160˚C and pretreatment circumstances while enhancing lignin solubilization. Thus, herein, we have synthesized several choline chloride-based NADES using bio-derived precursors, i.e., lactic acid, oxalic acid, glycerol, ethylene glycol, acetic acid by varying the molar ratio of HBD and HBA (1:1, 1:2) at 60 to 80˚C and were further employed for the pretreatment of oilcane bagasse for the fractionation of lipids and carbohydrates. Compositional analysis showed that oilcane bagasse is enriched with 3.3% of total lipids and 51% of carbohydrates. The initial study showed that the suitable eutectic combination of NADES, i.e., choline chloride and lactic acid in a 1:1 molar ratio at 60 to 80˚C, could effectively solubilize >80% lignin while enabling high biomass digestibility (>85%), and enhance lipid recovery (>80%). The research findings would further promote the design and fabrication of low-cost, environmentally friendly, biodegradable NADES-assisted pretreatment for enhanced lipid and sugar recovery from transgenic oilcane for renewable production under a circular biorefinery.

Keywords: Bioenergy Crops, Biofuels, Fermentation, Lignin, Green Solvents, Eutectic Solvents.

Biography

Dr. Tirath received his PhD in Chemistry from the Indian University of Petroleum and Energy Studies. He has more than 10 years of expertise in the field of environmentally friendly biomass processing for the generation of fuels and chemicals at the laboratory and pilot scale while working at the greatest laboratories in the world in India, South Korea, and the United States. Presently, he is working as a post-doctoral research associate at the University of Illinois in Urbana-Champaign, Illinois, USA, where in the majority he is involved in the development of efficient bioprocess for the conversion of bioenergy crops for chemicals, biofuels, and other bioproducts at CABBI, the fourth Bioenergy Research Center supported by the US Department of Energy. Scientifically, he has contributed >45 publications in peer-reviewed international review journals, co-invented 3 international patents, coauthored 3 books, and served as an editorial board member of three reputed Journals.

Vishal Dhar*, Subrata K. Majumder, Pankaj Tiwari

Department of Chemical Engineering, Indian Institute of Technology, Guwahati, Assam, India

Viscoelastic and flow properties of CO_2 foams stabilized by surfactant–nanoparticle systems

Foams have emerged as a promising method for gas mobility control in subsurface reservoirs, particularly in Enhanced Oil Recovery (EOR) operations and for Carbon Dioxide (CO_2) storage. However, the practical implementation of CO_2 foams is often limited by their inherent instability. Adding Nanoparticles (NPs) into surfactant solution has been widely employed in improving foam stability in CO2-EOR applications. In this study, the rheological behaviour of Nanoparticle (NP)-stabilized CO_2 foams was experimentally investigated to assess their potential for improved stability and flow performance in porous media. CO_2 foams were generated using a natural surfactant mixed separately with three different types of nanoparticles (0.1–0.5 wt.%) and the stability experiments were carried out at room temperature and pressure. The results showed that the CO_2 foams exhibited non-newtonian shear-thinning behaviour with a 9–20% increase in apparent viscosity upon increasing NP concentration for all the three types of NPs used. Viscoelastic measurements revealed dominant elastic behaviour (G′>G″) at low strain (<100%) and a transition to viscous behaviour (G″>G′) at higher strains (>100%), indicating strong structure–property dependence. Dynamic rheological tests showed a maximum reduction of 60% in G′ during strain sweeps and a 40% reduction during frequency sweeps. Microscopic analysis further revealed foam coarsening, with bubble sizes increasing from 30–50 µm to 250–600 µm within 2 hours due to coalescence. The enhanced viscosity and viscoelasticity of NP-stabilized foams suggest improved resistance to gas channelling and effective pore-blocking potential, underscoring their applicability in improving sweep efficiency in heterogeneous reservoirs.

Biography

Mr. Vishal Dhar has completed his graduation in Petroleum Engineering from Dibrugarh University, Dibrugarh, India and his master's in Petroleum Engineering and Geo-engineering from Rajiv Gandhi Institute of Petroleum Technology, Rae Bareli, India. He is currently working as a Research Scholar at the Department of Chemical Engineering at the Indian Institute of Technology, Guwahati, India under the supervision of Prof. Pankaj Tiwari and Prof. Subrata K. Majumder. He was awarded the prestigious Prime Minister Research Fellowship in 2022. His PhD research is particularly focused on the utilization of CO2 for Enhanced Oil Recovery in Northeast Indian Oilfields.

Wesley Welch*, Jeffrey Heylmun Ph.D., Damon Cardenas Ph.D.

Synthetik Applied-Technologies, Austin, Texas, United States of America

Machine learning and physics-based modeling to enhance subsurface feature characterization and optimize 3D imaging sensor array configuration

Synthetik has developed a 3D subsurface image reconstruction approach that leverages a combination of physics-based modelling and machine learning to identify complex subsurface features while optimizing hardware requirements. This approach involves simulating acoustic pressure waves through a subsurface medium with relatively dense recording field array and subsequently training a set of ML models on reduced fields. Synthetik has developed models that will work for shipyard-related elements like retaining walls, box-caissons, and relieving platforms. These models were originally trained on rescaled recordings of deep geological features.

Synthetik has developed a custom numerical solver, called *BlastSeismic*, that uses GPU acceleration to provide rapid simulation of acoustic pressure waves recorded by acoustic sensors, specifically geophones. The labelled data, on which BlastSeismic is used to create synthetic shot records (electro-acoustic recordings), includes velocity maps that are 40’ x 40’ feet long and wide, with a depth of 35’. Synthetic sensors are located approximately every 4 meters apart, and data is “recorded” from 9 equidistant source shots (modelled as 187Hz ricker pulses). As a proof of concept, Synthetik trained a base machine learning model using modified open-source data from geological sites, totalling 9600 samples (80% for training, 20% for validation). An additional 2000 (80% training, 20% validation) samples were used to fine tune the model for each additional feature type.

Once models were created for this field, every possible configuration of the source shots, involving reducing the number of source of shots and changing shot locations, was tested for its impact to the accuracy of the model predictions. Using this approach, we have determined the smallest number of shots that could be used without significantly impacting the prediction accuracy as well as identifying critical shot locations. For this specific models, all three fine-tuned models (described in the first paragraph) showed a reduction to 5 shots from original 9 would sufficiently provide the data required to accurately replicate the model; however, each model had critical locations along the corners and center of the imaging field. Different configurations would yield significantly worse predictions of the subsurface. For further field reductions, we observed that the optimum configurations varied by expected subsurface features.

Our future explorations will include enhancing our baseline model with increased sensor and source shot locations, expanding the subsurface feature types, and increasing the training/validation samples. We will additionally try to reduce the number of samples required to adequately fine-tune models, and target subsurface features most relevant to the oil, gas, and petroleum discipline.

Biography

Wes Welch is a machine learning specialist with nearly a decade of experience designing AI-driven systems that bridge data-driven modeling and physics-based simulations. His work focuses on applying advanced techniques—such as generative synthetic data, Physics-Informed Neural Networks (PINNs), and hybrid AI-physics frameworks—to solve complex problems in resource-intensive and data-constrained environments. Wes has led the development of several large-scale AI systems, including machine-assisted annotation pipelines, surrogate modeling frameworks, and simulation acceleration tools. His expertise lies in combining real-world and synthetic datasets to enhance model generalization and performance in scenarios where physical measurements are limited or difficult to obtain.

P. Asthana[1], E. Murdoch[2], A. Bukhamseen[1], S. Jacob[1], Zac Arackakudiyil Suresh[3*]

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Evolution of zonal isolation completion technologies, from simple to smart

Zonal isolation seeks to segregate undesirable intervals by preventing fluids, such as water, oil or gas, in one zone from mixing with fluids from another zone. It creates the necessary compartmentalization to allow flow control devices to control the zones independently or commingled for optimal inflow performance of the reservoir. This is typically done through the deployment of efficient and robust completion zonal isolation technologies. This paper reviews the chronological advancements in the evolution of zonal isolation completion technologies from past to present. Insights into future developments are presented in this paper, highlighting the challenges and opportunities that are shaping new advancements.

A classification of the design families, and critical design considerations thereof, are presented with a focus on matching optimum tool design criteria to the well completion requirements such as open-hole/cased-hole, and well environmental conditions. The best practices and lessons learned are derived from a combination of literature review, subject matter expert input, and the authors' own experience in the industry. Completion zonal isolation tool systems, such as packers, seal assemblies, and bridge plugs, are reviewed with emphasis on the most recent advancements, including wireless technologies and novel barrier materials. An evaluation of their merits and demerits is presented via an application weighted summary matrix.

The design and selection of zonal isolation technologies directly determine well integrity and production success. The main role of the described tool systems is to act as well barriers by enabling anchoring and sealing functions. Therefore, the ultimate target should be for system reliability and safety of equipment, especially with any increased technical complexity. Zonal isolation technology has been around for a long time and field-proven technologies are still preferred. This makes it difficult to accept unproven, novel technology concepts, no matter how simple and creative the design and operation of the advanced system being developed and deployed. Rigorous qualification of technologies against benchmarked industry standards, such as those published by the American Petroleum Institute (API) and Advanced Well Equipment Standards (AWES), provide design and quality assurance for new technology designs through standardized verification and validation criteria.

Advanced zonal isolation technologies promise new completion design strategies previously not possible. The plethora of system designs, from past to present, needs to be classified into simple categories, including for the advanced hybrid designs. This paper presents the pros and

cons of existing and emerging integrated zonal isolation systems from a reliability and complexity perspective, and categorizes them through a succinct summary matrix. The analysis will guide production and reservoir professionals through quick reference selection criteria.

Biography

Zac Arackakudiyil Suresh is an award-winning Chartered Engineer with a distinguished background in operations, consultative sales, and research and development, specializing in Intelligent Completions, Smart Well Technologies, and Remote Open and Close Technology (ROCT). He brings deep technical expertise in advanced Smart Well Completion systems, including Interval Control Valves, Lubricator Valves, Zonal Isolation Intelligent Packers, and sophisticate downhole control systems. His proficiency also extends to Chemical Injection Systems and Permanent Downhole Gauges. Throughout his career, he has successfully led and executed complex projects across diverse regions, including South-East Asia, Europe, North America, the Middle East, and Africa—delivering innovative solutions that enhance well performance and operational efficiency.

P. Asthana[1], A. Bukhamseen[1], D. Patel[2], Z. Suresh[2*]

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Design and construction of a spool deployed fiber optic gauge array for sand-face monitoring

A critical element of smartwells is permanent downhole monitoring system. Currently Inflow Control Devices (ICDs) do not have any real-time monitoring of the annulus and tubing pressures. Production Logging Tool (PLT) or Formation Scanner Imager (FSI) only allows monitoring inside the tubing but are very expensive to run and provide onetime data. Real-time pressure and temperature data could potentially identify flowing zones, detect crossflow, identify communication between compartments, detect plugged ICDs or leaks through closed sleeve, and even allow for flow rate estimation from each compartment using flow equations. This paper discusses the design and construction of a spoolable fiber optic gauge system that addresses the need for a cost-effective solution to continuous multipoint sand face production monitoring. A fiber optic gauge array system designed for monitoring ICDs has been developed. The system features: a spooled deployment system to reduce rig time, a low-cost annulus/tubing pressure access technique, a technique for ensuring tubing string alignment, a redundant architecture that facilitates fault tolerant operation and support for Distributed Acoustic Sensing (DAS), Distributed Temperature Sensing (DTS), and Vertical Seismic Profiling (VSP) systems within the architecture. This system uses NACE qualified materials in its construction and exploits the unique multiplexing capability of Fiber Bragg grating optical sensing technology to provide permanent downhole Distributed Pressure and Temperature Sensing (DPTS) using sensor array. A key early application of the system is to permanently monitor downhole ICDs and differential pressure against ICDs. The system comprises an array of optical pressure/temperature gauges connected by a fiber optic cable to surface instrumentation. This spoolable solution can measure both tubing and annulus pressure and also incorporates a fully redundant system. The fiber system is divided into a primary connection and a redundancy connection. The primary fiber will be permanently connected to the surface instrument. The redundancy fiber will be connected to a surface instrument in the event of damage to the primary fiber connections. An additional line of reliability is provided through its redundant architecture, ensuring continuous data acquisition. The design elements, components of the system and system architecture are described. Engineering design has been based on running the spoolable ICD Monitoring System in the annular space between a 4 ½" completion tubing inside a 6 1/8" open hole. The array includes fiber optic gauges, splice boxes, connection block, jumper tube and ported coupling, all assembled and placed under a special protective clamp that has been designed to achieve a running diameter of 5 ¾" achieving the recommended 3/8" clearance. All connections to the downhole cable will be made with pressure-testable metal-to-metal

compression fittings. Rigorous qualification to benchmark industry standards was conducted to provide design assurance and quality requirements for new technology designs through standardized verification and validation criteria. This technology allows real-time pressure/temperature measurement across all ICD compartments with minimal investment cost. If successful, this will eliminate the need for frequent PLTs in ICD wells as the differential pressure measurement can be converted to flow rate estimation, resulting in significant cost saving and well intervention reduction for operators.

Biography

Zac Arackakudiyil Suresh is an award-winning Chartered Engineer with a distinguished background in operations, consultative sales, and research and development, specializing in Intelligent Completions, Smart Well Technologies, and Remote Open and Close Technology (ROCT). He brings deep technical expertise in advanced Smart Well Completion systems, including Interval Control Valves, Lubricator Valves, Zonal Isolation Intelligent Packers, and sophisticated downhole control systems. His proficiency also extends to Chemical Injection Systems and Permanent Downhole Gauges. Throughout his career, he has successfully led and executed complex projects across diverse regions, including South-East Asia, Europe, North America, the Middle East, and Africa delivering innovative solutions that enhance well performance and operational efficiency.

Zulqarnain[1,2*], Dong Hyuk Chun[1], Soohyun Kim[1], Jiho Yoo[1], Sangdo Kim[1], Hyuk Im[1], Hokyung Choi[1]

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Waste plastic upcycling via solvothermolysis: A pathway to bio-oil and carbon-rich solid production

The rapid increase in plastic consumption and waste generation has emerged as a critical environmental issue, affecting all forms of life. Consequently, growing research efforts are being directed toward converting waste plastics into valuable resources. One promising approach is the solvothermal conversion of waste plastics into liquid fuels and solid carbon using an autoclave reactor. The yields of bio-oil and solid carbon are influenced by factors such as solvent type, reaction temperature, and time. This study explores the effects of temperature (250˚C and 300˚C) and varying reaction times–both short (15–45 min) and long (3–9 h)–on the recovery of solid carbon using kerosene as the solvent. Similarly, bio-oil production was investigated under temperatures ranging from 150˚C to 300˚C and reaction times between 15 to 45 min. After 3 h, solid carbon contents of 25.21% and 23.39% were obtained at 250˚C and 300˚C, respectively. The highest solid carbon percentages of 34.80% and 30.50% were recovered at 250˚C after 15 min and 5 h, respectively. For bio-oil production, a maximum yield of 42–45% and conversion of 66–68% were achieved at 275˚C after 45 min. The Higher Heating Values (HHVs) of the oil samples, between 45.48–45.81 MJ/kg, were significantly higher than that of gasoline (43.4 MJ/kg). Overall, this work demonstrates the feasibility of an efficient and scalable method for upcycling waste plastics into value-added liquid fuels and solid carbon.

Keywords: Liquid Fuels, Carbon, Kerosene, Solvothermolysis, Upcycling, Waste Plastic.

Acknowledgement: This work was conducted under the framework of the research and development program of the Korea Institute of Energy Research (C4-2465).

Biography

Mr. Zulqarnain is a Ph.D. student at Korea Institute of Energy Research, University of Science and Technology, South Korea. Previously, he has completed Master's in Chemical Engineering from Universiti Teknologi Petronas, Malaysia in 2022. His research is focused on biomass and plastics liquefaction for biofuels production. He is also doing research projects on steam reforming of tar and hydrocarbons for H_2 production. He has published more than 15 research articles in SCI journals, with total citations of 565 and H-Index of 11.

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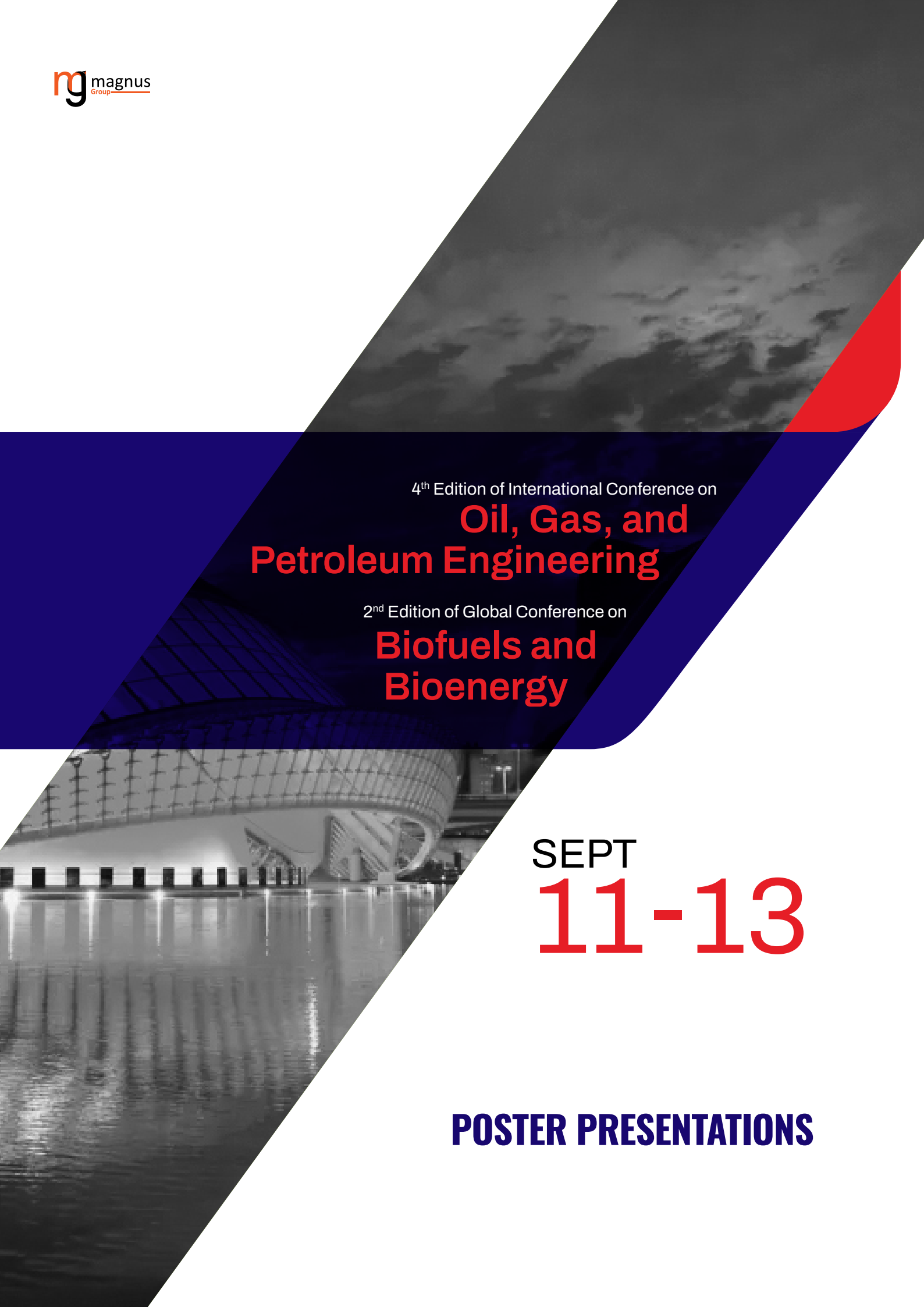

SEPT

11-13

POSTER PRESENTATIONS

Duaa Allahseh

Research Associate, Thermo-Chemical Conversion Division, DBFZ German Biomass Research Center GmbH, Leipzig, Germany

Hybrid heating system integrating HT-PEMFC, water heat pump, and steam reforming of biogas for residential applications

This study will investigate a hybrid heating system for residential applications, integrating advanced technologies including Steam Reforming of Biogas (SRB), High-Temperature Proton Exchange Membrane Fuel Cells (HT-PEMFC), a Water Heat Pump (WHP), and thermal storage. Biogas will serve as a feedstock for the SRB unit to produce pure hydrogen gas, subsequently fueling the HT-PEMFC for simultaneous power and heat generation. The waste heat generated by the fuel cell will be utilized effectively by heating the thermal storage tank and pre-heating the inlet of the WHP evaporator, thereby improving the WHP's Coefficient of Performance (COP). The electricity produced by the HT-PEMFC will power the entire system, making it self-sufficient and optimizing energy usage.

Different scenarios will be evaluated to thoroughly assess system performance under various operational conditions, providing a comprehensive efficiency analysis. Additionally, results will be benchmarked against existing hybrid heating systems that utilize biomass burners integrated with WHP technology. This comparative analysis will highlight the key advantages and identify potential areas of improvement in the proposed hybrid heating configuration.

Biography

Duaa Allahseh is currently a PhD student and Research Associate at the DBFZ German Biomass Research Center in Leipzig, Germany, focusing on renewable energy systems and sustainable hybrid heating technologies. She holds a Master's degree in Renewable Energy Engineering and Sustainability and has extensive experience in renewable heating systems, fuel cell integration, and biogas technologies. She has joined the research group "AG Intelligente Hybride Heizsysteme" led by Dr. Volker Lenz, where she contributes to advancing the application of hybrid systems to improve energy efficiency in residential and industrial sectors.

Fawzi H. Alharbi
Project Management Department, ARAMCO Dhahran, Saudi Arabia

Best practices to overcome challenges of a brownfield project

Brownfield projects execution, especially in hydrocarbon facilities, are always faced with many challenges like limitations in existing plant capacity, space layout constrains, underground obstruction or process parameters. In addition, construction in live plants comes with its own complications. Among others, presence of hydrocarbon, high pressure pipelines, live power lines and existing operating equipment are examples of these complications. This adds up to the usual projects' challenges in general in terms of engineering, procurement, delivery of material and execution contractor performance.

In a "Replacement of a Gas Compression Train" project, the objective was to replace an old existing gas compression train driven by a gas turbine with an equivalent gas compression train driven by a steam turbine utilizing some of the existing equipment. The project has gone thru a lot of the brownfield challenges starting from the design till putting the new train in service. The project team successfully implemented new design proposals and many execution practices to overcome all these challenges. In this presentation, we will shed some light on some of these practices that were followed in the design, procurement, and construction.

Among other practices, the following practices were followed:

- In procurement, novation of the main equipment Purchase Order from the design contractor to the LSTK contractor helped optimizing the delivery to the site.
- In design, using a back-to-back compression train arrangement addressed the space constrains and has less Capex and Opex.
- In construction, using a gantry crane system assured the safety at site and expedited the main skid erection.

Biography

Fawzi Alharbi earned his BSc in Mechanical Engineering from California State University, Long Beach in 2002. He has since built a distinguished career in the Oil & Gas industry, gaining extensive experience in drilling, operations, and project management. Currently, he holds a leadership position within Saudi Aramco's Project Management Department.

Gatot Simanjuntak*, Wisnu Sudibjo, Muhammad Kevin Al Ghozali

Maintenance and Inspection, PT Pertamina EP, Jakarta, Indonesia

Unlocking efficiency in oil and gas lifting monitoring: The impact of 144 custody metering system data integration on PT pertamina EP's digital transformation

This paper presents the implementation of a real-time Integrated Monitoring System (IMS) for oil and gas lifting operations at PT Pertamina EP (PEP), Indonesia's leading oil and gas company. The total number of the custody metering systems involved in the oil and gas lifting process is 144 metering systems throughout Indonesia. Oil and gas lifting activities surveillance used to be carried out manually based on reports obtained from operators on daily basis. It can't be carried out real time and on demand, especially for metering systems operated by transporters and consumers. The purpose of this paper is to describe the implementation of a data acquisition system for monitoring oil and gas lifting activities in real-time at 144 lifting points of the PEP. By leveraging industry-standard Modbus TCP/IP protocols, the IMS seamlessly integrates diverse data streams into a unified platform, enabling real-time monitoring and decision-making at an unprecedented scale.

The implementation of this data acquisition system enables real-time, online monitoring of oil and gas lifting activities at 144 lifting points, providing instant access to critical operational data. It enables PEP to make timely decisions by optimizing the lifting process, reducing manual monitoring costs by up to USD 3.4 Million annually, improving safety risk by minimizing workers mobilization to the field, and providing a more transparent report to stakeholders (government and holding company). The development of IMS is one of PEP's digital transformation in operations and integrity management. This digital transformation marks a critical step in PEP's long-term strategy, laying the groundwork for future advancements in analytics operations.

Keywords: Real-time monitoring, Integrated Monitoring System (IMS), Digital transformation, Operational efficiency, Data acquisition system

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Advanced manure-to-energy platform: Integrated gasification–activation for high-efficiency SOFC operation

This study aims to establish a sustainable and economically viable energy conversion system using livestock manure, specifically pig manure, through a gasification-activated carbon process integrated with a Solid Oxide Fuel Cell (SOFC). Livestock manure in Korea remains high, with over 50 million tons produced annually, creating environmental and land-use pressures. Existing treatment methods, such as composting and anaerobic digestion, are limited by economic feasibility, energy demand, and greenhouse gas emissions.

To address these limitations, a prototype system was developed consisting of a 30 kg/hr biomass gasifier and a 20 kg/day activator, optimized for converting wood chips into syngas and activated carbon. During the first year of development, the gasifier achieved a maximum syngas calorific value of 1,589 kcal/Nm^3 and a conversion efficiency exceeding 62.1%. Activated carbon production was also validated, with a yield of 43.84 kg/day under operational conditions. Simulation tools, including CFD and thermal-flow analysis, were applied to optimize gasifier and burner designs, while thermal balance calculations confirmed sufficient syngas energy to drive the superheated steam activation process.

By transforming livestock waste into high-value activated carbon and renewable electricity, this approach reduces dependence on fossil-based activated carbon imports, promotes carbon neutrality in agriculture, and demonstrates strong potential for rural energy independence.

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Biography

Dr. Geun Ho Gim studied Environmental Engineering and Inorganic Chemistry at Chosun University, Korea, where he also earned his PhD in Biotechnology in 2018. He later joined the Green Energy Institute, focusing on renewable energy, bioenergy, and agrophotovoltaic systems. He has authored multiple SCI(E) articles and participated in national R&D projects on solar PV, waste valorization, and battery recycling.

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Enhancing flare system operations and environmental compliance through optimized purging

Flare systems are a critical component of oil and gas operations, and are essential for both regulatory compliance and maintaining operational reliability. A key aspect of these systems is the purging process, which is used to sustain positive pressure and prevent oxygen ingress. However, conventional purging methods have historically shown significant contribution to Sulfur Oxide (SOx) emissions and introduce long-term operational challenges.

This presentation explores opportunities to enhance flare system performance by reconsidering the type of gas used for purging. Drawing on practical insights from facility upgrade projects, it examines the environmental and operational trade-offs associated with adopting cleaner alternatives such as sweet gas or inert gases. The focus is on minimizing harmful emissions while maintaining the integrity and safety of flare systems. Additionally, one of the study's core objectives is to align operational practices with both national and international environmental targets, contributing to broader sustainability efforts.

Biography

Omar T. Alhindi graduated from King Fahd University of Petroleum and Minerals (KFUPM) in 2020 with a bachelor's degree in Mechanical Engineering. He joined Saudi Aramco later the same year and works as a project engineer in the Engineering Unit within the Producing Project Management Department. Omar is a PMI-certified Project Management Professional (PMP) as of 2024, and is currently pursuing a Master of Business Administration (MBA) degree. His experience spans project planning and coordination, as well as engineering and construction of oil and gas projects, with a particular focus on facility upgrades and operational optimization.

Sabih Alharbi is Supervisor of Project Planning and Business Administration at Saudi Aramco, managing a project portfolio exceeding $1 billion USD. He began as a Project Engineer, advancing through roles in project management across oil and gas developments from design to commissioning. Sabih holds a Chemical Engineering degree from King Fahad University of Petroleum and Minerals and certifications including PMP, Certified Energy Manager, and completion of the Accelerated Program for Process Engineers. He specializes in project planning, cost and schedule control, and aligning execution with corporate KPIs.

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Overcoming surface congestion constraints through strategic utilization of evaporite pits a success case from greater Burgan field

South & East Kuwait (S&EK) has been facing a persistent challenge of severe surface congestion near Gathering Center 21 (GC-21), which has prevented the drilling of new wells in the area for over seven years—despite the presence of significant untapped oil potential in the Burgan reservoir. A breakthrough was achieved through collaborative efforts between the Greater Burgan Subsurface (GBS), Field Development South Kuwait (FD SK), and Production Operations South Kuwait (PO SK) teams. The solution involved the innovative repurposing of an inactive evaporite pit to host new well placements. This initiative not only resolved the surface constraint issue but also enabled the successful drilling and completion of three new Burgan producers—Well 1, Well 2, and Well 3—resulting in a combined estimated production gain of 4,500 BOPD. Looking ahead, this success has paved the way for future development targeting the Minagish reservoir. The original plan involved Extended Reach Drilling (ERD) wells, each costing approximately 3 MMKD, with an estimated total of 29.5 MMKD for 10 planned wells. By utilizing the same evaporite pit and adopting a conventional deviated well profile instead, the revised approach is expected to reduce the cost to 2 MMKD per well, resulting in projected savings of 12 MMKD. This initiative exemplifies adaptive planning, cross-disciplinary collaboration, and efficient resource utilization. Key to the project's success was the identification of underutilized evaporite pits—originally used for water disposal—that became available following increased subsurface disposal capacity. The technical teams aligned to repurpose these locations for drilling, enabling the inclusion of three Burgan producers in the 2023/24 budget and planning of 40 Minagish wells on four additional pads in future budget years (2025/26 and beyond). The integration of subsurface data with seismic interpretation allowed the teams to effectively define and execute suitable well targets. The success of this initiative reflects the outstanding collaboration and coordination among GBS, FD SK, PO SK, and GC-21 teams, and would not have been possible without the strong support and leadership of FD SEK management. This case study highlights the importance of innovation, flexibility, and teamwork in overcoming operational challenges and achieving strategic reservoir development goals.

Biography

Salem N. Al Mutairi has 20 years experiences in oil industries. He graduated from Kuwait University in 2003 & joined to Kuwait Oil Company in 2004 as Development Geologist in Greater Burgan field. He involved in many projects since he have joined to KOC such us: Sequence stratigraphy, well planning & Remaining Oil Maps. His experience is in the Clastic sedimentology, especially in the sandstone reservoir.

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Project complexity in oil & gas: The missing link between business case and execution

Enterprises in the oil and gas sector face increasing challenges due to growing project complexity driven by technical, organizational, external market conditions, and environmental factors. These complexities significantly impact project feasibility, cost estimation and strategic alignment. Yet, during business case preparation, complexity is often overlooked unless a structured approach is in place. This research introduces a quantitative model to assess project complexity in the oil and gas sector, offering a structure methodology to refine conceptual estimates, economic evaluation and sensitivity analysis.

By implementing a measurable framework rather than relying solely on subjective assessments, enterprises can better anticipate project challenges, establish realistic expectations, and improve decision-making. This model empowers planners, business developers and projects managers to integrate complexity considerations from the outset, enhancing project execution strategies and risk mitigation.

Biography

Eng. Tulio J Quijada Alvarado studied Chemical Engineering at the UNEXPO university, Venezuela and graduated as BS in 2005. He then joined Petroleum of Venezuela in 2006 with the Downstream Projects Department. He received post-graduate diplomas in Management of Downstream Projects Master in Business Administration from Institut Français du Petrole and Swiss Business School respectively. In 2014 he joined Saudi Aramco NAOO Capital Projects Management, Saudi Arabia. He obtained certifications as Project Management Professional from PMI and Cost Certified Professional AACE in 2015 and 2024 respectively. Currently, he is Lead Engineer in Producing Projects Management Department at Saudi Aramco.

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