



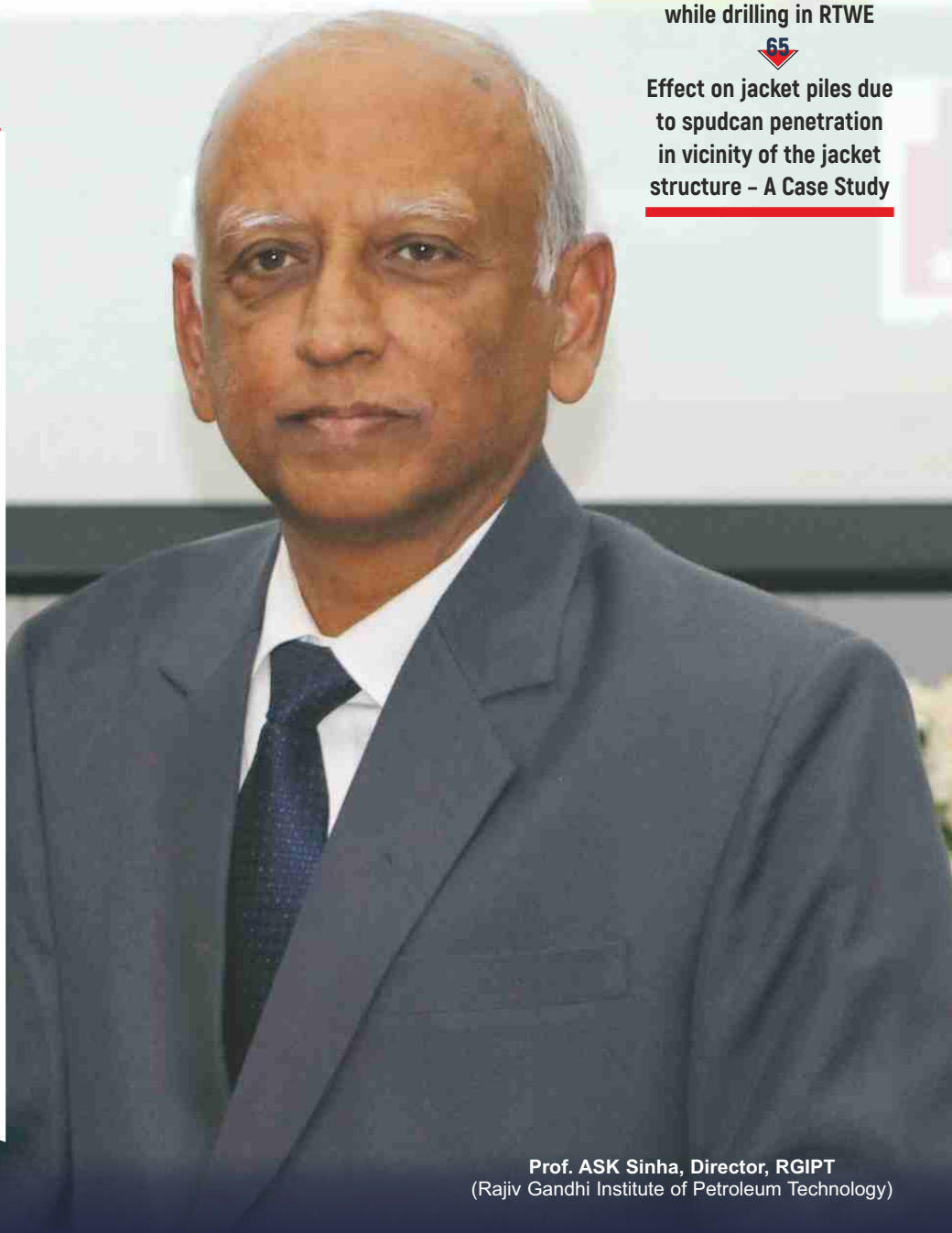
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## RGPT Future Ready

RGPT, an institute of national importance, excels in engineering and management education. Its high-quality science-based research and handling of crucial industry-sponsored projects are examples of successful industry-academic collaboration. For unparalleled R&D solutions, it has drawn up a 10-point strategy to be future-ready and an institute of industry's choice.

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Prof. ASK Sinha, Director, RGPT  
(Rajiv Gandhi Institute of Petroleum Technology)

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Prof. ASK Sinha, Director, RGIPT, talks to Arun Kumar Singhal, Chief Editor, DEW Journal, about his priorities and thrust areas and about the academic excellence achieved and R&D strengths of the institute

## RGIPT Future Ready

**RGIPT, an institute of national importance, excels in engineering and management education. Its high-quality science-based research and handling of crucial industry-sponsored projects demonstrate successful industry-academic collaboration. For unparalleled R&D solutions, it has drawn up a 10-point strategy to be future-ready and an institute of industry's choice.**



Since its establishment 16 years ago, the Rajiv Gandhi Institute of Petroleum Technology (RGIPT) has been playing a prominent role in generating new knowledge by engaging in cutting-edge research, promoting academic growth, and developing human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders can emerge in the domain of energy, oil and gas, engineering, and management.

RGIPT has been fastidiously working under the leadership of Prof. ASK Sinha, Director, on the academic and research mandates set by the Ministry of Petroleum and Natural Gas, Govt. of India. The institute has collaborated with institutional partners on basic and applied research problems pertaining to the energy sector.

The past few years have seen RGIPT emerge as a new-age academic institution. An institution that has not only achieved academic excellence in the field of engineering and management studies but is also successfully handling industry-sponsored R&D projects. It is truly a step towards being future-ready.

Established by the Ministry of Petroleum and Natural Gas, Government of India, RGIPT, based in Jais, Amethi, Uttar Pradesh, is an Institution of National Importance along with the lines of the Indian Institutes of Technology (IITs). The institute is empowered to award degrees in its own right and is co-promoted as an energy domain-specific institute by six leading oil public sector units (Oil and Natural Gas Corporation Ltd., Indian Oil Corporation Ltd., Oil India Ltd., Gail (India) Ltd., Bharat Petroleum Corporation Ltd., and Hindustan Petroleum Corporation Ltd.) in association with the Oil Industry Development Board. The institute is associated with leading international universities and institutes specialising in the petroleum technology and energy sectors.

Prof. Sinha has fostered interdisciplinary research and innovation focused on sustainable development, generative AI, and energy sciences. In order to further industry engagement, RGIPT has signed a number of MoUs with industry players and collaborated with foreign universities. The state-of-the-art facilities and the

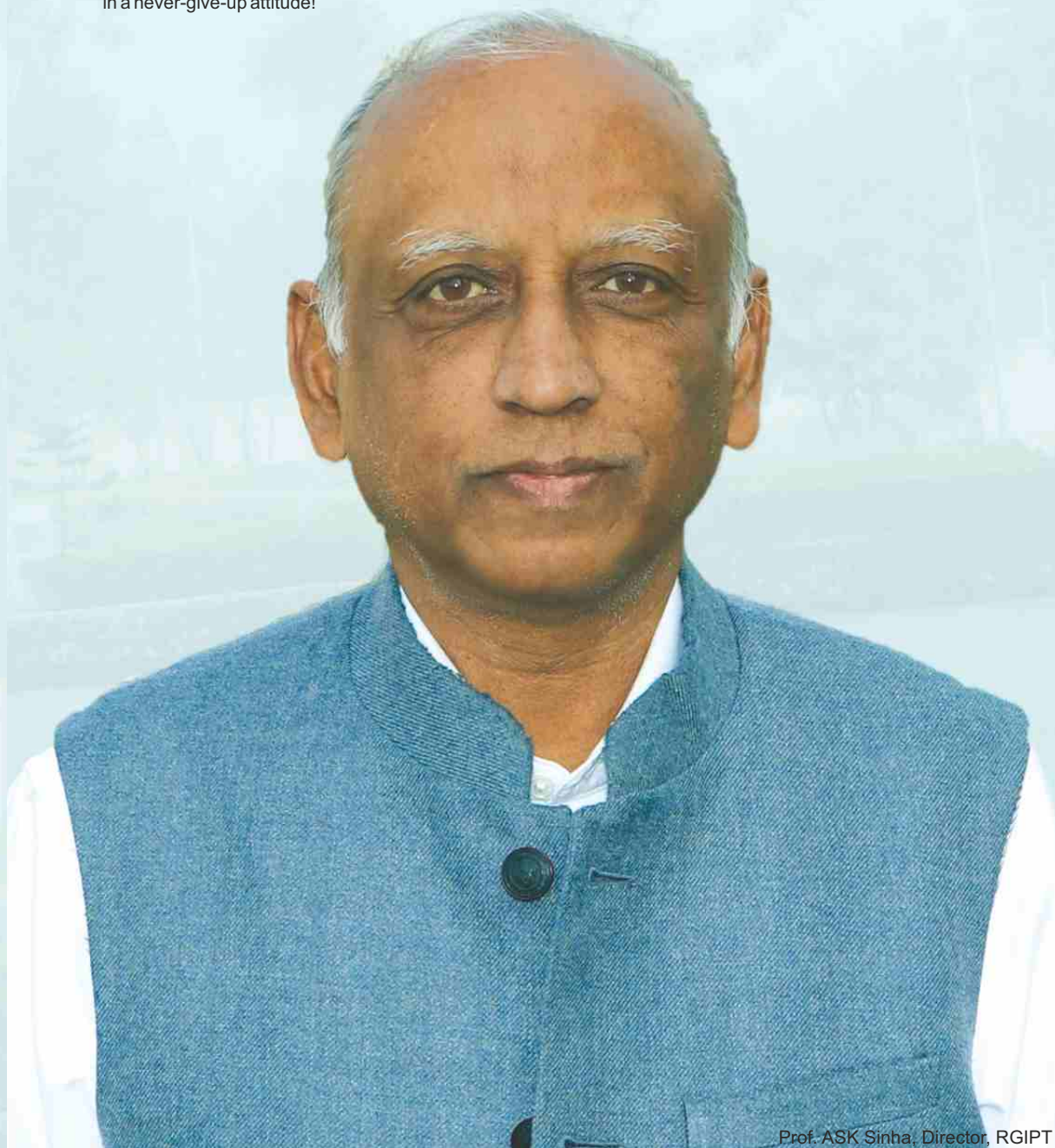
**Prof. ASK Sinha** is the Director of RGIPT and an eminent Professor of Chemical Engineering. Professor Sinha has a Bachelor's Degree in Chemical Engineering specialising in Chemical Reaction Engineering, an M.Tech., and a PhD, all from the Institute of Technology, Banaras Hindu University.

Under his leadership, RGIPT has impressed upon translational research and is constantly engaged in high-quality science-based research, bagging prestigious industry-sponsored research projects.

Today, RGIPT is a trusted name in the academic field relied upon by the industry. It stands tall as an institution of national importance at par with the Indian Institute of Technology's (IIT's).

Apart from his interest in the application of chemical reaction engineering concepts in the physics and chemistry of materials, Prof. Sinha's mission is to bring about a paradigm shift in society through science and engineering concepts.

What keeps Prof. Sinha going is the fact that he is a strong proponent of Swami Vivekanand's philosophy and a believer in a never-give-up attitude!



Prof. ASK Sinha, Director, RGIPT



research environment at RGIPT, demonstrates the institute's commitment to practical training and hands-on learning for application in the oil and gas industry.

As the prime objective of the institute in providing technical education, training, and research to roll out efficient human resources and meet the growing

requirements of the petroleum and energy industries, the institute is offering a number of bachelors and masters degree programmes. Additionally also offering postgraduate diploma courses, and doctoral programmes in science, engineering, mathematics, and management.



## RGIPT DRAWS ON A 10-POINT STRATEGY

- 1. Revamping of the academic curriculum as per industry needs.**
- 2. Implementation of a project-based course curriculum.**
- 3. Introduction of new courses at the UG and PG levels relevant to today's changing world.**
- 4. Equal emphasis is placed on character building to nurture future leaders.**
- 5. Attracting the best talents to strengthen its academic and R&D activity.**
- 6. Creating and enabling a conducive R&D infrastructure to enable future technologies.**
- 7. Linking laboratory research with industry requirements**
- 8. Focus on AI/ML and digitalization in the energy sector.**
- 9. Offering industrial consulting services in domain of expertise.**
- 10. Collaboration with national and international academic and research institutes.**

The Assam Energy Institute and the Energy Institute, Bengaluru are centres of RGIPT.

In its journey since inception, RGIPT has kept a strong commitment to its vision and mission, as a result of which it has constantly gained position in the National Institutional Ranking Framework (NIRF), being ranked 79th in the Engineering Category in the NIRF 2023. The institute is aiming to be in the first 50 in the NIRF ranking for 2024 according to Prof. ASK Sinha, Director, RGIPT talking to Arun Kumar Singhal, Chief Editor, DEW Journal.

More than a key player in engineering and striving for continued academic excellence and providing a conducive learning environment for its students, RGIPT in the past few years has risen high on R&D and innovation in oil and gas and alternative energy. Having grown in stature over the years handling industry-sponsored projects offer solutions to industrial problems through basic and advanced research, says Prof. Sinha.

The institute, he said, has created an excellent research atmosphere with state-of-the-art facilities, and most of the R&D activities are directed in line with the emerging needs of the oil, gas, and energy sectors, including the renewable energy industries. The institute has initiated programmes to collaborate closely with MNCs and research institutions for innovative research. The mission is to make this

place of learning a unique centre for providing skilled human resources capable of reshaping the future energy basket to secure the energy future of the country, Prof. Sinha stressed.

As a research-based institution, Prof. Sinha mentioned of the number of MoUs signed by RGIPT with the industry and about the thematic and industry-centric research projects successfully completed in the recent past. He made a special mention of the project that RGIPT undertook to develop electrodes and design a prototype for hard and seawater electrolysis. Seawater electrolysis is an innovative approach to harnessing hydrogen energy using seawater as an electrolyte.

Prof. Sinha mentioned a state-of-the-art research building, "Laboratory Complex-I," set up on the institute campus in March 2024, which is aimed at playing a pivotal role in shaping the future of the institute's energy and petrochemical landscape and fostering collaboration between academia, industry, and government

While the mandate for the institute is very clear: to serve the oil and gas companies, the institute has also expanded its wings to address the alternative energy demands of our nation, including hydrogen, bioenergy, solar energy, e-mobility, batteries, etc.

institutions. This, he said, is in line with his commitment to promoting advancements in science and technology, especially clean fuels and sustainable chemicals.

Considering the strong requirements of digitization, the Internet of Things, and AI in the domain industries, the Institute is advancing skills in these specialised areas. The Institute, Prof. Sinha reiterated, is engaged in empowering skills in the realm through its present-day teaching and state-of-the-art research provisions.

Sharing his long-term vision for the institute and major priorities and thrust areas, Prof. Sinha says that in the long term, the vision of the institute is to become a self-reliant and self-driven entity based on a global standard with a commitment to meet the country's growing demand for competent technical manpower and professionals in



## A remarkable leap in NIRF rankings by RGIPT

**“According to the NIRF ranking report, RGIPT is ahead of several IITs, NITs, and IIITs”**

Rajiv Gandhi Institute of Petroleum Technology (RGIPT) is ranked 79th in the Engineering Category in the National Institutional Ranking Framework (NIRF) 2023. The institute was ranked 182 in the previous year's NIRF ranking. According to the ranking report, apart from RGIPT, only 06 institutions have qualified from Uttar Pradesh, and the institute is ahead of several IITs, NITs, and IIITs.

The NIRF is a ranking methodology adopted by the Ministry of Education, Government of India, to rank higher education institutions in India. The ranking parameters broadly cover "Teaching, Learning and Resources," "Research and Professional Practices," "Graduation

Outcomes," "Outreach and Inclusivity," and "Perception."

According to Professor Sinha, the institute has made a remarkable leap in rankings a testament to the hard work and dedication of both the faculty and students. It may be noted that Prof. Sinha has fostered interdisciplinary research and innovation focussed on sustainable development, generative AI, and energy sciences. In order to foster industry engagement, he has signed various MoUs with industry players and collaborated with foreign universities too. All these efforts have also resulted in a galloping jump in the RGIPT rankings. The improved ranking further opens avenues of opportunities for external research funding and grants.

## ONGC and RGIPT sign MoU for Microwave Heater study



In the world of oil production and processing, the efficient separation of oil and water is paramount. Traditional methods have relied on various techniques, but recent advancements have introduced a game-changer: the Microwave Heater Treater Separator. This innovative technology combines the power of microwaves with a heater treater to streamline the separation process, delivering remarkable efficiency and cost-effectiveness.

The Microwave Heater Treater Separator incorporates microwaves into the traditional heater treater design, improving the separation efficiency significantly. As oil and water are heated, the microwaves generate localized heating zones, enhancing the coalescence and separation of the two fluids. This process is highly effective, ensuring that the separation occurs more rapidly and with greater precision. One of the key advantages of the Microwave Heater Treater Separator is its ability to rapidly heat the oil and water mixture and reducing the overall treatment time. Moreover, the precise control offered by microwave technology allows operators to maintain optimal separation temperatures, leading to superior results and minimizing the risk of emulsions.

Compared to conventional separators, the Microwave Heater Treater Separator offers a significantly reduced footprint. Additionally, the enhanced separation efficiency and reduced treatment time translate into cost savings in terms of energy consumption and maintenance.

The Microwave Heater Treater Separator prioritizes safety and environmental sustainability. By minimizing the residence time of oil and water within the system, the risk of equipment fouling, and potential hazards associated with high-temperature operations is reduced. Moreover, the technology enables efficient water treatment and reduces the environmental impact of oilfield operations by minimizing the volume of wastewater requiring disposal or treatment.

Its adaptable nature allows it to handle varying oil viscosities, water cuts, and other fluid characteristics, making it suitable for diverse oilfield applications. The flexibility of the technology ensures optimal performance and compatibility with different operational requirements. With its potential to revolutionize oilfield operations, this groundbreaking technology will surely establish itself as a game-changer in the field of oil and water separation.

The Oil and Natural Gas Corporation Limited (ONGC), Mehsana Asset and the Department of Petroleum Engineering and Geoengineering (PEGE), RGIPT are aggressively moving towards fostering industrial academia collaboration in the energy and associated domains. Both have recognized the importance of joint research projects, knowledge exchange programs, and skill development initiatives. ONGC has expressed a keen interest in leveraging RGIPT's expertise in developing cutting-edge technologies.

ONGC and RGIPT have also signed an MoU for the "Microwave-Assisted Mobilization of Viscous Crude Oil for Improved Oil Recovery And Flow Assurance Applications: A Study On Lab To Field Approach" project executed by Dr. Amit Saxena and Dr. Shivanjali Sharma from RGIPT.

RGIPT has ongoing research projects, related to drilling fluids & cementing, oilfield specialty chemicals, flow assurance, enhanced oil recovery techniques, unconventional resources, and environmental sustainability in the oil and gas industry.

“We are reorienting to adopt a fit-for-purpose, accountable research ecosystem while promoting translational research to build individual and institutional excellence”

the energy sector and innovation.

The institute, he added, would be undertaking and promoting high-quality science-based research needed for the growth of this sector with a future perspective while fulfilling its national obligation as a vital source and centre to provide technical services and training to the petroleum and allied industries. While the mandate for the institute is very clear: to serve the oil and gas companies, the institute has also expanded its wings to address the alternative energy demands of our nation, including hydrogen, bioenergy, solar energy, e-mobility, batteries, etc.

To remain meaningful in the new age and environment, the institute has drawn up an explicit agenda, a 10-point strategy to elevate the institute to the next level, Prof. Sinha disclosed.

He said that for realising the above-stated aspirations, the 10-point strategy formulated encompasses the following:

- Revamping of the academic curriculum as per the need of the industry.
- Implementation of a project-based course curriculum.
- Introduction of new courses at the UG and PG levels relevant to today's changing world.
- Equal emphasis is placed on character building to nurture future leaders.
- Attracting the best talents to strengthen its academic and R&D activity.
- Creating and enabling a conducive R&D infrastructure to enable future technologies.
- Linking laboratory research with industry.
- Focus on AI/ML and digitalization in the energy sector.
- Offer industrial consulting services.
- Collaboration with national and international academic and research institutes.

Replying to my question on the state of research and development

Since applied and translational research play crucial role in advancing the field of energy and driving practical solutions for real-world challenges, our focus lies here

affairs, Prof. Sinha stated, Team RGIPT aims to identify all the technological gaps in its subject domain and restructure its entire research and development enterprise in tune with national priorities. Faculty would be reorienting themselves to adopt a fit-for-purpose, accountable research ecosystem while promoting translational research to build individual and institutional excellence, he stressed.

The future academic and R&D structures of the RGIPT, he emphasised, will be based on supporting the country's energy appetite in line with India's energy R&D

RGIPT Campus



While the mandate for the institute is very clear: to serve the oil and gas companies, the institute has also expanded its wings to address the alternative energy demands of our nation, including hydrogen, bioenergy, solar energy, e-mobility, batteries, etc.



“Our consistent approach to industries for research collaboration is being well appreciated by the industry. RGIPT is currently carrying out mutable projects funded by the PCRA/CHT, PPAC, OIL, ONGC, CPCL, HAL, HMEL, and NTPC Energy Technology Research Alliance”

landscape, and the Institute will endeavour to undertake innovative R&D activities based on breakthrough ideas across different energy carriers.

Specifying his major priorities and thrust areas as Director of RGIPT, Prof. Sinha said that since applied and translational research play crucial roles in advancing the field of energy and driving practical solutions for real-world challenges, our focus lies here. He said that translational research in the energy sector can involve taking discoveries from laboratories and applying them to create more effective and durable components for renewable energy systems. The institution is collaborating with energy companies to test and implement new technologies in actual energy production facilities or collaborate on pilot projects to demonstrate the feasibility of innovative solutions. The translational research outcomes can influence policy and regulatory frameworks, shaping the adoption of new technologies and practices in the energy sector. Considering these scenarios, RGIPT is focusing on research as a thrust area like never before, Prof. Sinha emphasised.

On being asked about the demand for professionals in the energy and oil and gas sectors, Prof. Sinha stated that RGIPT aims to be a key contributor to the development of human potential and technical potential needed in the energy sector. In line with the huge demand for professionals expected in the oil and gas sector over the past few decades, RGIPT, he said, is educating and training undergraduate, postgraduate, and doctoral

students in energy systems, even beyond petroleum, that will best serve the nation and the world.

On being asked about the most recently completed successful industry-sponsored project and of the ongoing industry projects in all

disciplines of the institute, Prof. Sinha stated, “Our consistent approach to industries for research collaboration is being well appreciated by the industries, and RGIPT is currently carrying out mutable projects funded by the PCRA/Centre for High Technology, Petroleum Planning and Analysis Cell, OIL, ONGC, Chennai Petroleum Corporation, Hindustan Aeronautics Limited, Hindustan Petroleum Mittal Energy Limited (HMEL), and National Thermal Power Corporation (NTPC) Energy Technology Research Alliance.” RGIPT, he said is becoming an institute of choice by the industry.

The following is a Q&A, with Prof. Sinha :

**DEW: Which industry-sponsored project has been recently completed by RGIPT?**

**Prof. Sinha :** The recently industry-sponsored project by RGIPT relates to the generation of Hydrogen via sea water electrolysis. Currently available commercial electrolyzers for green hydrogen production from water-splitting are either alkaline or proton or anion exchange membrane based. There are two important components of these devices: electrodes and membrane or diaphragm. Hydrogen and oxygen gases generate at respective electrodes, and the membrane/diaphragm physically separates these gases and also allows ions to pass through to complete the internal circuit. These electrolyzers demand high purity to ultrapure water (<10 ppm), without having chloride ions. The presence of chloride ions causes the evolution of toxic chlorine gas at oxygen-electrode, thus makes the electrode unsuitable

“Catalysts suitable for sea water electrolysis and a prototype flow-through electrolyzer without a membrane have been developed at RGIPT in collaboration with NTPC. The electrodes mitigate the challenges of chlorine evolution reaction. Further, a protective carbon material-based coating on the electrode helps to prevent catalyst-poisoning from the hard metal ion deposition”





## RGIPT-ONGC MoU in drilling technology

RGIPT and Institute of Drilling Technology (IDT)-ONGC have agreed to collaborate on projects which are useful in making the drilling technology efficient. In addition, both the parties are intended to work on joint research and development projects which they find mutually relevant and are of interest to petroleum industries in general. Providing technical support and services to each other is also an aspect of the MoU.



for electrolysis of sea or hard water which is in abundance nature. Further, the use of sea or hard water causes blockage of pores of membrane/ diaphragm, resulting in higher, and increasing over time, operating potential, and thus requires its frequent replacement. These two technological hindrances were efficiently alleviated by our innovations in electrode and electrolyser set-up.

Catalysts suitable for sea water electrolysis and a prototype flow-through electrolyzer without a membrane have been developed at RGIPT in collaboration with NTPC. The developed electrodes mitigate the challenges of chlorine evolution reaction. Further, a protective carbon material-based coating on the electrode helps to prevent catalyst-poisoning from the hard metal ion deposition. A prototype of flow-through electrolyzer of hydrogen production capacity of 10 L/hr was developed which eliminates the use

RGIPT has signed MoUs with IndianOil. The first is with the IndianOil R&D Centre to provide an opportunity to students of RGIPT for Ph.D through "IndianOil-CSIR-RGIPT Research Fellowships". Second MoU is with the IndianOil BD for training programs and capacity building for overseas clients in hydrocarbon activities. Third MoU is with the IndianOil Refinery Division for conducting residential training for Chemical engineers of IndianOil in the area of Petroleum Refining.



Professor A S K Sinha with Dr G Narahari Sastry, Director, CSIR-NEIST, Jorhat



“ RGIPT, considering its pool of intellectual resources available, ranging from conventional fields to ultra-advanced areas like Generative AI, ML, Cloud Computing and IoT, is well placed to offer solutions to industrial problems through basic and advanced research works. ”

fields to ultra-advanced areas like Generative AI, ML, Cloud Computing and IoT, is well placed to offer solutions to industrial problems through basic and advanced research works. Besides, we have been making extensive efforts to reach out to industries to understand their problems. Our consistent approach to Industries for research collaboration is being well appreciated by the industries and RGIPT is currently carrying out mutable projects funded by the PCRA/CHT, PPAC, OIL, ONGC, CPCL, HAL, HMEL, and NTPC Energy Technology Research Alliance. The details of the ongoing industrial sponsored projects are given below.

of costly membrane/ diaphragm. An outcome this collaborative work, RGIPT and There have jointly filed the following four patents:

- i. Bimetallic nano-catalyst for water splitting applications and method thereof
- ii. Method and system for sodium sulfide induced NiFeCo based trimetallic electrode for sea-water electrolysis
- iii. Molybdenum based durable electro catalyst and fabricated electrodes for sustainable and efficient sea water splitting
- iv. Membrane-less electrolyzer for green hydrogen production

Based on promising results from studies, RGIPT has recently received a grant worth Rs. 128.67 lakh for fabrication of a large scale electrolyzer of capacity 1000 L/h.

#### DEW : What are ongoing industry projects (all disciplines) at RGIPT?

**Prof. Sinha :** RGIPT, considering its pool of intellectual resources available, ranging from conventional

#### Ongoing Industrial Sponsored Projects at RGIPT

S.No.	Title of the Project	Sponsoring Agency
1	Technical upgradation of Electrode and Membraneless Electrolyzer for Sea Water Electrolysis	NETRA
2	Performance Evaluation of a floating biogas plant by integrated semitransparent photo-voltaic thermal (SPVT) collectors (Bio-SPVT)	PCRA/CHT
3	Geophysical survey for the Malshej Ghat Project, Malsej	Geo wings Engg.
4	3D Geo-mechanical Model Development for Balimara Field	Oil India Ltd.
5	Single - step Silica Nanofluids to enhance Mechanical properties, Microstructure refinement and as a Shale Stabilizer for cement slurries	IDT-ONGC
6	Organic Petrography, Biostratigraphy and Palynology Study of Shales of well 'Sadiya-1' of Oil India Limited	Oil India Ltd.
7	A study on hydrogen industry competitiveness in India: Role of Northeastern States	Oil India Ltd.
8	Study and one-step solution for downhole problems of Oil India Limited using multi-functional drilling fluid additive	Oil India Ltd.
9	Geoscientific Data Analysis of Ganga-Punjab and Vindhyan Basin	DGH
10	Development of surfactant-based drag reducing agents for transportation of asphaltenic crude oils through pipelines	HMEL
11	Testing of ELT Antenna	HAL
12	Microwave-assisted EoR	ONGC Mehsana Asset
13	Examining the Corrosion inhibitor formulation developed for mitigation of the corrosion led by ethanol blended petrol.	CPCL
14	Scaling up to demonstration plant: production of Micro/ Nano cellulose, and fuel (DMF) from Rice straw and green coconut shells.	CPCL
15	A study on adoption of advanced biofuels in India: A focus on bioethanol	IOCL
16	A Study on decarbonization: opportunities and challenges for Indian industries	PPAC
17	Computation of Impact on DBAU Falling - conservative estimation of possibility of rupture	HAL

### Projects under active considerations with various Industries

S.No.	Name of the Industry	Project area
1	HPCL	Green Hydrogen
2	Coal India Limited	Geotechnical characterization and quality parameter estimation of Indian coal seams
3	NRL	H <sub>2</sub> S to Hydrogen
4	NRL	Bio-Adhesive from Lignin
5	NRL	Electrochemical Conversion of (Water + Methanol/ Ethanol) to Hydrogen
6	NRL	Additives for producing more stable Methanol blended diesel Production
7	NRL	Development Hydro conversion Catalyst
8	NRL	Photocatalytic Degradation of Phenol
9	NRL	Corrosion Inhibitors
10	BPCL R&D	C <sub>3</sub> separation using membrane matrix
11	BPCL R&D	Value addition to petcoke by conversion to hard carbon
12	BPCL R&D	Demonstration of redox flow battery for stationary energy storage at kW scale
13	BPCL R&D	Electrochemical conversion of CO <sub>2</sub> to fuels/ chemicals
14	BPCL R&D	Micro-channel reactor for onboard H <sub>2</sub> generation using Liquid Organic Hydrogen Carrier (LOHC)
15	Sun Petrochemicals Limited	Effect on offshore designs on change in geomechanical data
16	Sun Petrochemicals Limited	Subsidence of seabed and its effect on steel offshore platform and other facilities in gas fields.
17	Sun Petrochemicals Limited	Pipeline design for transportation of gas from offshore to On Land Terminal and its laying methodology in transit Zone
18	Sun Petrochemicals Limited	Generating blue hydrogen from very highly viscous crude oil field.
19	Sun Petrochemicals Limited	Combo Chemical (PPD and Demulsifier) for treatment of oil and its injection at well bore



Professor A S K Sinha with Dr Biswajit Roy, Director General, GERMI

“RGIPT - GERMI have identified several areas wherein they will combine their core strengths and aid each other to further their activities and serve the Petroleum, Refining, Petrochemical, Fuel Cell, Energy Policy, Think Tank, Battery Energy Storage, E-Mobility & Renewable Energy Sector as a whole.”

**DEW : What have been some of the major outreach activities by RGIPT in the past few years?**

**Prof. Sinha :** Some of the major outreach activities by RGIPT are as follows:

**Gyan Arpan:**

RGIPT Jais, Amethi is running the Gyan Arpan program through which it is augmenting learning capabilities, educational resource generation, enrichment of ethos, values, and sensitization on higher education by running its classes at identified Gyan Arpan centres within Amethi District. The project commenced on 1st September 2019 and helped more than 5000 school-going children under this on-going project.

Gyan Arpan currently conducts weekend classes at RGIPT campus as well as at the designated places within the Amethi district, Uttar Pradesh for the standard IX and XI students, who were selected through a screening examination. The RGIPT student volunteers, who all are IIT JEE (Advanced) qualified, teach Maths, Physics, Chemistry and English to the school children and conduct regular doubt clearing classes as well on weekends.

**Research Internship in Petroleum and Energy (RIPE):**

Every year, RGIPT offers the summer Research Internships in Petroleum and Energy (RIPE) domain for Six Weeks. Students, who will be completing 1st year M Sc or 2nd year to the pre-final year of their B Tech programme in the year, shall only be eligible. The selections are purely based on academic achievements. At the end of the programme, students will be provided with a certificate for successful completion of the programme.



**Institution of Urja Shakti Award:**

It is a well-established fact in modern times that no country makes effective progress until the females get equal opportunity and support. As an academic and research institution, "RGIPT" has taken a step with the "Urja Shakti" event to make the progressive dreams of daughters of India true. The Urja Shakti event is an initiative by RGIPT to promote women's presence in the Energy Sector. The name "Urja Shakti", itself talks about the idea of this event, "Urja" represents the theme of the event - Energy and "Shakti" represents Feminine Power. The Urja Shakti event consists of two categories: (i) Urja Shakti Lifetime Achievement Award for a Female Representative from the Energy Sector who has done exemplary work in the field of energy and (ii) Urja Shakti Write-up contest award for Undergraduate B. Tech Girl students. The female undergraduate engineering students are selected based on the national-level write-up competition.

**Business Plan Competition: UDAAN**

Business plan competitions are excellent opportunities for budding entrepreneurs to put their ideas to the test, gain valuable feedback, and potentially secure the resources needed to turn their vision into a successful business. These events promote innovation and entrepreneurship while creating a supportive ecosystem for emerging startups. Also, these competitions serve as



RGIPT Innovation and Incubation Foundation (IIF) is a state-of-the-art platform to support the promotion of start-up activities in the field of science, technology and management for motivated entrepreneurs across the country. The foundation provides the initial funding, lab spaces, research advice, lab facilities, and technical and market suggestions to support entrepreneurs to develop their businesses. RGIPT-IIF will also provide support for the commercialization aspect of products and services of the incubated start-ups.

platforms for individuals or teams to showcase their business acumen, strategic thinking, and the potential of their ventures.

Annually, RGIPT conducts business plan competition "UDAAN" with the aim to inspire Amethi residents to incubate their creative ideas. UDAAN targets to stimulate people of Amethi and nearby districts to come forward with their innovative ideas. The competition provides an

opportunity to conceptualize and work on plans to shape interesting business models generating innovative products or services. The best business plans are given rewards in three different categories: (a) residents from within a radius of 150 km, (b) students from within a radius of 150 km and (c) RGIPT students.

**RGIPT Innovation and Incubation Foundation :**

RGIPT Innovation and Incubation Foundation (IIF) was established in July 2023 to support knowledge-based entrepreneurship and social relevance. It is a state-of-the-art platform to support the promotion of start-up activities in the field of science, technology and management for motivated entrepreneurs across the country. The foundation provides the initial funding, lab spaces, research advice, lab facilities, and technical and market suggestions to support entrepreneurs to develop their businesses. RGIPT-Innovation and Incubation Foundation will also provide support commercialization aspect of products and services of the incubated start-ups. dewjournal.com







Energy Transition Outlook 2023

# MARITIME FORECAST TO 2050

## Exploring all options to reach shipping's decarbonization goals

The 2020s has emerged as the decisive decade for the decarbonization of shipping. The action we take now will determine our future success. This year's Maritime Forecast to 2050 explores selected energy efficiency technologies that support the industry to meet IMO's 2030 targets and others that can help alleviate future carbon-neutral fuel demands. It also provides guidance and a stepwise approach for establishing green shipping corridors.

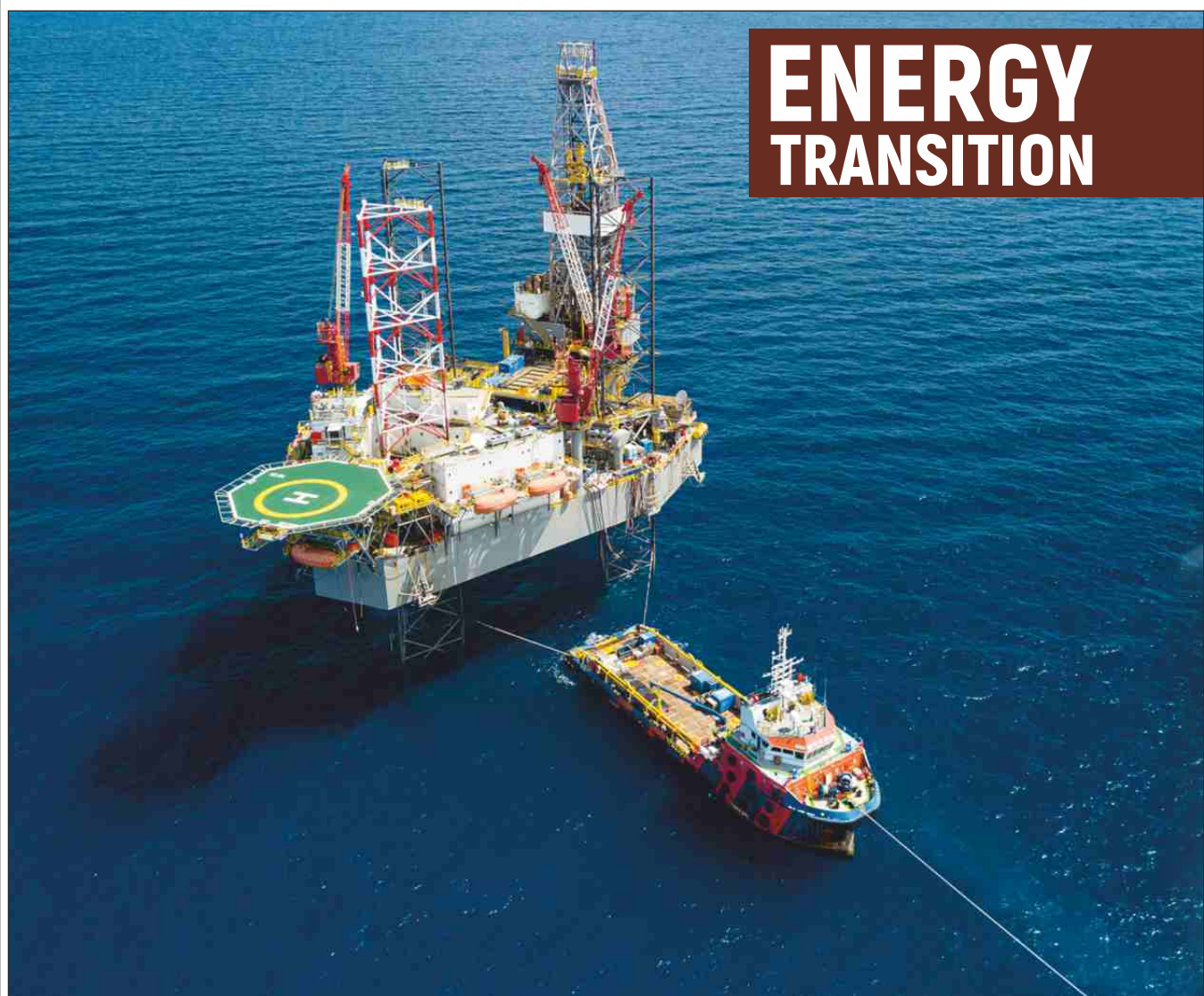


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# Clean energy transition is rapidly underway,

To create a positive impact on enhancing the scientific capacity and leading to a more inclusive growth, the Science and Engineering Research Board (SERB), a statutory body under the Department of Science and Technology, Government of India, in association with the Department of Petroleum Engineering and Geo-Engineering and the QIP Centre, Rajiv Gandhi Institute of Petroleum Technology (RGIPT), held a workshop and a high-powered panel discussion on energy transition under the Scientific Social Responsibility (SSR) initiative. A report by DEW correspondent. \_\_\_\_\_



# transforming the energy landscape



Science and Engineering Research Board is a statutory body under the Department of Science and Technology, Government of India, established by an Act of the Parliament of India

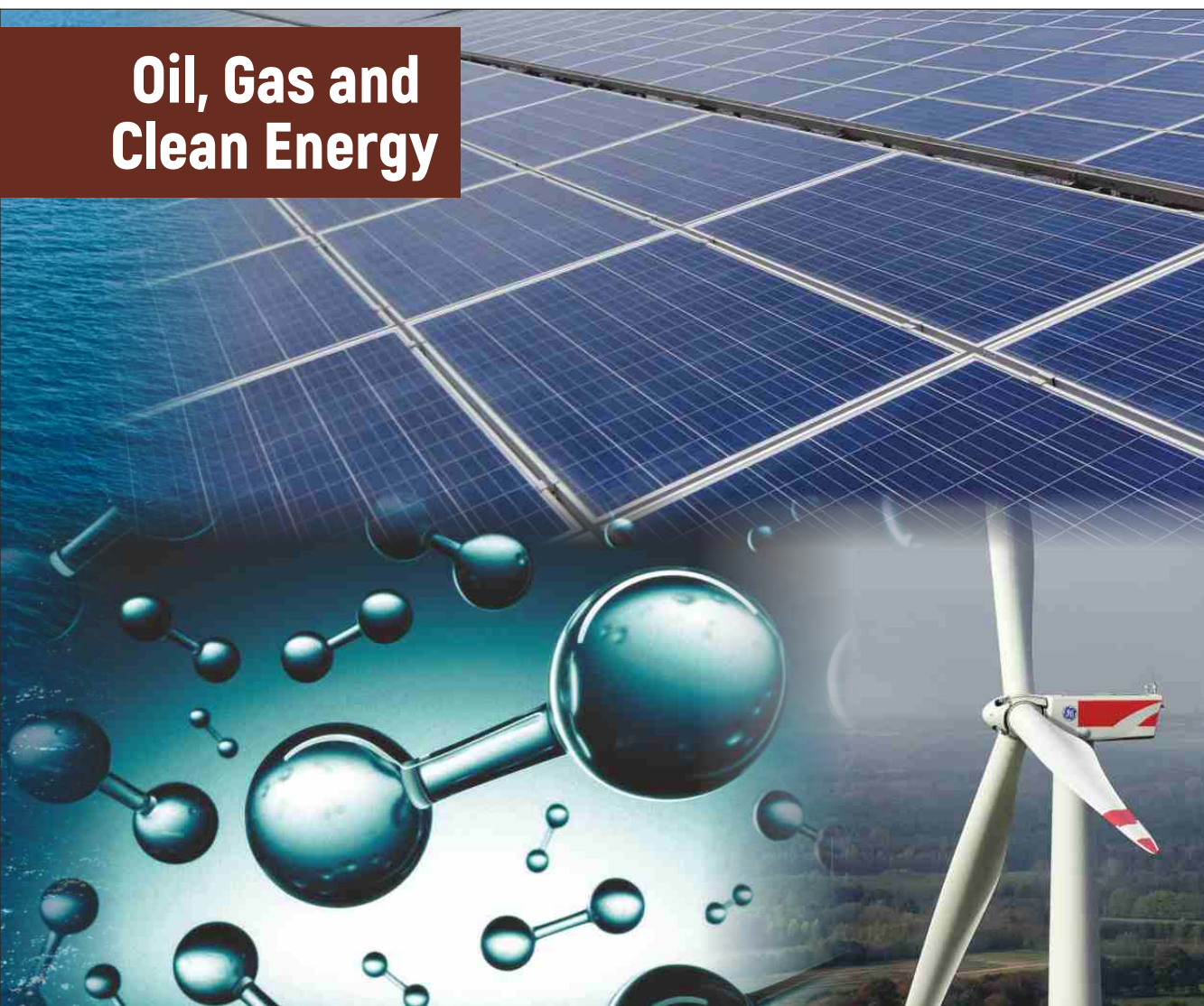


Scientific research continues to spur various technological advances and is one of the pivotal factors driving the economic growth of a nation. Science in India has witnessed rapid progress over the past several years, and the number of research institutions, scientific infrastructure, and resources, along with research output, have increased significantly. Scientific resources and knowledge thus developed are unprecedented wealth, which, when strategically tapped and channelled, can create a huge impact on the research ecosystem of the nation.

## An Industry-Academia Initiative:

To create a positive impact on enhancing the scientific capacity and leading to more inclusive growth, the Science and Engineering Research Board (SERB), a statutory body under the Department of Science and Technology, Government of India, a premier organisation for funding basic research in the disciplines of science and engineering in the country, organised in association with the Department of Petroleum Engineering and Geo-Engineering and the QIP Centre of RGIT a workshop on "Energy Transition: Sustainable Pathways" at the Rajiv Gandhi Institute of

## Oil, Gas and Clean Energy





Petroleum Technology, Jais, Amethi, Uttar Pradesh, under the Scientific Social Responsibility (SSR) initiative.

Students and faculty from different institutions, including the Rajiv Gandhi Institute of Petroleum Technology, attended the workshop and a panel discussion. Prof. Alok Kumar Singh from the Department of Petroleum and Geo Engineering (DPGE) and Dean, RGIPT along with Dr. Shivanjali Sharma, Associate

Professor, DPGE and Associate Dean, RGIPT were the conveners of the event.

A high-powered industry-academia panel discussion followed the workshop on April 3, 2024, focused on "Hydrocarbon Sector in the Era of Energy Transition." The panel discussion was sponsored by Oil & Natural Gas Corporation Limited (ONGC), Oil India Limited (OIL), SunPetro, and HPCL-Mittal Energy Limited (HMEL).

## “Keeping in view the importance of energy transition, RGIPT, from its current session 2024-25, is launching an MBA in Energy Transition”



Prof. ASK Sinha, Director, RGIPT

The SERB's concept of scientific social responsibility (SSR) under which the workshop and panel discussion were held is on the lines of corporate social responsibility, and it aims to create an environment for the sharing of ideas and resources to inculcate connections between leading institutions and all stakeholders, including schools and colleges. Thus this initiative is valuable as it creates an environment for sharing of ideas and resources.

The event also held importance as the need for an energy transition is universally acknowledged, and attention is now on finding ways to do it as quickly as possible. There is a growing worldwide commitment to combating climate change and moving towards a more sustainable future. Central to this transformation is the increasing emphasis on renewable energy sources and the adoption of clean technologies. Among the various sustainable solutions, green hydrogen has emerged as a promising alternative energy vector for decarbonisation.

As an institution of national importance engaged in high-quality R&D work and awarding bachelors, masters, doctoral, and postgraduate degrees and diploma in different streams relevant to petroleum science and technology, including management through its Jais-Amethi, Sibsagar-Assam and Bengaluru campuses. RGIPT is set up through an act of Parliament by the



Government of India. The institution since its inception has carved a niche for itself as a research-based institution in the fields of energy, oil and gas, and digitalization. It has even been deeply involved with industry sponsored research projects with the industry.

Co-promoted as an energy domain-specific institute by the six leading Indian public sector oil companies and the Oil Industry Development Board. RGIPT over the past sixteen years of its establishment has been instrumental in imparting world-class education to its students and providing innovative technological solutions to the problems being faced by Indian petroleum industries, both in the upstream and downstream sectors.

**Director RGIPT speaks:**

Inaugurating the workshop, Prof. ASK Sinha, Director, RGIPT, defined the theme of the workshop and panel discussion as not only timely but of high priority in view of climate change and global temperature rise.

The transition from traditional fossil fuels to renewable and sustainable energy sources is not just an environmental imperative but also a strategic necessity for long-term economic growth and social well-being, he added.

Prof. Sinha stressed the aims of the workshop is to explore the multifaceted challenges and opportunities associated with transition, bringing together experts, industry leaders, policymakers, and academics to share insights, and best practices. He also stated that together, we can drive meaningful change, accelerate the transition towards sustainable energy systems, and create a brighter, cleaner, and more resilient future for all.

Prof. Sinha called for continued research and investment in renewables as this will play an important role in the long run in reducing the overall cost of the energy sector while boosting employment.

He disclosed, keeping in view the importance of energy transition, RGIPT, from current academic session 2024–25, is launching an MBA in Energy Transition, which will dwell on the subject to prepare the future work force addressing this important area. This will be open to oil and gas industry professionals as well, he said.

Prof. Sinha also shed light on the mission of the institute. The institute he said, serves as the fountainhead for nurturing world-class engineers and scientists by providing state-of-the-art education, training, and research facilities for not only manning the future petroleum industries but also help society by developing affordable technologies to reduce the country's dependence on fossil fuels.



Dignitaries inaugurating the workshop at RGIPT by lighting the lamp.



Prof. Dr. Satish Sinha, Head of Department of Petroleum Engineering and Geo-Engineering, RGIPT



Dr. Shivanjali Sharma, Workshop Coordinator, Associate Professor, Dept. of PEGE, and Associate Dean, RGIPT

### Setting the tone:

In his address, Prof. Dr. Satish Sinha, Head of Department of Petroleum Engineering and Geo-Engineering, RGIPT stated that the coming together of the industry and academia experts on a common platform at RGIPT reflects the commitment of the industry, academia, and government to discuss a very pertinent subject as energy transition. This he said has been possible due to the proactive approach of the Director, RGIPT, in building a strong industry-academia relationship. Together, this he said also speaks of the capabilities of the institution and industry's trust in them. He thanked the invited experts for gracing the occasion.

As the workshop technical session chair Mr. Arun Kumar Singhal, founder and Chief Editor of DEW Journal, was of the view that the urgency with which we need to achieve our decarbonisation goals grows with each passing day. With the energy market continuing to evolve on its path towards improved sustainability, the hybrid approach, which combines multiple types of energy generation and/or storage options, is looking favourable. The industry needs to balance reliability and emissions reductions. While fossil fuels, particularly gas, are likely to play a part in the energy mix for at least the next decade, as renewable sources continue to expand, the choice is no longer a straight forward either/or dilemma. In any case, completely phasing out fossil fuels is far from reality, he pointed out.

He complimented RGIPT and SERB for organising a very timely discussion by way of organising the workshop.

Mr. Singhal also spoke of the growing importance of RGIPT as a research-based institution. With the industry collaborating with it for joint research projects, it reflects the quality of R&D at RGIPT, he said.

On the importance of the workshop, the workshop coordinator, Dr. Shivanjali Sharma, Associate Professor, Dept. of Petroleum Engineering and Geo-Engineering, and Associate Dean RGIPT, stressed that the world is witnessing an unprecedented shift in energy systems, driven by the urgency to mitigate climate change, ensure energy security, and promote sustainable development. The energy transition represents a paradigm shift from traditional fossil fuel-based energy sources towards renewable and low-carbon alternatives. This transition is not merely a technological challenge but also a socio-economic and political endeavour that requires a holistic and collaborative approach.

Informing about the topic "Energy Transition: Sustainable Pathways" selected for a panel discussion brings together industry leaders, academic experts, and policymakers to shed light on this critical issue, she said.

There are two main reasons why this panel discussion topic is crucial in today's context Dr. Shivanjali said. First, the energy transition is a challenge that affects all nations and sectors. The consequences of inaction or delayed action in transitioning to sustainable energy sources could be catastrophic, exacerbating climate change, energy insecurity, and environmental degradation. Engaging experts from diverse



backgrounds, the panel discussion will provide a comprehensive understanding of the challenges and opportunities associated with the energy transition, she said.

Secondly, achieving a successful energy transition requires a multidisciplinary approach that spans various domains, including technology, economics, policy, social sciences, and environmental studies. Industry experts can offer insights into practical challenges, technological advancements, and market dynamics, while academia can contribute cutting-edge research, theoretical frameworks, and long-term perspectives. By fostering a dialogue between these stakeholders, the panel discussion can generate holistic and innovative solutions for navigating the energy transition.

Sustainable pathways for the energy transition Dr.Shivanjali said encompasses a multifaceted strategy that addresses various aspects of energy production, distribution, and consumption. Key components of these pathways, she said, include accelerating the adoption of renewable energy sources to facilitate the large-scale integration of renewable energy into existing grids and energy systems; energy efficiency and conservation; promoting energy-efficient buildings, appliances, transportation systems, and industrial processes; and fostering behavioural changes towards more sustainable energy consumption patterns.

According to Dr.Shivanjali, modernising the electricity grid with smart technologies and integrating energy storage solutions is vital for



Mr. Arun Kumar Singhal, Founder & Chief Editor of DEW Journal and Workshop Session Chair



The august gathering at the inaugural session of the workshop at RG IPT

managing intermittent renewable energy sources and enhancing grid resilience. Energy storage technologies, such as batteries, pumped hydro, and thermal storage, can help balance supply and demand, enabling higher penetration of renewables. Additionally, transitioning towards electricity as the primary energy carrier, particularly in the transportation and heating sectors, can reduce reliance on fossil fuels. Concurrently, fuel switching to cleaner alternatives like hydrogen, biofuels, and synthetic fuels can complement electrification efforts in sectors where direct electrification is challenging, she said.

On carbon capture, utilisation, and storage (CCUS), she added that while the primary focus should be on reducing emissions at the source, CCUS technologies can play a role in mitigating emissions from hard-to-abate sectors, such as heavy industry and certain power generation processes. However, the scalability and economic viability of CCUS remain ongoing challenges.

Coupled with these, she pointed out the need for a circular economy and resource efficiency, in addition to a good policy and regulatory framework.

The energy transition is a global challenge that requires international cooperation, knowledge sharing, and technology transfer. Collaborative efforts among nations, industries, and stakeholders can accelerate the deployment of sustainable energy solutions and ensure

equitable access to clean energy, she asserted.

#### **SERB-RGIPT Technical Workshop & Panel Discussion:**

The SERB-RGIPT technical workshop focused on the theme "Energy Transition: Sustainable Pathways." The industry-academia panel discussion touched upon "Hydrocarbon Sector in the Era of Energy Transition."

The workshop comprised three presentations by industry experts related to the theme energy transition; sustainable pathways.

By bringing together industry leaders and academic experts, the panel discussion that followed the three technical presentations provided a comprehensive understanding of the energy transition and its sustainable pathways. Through constructive dialogue and knowledge sharing, the panellists shed light on the challenges, opportunities, and best practices for navigating transition towards a more sustainable and resilient energy future.

A wide range of discussions on the broad elements of India's decarbonisation strategy, including increasing electrification, higher penetration of cleaner fuels in the energy mix, accelerated adoption of energy-efficient technologies, rising digitalization, and improved material efficiency, including determined moves towards a circular economy, electric vehicles, energy storage, and renewable energy programmes, were taken up by energy professionals from industry, academia, and energy



Experts at the Workshop deliberating on the theme 'Energy Transition - Sustainable Pathways. L to R: Mr. Arun Kumar Singhal, Session Chair and Founder & Chief Editor of DEW Journal; Professor G. Suresh Kumar from the Indian Institute of Technology, Madras; Padam Shree Dr. Rabi Narayan Bastia, CEO (E&P), Oil Max Energy; and Mr. Kallol Saha, Director, Companies & Transactions, S&P Global Commodity Insights.



sector analysts during the workshop and panel discussion.

Both events also discussed how India is beginning to influence the clean energy transition, specifically the hydrocarbon sector, and identified principles and strategic opportunities for the country's leaders to drive economic recovery and maintain momentum on clean energy transition.

The event also held importance in view of the revamped India Energy Security Scenarios (IESS) 2047 of the NITI Aayog. The IESS assesses the integrated impact of various green energy policies in India.

#### Experts Views:

To quantify the potential impact of transitions and analyse of oil, net energy, and net CO<sub>2</sub> emissions savings, industry and academia experts comprising Padam Shree Dr. Rabi Narayan Bastia, CEO (E&P), Oil Max Energy, Professor G. Suresh Kumar from the Indian Institute of Technology, Madras, and Mr. Kallol Saha, Director, Companies & Transactions, S&P Global Commodity Insights, delved into different dimensions related to the theme of the workshop. The session chair was Arun Kumar Singhal, Founder and Chief Editor of DEW Journal.

Prof. G. Suresh Kumar from the Department of Ocean Engineering, Indian Institute of Technology, Madras, very emphatically put forward his views on whether carbon dioxide (CO<sub>2</sub>) emissions from oil and gas industries were actually responsible for the rise in mean global temperature.

Prof. Suresh Kumar stated he critically feels that in the absence of developing a clear conceptual model, it is not possible to delineate the physics and chemistry of importance and dominance, and in turn, it will not be

possible to delineate the physical and chemical parameters that remain to be extremely and moderately sensitive. With an argument supported by substantial facts, according to Prof. Suresh Kumar, there are many scientific aspects that require to be explored and, in turn, clarified before uncritically accepting a direct correlation between CO<sub>2</sub> emissions from oil and gas industries and the rise in mean global temperature.

*(Prof. Suresh Kumar's thoughts are elaborately discussed in an exclusive article on page no.50).*

Dr. Bastia's talk focused on the subject, "From Black Gold to the Green Future: Navigating the Energy Transition through the Story and Glory of Oil and Gas."

Dr Rabi Bastia is an eminent scientist with exemplary contribution in the field of Oil and Gas. His contribution to hydrocarbons discoveries in the unknown provinces of India is commendable. He has provided a high level of leadership in directing and implementing several major exploration programmes in the east coast of India leading to major hydrocarbon discoveries including the world's largest gas discovery in Krishna Godavari Basin, Andhra Pradesh in the year 2002 along with others in the Mahanadi and Cauvery offshore. His most recent success is in leading a significant hydrocarbon discovery for the first time in the Gulf of Oman.

He is one of the few exploration professionals in the world who has adopted the latest emerging technologies and integrated them with other geophysical methods to enhance the chances of finding oil and gas.

Elaborating on the topic, Dr. Bastia said that the global energy landscape has undergone a remarkable journey, evolving from primitive sources like



Dr. Rabi Narayan Bastia



Speaker Felicitation by RGIPT



Professor G. Suresh Kumar



Speaker Felicitation by RGIPT



Mr. Kallol Saha



Speaker Felicitation by RGIPT



Mr. Arun Kumar Singhal



Session Chair Felicitation by RGIPT

wood fire to the dominance of hydrocarbons such as oil, gas, and coal. This evolution, marked by technological advancements and societal needs, has propelled humanity towards increasingly complex energy sources.

He stated that the technological advancements in the oil and gas industry have been pivotal, driving unprecedented growth and development through innovations such as directional drilling, hydraulic fracturing, and advanced seismic imaging. These advancements have not only optimised production efficiency but also enhanced safety and reduced environmental impact. However, as the imperative to mitigate climate change becomes more urgent, a fundamental shift towards cleaner, renewable sources like solar and wind energy has emerged.

Looking towards the future, Dr. Bastia said, four dominant trends shape the global energy landscape: the declining role of hydrocarbons, rapid expansion in renewables, increasing electrification, and the growing use of low-carbon hydrogen. Hydrogen, often termed the "fuel of the future," holds immense promise for revolutionising energy production and decarbonising sectors reliant on fossil fuels. Its clean and abundant nature presents a viable pathway towards mitigating climate change and building a sustainable future, he added.

The transition to a hydrogen-powered future, he said, presents challenges, requiring bold investments, robust infrastructure, and widespread collaboration. Yet history attests to humanity's remarkable ability to innovate and adapt in the face of adversity. Therefore, embracing this moment of transition with determination and collective effort is crucial, he stated.

Mr. Kallol Saha spoke on "Upstream M&A: How is it changing in a transitioning world?" According to him, the pursuit of a sustainable future amid the challenge of ensuring accessible and affordable energy in a progressively unstable global environment is continuing to influence short-term and longer-term strategic acquisitions and divestitures.

Mr.Saha opined that the upstream M&A market is

navigating through a notably unstable period, amplified by widespread geopolitical and commodity market instability, mainly stemming from Russia's conflict in Ukraine, recent disturbances in the Middle East, and the accelerating speed of the energy transition.

Elaborating the figures, he said, in 2023, the global upstream transaction value surged by 140% year-over-year to \$245 billion, driven by two \$60 billion-plus megatakeovers: the first one was ExxonMobil's purchase of Pioneer Natural Resources, and the second one was Chevron's proposed acquisition of Hess Corp. This is despite a relatively subdued market characterised by a low deal count, which is approximately half the 20-year average he informed.

Major oil and gas companies, Mr.Saha said, have been optimising their portfolios to focus on their core growth areas to sharpen their balance sheets and prioritise shareholder returns. Consequently, they allocate a substantial part of their surplus cash flow and equity pricing power towards inorganic growth and low-carbon businesses.

Regarding M&A, spending by National Oil Companies (NOCs) has been subdued during the current decade; however, they are expected to spend more on acquiring international assets with active participation from the Middle Eastern NOCs, Mr.Saha said.

Regionally focused private producers and PE (private equity)-backed E&Ps, who remain steadfast in their belief in the long-term prospects of the global fossil fuel market, are strengthening their foothold in mature assets within their focused geographies, he added.

Since gas is widely considered a transitional fuel in the global efforts to decarbonise, the gap between forecasted LNG liquefaction capacity and global LNG demand suggests that energy security may drive further M&A in the LNG sector, Mr.Saha stressed.

Intense competition for cost-efficient and low-carbon-advantaged barrels will therefore attract premium valuations, he said. In addition to opportunistic acquisitions and divestitures, strategic partnerships aimed at technologically advanced solutions for carbon capture and tangible emission reductions are becoming increasingly critical, Mr. Saha added.

The topics of all three presentations elucidated the subject with new and innovative dimensions.

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While the environmental impact cannot be ignored and the transition is inevitable sooner or later it is not about replacing hydrocarbons and fossil fuels but new energy addition in the energy basket. Therefore, it should be addressed as an energy addition to the transition

**Panel Moderator Arun Kumar Singhal, Founder and Chief Editor, DEW Journal**

**The Panel Discussion:**

The expert talk session was followed by a panel discussion on the subject "Hydrocarbon Sector in the Era of Energy Transition." The panellists comprised Prof. G. Suresh Kumar of IIT Madras, Dr. Rabi Bastia, CEO (E&P), Oil Max Energy, Mr. Kallol Saha, Director, Companies & Transactions, S&P Global Commodity Insights, Mr. DLN Sastry, Director (ORM), FIPI, Mr. Mainak Ray, Deputy Manager-R&D and Innovation, HPCL-Mittal Energy Limited, and Prof. ASK Sinha, Director, RGIPT. The panel moderator was Mr. Arun Kumar Singhal, Founder and Chief Editor, DEW Journal.

In his opening remarks, Mr. Singhal emphasised that the winds of transition across all sectors of the economy, globally, are blowing. A clean energy economy can only help the world avoid and lessen the most severe impacts of climate change being witnessed.

He pointed out the fact that 51 billion metric tonnes of greenhouse gases the world adds to the environment every year, of which 21.42 billion metric tonnes per year are emitted by the oil and gas industry, with India's oil and gas share of green house gases at around 1.134 billion metric tonnes. So for carbon capture, India will have to invest almost \$200 billion per year for the next 50 years to go green. Likewise trillion of dollars required by the world to make a greener earth and environment and checking temperature rise. In this context, the need for energy transition to cleaner sources of energy is critical, he said.

The energy transition, he pointed out, is made up of several main components, including the following:

Decarbonisation is the process of reducing or eliminating greenhouse gas emissions by switching to renewable energy sources like wind, solar, and geothermal heat and phasing out fossil fuels.

Digital transformation: enabling the integration of renewable energy into the electricity system, improving grid reliability, and helping to manage energy demand.

Renewable energy plays a vital role in the energy transition, with studies showing that it can make up between 48% and 94% of the primary energy supply.

Science and technology he said, plays a crucial role in the development and advancement of renewable energy sources, making them more efficient, cost-effective, and widespread. While optimism prevails, the shift to renewable energy makes some big promises:

The mandate for RGIPT is very clear, i.e., to serve the oil and gas industry. However, keeping in view the winds of change in the form of energy transition blowing, the institute has expanded its wings to address the alternative energy demands for our nation, including hydrogen, bioenergy, solar energy, e-mobility, batteries, etc.

**Prof. ASK Sinha, Director, RGIPT**

cleaner air, reduced greenhouse gas emissions and greater energy security. But as the world grapples with the increasingly obvious impact of climate change blamed on fossil fuels, the question on everyone's mind is: can renewables actually do it if fossil fuels are phased out?

These were some of the many issues panellists tackled while also discussing that all kinds of energies are most welcome to be part of the ecosystem with transition more meaningful as new energy additions.

Oil companies are actively striving to transition into integrated energy firms, aiming to reduce their carbon footprint. It is projected that India will achieve net-zero emissions by 2070. However, it is also acknowledged that fossil fuels will remain the primary energy source for the foreseeable future, Mr. Singhal added. Viable alternatives are perhaps not yet prepared to shoulder a significant energy load, necessitating the simultaneous operation of both new and existing energy sources for an extended period, he stressed.

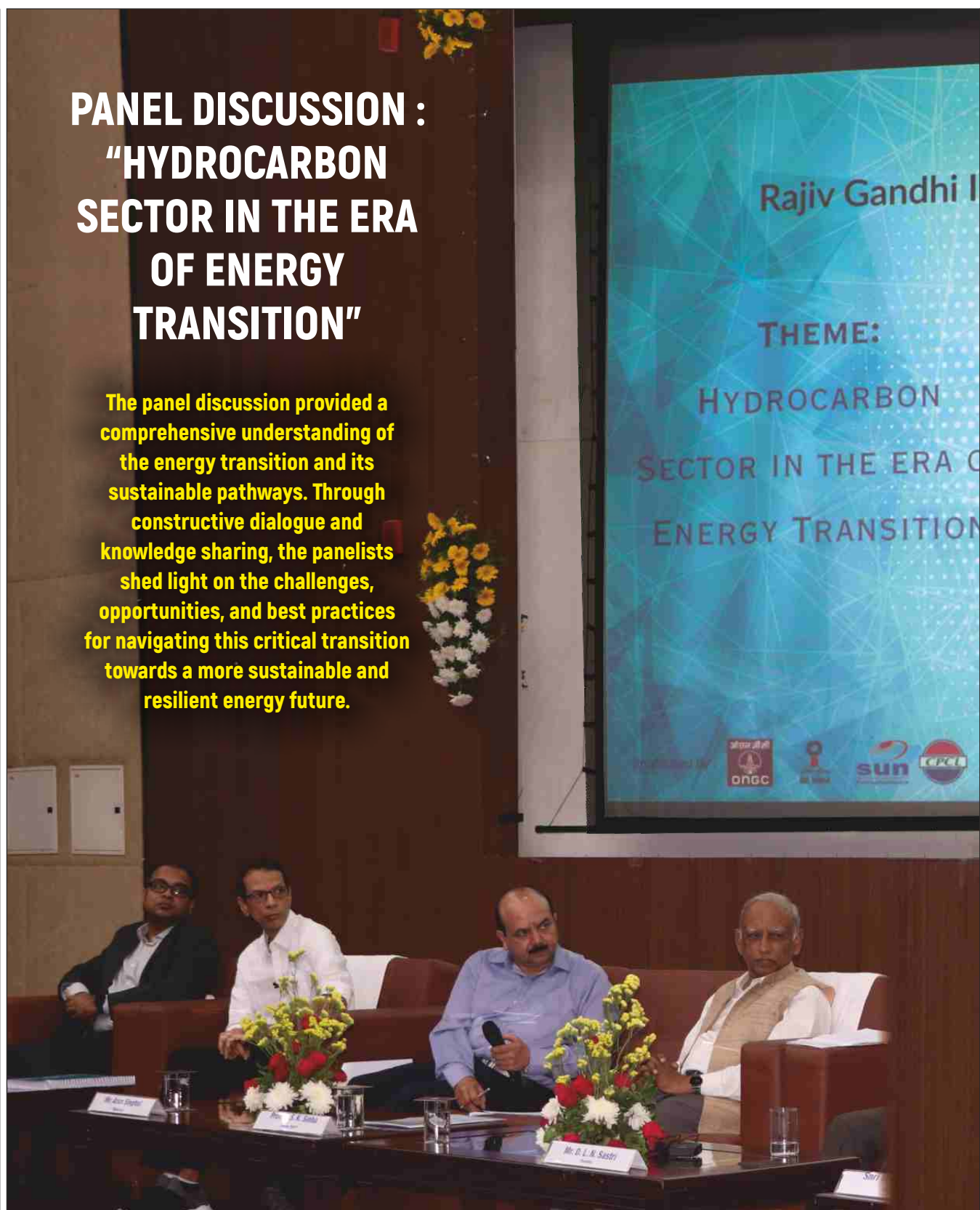
While the environmental impact cannot be ignored and the transition is inevitable sooner or later it is not about replacing hydrocarbons and fossil fuels but new energy addition in the energy basket Mr. Singhal pointed out. Therefore, it should be addressed as an energy addition to transition. The need of the hour, however is to check emissions and devise innovative technologies to check the 51 billion metric tonnes of greenhouse gases the world adds to the environment every year, he stressed.

The panel discussed the future of oil and gas and whether the oil and gas industry needs to change its ways of exploring and producing. The focus was also on whether energy transition means moving away from fossil fuels or whether it means energy addition. Also discussed was whether hydrocarbons will remain the primary energy source for the foreseeable future since viable alternatives are perhaps not yet sufficiently prepared to shoulder a significant energy load. How the world can meet its energy needs and climate goals.

The experts discussed steps that can decarbonise

## PANEL DISCUSSION : "HYDROCARBON SECTOR IN THE ERA OF ENERGY TRANSITION"

The panel discussion provided a comprehensive understanding of the energy transition and its sustainable pathways. Through constructive dialogue and knowledge sharing, the panelists shed light on the challenges, opportunities, and best practices for navigating this critical transition towards a more sustainable and resilient energy future.



L to R: Mr. Kallol Saha, Director, Companies & Transactions, S&P Global Commodity Insights; Prof. G. Suresh Kumar, Indian Institute of Technology - Madras (IIT Madras); Panel Moderator Mr. Arun Kumar Singhal, Founder and Chief Editor, DEW Journal; Prof. ASK Sinha, Director, RGIPT





**Institute of Petroleum Technology, Jais, Amethi**

# PANEL DISCUSSION



**Shri Mainak Ray**  
Deputy Manager-R&D and  
Innovation, HPCL-Mittal Energy Ltd



**Dr. Rabi Bastia**  
CEO (E&P), Oil Max Energy



**Prof. G. Suresh Kumar**  
Professor (HAG), IITM



**D.L.N. Sastri**  
Director (ORM),  
FIPI



**Mr. Kallol Saha**  
Director, Companies and  
Transactions, S&P Global  
Commodity Insights



**Prof. A.S.K. Sinha**  
Director, RGIPT



**Shri Arun Singhal**  
Founder & Chief Editor,  
DEW Journal

Media Partner: 



L to R: Mr. DLN Sastry, Director (ORM), Federation of Indian Petroleum Industry (FIPI); Mr. Mainak Ray, Deputy Manager-R&D and Innovation, HPCL - Mittal Energy Limited (HMEL); Dr. Rabi Bastia, CEO (E&P), Oil Max Energy.

Honouring the legacy of oil and gas while charting a new course towards a greener, more sustainable future is imperative.

Together, through concerted efforts guided by the story and glory of our past, humanity can navigate the energy transition towards a brighter tomorrow for generations to come.

**Dr. Rabi Bastia, CEO (E&P), Oil Max Energy**

the oil refining industry while still transitioning to net zero. Accelerating a clean energy transition for the petrochemical industry in the wake of the fact that petrochemicals are rapidly becoming the largest driver of global oil demand was discussed.

Also discussed was how natural gas, green hydrogen biofuels, ethanol, and biogas are emerging as big success stories.

The panel appeared divided on how realistic the goals of making natural gas reach 15% of the primary energy mix by 2030 and reducing carbon footprints in some of the harder-to-abate sectors were.

To a question posed by the moderator, Prof. ASK Sinha, Director, RGIPT, emphasised the mandate for the institute is very clear, i.e., to serve the oil and gas industry. However, keeping in view the winds of change in the form of energy transition blowing, the institute has expanded its wings to address the alternative energy demands for our nation, including hydrogen, bioenergy, solar energy, e-mobility, batteries, etc.

As part of its strategy, RGIPT, Prof. Sinha said, is introducing new courses at the UG and PG levels relevant to today's changing world. Towards the end of the current academic session, an MBA in Energy Transition will be launched.

Towards furthering research in the field of hydrogen as a clean fuel, a prototype flow-through electrolyzer

without a membrane has been developed at RGIPT in collaboration with NTPC, which is a landmark achievement of the institute, Prof. Sinha stated.

Prof. Sinha added that RGIPT, as part of a sponsored industrial project, is working on a study on the

adoption of advanced biofuels in India with a focus on bioethanol.

Also, among the projects under consideration with various industries by RGIPT, Prof. Sinha made mention of H<sub>2</sub>S to Hydrogen, Electrochemical Conversion of Water + Methanol/Ethanol to Hydrogen, additives for producing more stable methanol blended diesel production, generating blue hydrogen from a very highly viscous crude oil field, among a host of other initiatives towards transition and cleaner fuels.

In response to a question raised during the panel, Dr. Bastia said that humanity is facing significant threats, including global warming, air pollution, and water pollution, all exacerbated by our reliance on fossil fuels. The urgency for action has never been clearer, with the need for embracing renewable energy, implementing robust environmental policies, and adopting sustainable practices becoming increasingly evident. Amidst these challenges lies an opportunity for collective action and transformative change. By leveraging renewable energy sources and nurturing collaboration across industries and nations, humanity can forge a path towards a healthier, more resilient future.

Dr. Bastia was of the view that honouring the legacy of oil and gas while charting a new course towards a greener, more sustainable future is imperative. Together, through concerted efforts guided by the story and glory of

our past, humanity can navigate the energy transition towards a brighter tomorrow for generations to come.

On being asked during the panel if oil and gas were major polluters, Prof. Dr. G. Suresh Kumar from IIT Madras very emphatically and in a straight-forward manner said that the oil and gas industry is not the sole polluter as projected. According to Prof. Suresh Kumar, Milankovitch climate theory describes, how exactly, the seasonal and latitudinal

Milankovitch climate theory describes the seasonal and latitudinal variations of solar radiation that hit the earth in different ways, and at different times, have the greatest impact on earth's changing climate patterns, revealing that earth's climate alters, resulting from extraneous factors, which have nothing to do with CO<sub>2</sub> emissions from oil & gas industries.

Milankovitch with his model studies concluded that earth's climate has always been changing, and it is in a constant state of flux, while ruling out any influence of human beings (CO<sub>2</sub> emissions from oil & gas) trying to alter the earth's climate.

**Prof. G. Suresh Kumar, Indian Institute of Technology - Madras**

variations of solar radiation that hit the earth in different ways, and at different times, have the greatest impact on earth's changing climate patterns, revealing that earth's climate alters, resulting from extraneous factors, which have nothing to do with CO<sub>2</sub> emissions from oil and gas industries; and in fact, Milankovitch with his model studies concluded that earth's climate has always been changing, and it is in a constant state of flux, while ruling out any influence of human beings (CO<sub>2</sub> emissions from oil and gas industries) trying to alter the earth's climate, he stated.

Among other areas, he touched upon climate science, geo-sequestration of carbon dioxide, and geothermal reservoir characterization needed in today's context.

Since gas is widely considered a transitional fuel in global efforts to decarbonise, the gap between forecasted LNG liquefaction capacity and global LNG demand suggests that energy security may drive further M&A in the LNG sector, Mr. Kallol Saha, Director, Companies & Transactions, S&P Global Commodity Insights, stressed.

Replying to many questions during the panel, Mr. Mainak Ray, Dy. Manager R&D Innovation, HPCL-Mittal Energy Limited (HMEL), sensitised everyone on the need for more R&D and innovation and the growing role of industry-academia research projects as a way to seek solutions to meet future challenges.

Replying to a question, Mr. Ray said, the world is undergoing an energy transition with the hydrocarbon sector having a significant role to play in this. It is not that discarding what we have; it is about innovating and adopting to meet future challenges he asserted.

HMEL, he added, is committed to being a part of the solution, and with the continued support of stakeholders and industry-academia collaboration, we can significantly contribute to a sustainable energy future. He went on to say that, Biofuel, i.e., Bioethanol, and solar cells, especially Perovskite Solar cells, will lead the energy transition.

Mr. Ray stated that HMEL is ahead of the curve in exploring the potential of Biofuels, Bioethanol, and sustainable aviation fuel. We have installed a 300 KLPD 1st Generation Grain-Based Ethanol Plant to meet the country's Ethanol Blending Programme and reduce crude import dependency. Additionally, we are exploring alcohol-to-jet for significantly contributing to GHG reduction in the aviation sector.

He also stated HMEL has explored technology for waste ammonia recovery from a sulphur unit, which is called "Blue Ammonia," a value product that India imports around 2.56 lakh metric tonnes per year, and developed

alternative wet air oxidation technology for sustainable spent caustic treatment in refinery and petrochemicals. Energy Transition Towards sustainability requires more technological advancement and continuous R&D that can propel sustainability with economics; without economics, sustainability cannot be affordable globally, he emphasised.

Mr. Ray said the need to mitigate climate change and reduce greenhouse gas emissions is driving a shift from traditional fossil fuels to cleaner, more sustainable energy sources due to the rise in CO<sub>2</sub> concentration in the last 50 years. However, the hydrocarbon/ refining sector still



Curious audience posing question to panellist





Prof. Dr. Satish Sinha presenting a memento to Prof. ASK Sinha, Director RGIPT as member of the panel discussion



Prof. Dr. Satish Sinha presenting a memento to Dr. Rabi Narayan Bastia, CEO (E&P), Oil Max Energy as member of the panel discussion



Prof. Dr. Satish Sinha presenting a memento to Prof. G. Suresh Kumar, IIT Madras as member of the panel discussion



Prof. Dr. Satish Sinha presenting a memento to Mr. DLN Sastry, Director (ORM), FIPI as member of the panel discussion



Prof. Dr. Satish Sinha presenting a memento to Mr. Mainak Ray, Dy. Manager-R&D & Innovation, HPCL-Mittal Energy as member of the panel discussion



Prof. Dr. Satish Sinha presenting a memento to Mr. Kallol Saha, Director, Companies & Transactions, S&P Global as member of the panel discussion



Prof. Dr. Satish Sinha presenting a memento to Mr. Arun Kumar Singhal, as Session Chair of the Technical Workshop



plays a crucial role in this transition and will remain steady. This view also aligns with the Prime Minister's vision of almost doubling India's refining capacity from 254 MMTPA to 450 MMTPA by 2030, he said.

He also pointed out that fossil fuels have powered our industries, economies, and homes for over a century, and it's continuing. But their environmental impact is a concern and well understood; as an R&D expert in the refinery sector, I can assure you that we are not blind to these challenges, and refineries have taken many adequate technical measures to reduce CO<sub>2</sub> and GHG emissions during their process. HMEL, he said, is proactively investing in technologies to make hydrocarbon production cleaner and more efficient.

One such technology is carbon capture, utilisation, and storage (CCUS) and CO<sub>2</sub> to value chemicals. This technology captures CO<sub>2</sub> emissions from using fossil fuels in electricity generation and industrial processes, preventing CO<sub>2</sub> from entering the atmosphere. In the first phase, we installed carbon capture technology in our ethanol plant, and we are exploring how the captured Biogenic CO<sub>2</sub> can be valorized for various value chemicals, including green methanol production, to achieve net-zero emissions, Mr. Ray said replying to a question.

Another promising area under study is blue and green hydrogen. Blue hydrogen is produced by capturing CO<sub>2</sub> from existing HGU units, and green hydrogen is produced through water electrolysis using renewable energy, he said. Apart from the scaling-up factor of green hydrogen, both blue and green hydrogen look for sustainable paths forward for the hydrocarbon sector. However, their influential impact on economics must be considered because Rs 200/kg of Grey H<sub>2</sub> contributes to the gas price of approximately Rs 100/lit, but 400–500/kg of Blue or Green Hydrogen will raise the gasoline or energy cost, which is a challenge for daily life, the commodity market, and the growth of the nation. I think in the future "turquoise hydrogen" from methane cracking

Since gas is widely considered a transitional fuel in global efforts to decarbonise, the gap between forecasted LNG liquefaction capacity and global LNG demand suggests that energy security may drive further M&A in the LNG sector.

**Kallol Saha, Director, Companies & Transactions, S&P Global**

would be a viable solution for sustainability and economics, Mr. Ray stressed.

Speaking of the role of the Federation of Indian Petroleum Industry (FIPI) and its many initiatives, Mr. D.L.N. Sastry, Director said, FIPI, is working to ensure the Indian hydrocarbon industry's sustained growth with more holistic, low-cost, low-carbon energy solutions since all major companies operating in the oil and gas sector in India are members of FIPI.

It was opined that in the process of energy transition, the challenge we face may be daunting, but the need of the hour is to commit to the pursuit of a more sustainable and equitable world where every individual can thrive in harmony with nature.

It was felt that India will have to strike a balance to increase energy access and reliability while delivering affordable energy supplies and diversifying its fuel mix to reduce the overall carbon intensity, coupled with the need to look more scientifically at Carbon Capture and Storage (CCS) and Carbon Capture, Utilisation and Storage (CCUS).

The way ahead will not be straightforward; however, there are actions that will enable the provision of secure, affordable, and sustainable heat, light, and mobility to all. We are all still in the learning phase; however, this learning has to be fast if we want to reign in rising temperature by the turn of the century, the experts felt.

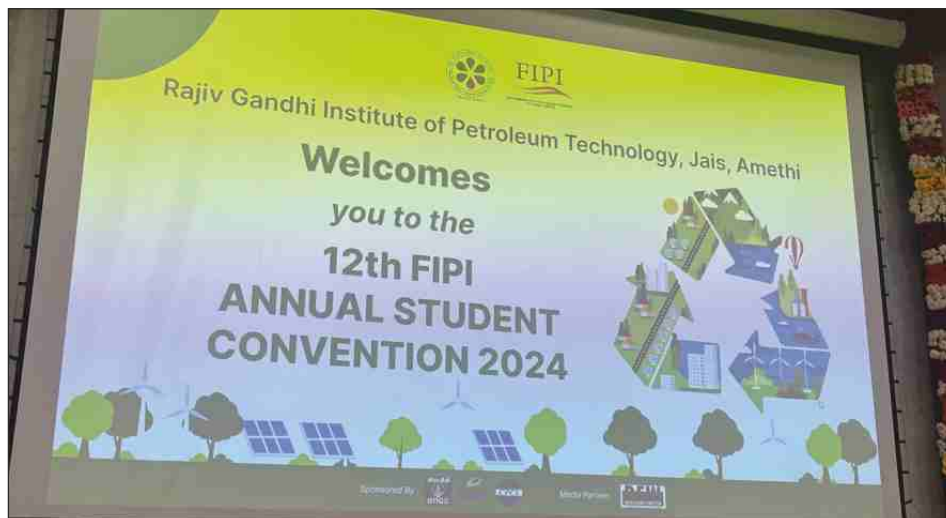
A general consensus by all was that we cannot ignore the environmental impact, and the transition is inevitable sooner or later.

The engrossing interactive and very thought-provoking panel discussion slated for one hour stretched double its time and saw many issues being discussed by the panellists with the audience comprising university professors, faculty members, students and researchers who all appeared enthused with the deliberations. The panel discussion was looked upon as a very timely event on an important subject by the attendees. [dewjournal.com](https://dewjournal.com)

**Energy transition towards sustainability requires more technological advancement and continuous R&D that can propel sustainability with economics; without economics, sustainability cannot be affordable globally.**

**Mainak Ray, Manager R&D Innovation, HPCL Mittal Energy Limited**

## RGIPT hosts the 12th FIPI Annual Students Convention 2024



# FIPI



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## The convergence of technologies offers space for all forms of energy to coexist with oil: Experts

By DEW Correspondent

The 12th Annual Federation of Indian Petroleum Industry (FIPI) Student Convention 2024, hosted by the Rajiv Gandhi Institute of Petroleum Technology (RGIPT), Jais, Amethi, Uttar Pradesh, saw seven universities and institutions participate, namely Pandit Deendayal Energy University (PDEU), UPES, Rajiv Gandhi Institute of Petroleum Technology (RGIPT), IIT (ISM), IIT-Guwahati, Jawahar Lal Nehru Technology University Kakinada (JNTUK), and Dibrugarh University.

The convention is an annual fixture of FIPI, wherein its student chapters at various

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(Left): Dignitaries on the dais during the inaugural session of the Convention. (Right): Jordan Strickler, Program Manager, Global Standards Strategy, American Petroleum Institute (API) delivering online talk during the inaugural session of the Convention.



universities and institutions participate and showcase their activities over the year towards knowledge assimilation in the fields of energy and oil and gas. The theme of this year's convention was "Pathways for the Hydrocarbon Industry in its Journey Towards Net Zero."

The convention was jointly opened by Prof. ASK Sinha, Director, RGIPT, and Mr. Gurmeet Singh, Director General of the Federation of Indian Petroleum Industry (FIPI).

Prof. ASK Sinha welcomed all to the RGIPT and thanked FIPI for considering his institution to host the 12th FIPI Annual Students Convention. He welcomed all the participating institutions and universities to RGIPT. Prof. Sinha also extended RGIPT's greetings to the Chief Guest, Mr. Chandrasekhhar N, Head (Research & Development), Bharat Petroleum Corporation Limited (BPCL), and the Guest of Honour, Mr. Rajesh Singh, Executive Director and Uttar Pradesh State Head, Indian Oil Corporation Limited, for gracing the convention.

Speaking on the occasion, Prof. Sinha briefed all about the institute activities, infrastructure available for research, achievements, and different initiatives taken by the institute for the holistic growth of students. He encouraged the students to seize this opportunity to expand their horizons, learn from the best in the industry, and engage actively in the sessions, ask questions, and share ideas and insights. He said the students are the future leaders and innovators who will drive the energy sector forward in the years to come.

The event commenced with an online address by Jordan Strickler, Program Manager, Global Standards Strategy, American Petroleum Institute (API) on the capabilities of API in relation to the convention theme.

The high point of the event was brief presentations on activities conducted by FIPI Student Chapters from the seven participating universities followed by their presentations on the theme "Pathway for Hydrocarbon Industry in its journey towards Net-Zero". All the seven teams performed exceptionally well and covered the theme in a precise and to the point manner.

On the basis of presentations by the various participating universities the jury presented the Best Chapter award to Pandit Deendayal Energy University FIPI student chapter, while the University of Petroleum and Energy Studies, Dehradun, emerged as the Winner in the theme presentation, followed by Rajiv Gandhi Institute of Petroleum Technology, Jais, and JNTU Kakinada as Runners Ups (see pics on page 47).



Formal inauguration of the Convention at the hands of Prof. ASK Sinha, Director, RGIPT, Mr. Chandrasekhhar N, Head (Research & Development), Bharat Petroleum Corporation Limited, Mr. Rajesh Singh, Executive Director and Uttar Pradesh State Head, Indian Oil Corporation Limited, and Mr. Gurmeet Singh, Director General of the Federation of Indian Petroleum Industry (FIPI)



Prof. ASK Sinha



Mr. Gurmeet Singh

In his address, Mr. Gurmeet Singh, DG, FIPI, while thanking the dignitaries from the industry, eminent professors from different institutions and universities appraised the role of FIPI as a financially self-sustaining, not-for-profit organisation and an apex society of entities in the hydrocarbon sector that acts as an industry interface with government and regulatory authorities. Under the aegis of the Ministry of Petroleum and Natural Gas, Government of India, he said, FIPI is the most effective and influential voice of the oil and gas industry to facilitate its development as a globally competitive industry in India that enjoys the respect and trust of society. With 15 functional committees, FIPI, he said, covers every aspect of the oil and gas business and is represented by senior professional executives from the member companies.

#### The Chief Guest Speak:

Delivering the inaugural address, Mr. Chandrasekhar N, Head (Research & Development), Bharat Petroleum

Corporation Limited (BPCL), said we are in a state where the future may look complex, the present may look very challenging, and we are also wondering how we lived in the past. This is the actual reality for many of us today.

On the future of the oil industry, he categorically emphasised that oil is here to stay. There may be other sources of energy much cleaner than fossil fuels, but oil is here to stay for many decades to come.

Speaking about net zero and the emissions that are coming from oil refineries, coal plants, cement plants, and other sectors, Mr. Chandrashekhar said the big challenge today is to ensure a balance between the carbon that is being emitted and that which is being consumed. Global efforts are going in

this direction with India actively part of it, he said.

On renewable and cleaner sources of energy, he stated that our future will have more hydrogen. The Government of India, he said, is putting in all its efforts to ensure that green hydrogen, green hydrogen generation, and green hydrogen usage for mobility reach its peak.

Mr. Chandrashekhar mentioned India's first indigenous alkaline electrolyser by BPCL, a groundbreaking achievement developed collaboratively by his company and the Bhabha Atomic Research Centre (BARC). The prototype, he said, has received the Prime Minister's appreciation.

Alkaline water electrolysis, the process through which hydrogen is produced from alkaline water via electrolysis, marks a pivotal advancement in industrial-scale applications. The technology demonstrates high cell efficiency and robustness in an alkaline environment.

Electrolyzers are devices that use electricity to split





water into hydrogen and oxygen, a process called electrolysis. Electrolyzers can be small, like an appliance, or large, like a central production facility. Renewable energy sources like solar, wind, hydroelectric power, or biofuels can be used to produce emissions-free hydrogen.

In line with India's target to produce 5 million tonnes of green hydrogen by 2030, BPCL strategically plans a 5 MW green hydrogen plant at Bina Refinery. Additionally, a 500-KW-capacity integrated hydrogen refuelling station will be established at Cochin International Airport. With a focus on sustainable solutions, the company is developing an ecosystem and a road map to become a Net Zero Energy Company by 2040, in Scope 1 and Scope 2 emissions, he said.

On how to make this hydrogen compatible with other fuels and other gases, he said that if hydrogen can be blended with some appropriate fuel, keeping it to a particular limit, it will certainly reduce the cost of energy in households. BPCL, he said is going to showcase the first green hydrogen mobility system in Cochin shortly, where it is going to place the BPCL electrolyzers at the Cochin International Airport for hydrogen production.

Cochin International Airport will have the largest green field solar hydrogen plant. From this plant's production, BPCL will be building fuel stations, and plans are to operate hydrogen buses from the airport, he said.

Mr.Chandrashekar also pointed out an important resource: water. When talking about energy, we should not forget water, which is very essential. He also stressed the conservation of water, which he said is the need of the hour for abundance in energy. Water shortage is going to pose challenge for the mankind, he said.



Mr. Chandrasekhar N



Mr. Rajesh Singh

On the present high cost of the electrolyser, Mr.Chandrashekar said this is an issue on which research is on to see how the cost can be lowered. He invited the students to come up with innovative ideas to improve the quality of the electrolyzers, improve the technology of the electrolyzers, and bring down the cost. If any student wants to collaborate with BPCL, he is welcome Mr.Chandrashekar pointed out.

#### **Guest of Honour Speak:**

Sharing his views on the occasion, the guest of honour, Mr. Rajesh Singh, Executive Director and State Head, Uttar Pradesh, Indian Oil Corporation Limited, stressed the timeless adage that we don't inherit the earth from our ancestors; we borrow it from our children. I think this statement underscores our responsibility to safeguard our planet for generations to come, he said.

Mr. Singh added, We are all aware we are at a very crucial junction in history where the reality of climate





Indian Oil is enhancing its compressed biogas network. Towards this end, Indian Oil is planning to set up 30 CBG plants in the country. The most recent one is the CBG plants commissioned in Gorakhpur. It is a 200-tonne CBG plant and uses paddy straw as the feedstock which is mostly burned by the farmers. Now it is being used for the generation of CBG. This technology is also developed by IndianOil R&D, which is based on bio-methylation.

**Mr. Rajesh Singh, Executive Director  
and Uttar Pradesh State Head, Indian Oil Corporation Limited**

change towards urgent and decisive action is very important at this stage, and the evidence is indisputable. From the devastating wildfires in the forests to the severe storms that are battering the coastlines, the signs of environmental distress are all around us. From droughts to floods, extreme temperatures, cyclones, and rising sea levels are all signs of climate change, Mr. Singh stressed.

These phenomena, he said, not only pose an immediate threat to human lives and livelihoods, but they also jeopardise the long-term sustainability of the planet. The centre of all is the phenomenon of global warming which need to be addressed, he added.

We all are aware that, in line with the COP26 Paris Agreement, the international community has united and targeted to secure global net zero by mid-2050 and to limit the rise of the global average temperature by 1.5 degrees Celsius over the pre-industrial level by the end of this century. This is indeed a huge task considering our predominant nature and our dependence on fossil fuels to energise the world. Providing a global perspective Mr. Singh said, with a population of 8 billion, the world has a primary energy consumption of almost 14,400 million metric tonnes of oil equivalent. And of these fossil fuels, that is, oil, gas, and coal constitute more than 80 percent of the primary energy consumption, and the rest is currently coming from other sources, including renewables. China, with a 26 percent share, is the world's largest energy consumer, followed by the USA with 16 percent. India is number 3 as far as primary energy consumption is concerned, at 6 percent, Mr. Singh shared.

Even though, when it comes to per capita energy consumption, our figures are one of the lowest in the world, he said, but still, in absolute terms, we are number 3 in the world. Now, when it comes to CO<sub>2</sub> emissions, as humans, we are emitting almost 40 gigatons of CO<sub>2</sub> into

the atmosphere every year. This is responsible for increasing the CO<sub>2</sub> concentration in the atmosphere, resulting in the greenhouse effect and leading to global warming. In addition to CO<sub>2</sub>, other gases like methane, nitrogen, oxide, and HFCs are contributing significantly to the warming of the globe.

On India's ambitious target of being a \$30 trillion economy by 2050 from its current \$4 trillion economy.

Now, from its present primary energy demand of almost 900 million metric tonnes of oil equivalent, India is poised to grow at an average annual rate of almost 2.4 to 2.6 percent in the next two decades. And thus, we are expected to double our primary energy consumption by 2050, he said.

Currently, oil and gas consumption of the country is around 250 million metric tonnes, which is expected to reach about 400 million metric tonnes by 2050. Our share of global primary energy consumption, he pointed out, is going to increase to 14 percent from the current level of 6 percent. Thus, we are having the dual challenge of meeting the huge growth in energy demand while at the same time tackling the urgent challenge of climate change.

Mr. Singh, while pointing out the country's commitment to net zero emissions by 2070, stated that IndianOil is aligned with the nation's goal and has resolved to achieve net zero operational emissions by 2046.

He also disclosed IndianOil's vision for 2050, wherein it is targeting becoming a \$1 trillion revenue company by 2047. This is in line with the country's aspiration to have a \$30 trillion economy. As far as the primary energy share of the country is concerned, we currently have a 9 percent share, and by 2050 we will have a share of 12.5 percent, he stated. As part of this vision, IndianOil's share of renewable and clean energy as far as the energy portfolio is concerned will be increased to 26 percent from the previous 0.2 percent; this is a phenomenal jump to clean energy.

Likewise, natural gas, which constitutes about 8 percent of our energy portfolio, is targeted to increase to 27 percent. As far as oil products are concerned, currently 92 percent of our energy portfolio comes from oil. Moving forward, by 2047, we are expecting it to go down to 46

percent, he said.

Our vision demonstrates our commitment to a sustainable tomorrow, as 26 percent of the turnover of the company will come from renewables and clean fuels; in fact, this will have a low carbon footprint, he said.

On IndianOil developing green energy solutions, he said these encompass biofuels, renewable energy portfolios, e-mobility solutions, and green hydrogen. He said IndianOil is also venturing into innovative carbon abatement solutions like carbon capture, utilisation, and storage, apart from large-scale tree plantations.

Mr. Singh stressed hydrogen as a key input in the refinery process. And green hydrogen provides significant opportunities as a green fuel for decarbonation, he said.

Mr. Singh added Indian Oil is setting up a 10 KTA green hydrogen plant at its Panipat refinery. In fact, we have set up India's first hydrogen dispensing plant at our R&D centre, and currently, our R&D centre is operating 15 buses running on green hydrogen, he said.

The second hydrogen dispensing plant has been set up by Indian Oil at our Koily refinery. In addition to that, we are already supplying H-CNG, which is basically CNG blended with hydrogen, to DTC,

as Mr. Singh stated.

On hydrogen adoption, one of the pathways that sounds very promising he said is blending hydrogen with CNG and using CNG for the transportation of hydrogen. IndianOil R&D centre is working on this technology, Mr. Singh stated. In fact, IndianOil R&D is working on all aspects of hydrogen adoption in mobility as well as other



Pandit Deendayal Energy University (PDEU) FIPI student chapter bagged the best Chapter award.



UPES emerged as the winner in the theme presentation



Rajiv Gandhi Institute of Petroleum Technology (RGIPT) and Jawahar Lal Nehru Technology University Kakinada (JNTU Kakinada) jointly bagged the runners ups award.



Prof. Alok Kumar Singh

applications, he said.

He informed the house about IndianOil's joint venture with Renew and L&T to get into the green hydrogen ecosystem and for the manufacturing of electrolyzers.

As far as electric mobility is concerned, Indian Oil has a close partnership with power suppliers, gas aggregators, and automotive companies to set up EV charging stations. We have also tied up with Sun Mobility for battery-soaping business, he stated.

Mr. Singh disclosed that Indian Oil has also set up a joint venture with Phinergy Limited of Israel. The joint venture company, IOC Phinergy Pvt. Limited is focussing on the integration of aluminium-air battery technology into electric vehicles, encompassing both mobility as well as stationary power applications, he said.

He added, the collaboration will manufacture Aluminum-Air systems in India and recycle used Aluminum to strengthen India's energy security. It may be noted, the JV between IndianOil and Phinergy for commercializing Aluminum-Air technology is looked upon as an important initiative towards technology-driven Energy Transition by higher echelons of both the companies and the government.

Recently, IndianOil, he said, has also signed an agreement with Panasonic Energy to manufacture lithium-ion cells in India and to set up a gigawatt-level battery technology factory in India.

On the biofuel front, IndianOil, he said, is enhancing its compressed biogas network. We are currently marketing our CBG under the brand name Indigree through 76 fuel stations aligned with the government's SATAD initiative. You must be aware that it is sustainable and an alternative to affordable transportation. Towards this end, Indian Oil is also planning to set up 30 CBG plants in the country.

He disclosed that one of the CBG plants was recently commissioned in Uttar Pradesh by his state office in Gorakhpur. It is a 200-tonne CBG plant and uses paddy straw as the feedstock. In fact, that is a very eco-friendly solution because earlier this paddy straw was being burned by the farmers; now it is being used for the generation of CBG. This technology is developed by IndianOil R&D, which is based on bio-methylation.

Elaborating further on IndianOil's many initiatives on the clean energy front, Mr. Singh said the company is even setting up India's first sustainable emission fuel plant, which is being developed at Panipat, which is an 86.8 million metric tonne capacity plant with the help of Lanzatec Technology. IndianOil has also set up the first ever 3G ethanol plant in Panipat, which has a capacity of 128 kiloliters per day. This plant, he said, is being developed with the technology being provided by Lanzatec. This is utilizing the refinery of gases to produce ethanol. So as far as the current renewal portfolio of IndianOil is concerned, we are running 240 megawatts. But we have significant ambition to scale it up because IndianOil is venturing towards securing renewable powers for all our operations as part of our target to achieve net zero, he stressed.

In support of its net zero commitment, IndianOil has embraced an ambitious target towards the development of a green energy portfolio of 31 gigawatts of renewable energy, 4 million metric tonnes of biofuels, and 1 million metric tonnes of biogas by 2030, which subsequently will be increased to 200 gigawatts of renewable energy, 7 million metric tonnes of biofuels, and 9 million metric tonnes of biogas by 2050. This ambitious target, of course, requires a huge amount of capital expenditure. And just to give you a sense of quantum, the corporation has committed to undertake a capex of more than 2 lakh crores by the year 2046 to achieve net zero emissions.

He emphasised that these investment numbers can provide a sense of scale and enormity of the energy transition towards decarbonisation, which is taking place in the country and by IndianOil.



Mr. Singh stated that if one looks at the other global oil majors, a similar strategy or pathway towards net zero and energy transition is being followed across the globe by the oil majors on which Indian Oil is moving.

Mr. Singh stated even with all these clean energy sources, substantial revenue will still come from oil and gas.

With the convergence of technologies, there is a space for all forms of energy to coexist, right from renewables, which include solar, wind, and nuclear, low-carbon fuels, and biofuels, coupled with energy storage and transport solutions in the form of green hydrogen, batteries, hydroelectric storage, advanced solar, and power grids, to propel the world towards a greener future, he emphasised.

In the backdrop of the emerging developments he assured the students that big career opportunities await them.

#### Thanks Giving:

As the Faculty Convener, FIPI Student Chapter, RGIPT, the host institutions, Prof. Alok Kumar Singh from the Department of Petroleum Engineering & Geo-Engineering and Dean, RGIPT, discussed the theme of the Convention and thanked all the participants for their presence to make it a success.

Prof. Singh also extended heartfelt gratitude to the Director of RGIPT, Prof. A S K Sinha, for his invaluable guidance and mentorship in RGIPT successfully organizing the Convention. He also acknowledged the support and encouragement from faculty members, staff, and students of RGIPT throughout the event.

Extending thanks to the sponsors of the convention, Oil and Natural Gas Corporation Limited, Oil India Limited, Chennai Petroleum Corporation Limited, Sun



RGIPT presents mementos to dignitaries

Petro, and media partner DEW Journal Prof. Singh said their support and unwavering commitment to empowering the next generation of petroleum professionals is acknowledged. He even thanked FIPI for providing the opportunity to RGIPT to host the 12th Annual Convention of FIPI Student Chapters.

Prof. Alok Kumar Singh and Dr. Shivanjali Sharma were the conveners of the 12th FIPI Annual Students Convention .

The event concluded on a high note that the clean energy transition in India is already well underway, offering a huge economic opportunity. The country is particularly well placed to become a global leader in renewable batteries and green hydrogen. As a large developing economy with over 1.3 billion people, India's climate adaptation and mitigation ambitions are not just transformational for India but for the entire planet.

As a token of appreciation Prof. ASK Sinha, Director RGIPT presented mementos to Mr. Chandrasekhar N, Head

(Research & Development), Bharat Petroleum Corporation Limited, Mr. Rajesh Singh, Executive Director and Uttar Pradesh State Head, Indian Oil Corporation Limited, and Mr. Gurmeet Singh, Director General of the Federation of Indian Petroleum Industry (FIPI).

The event concluded with a cultural night in which all dignitaries and delegates were mesmerized by the performance of the Classical Group from Lucknow whose artists performed Kathak dance and presented Ramayana ballet dance.

The OILY EXPO, a fete organized by the RGIPT student after the conclusion of the convention, attracted all and was well appreciated. [dewjournal.com](http://dewjournal.com)