‘SUSTAIN-A-THON’ 2024 – Sustainability Hackathon by IndianOil

Open Innovation Challenge

Sparking Innovation for Fuelling a Sustainable Tomorrow

Themes

The sustainability themes are around supply chain, circular economy, resource efficiency, alternate energy, carbon capture and management, digitalization of energy and green buildings. The sub-themes formed within these broad themes with brief problem statement for each will provide the participants with clarity while submitting their entries for the competition. The details on the themes are:

THEME	S. No.	SUB-THEME	PROBLEM STATEMENT BRIEF
Supply chain	1	Energy-efficient logistics solution	***Problem Brief:*** IndianOil transports large quantum of crude and products like petrol, diesel, LPG, etc. across the country. With significant complexity with different modes of transportation, one challenge is to optimize the transport and reduce carbon emission. ***Deliverables/Expectations:*** Participants to provide solutions for reducing carbon emission in IndianOil's supply chain by optimizing transport method, type of fuel, routing, etc.
	2	Packaging material for Pol products, Lubes & Petrochemicals	***Problem Brief:*** IndianOil is catering to the rapidly increasing demand for POL products, lubricants, petrochemicals. It shall explore innovative packaging methods to comply with all regulatory requirements and also reduce the carbon footprint. ***Deliverables/Expectations:*** Participants are requested to provide innovative solutions to improve packaging and material handling while being conscious of its environmental impact.
Circular economy	3	Feedstock collection for bio-fuels	***Problem Brief:*** IndianOil has strengthened its commitment to the nation’s energy security, the welfare of farmers & solving environmental problems by the commissioning of their 2G Ethanol plant in Panipat in 2022. Subsequently, the CBG Plants are also being commissioned by IndianOil. An adequate supply of feedstock (paddy waste, sugarcane waste) is crucial to sustain the production of biofuels. Therefore, timely collection & storage of generated biomass (paddy waste, sugarcane waste, etc) is required innovative models for developing sustainable biomass supply chain to collect, store and supply of these organic waste to bioenergy plants in sustainable and affordable manner. ***Deliverables/Expectations:***

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			A hybrid approach, web based as well as innovative model to engage various stakeholders in different social, economic and environment conditions. The innovative business models and ideas are needed to create effective and cost-efficient Feedstock Management solutions for IndianOil's 2G bio-ethanol and CBG plants.
	4	3Rs (Recycle, reuse and reduce) technologies	***Problem Brief:*** Recycle, reuse and reduce (3Rs) technologies and know-hows is an important component of the circular economy. Waste materials can be treated mechanically and chemically to be transformed into new products to be reused. IndianOil is aiming to increase its recyclate production. ***Deliverables/Expectations:*** Participants will identify opportunities and devise efficient solutions to implement to ensure the 3Rs approach integrated into its logistics value chain.
	5	Extended Producer Responsibility (EPR)	***Problem Brief:*** OECD defines Extended Producer Responsibility (EPR) as an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle. This is critical for IndianOil in view of its large ***Deliverables/Expectations:*** How can Indian Oil Corporation Limited implement an effective extended producer responsibility program for its key product portfolio to reduce the environmental impact of its products?
	6	End-to-end supply chain traceability	***Problem Brief:*** Companies need to know the end-to-end view of the product lifecycle to make sustainable claims in a non-deceptive manner. ***Deliverables/Expectations:*** Participants will recommend technology solutions to make products traceable so that companies can trace products and materials to verify their origins, certificates & other details in a cost-effective manner.
Asset efficiency & effectiveness	7	Energy utilization	***Problem Brief:*** In line with their commitment to reducing the environmental footprint, IndianOil is focusing on improving energy efficiency.

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			Deliverables/Expectations: Participants will recommend retrofitting technology solutions for increasing energy efficiency in oil refineries in a cost-effective manner with minimal changes to refinery configuration.
	8	Water utilization	***Problem Brief:*** IndianOil is identifying solutions for optimizing water consumption across locations in line with their commitment towards Sustainable Development Goals. ***Deliverables/Expectations:*** Participants will identify areas of improvement for water usage efficiency in various stages in refineries and propose technology-based cost-effective innovations to reduce water consumption and increase the re-use of water.
	9	Membranes for gas separation (CBG/ CO_2/CO/GH_2/N_2 etc)	***Problem Brief:*** Renewable and Alternative Energy technologies such as hydrogen and fuel cell, biogas etc. requires different types of membranes. Gas separation is an essential process for removal of impurities and undesired compounds from bio-methane (CBG) and hydrogen. To utilize biogas for automotive applications, biogas needs to be enriched in methane content (> 96%) by removing CO2 and other impurities from it. Further, to generate fuel cell grade hydrogen through gasification of biomass, hydrogen is required to be separated from the synthesis gas, which is a mixture of H_2, CO, CO_2, CH_4 etc. Moreover, PEM fuel cells require solid polymer membrane (a thin plastic film less than 50 micron) which is permeable to protons when it is saturated with water but does not conduct electrons. Desired proton exchange membrane properties are high proton conductivity, good mechanical and chemical stability with less hydrogen crossover. The membranes should be cost effective and durable with desired performance. ***Deliverables/Expectations:*** Participants will suggest solutions to develop efficient and cost-effective membranes for Renewable and Alternative Energy technologies such as purification of hydrogen/ biogas and electrolyser and fuel cell application.

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	10	Technologies for improving petrochemical production	***Problem Brief:*** The energy transition is shifting the drivers of oil demand towards petrochemicals. Forward-looking refiners are already looking for opportunities to boost their petrochemical assets. ***Deliverables/Expectations:*** Participants will suggest ideas on updating the existing refinery configurations to enable higher petrochemical production at a disruptive scale while still ensuring that the industry moves towards a net zero emissions scenario. Alternatively, participants will provide ideas on improving the yield of existing petrochemical assets.
	11	Energy-efficient data storage solutions	***Problem Brief:*** IndianOil stores a large quantum of data in the cloud and on physical servers. ***Deliverables/Expectations:*** Participants will suggest solutions to reduce the carbon footprint of the data storage solutions.
Energy Transition	12	Alternate Energy	India is on its way to deploy bio-diesel, ethanol, methanol, hydrogen and propane among many. They are upcoming alternatives in automobiles, heating, cooking and most importantly industrial feedstocks. Participants will explore opportunities for utilizing and popularizing various green fuels in the value chain across the entire energy space. They will provide solutions and recommendations around current roadblocks, alternatives and to eventually transition to low carbon emission fuels.
	13	Retail EV charging	IndianOil is setting up EV charging stations at their retail outlets. However, building enough charging stations in the right places is a key challenge. Additionally, providing green electricity for EV and increasing sources of revenue for waiting customer is another challenge. ***Deliverables/Expectations:*** Participants will provide solutions for capacity building, green electricity supply with a business plan to justify IndianOil's entry in EV charging.
	14	Bio-fuel production	MoPNG is promoting the production & usage of CBG as automotive & industrial fuel to reduce the dependence on imported fuel through the SATAT Scheme launched in 2018. Under the scheme, entrepreneurs shall set up CBG plants, produce and supply CBG for sale to oil marketing companies. The

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			government has envisaged an ambitious target to set up 5000 CBG plants. ***Deliverables/Expectations:*** Participants will recommend solutions to drive accelerated adoption of the SATAT scheme especially for the CBG value chain to ensure energy security through alternate fuel.
Carbon capture/abatement	15	Carbon capture & utilization	Carbon Capture, Usage and Sequestration (CCUS) is a technology that can capture and make effective use of the high concentrations of CO_2 emitted by industrial activities. Carbon sequestration is a natural or artificial process by which carbon dioxide is removed from the atmosphere. Consequently, the technology has a key role to play in decarbonization and meeting the requirements of Net-Zero. These are kind of artificial carbon suckers that can neutralise the emissions generated from stations. CCUS is a popular method in developed countries for lowering the carbon footprint of industries. ***Deliverables/Expectations:*** Participants will provide innovative, scalable, and cost-effective solutions for CCUS system and provide services for sequestering carbon generated from our Refineries, Retail outlets by deploying technology along with benchmarking against existing solutions.
	16	Carbon credit marketplace	As per the recent amendment to the Energy Conservation Bill in Dec 2022, the government or an authorized agency can now set up a carbon credit trading scheme. The scheme can help companies meet ambitious goals for reducing greenhouse emissions. Purchasing carbon credits is the way for companies to address emissions it cannot eliminate. One of the challenges is tracing carbon capture through afforestation & agriculture. IndianOil is undertaking large scale tree plantation to sequester carbon while generating carbon credits towards its Net Zero journey. ***Deliverables/Expectations:*** Participants will provide innovative & sustainable conceptual solutions supported by digital systems to ensure the traceability of carbon credits through the entire process value chain.
Digitalisation	17	Development of a Real-time Sustainability (Net Zero 2046) Dashboard	IndianOil's commitment of Net Zero by 2046 requires a lot of process upheaval and system changes to aim at all decarbonization initiatives, process efficiency, fuel replacement, and moving to clean energy. With the implementation of initiatives toward Net zero, the monitoring and tracking of real–time data such as GHG mitigated, cost saving, scenario analysis, and MIRR of

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			different technologies adaptation will be a challenge in making a sustainable decision and strategy. ***Deliverables/Expectations:*** The deliverable is to create a Net zero Dashboard incorporating all initiatives linked to it on one platform. 1) Making a Corporate Dashboard for monitoring all initiatives linked to Net Zero 2) Separate Dashboard for all locations linked with Corporate Net Zero Dashboard. The locations Net Zero dashboard will capture all possible data on a real-time basis and data analysis. 3) Scenario analysis that can capture the latest information and compare it with the planned roadmap of IndianOil to show the deviation. 4) Dashboard to align all impact of IndianOil Net zero initiatives with Government Net zero target, INDC and international commitments. 5) Dashboard to be scalable, agile and customized as per the increasing requirement of IndianOil with time. 6) Option to sell dashboard to other companies in the oil and gas sector to generate additional revenue.
Green buildings	18	Energy efficiency and alternate energy systems in Green Buildings (Commercial)	IndianOil owns and operates large number of corporate offices pan India. The energy demand for heating, cooling, lighting, etc, are currently optimized through independent energy saving initiatives. Although a comprehensive and integrated energy solution is a challenge. Alternate energy systems like Bio-digester, Solar electricity, Solar water heater etc are available for individual buildings (commercial). ***Deliverables/Expectations:*** Participants to develop business case for retrofitting current IndianOil buildings to optimize energy efficiency, water conversation, sustainable building materials, indoor air quality, etc. Indian Oil is looking for having product, system or innovative idea for generation and utilization of alternate energy for its commercial buildings. This solution should impact general efficiency and shall further improve employee well-being.
Plantation Management	19	Nature Based Solutions to achieving Net Zero	The World Environment Day 2024 is focusing on land restoration, desertification and drought resilience. As a nation facing degradation, desertification and drought. Trees are the largest natural carbon sinks and different tree has different carbon sequestration capacity. Out of the lot, mangrove trees are having one of the highest capacities to neutralize carbon emissions. GoI has also recognised the same by launching MISHTI in Budget 2023. By implementing the scheme, tonnes of carbon can be sequestered to balance our emissions.

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			IndianOil has undertaken several Emission Mitigation & Avoidance actions and among this includes large plantation drive across its location. With the announcement of achieving operational Net-Zero by 2046, it is imperative that focus of large-scale plantation drive shall continue with much gusto in days ahead. However, problem lies in finding the sustainable and cost-effective way to maintain large scale plantations and also ensure the health of such plantation, reporting of mortality and re-plantation activity being undertaken. ***Deliverables/Expectations:*** A cost-effective viable solution is needed for mangrove afforestation along the coastal areas, thereby, carbon neutralizing operation emissions of IOCL Refineries, Depots. Terminals, Retail Outlets, and reaping maximum benefits out the Project MISHTI declared by Government of India. A cost effective and easy-to-implement robust mechanism to undertake and report large scale plantation, monitor its health, mortality rate, replantation activity, CO_2 sequestered and any related activities. Integration of such information with IndianOil's already existing system.