



NEW GENERATION IDEATION CONTEST 2024



About the NGIC-2024

HP Green R&D Centre embarked on an innovation drive in 2019 with the objective to encourage students in India to come up with new and innovative ideas to address modern world challenges such as rising energy demands, environmental pollution and growing consumerism.

To support this initiative, HPCL is organizing the “New Generation Ideation Contest” providing a golden platform for the students and young researchers to share their innovative solutions for the upcoming challenges.

The fifth edition of the contest was launched in 2023. Three entries were selected as winners in the Undergraduate Category, and five entries in the Open Category; five ideas were awarded commendation prizes. In 2024, HP Green R&D Centre is all set to launch the sixth edition of the innovation drive - New Generation Ideation Contest 2024.

In this edition also, various innovative ideas are welcomed from researchers, postgraduate scholars and undergraduate scholars from across the country in the 6 Themes: Zero Waste Economy, Next-Gen Digitalization, Hydrogen Fuel Technologies, Carbon Capture & Conversion Technologies, Next-Generation Functional Materials and Refining Technologies & Petrochemical Production.



HPCL

Hindustan Petroleum Corporation Limited (HPCL) is a Maharatna CPSE Company with Annual Gross Sales of about Rs. 4,59,815 Crore during FY 2023-24. HPCL has a strong presence in the Refining & Marketing of Petroleum Products in the country. HPCL owns and operates Refineries at Mumbai & Visakhapatnam with design capacities of 9.5 MMTPA & 13.7 MMTPA respectively. HP Green R&D Centre at Bengaluru is a state-of-the-art research facility for driving innovation in HPCL.

HPCL also owns the largest Lube Refinery in the country at Mumbai for producing Lube Oil Base Stock with a 428 Thousand Metric Tonnes Per Annum (TMTPA) capacity. HMEL & MRPL are JVs of HPCL which add to the refining capacity of HPCL portfolio. HPCL, through its subsidiary Prize Petroleum Company Ltd., owns 7 E&P blocks. Overall, HPCL is a strong player in the field of Refining, Lube marketing, Petrochemical marketing infrastructure, Bitumen emulsions, Biofuels, Natural Gas, etc. HPCL has a vast marketing network consisting of 22050 Retail outlets, 6353 LPG distributorships, 5 Lube blending plants, 42 exclusive lube depots, 43 terminals & TOPs, 56 LPG bottling plants, 55 Aviation Fuel stations, 35 Inland relay depots and 4435 Kms long of the pipeline network. HPCL has a significant presence in CNG & EV charging stations with 1705 CNG outlets & 3661 EV charging stations. In order to strengthen core processes and modernize, HPCL has embarked upon ambitious plans for expansion and diversification, such as Visakh Refinery Modernisation Project (VRMP), HPCL Rajasthan Refinery Ltd. (HRRL), etc.

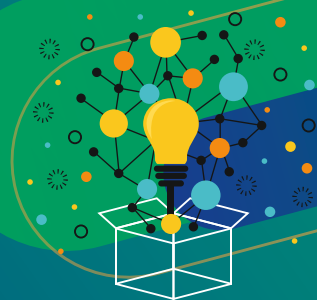
HPCL along with its JVs is committed to the nation by transforming the energy landscape with a mission of becoming a “fully integrated company in the hydrocarbons sector of exploration and production, refining and marketing; focusing on enhancement of productivity, quality & profitability, caring for customers and employees, caring for environment protection and cultural heritage. It will also attain scale dimensions by diversifying into other energy-related fields and by taking up transnational operations”.

HPGRDC

HPCL has set up its world-class research campus 'HP Green R&D Centre' in Bengaluru, India with a mission to make energy & chemicals accessible to everyone through innovation. HPGRDC has a vision to be an energy research centre par excellence, pioneering innovative & sustainable technologies and products globally.

HP Green R&D Centre has laboratories focusing on the areas of FCC / RFCC, Hydroprocessing, Catalysis, Bioprocesses, Crude Evaluation & Fuels Research, Analytical & Chemical Synthesis, Standard Testing, Process Modelling & Simulation, Nano Technology, Petrochemicals and Polymers, CoE Lube Research, Resid Upgradation, Engine Testing, Novel Separations, Corrosion Studies and Battery Research. Recently, several labs have been established to focus on Solar Energy, Combustion Research, Hydrogen, Bitumen Research and Water Research. All the labs are built with state-of-the-art research facilities. The R&D centre is recognized by the Department of Scientific and Industrial Research (DSIR) and has collaborations with various research institutes in India and abroad.

The R&D Centre has made major technical accomplishments in terms of developing & commercializing novel technologies/ products in refineries, contributing towards meeting the renewable energy demands, which led to significant cost advantages and efficiency improvements in HPCL. HPCL Green R&D believes in nurturing innovation in all employees and has carved out several pathways for incubating innovative culture within the organisation.



THEMES IDEAS for NGIC 2024

THEME 1 Zero-waste economy

As the world undergoes rapid change, pollution and the scarcity of resources have emerged as major global challenges. The concept of a zero waste economy provides a sustainable approach by encouraging the reuse and recycling of products to mitigate issues such as climate change, biodiversity loss, waste, and pollution. We invite innovative ideas and solutions under the following themes that support the principles of the zero waste economy

- Urban Mining and Plastic waste management
- Refining spent catalyst utilization
- Biomass utilization for fuels and chemicals (emphasis on lignin conversion)
- Smart Water Recycling & Treatment Technologies
- Microplastics: From Pollution to Circular Solutions
- Sustainable Green Polymers for a Circular Economy
- Protein Secretion Optimization in Mycelial Fungi & Yeast for Industrial Applications

THEME 2 Next-Gen Digitalization

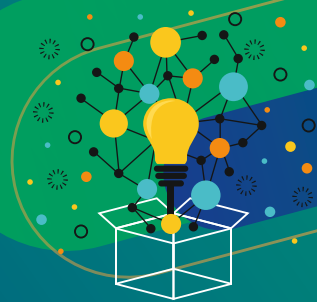
Digitalization is transforming every facet of science, from agenda-setting and experimentation to knowledge sharing and public engagement. Artificial Intelligence (AI) and Machine Learning (ML) focus on creating intelligent systems capable of performing tasks that usually require human cognition. It's important to understand that AI is constantly evolving. Technologies such as machine learning, image recognition, natural language processing, real-time analytics, and IoT-connected systems all leverage AI to offer enhanced functionalities and capabilities. We invite innovative ideas and solutions under the following themes related to Next-Gen Digitalization.

- Digital Twin Solutions for Refinery Efficiency
- Intelligent Corrosion Monitoring & Diagnostics
- AI-Powered Process Efficiency Enhancement
- Tailored 3D Printing of High-Performance Catalysts
- AI-Powered Pathways to Clean Energy
- Leveraging Machine Learning for Material Design

THEME 3 Hydrogen Fuel Technologies

Hydrogen is currently experiencing unparalleled growth and attention, as global initiatives aim to integrate it into a clean and sustainable energy future. Practical and actionable recommendations for industries will enable them to fully capitalize on this growing momentum. We invite innovative ideas and solutions under the following core themes related to Hydrogen Fuel Technologies.

- Hydrogen-Based Fuel Cells for Clean Energy
- Next-Generation Hydrogen Transport Solutions
- Clean Hydrogen for a Sustainable Future
- Design Innovations for Hydrogen Fuel Engines



THEMES IDEAS for NGIC 2024



THEME 4 Carbon Capture and Conversion Technologies

Fossil fuels still account for the majority of global electricity production, making power generation the leading source of carbon emissions in the energy sector. While renewable energy generation is expanding rapidly, the scale of current emissions from the power sector, coupled with the crucial role of electrification, means that countries must urgently address these emissions to meet global climate targets. In other words, the power sector must significantly reduce its carbon intensity. We invite innovative ideas and solutions under the following core themes of CO₂ capture and conversion technologies.

- a. Next-Generation Membranes for Carbon Dioxide Separation
- b. Carbon Dioxide Capture and Valorisation for Fuels & Chemicals
- c. Sustainable CO₂ Conversion into Ethanol
- d. Future solvents and absorbents materials

THEME 5 Next-Generation Functional Materials

Advanced functional materials and interfaces are inherently interdisciplinary, with chemistry serving as a key component. These materials are extensively utilized across diverse fields due to their exceptional properties, including magnetism, catalysis, electrical and optical characteristics, high surface area, and strong mechanical attributes. We invite innovative ideas and solutions under the following core themes of Next-Generation Functional Materials

- a. Advanced Polyolefin Composites: Adhesives, Self-Reinforced Polymers, and Thermal Plastics
- b. High-Performance Materials for Batteries and Supercapacitors
- c. Materials Solutions for the Oil and Gas Sector
- d. Polymer Separators for Sustainable Energy Solutions
- e. Polymer Electrolytes for Next-Gen Energy Devices

THEME 6 Refining Technologies & Petrochemical Production

Petroleum and petrochemicals are among the most productive and dynamic industries of the 21st century. Every year, over 2,500 million tonnes of oil are consumed, highlighting the industry's scale, significance, and economic foundation. Over time, there has been a major shift from the earliest, most basic methods of petroleum extraction and refining to the modern, advanced refinery processes we see today. This transformation has been driven by the integration of scientific and technological advancements at the right stages. Staying updated with these ongoing developments is crucial, as the field continues to evolve rapidly. We invite innovative ideas and solutions under the following core themes of Petroleum Refining and Petrochemical Production.

- a. Process Intensification Strategies for Refining Operations
- b. Advanced Re-refining Technologies for Used Lubricating Oils
- c. Polymers and Petrochemicals
- d. Cutting-Edge Solutions for CO₂ and H₂S Absorption
- e. Cost-Effective Synthesis of Advanced Zeolite Catalysts for Petroleum Refining

Archives

2023



Award Ceremony – NGI Contest 2023



Award Ceremony – NGI Contest 2023

2022



Award Ceremony – NGI Contest 2022

NEW GENERATION IDEATION CONTEST 2023 RESULTS



Open Category

| Position | Idea Title | Name of author | Institute |
|-------------------------------|--|--|---|
| Ist Prize | | | |
| 1st | Bajrang Baan - A microbial consortium for up scaling agro-waste to bio resource | 1. Prof. Sachin Mandavgane 2. Mr. Praful Dadhe | Visvesvaraya National Institute of Technology, Nagpur |
| IInd Prize | | | |
| 2nd | Hollow 3D nano structures of defect-rich ceria quantum dots synthesized via continuous flow route for solar-driven H ₂ production | 1. Ms. Sayoni Sarkar 2. Mr. Ajit Kulkarni | Indian Institute of Technology, Bombay |
| 2nd | Bio-based valorisation of CO ₂ for the production of succinic acid with isolated anaerobic strain | 1. Ms. Triya Mukerjee 2. Mr. S Venkata Mohan | CSIR- Indian Institute of Chemical Technology, Hyderabad |
| IIIrd Prize | | | |
| 3rd | Electrochemical reactive CO ₂ capture to value-added chemicals in Deep Eutectic Solvent system - an energy efficient technology | 1. Mr. Cini Mettayil Suresh | Indian Institute of Technology, Delhi |
| 3rd | Circular approach for the treatment of solid waste (Tetra Pak) to generate value-added product via solvothermal treatment | 1. Mr. Ayush Dave 2. Dr N Siva Mohan Reddy | Indian Institute of Technology, Roorke |
| Commendation Prize | | | |
| Commendation Prize | Reversible humid air hydrogen fuel cell electrolyser | 1. Mr. Ravi Kumar | Green Energy Technologies |
| Commendation Prize | Advanced Industrial-Scale Solar Hydrogen Production Technology: Quantum Encapsulation in Action | 1. Dr. Somenath Garai 2. Dr S Srikrishna 3. Ms. Shankab Jyoti Phukan 4. Mr. Suraj Goswa | Banaras Hindu University, Varanasi |
| Commendation Prize | Polymer composite (Polyethylene film) based Passive daytime radiative cooler for sub-ambient cooling of Man-made Structure | 1. Mr. Prajjwal Chaudhary | Indian Institute of Technology (Indian School of Mines) Dhanbad |

NEW GENERATION IDEATION CONTEST 2023 RESULTS



**NEW
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Under Graduate Category

| Position | Idea Title | Name of author | Institute |
|-------------------------------|--|---|--|
| Ist Prize | | | |
| 1st | Microbial hydrogen generation from petcoke slurry inside hollow-fiber bioreactor | 1. Ms. Sabhyasachi Bose 2. Meghna Bhattacharya 3. Zeba Haq | National Institute of Technology, Durgapur |
| IInd Prize | | | |
| 2nd | Supercapatteries: Fabrication of stretchable gel electrolyte and ternary composite electrode for flexible electronic devices | 1. Mr. Rayavarapu Venkata Sai Lokesh 2. Dr Tapas Das | National Institute of Technology, Durgapur |
| IIIrd Prize | | | |
| 3rd | Enhancing the properties of ZnTiO ₃ for Supercapacitor Electrode Material Application | 1. Mr. Arjun Krishna 2. Mr. Sujeet Kumar Pandey 3. Prof. Amit Ranjan | Rajiv Gandhi Institute of Petroleum Technology, Amethi |
| Commendation Prize | | | |
| Commendation Prize | Co ₂ to methanol conversion using MOFs in continuous photocatalytic reactor | 1. Mr. Manas Seth 2. Mr. Sandesh Kalantri | Institute of Chemical Technology, Mumbai |
| Commendation Prize | Conversion of flue gas to biofuel via algae using photosystem targeting and slope-space ladder method | 1. Mr. Pratik Sagar 2. Bibhutibhushan Nandi 3. Kamal Lochan Barik | University of Agricultural Sciences, Bangalore |

Best Institute NGIC-23: Indian Institute of Technology (Indian School of Mines) Dhanbad





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Touching Lives... Every Day... In Every Way...

Who should participate?

Competition seeks participation from under graduate students, post graduate students & research scholars from different Institutes, Universities and Colleges, and also from any individuals across India.

How to submit the ideas?

Participants should submit the ideas on or before **31st Jan 2025**

Please visit

<https://hindustanpetroleum.com/>
for submission of ideas

Instructions

- The write-up on Idea should be limited to 1000 words.
- One participant can submit multiple entries through multiple submissions.
- Write-up should be original. Plagiarism is strictly prohibited.
- Ideas will be evaluated based on its Novelty, Applicability, Clarity, Scalability and Integration Potential.
- Shortlisted ideas will be qualified for the next round. The details of next round will be disclosed subsequently.

PRIZES FOR THE WINNERS

1st PRIZES WORTH INR 1,00,000/-

2nd PRIZES WORTH INR 50,000/-

3rd PRIZES WORTH INR 25,000/-

COMMENDATION PRIZES WORTH INR 10,000/-

**“Best Institute Award - NGIC 2024” for
contributing maximum number of Ideas in
NGIC-2024”**

Prizes will be awarded under two categories:

A) Open Category

B) Under Graduate Category

CONTACT DETAILS

For any queries / clarifications, please write to us in the following email id:

ngi@mail.hpcl.co.in

HP Green R&D Centre

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