

BIOFUEL:

THE FAST-TRACK SOLUTION TO CLIMATE CRISIS & ACHIEVING SDGS.

ABHILEKHA DAS



INTRODUCTION TO SDGS:

SDGs or sustainable development goals are a set of 17 goals that are interlinked globally with the aim to achieve a sustainable, ambitious and renewable future by 2030. The UNESCO adopted this program in the 70th session of the UN General assembly back in September 2015. These 17 sets of goals provide a powerful framework for the collaboration of civil society

and both public and private sectors, to deal with the most pressing challenges faced by humans all over the world such as poverty, hunger, good health, quality education, gender equality and so on. The SDGs are universal, hence apply to every continent. They also established that economic development and protection of nature must go hand in hand.

In this article, we will discuss the objectives specifically implemented to upgrade the quality of environment (SDGs 7 & 13) and most importantly the role of renewable resources in tackling the climate crisis.

WHAT ARE BIOFUELS?

With the rapid rise in global temperatures and the ever-increasing environmental hazards, scientists and conservationists are now emphasizing on the adoption of clean and reliable energy projects such as biofuel production to cut carbon emissions from the atmosphere. The term 'biofuels' basically means grown fuels that can be used instead of fossil fuels. They are mainly derived from biological materials (biomass) like plants, microorganisms, animals, and organic waste. Biofuels are sustainable. For example: Bioethanol is processed from naturally grown sugarcane which can be replanted and harvested. Different countries and regions utilize various sources of raw materials to manufacture biofuels; hence making it a more feasible source of energy to meet the growing energy demands. As of 2018, The United States and Brazil accounts for nearly 87% share of the world's biofuel market



Prior we move along to talk about how biofuels play a major role in pursuit of SDG 7 & 13, a short illustration on the four categories of biofuels will set out a superior understanding of its manufacturing materials and methodology.

TYPES OF BIOFUELS

FIRST GENERATION BIOFUELS:

Biofuels produced using edible crops such as sugarcane, corn, cassava, sugar beet etc., are categorized under first generation biofuels. For example, Biodiesel is manufactured from oily plants and seeds through the chemical process of base catalyzed ester hydrolysis. It is a complex and very different process as compared to Bioethanol generation, which is made from fermentation of C6 sugars i.e., glucose. There are many other feedstocks used such as whey, barley, potato waste and so on.

SECOND GENERATION BIOFUELS:

Second generation biofuel technology involves broad feedstock that are mostly non-edible or lignocellulose matter (mixture of lignin, cellulose, and hemicellulose) such as agricultural or forest residues, straw, bagasse etc. Biomass utilized in second generation biofuels are mainly classified into three categories: homogeneous (woodchips), quasi-homogeneous (residue like corn husk or wheat straw) and non-homogeneous (urban waste).

These biofuels are cost efficient since there is no need for fertilizers, herbicides for crop growth.

THIRD GENERATION BIOFUELS: This category of biofuel is generated from algal biomass through advanced biotechnological processes. The lipid content in algae determines the production of biofuels. For example, Chlorella has high lipid content of around 70% and therefore is a more suitable source. However, there are many challenges related to its production process such as geographical conditions of a region and less commercial availability of certain algae.

FOURTH GENERATION BIOFUELS:

This generation of biofuel is a recent approach for a more sustainable source of processing biofuels. It utilizes genetically modified (GM) algae, which is a better alternative to fossil fuels. Extensive research has been carried out on this revolutionary process to increase the productivity of fourth generation biofuel through GM algae strains.



CIRCULAR ECONOMY & ROLE OF BIOFUELS IN SDG NO:7-

Sustainable development goal 7 focuses on ensuring “access to affordable, reliable, sustainable and modern energy for all”. Now this is where the term “Circular Economy” is introduced. Circular economy (CE) is a methodical approach to sustainability in which expired existing materials are recycled, repaired or refurbished and kept in the system for as long as possible, thus reducing waste to a minimum. In simpler words circular economy removes the term ‘expiration date’. This process creates a circular flow of materials and energy in our economy.



CE is a useful tool in achieving SDG 7. The demand for energy and resources are soaring high globally every year due to increasing population, ultimately leading to fuel price hikes. As a result, most of the people could not afford these resources at a regular basis. Biofuels, being the most advanced alternate source of energy, play a crucial role in pursuit of this goal. In recent years, waste management has been one of the toughest challenges to mankind. As discussed above, the second generation of

biofuels are waste based. Agricultural and forest wastes such as grasses, straws, sawdust, wood chips, sugarcane bagasse etc. can be converted into biofuel by the process of Bio refining, a key strategy in circular economy. Biorefinery is a facility that integrates the processing of biomass into various commercial products and bioenergy (fuels, power, and heat). Biorefinery allow an efficient use of biomass while minimizing waste. A case study for clear insight of this concept is written below.

CASE STUDY: India's food delivery app Zomato, in 2019 adopted a strategy towards affordable and recycled fuel for a healthy environment. Zomato and biodiesel manufacturer Bipod Energy joined hands in a partnership to collect used cooking oil from restaurants around India and then process it into biodiesel. This step help restaurants in the disposal of used oil in a more sustainable way. Zomato aimed at collecting a total of 1000 MT oil every month till March 2020. They also fund local environmental projects to reduce the carbon footprint of the deliveries and food packaging.

This case study draws the relationship between Circular economy and biofuel. When such organic waste is turned into any form of energy consumed, there will be no wastage of materials in the ecosystem which is the ultimate rule to ensure a circular flow for sustainability. Cheaper production methods are promoted to manufacture biodiesel in large quantities, making it a relatively low-cost fuel in developing countries wherein the renewable sources are not enough to meet the energy demands of a huge population.

CLIMATE CHANGE AND ROLE OF BIOFUELS IN SDG NO:13-

When the industrial revolution was initiated, the carbon dioxide in our atmosphere began to rise exponentially (about 0.17% per year). We started breaking Co2 records and we have not stopped since. Co2 concentrations are going up mostly because of nonrenewable resources that people are burning to power homes, factories, airplanes, cars etc. When we burn fossil fuels like coal and gasoline, pollutant gases (like methane, carbon dioxide) gets accumulated in the air and when sunlight enters Earth, these gases absorb the solar radiation trapping the heat from them. This has led to an increase in the overall temperature of the atmosphere, which is commonly known as global warming. Due to global warming, we started experiencing longer and hotter summers, more droughts, heavy rainfall, and all other extreme weather conditions. These changes have disturbed the climate pattern of Earth at local, regional, and global levels. This is known as climate change. While climate change is happening due to various other factors, human-induced greenhouse gas emissions is the fundamental cause of changing climate patterns all over the world. An abstract on this topic is given below:

CASE STUDY- Recently in Australia, thousands of students plus supporters joined the global youth-led movement "SCHOOL

STRIKE 4 CLIMATE" (ALSO KNOWN AS FRIDAYS FOR FUTURE) event in large rallies, urging the federal government to withdraw their latest decision of investing a massive sum of 600 million dollars on a new Gas-fired power plant and to ensure a renewable and clean energy future for them. Australia is one of the world's biggest carbon emitting country on a per capita basis and the government has long faced criticism over efforts to cut emissions. According to the weather and science department, the country's average temperature has warmed up by 1.4 degree Celsius and this has led to an increase in forest fires. The students skipped their classes on Friday to raise awareness on climate change, calling for greater action on global heating.

Sustainable development goal no:13 is about "taking urgent action to combat climate change and its impact". It is an approach to prevent and mitigate the adverse effects of climate change. Biofuels are pivotal to achieve SDG 13. The main reason behind adoption of biofuel for energy has been fear of climate change and increasing greenhouse gas emissions. According to recent studies and surveys conducted, it has been found that Biofuels cut greenhouse gas emissions by an average of 46% compared to traditional gasoline (burning fossil fuel and its



derivatives adds more than a third to the total world pollution). It can significantly bring down the negative effects of global warming as well as reduce our over-dependence on non-renewable resources. Unlike fossil fuels, when we burn biofuel in automobiles, the emission of carbon dioxide in the atmosphere is being absorbed and balanced by the plants which they use for their growth. This in turn do not cause any increase in levels of Sulphur and carbon monoxide, preventing changes in climate pattern.

CONCLUSION:

Throughout the article, we discussed how biofuels possess immense potential for a sustainable future. However, there are some detrimental effects of large-scale biofuel production specially in developing countries. First generation biofuels which are made from commercially available crops have proven to be not so environment friendly as they interfere with food availability and prices. Moreover, first generation biofuels require large number of inputs such as fertilizer, water and land which isn't economically feasible. In developing or underdeveloped countries, shortage of food has been a cause of concern and making biofuel out

of food crops could violate basic human rights. Therefore, a more cautious approach towards a clean future is needed. It is of utmost importance that the feedstock used for biofuel should not compete with food crops. A limit on the production of first-generation biofuels and investing more in second, third and fourth generations will create a balance and flexibility. This will also reduce any negative trade-offs in terms of feedstock usage without disturbing the livelihood of the vulnerable section of society.