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ACCELERATING ENERGY TRANSITION THROUGH BIOECONOMY



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As the campaign for Race to Zero catches steam post COP 26 Glasgow summit, harnessing the bioeconomy has emerged as a promising solution to achieve carbon neutrality

Economic growth refers to an increase in the productive capacity of an economy as a result of which the economy is capable of producing additional quantities of goods and services. One of the major pillars that drives the economic growth of any country is industrialization. Industrialization enables agricultural, commercial, and transportation advancements, as well as all other economic activities. Energy is a major source of industrialization. Rapid industrialization is indeed eradicating poverty, improving healthcare services, and standard of living, but taking a huge toll on the environment.

At the global level, this is manifest in the concern expressed about the environmental damage incurred as the global production base is expanded in order to meet ever-increasing energy demand. Increased fossil-based energy usage leads to visible pollution like smog and hazardous fumes as well as invisible pollution including greenhouse gas emissions. These are irreversibly damaging the planet. It is a serious apprehension whether economic growth through increased energy consumption is achieved at the cost of the right to survival of the future generation. Hence, there is a dire need to adopt responsible industrialization, through a circular bioeconomy approach.

ENERGY LANDSCAPE

The global energy landscape continues to be dominated by fossil fuels. Over 73% of human-caused greenhouse gas emissions are attributable to energy consumption. According to the International Energy Agency (IEA) estimates oil, coal, and natural gas ac-

count for approximately 81.3% of the global energy mix. Biofuels and waste streams account for 9.3% whereas nuclear, hydropower, and other sources account for 9.4% respectively in the overall energy mix.

NEED AND DRIVERS

The economic and population growth have led to an increase in energy demand. The consumption of fossil fuels leads to an increase in greenhouse gas (GHG) emissions causing global warming also impacting human health. Climate extremes such as heatwaves, devastating floods and droughts, threats to food and water security, population shifts, and the loss of lives and livelihoods are becoming more frequent and severe. This has precipitated immediate climate action initiatives on war-footing to cut-down carbon dioxide emissions to half by 2030. One of the very promising solutions is moving away from fossil fuels and adopting low-carbon energy derived from renewable sources.

According to the World Economic forum's Global Risk Report, 2022, 5 out of the top 10 risks are related to the environment. These include climate action failure, extreme weather, biodiversity loss, human environmental damage, and natural resources crisis.

The COP26 summit at Glasgow last year stressed the importance of achieving net-zero emissions and gave a clarion call to contain global warming to 1.5°C.

INDIAN PERSPECTIVE

India has announced achieving a net-zero target by 2070. By the year 2030, India plans to reduce one billion tonnes of carbon

emission and achieve 50% of its energy requirements from renewable energy.

In India, the National Biofuels Policy-2018 (NBP-18) lays down concrete goals to move towards self-sufficiency in energy generation while also conserving the environment. NBP-18 aims to reduce the dependency on mineral oil imports by 40% by the end of 2030.

The Policy entails increasing domestic production of mineral oil, expanding access to non-traditional/renewable energy resources, enforcing stringent guidelines for energy efficiency, and also providing consumers with cost-effective alternatives. In 2020-21, India's net petroleum imports totalled 185 MT at a cost of US \$551 billion. A roadmap for Ethanol Blended Petrol (EBP) program under the policy directs the blending of 20% ethanol with gasoline by 2023 which would save Rs. 30,000 crores of foreign exchange per year for India.

With the inclusion of surplus grains as a feedstock for ethanol production in 2020 and government supporting policies like Sustainable Alternative Towards Affordable Transportation (SATAT), the future of ethanol blending programs has been fortified. Thus, the goal for the E20 blending target has advanced to 2023 from 2030. Several other benefits include increased energy security, decreased carbon emissions, improved air quality, self-sufficiency, the use of damaged food grains, increased farmer incomes, job creation, and increased investment opportunities.

BIOENERGY AND BIOECONOMY

Bioeconomy in simple terms is a knowledge economy that uses renewable natural resources to produce food, energy, products, and services. Bioeconomy utilizes biological resources, available in abundance to generate wealth from waste. Using bio-based products facilitates carbon recycling with no or minimal addition of new carbon in the atmosphere thereby curbing and decarbonizing the emissions.

When considered in the context of the bioeconomy as a whole, bioenergy is a significant sector with a global footprint. Bio-residues generated by other bioeconomy sectors are frequently used as raw material in bioenergy conversion processes. Socio-economic inequalities in less developed areas



The emergence of a new carbohydrate economy in the 21st century is being fuelled by a convergence of economic, technological, political, and resource developments. Renewable liquid biofuels produced by exploiting polysaccharides will eventually displace significant amounts of fossil fuels.

can be reduced by the development of bioenergy projects in rural areas close to biomass feedstock.

Solid biofuels, which include firewood, processed firewood like charcoal, forest and agricultural residues, and dung, are one of the world's most diverse energy sources. Liquid biofuels are the most convenient and cost-effective means of transporting energy to distant areas. Ethanol and methanol being the simplest of alcohols have begun to emerge under the oil's dominance as sustainable biofuels. Their potential to be renewable and to recycle waste thereby serving environmental and socioeconomic benefits has brought the duo to the forefront in bioenergy.

Bioeconomy resonates perfectly well with the bigger objectives of sustainable growth and environmental conservation. It encompasses as many as 11 of the 17 Sustainable Development Goals (SDGs) released by UNFCCC. What is more, is that it also facilitates the fulfilment of Nationally Determined Contributions (NDCs) as committed in the landmark COP 26 climate change summit held in Glasgow. As the campaign for Race to Zero catches steam post COP 26 Glasgow summit, harnessing the bioeconomy has emerged as a promising solution to achieve carbon neutrality.

CARBOHYDRATES: A SUSTAINABLE ALTERNATIVE

Carbohydrate-based bio-inspired sustainable materials are gaining interest in the chemical industry as a strategy for producing new materials with unique properties from waste resources. Exploiting natural polysaccharides such as cellulose, hemicellulose, and starch is crucial to reducing reliance on fossil fuels and advancing the circular econ-

omy. The emergence of a new carbohydrate economy in the twenty-first century is being fuelled by a convergence of economic, technological, political, and resource developments. Renewable liquid biofuels produced by exploiting these polysaccharides will eventually displace significant amounts of fossil fuels in the coming years.

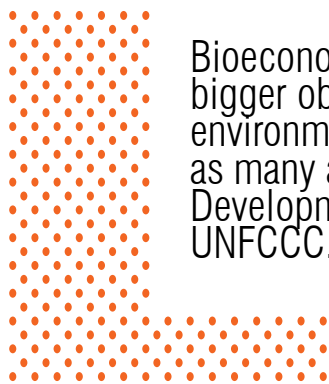
DECARBONIZING THE TRANSPORTATION SECTOR

The transportation sector is the second-largest emitter of GHGs after industry, its decarbonization is not a matter of choice but an imperative as climate action.

The Bio-Mobility* platform offers innovative technology solutions to produce low-carbon transportation biofuels across all modes of transportation. Biofuels are produced from biomass. Biomass is one of the abundant and renewable energy feedstocks available in India. Biofuels are a sustainable and adaptable alternative as they can be easily incorporated into today's energy mix. Little or no engine modifications are required in the already available engines and hence, biofuels usage is gaining traction today.

India's stride in the bioeconomy in recent times has caught the imagination of the world and undoubtedly the government's progressive strategic interventions have played a big role in it.

One of the unique aspects of India's growth story in biofuels is its strong capability in developing and deploying home-grown innovative technology solutions. These not only continuously improve the techno-commercial viability of established solutions deployed in greenfield and/or brownfield projects but also the introduction of innovative solutions that act as a game-changer.



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ENERGY TRANSITION: AN IMPERATIVE

The threat of climate change is the biggest danger mankind is facing and its ill effects in the form of climate disasters are taking a toll on the economy and lives. The latest Intergovernmental Panel on Climate Change (IPCC) report released on 4th April, 2022 has renewed warning for immediate climate action to avert the crisis.

Transitioning to cleaner, greener energy sources from existing fossil-based energy isn't a matter of choice anymore and in fact,

there is an urgent need for it like never in the past.

Bioenergy has a bright future ahead of it, as only a small fraction of its potential has been realized thus far. Bioenergy is a strong catalyst for the development of local and regional circular bioeconomy.

As per the popular proverb, 'We do not inherit the Earth from our ancestors, we borrow it from our children,' which states that we need to act if we want to pass on a world with a healthy environment to future generations.

*Bio-Mobility is a registered trademark for a platform of technologies for production of low-carbon transportation fuels, developed by Praj Industries- A leading industrial biotechnology company. It encompasses established solutions such as 1st generation bioethanol, biodiesel and fast emerging advanced biofuel solutions such as 2nd generation bioethanol, sustainable aviation fuel (SAF), compressed biogas (CBG), bio-hydrogen, marine biofuels, etc. ■