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# EARTH ROOT

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## 21ST CENTURY HUMANS AND/VS THE ENVIRONMENT

-DR. BHARTI SHARMA

# About E-magazine

“Earth Root” is an open access e-magazine in the discipline of Environmental sciences published by Earth Root Foundation. The aim of the e-magazine is to provide information and upgradation of knowledge about environmental issues on wider scale and to share ideas and resources to the readers. Using essential knowledge people can lead a healthy life, which is more sustainable and can connect with ongoing efforts for stopping catastrophically the climate change. E-magazine caters to all related environmental aspects ranging from big issues like climate change, renewable energy and pollutants in the atmosphere to the health of human and living beings on Earth. We also take topics of water resources and efforts and measurement to provide optimum use of it; including large scale atmospheric circulation linked with oceans and ecology.


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# Editorial Board





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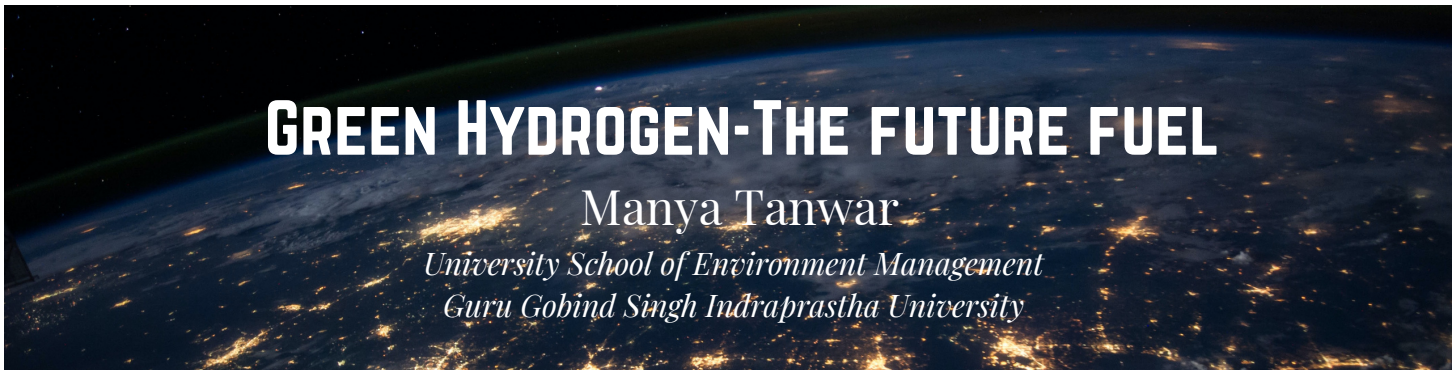

# Green Hydrogen-The future fuel

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The increasing ambition of climate targets creates a major role for hydrogen especially in achieving carbon-neutrality in sectors presently difficult to decarbonise. For hydrogen to have a role in future low-carbon energy systems, it is necessary to demonstrate that it has sufficiently low carbon emissions. It is well known that renewables will help us to achieve carbon neutrality, a lot of work has been done on harnessing solar and wind energy with their merits and de merits. The majority of the fuels used even today are coal, oil, natural gas, and petroleum. It has been fairly understood that fossil fuels release a very last amount of carbon in the environment still majority of the energy demands are still met with them. From the pre-existing data it is clear that on combustion coal releases carbon dioxide, carbon monoxide, Sox, NOx, fly ash but still globally we see that coal, followed by gas, is the largest source of electricity production. Petroleum is the most widely used fuel (but used only 1% in the electricity production). When fossil fuels are burned, they release nitrogen oxides into the atmosphere, which contribute to the formation of smog and acid rain. Burning of natural gas produces nitrogen oxides and carbon dioxide, but in lower quantities than burning coal or oil. When coal is burned, carbon dioxide, sulphur dioxide, nitrogen oxides and mercury compounds are released. Burning oil at power plants produces nitrogen oxides, sulphur dioxide, carbon dioxide, methane and mercury compounds. Realising the current scenario, it has become a necessity to shift to Renewable sources and majorly to the renewable sources that would help us achieve a zero-carbon economy as we wish to till 2070.

Prime Minister Modi made the pledge, the first time India has set a net zero target, at the Glasgow summit. So, the questions that come to our minds -are the currently employed hydrogen production methods really producing green hydrogen? Why green hydrogen is not yet common in use in different sectors of India and other countries? Can it be really regarded as the Future Fuel or it is far from reality? Some ways to produce hydrogen are:

**1**. Hydrogen production by reforming hydrocarbons and methanol. It is the most economic technology now a days. High temperature of 1200K and high pressure of 20-30 atmospheres is required where natural gas reacts with steam over a Nickel catalyst to produce Hydrogen and Carbon monoxide. Also, natural gas contains Sulphur impurities. So clearly the method is not green or the hydrogen produced in not Green.

**2**. Thermo Chemical methods. Here high temperature of 2500 degree Celsius is required along with chemicals.

**a.)** Westinghouse Electrochemical Thermal S Cycle. Wherein electrochemical reaction and thermolytic method are applied. By the thermolysis of Sulphuric acid water, oxygen and sulphur dioxide are also produced which is a gaseous air pollutant. Also, in the electrolysis of water SO2 is used to produce Hydrogen. So, we conclude that Green Hydrogen is not produced from this method.

**b.)** Bromine S cycle and

**c.)** Iodine S cycle also employ the same applications as the Westinghouse Electrochemical Thermal Cycle. So, none of the methods described so far produce Green Hydrogen.

**3**. Electrolysis of Water- splitting of water into hydrogen and oxygen. Diaphragms made up Asbestos are placed between the electrodes which are dipped in water mixed with KOH. When a voltage is given, energy is released at the anode and at the cathode hydrogen is produced. The method has two types of electrode arrangement. Tank type Electrolyser(a.) and Filter press electrolyser(b.). Here lies our answer and Electrolysis is the perfect match as it is a cleaner way to produce hydrogen. National Hydrogen Mission has been launched by the Government of India on 15 August 2021. As a part of the policy, Government of India also launched PNG (Piped National Gas) which is a fossil fuel although releasing very less carbon dioxide. Attention has been put on mixing both of them then industry bump up is predicted with negligible number of emissions. 2021-2024 has been categorized as the Pilot Phase and after 2024 mass adoption and commercialization of Green Hydrogen is targeted. The focus to use renewable energy like wind and solar energy to produce electricity that would be used in the electrolysis to produce hydrogen. It is apt to say here that if the electricity is coming from non-renewables to produce hydrogen, then the hydrogen produced cannot be regarded as Green Hydrogen.

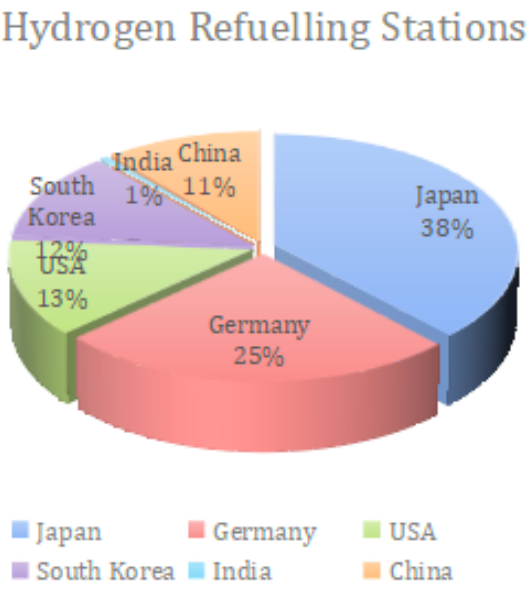
## Green Hydrogen Cars- Present scenario in India and Globally

Let us understand this by realizing the facts that to hit a market, the following five criteria have to be fulfilled by using a chart-


**1.** Price- Based on my research from the existing sources I found out that there are currently 3 Green Hydrogen cars in the world namely Toyota Mirai, Hyundai Nexo, Honda Clarity. None of these is for sale in India but can be imported. Talking about the price Toyota Mirai costs 37L for the cheapest model, Hyundai Nexo is for 65L and Honda Clarity for 44L.So, it's clear that to even think about the cars for the common people is far off from the reality.

**2.** Fuel Availability- From the existing source I found that by December 2020, 31,225 Green Hydrogen cars were sold, South Korea being on the top (10041 cars), followed by America (9134), China (5546), Japan (4100). The fuel stations are highest in Japan (134 stations), Germany (90), USA (46), South Korea (43), China (39) (The Economic Times). Talking about India, there are 2 Hydrogen fuel stations – Indian Oil RND Station in Faridabad and National Institute for Solar Energy in Gurugram. Also, to fill one Hydrogen car approximately Rs. 6,000 is spent, which is very expensive (The green hydrogen portal).

Let us understand the Hydrogen refuelling stations in the world currently using self-made pie chart-



**1.** Performance- It is found that Hyundai Mirai, takes 9.1 seconds to reach the speed 60Km from 0Km.The top speed of the Hydrogen cars is estimated to be 106 miles per hour which is not to bad still not up to the mark as compared to other cars.

**2.** Environmentally Friendly- It is also important to access the energy wastage to produce a fuel also. For instance, 100Watts of electricity is produced by wind energy that is used to produce Green Hydrogen by hydrolysis. 25%of the energy is wasted to cool it, 10% electricity is further wasted to fuel the station and 40% is wasted in the car. Out of 100W electricity 38W electricity is used and 62% energy is wasted (The Economic Times). Comparing to Electric Cars only 20% of the energy is wasted.

**3.** Competition- Presently Green Hydrogen cars are yet to become a reality in terms of Competition with other cars.

**4.** A very impressive use of Green Hydrogen has been seen in the 2020 Tokyo Olympics and Para Olympics, wherein the entire Olympics village was run on Green Hydrogen.

A hydrogen economy has long been promoted as a ground-breaking aspect of a low-carbon future. After going through a lot of papers I realized that a lot of work is being done in this direction but a lot is yet to be achieved. Currently shifting to green hydrogen by the developing countries is not yet economical due to a lot of challenges that we explored in the paper- from the green hydrogen research to be underfunded to green hydrogen production being costly.

It also became evident that green hydrogen cars are not and will not become common in India currently due to a lot of issues from the cars being very expensive to the inappropriate number of hydrogen fuelling stations. There are a lot of hurdles in it be adopted immediately. A lot of work is yet to be done. Green hydrogen is increasingly seen as a way of bringing offshore wind to shore and relieving pressure on an already overloaded onshore grid.


One of the biggest questions is whether enough green hydrogen can be ready fast enough to make a difference to climate change. Industrialists and environmentalists believe that- “we live within the constraint of carbon budgets. Electrolysers are not microchips. Of course, costs will go down significantly, but will they go down fast enough to meet the Paris climate goals?” As demand for hydrogen grows and green hydrogen gets cheaper, it will supplement and replace this fossil-based blue hydrogen. Japan, who invested in hydrogen long before climate neutrality was on the agenda, is working with its main supplier, Australia, to transition from grey to blue to green. Green hydrogen will ultimately be cheaper than grey hydrogen because of very cheap power from wind and solar. That is the game-changer. The fuel can be a game-changer for the energy security of India, which imports 85% of its oil and 53% of gas requirements. So, it can be concluded that if proper work and attention is given to green hydrogen then definitely the world would be shifting from running the economy majorly on fossil fuels to renewables where green hydrogen would definitely be at the top, ultimately reducing carbon emissions and achieving carbon neutrality in the near future.

# GREEN CHEMISTRY FOR A SUSTAINABLE FUTURE

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Green Chemistry is the design of chemical products and processes that reduce and eliminate the use and the generation of hazardous substances. The approach of green chemistry seeks to redesign the materials that make up the basis of our society and our economy—including the materials that produce, store, manufacture and transport our energy—in ways that are benign for humans and the environment and possess intrinsic sustainability. The ultimate aim of green chemistry is to completely cut down the stream of chemicals pouring into the environment and affecting it and the human health too. The concepts and practice of Green Chemistry have developed over nearly 20 years aimed at meeting the ‘‘triple bottom line’’ which is-sustainability in economic, social, and environmental performance. By using the 12 principles of green chemistry, the industries can achieve their desired products without harming the environment and human health. Reviews of chemical accidents show that while the chemical industry is safer than other manufacturing jobs, exposure controls can and do fail. The consequence is injury and death to workers, which could have been avoided by working with less hazardous chemistry and more safety. Impacts on human health and the environment from dispersal of hazardous waste are similarly grim, and monumental clean-up problems are faced as a result of the ‘‘treatment’’ rather than ‘‘prevention’’ approach.

In Green Chemistry, prevention is the approach to the risk reduction: by minimizing the hazard portion of the equation, using innocuous chemicals and processes, risk cannot increase spontaneously through circumstantial means—accidents, spills, or disposal.

Green chemistry is sustainable in terms of materials because of its minimum efficient use of raw materials and maximum recycling of materials. And in terms of wastes materials, it is sustainable because it does not cause an intolerable accumulation of hazardous-waste products, minimum production of unusable by-products, and other environmentally friendly factors.

Zero waste technology has proven a boon for the industries, in producing their goods without producing waste materials and if producing, then recycling it into the raw materials for further use.

Green Chemistry has been hugely successful in devising ways to reduce pollution through synthetic efficiency, improvements and catalysis in solvent technology. Alternative synthetic methods have been applied to reduce energy consumption in the chemical industry, and bio-based feedstocks are decreasing our reliance on depleted fossil resources.

It is not a solution to all environmental problems but the most fundamental approach to preventing pollution and harmful effects to human health and the environment.

Still many challenges lie ahead, lack of awareness among the stakeholders and researchers does allow the implantation of green chemistry. And even if they know they lack the training in these disciplines which further hampers the implementation of green chemistry on an industrial scale.

Therefore, strategy to solve these issues will be to see where the problems intersect with each other.

# 21st Century Humans and/vs the Environment

Dr. Bharti Sharma
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Approximately a quarter of the species of plants and animals are under threat of extinction, at a rate unprecedented in relation to paleo-historical records; three-quarters of the terrestrial environment and about 66% of the marine environment have been significantly altered by human actions; more than a third of the world's land area and almost 75% of freshwater resources are now used for agricultural or livestock production; the value of agricultural production has increased by about 300% since 1970; the raw timber harvest has increased by 45%; and each year approximately 60 billion tons of renewable and non-renewable resources are extracted globally, almost double of what it was in 1980. (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 2019) 1*

In the highly digitalised world, sunk deep into technology, electronics, bots, metaverse, cloning and different kind of mutations, we humans constantly fret over the dangers posed to the humankind, as what we see is that we are not too far from the times when humans will no longer be the only cognitive entities, that it is only a matter of time when we will find ourselves a puppet in the hands of merciless technology. However, what we fail to see is that we ourself are responsible for the dangers hovering over us; what we fail to see is how utterly selfish we are in looking at the bleak picture only in relation to ourselves; what we fail to see is how audacious it is of us to believe ourselves to be at the receiving end of cruelty when we ourselves are the perpetrators.

The aim of this article is not to present a scientific study of environmental concerns or to use scientific jargon to make of some theoretical observations for the sake of discussion. What I aim to do with the article is to hold a mirror to all of us and show how, as we indulge in our routine day today life, we unknowingly become our strongest enemy while abusing everything that should have been preserved as a precious gift.

In the past few years, a new vocabulary has made its way into our academic discussions where we often find ourselves discussing the ideas relating to posthumanism and the Anthropocene, and strangely, these discussions reverberate in the corridors of theories and criticisms, whereas the need of the hour is that they should stimulate awareness, sensitisation and responsibility in all humans so as to what should be our measures at the grassroot level to contribute to the environment preservation in the slightest way possible. Every step, every measure counts when it comes to harm or preserve the environment, in which direction we take that step is going to decide the health of our environment and our wellbeing at the same time. Pollution, carbon footprints, climate change, greenhouse effect, ozone layer, soil erosion, deforestation, mention any word, and one cannot fail but notice how human beings are at the centre of the environmental concerns, and how ironic it is that we ourselves are responsible for creating a vicious circle we endeavour to break so desperately yet inefficiently and superficially.

One can clearly see that it is the self-centredness of human beings, their urge to see everything in relation to them that has caused havocs. If analysed critically, what one sees as signs of progress and development and a representation of the highly advanced modern world, are the very examples of how insensitive and mindless we have been in playing our roles as thinking beings. Industrial revolution was only a starting point that led to movement to urban spaces, gave birth to consumerist culture, gradually, made people conscious of their social status and living standards, and thus, humans embarked on the journey of environmental degradation. In the name of scientific and technological progress, through new innovations to meet our needs, we are constantly exploiting and destroying what offered to us by benevolent nature.

In their greed for betterment and advancement and in their pride as thinking and evolving beings, humans became indifferent to the fact that the earth is not their sole property, and that survival is also about co-existence. Population explosion is an example of our selfishness, as we wrongfully claim the spaces that were meant for other species. Extinction of different species is only one example of how we are stripping others off of their rights to space and natural resources. Habitat destruction and deforestation exemplify humans' greed for more. Our food habits, comfort-living patterns, plastic usage, electricity consumption, chemical and radioactive waste that we discard so mindlessly, all suggest our self-centredness.

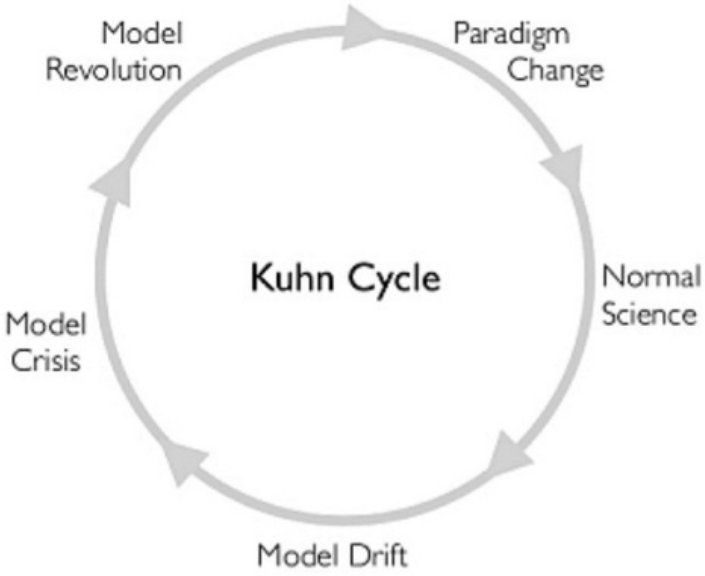
To add to this, technology has also made this possible for us to reach to the obscure areas that were earlier untouched by our greed. We constantly cross our limits and barge into spaces that are meant for the indigenous population and disturb the ecosystem 2*.Tourism, seen from this viewpoint, can easily be perceived as an enemy to the environmental balance 3*.

Source: -https://miro.medium.com/v2/resize:fit:720/0*-ubnv3XGWj2F2eAK

In the last two years, the unprecedented situation of the pandemic also made us face the reality which we soon chose to ignore and forget. Work from home, online teaching and learning, day long scrolling on social media, all these activities in the virtual space have contributed further to climate crisis and greenhouse emissions, as we leave environmental footprints with every single click on our gazettes. Apart from these, our routine activities in life, while constantly make our life comfortable, prove us an enemy of our environment, and in turn, of ourselves. Driving for work or enjoyment, buying multiple vehicles as a sign of social status; improper disposal of non-biodegradable products; unsparing use of paper; mindless use of electricity; cosmetic products; non-veg consumption; automatic faucets and sanitary wares or something as simple as brushing teeth, are all signs of indifferent self-centredness of human beings 4*.In the 21st century, living in a globalised world, if we think about the environment only because there is a lack of fresh air, unpolluted water, healthy spaces for us, we need to think twice about what should serve as the motivation for us to be sensitive towards the environment and nature. When we express our concerns about, water pollution, acid rains and ocean acidification, the loss of biodiversity, global warming and climate change, talk about 'climate-anxiety' or 'ecological grief' 5*, we can clearly hear the shallowness and the guilt in our voice 6*.

What we need to understand is that technological advancement, a life of comfort and luxury, the desire to have everything at our disposal or just a click away, every seemingly small and unharmful activity, mindless exploitation of natural resources, the use and throw attitude, all of these combined make us sin not only against our environment but against ourselves also. Our sense of responsibility towards ourselves and the desire to have the best of everything for ourselves need to be ingrained in inclusivity.

We need to realise our position in the ecological system. Our ambitions and efficiency, our position in the chain of being should make us realise that more than any other living or non-living entity, we humans are gifted with the cognitive skills that once channelised in the right and altruistic direction would create an environmental harmony where we will not work against our ecological system, while working for our growth, but will rather adopt measures that will ensure a holistic safeguarding of all the elements of nature and environment including ourselves.

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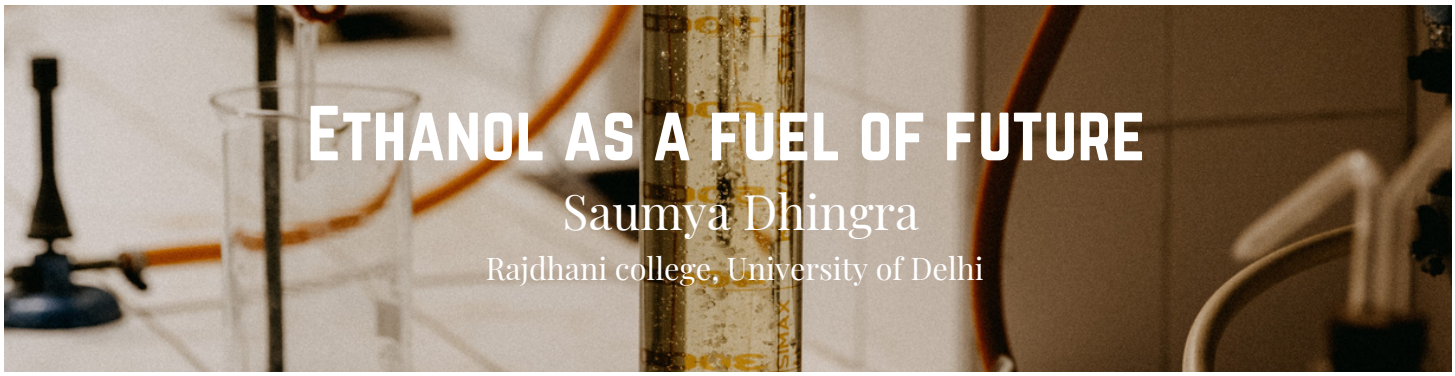
**References:**

1.https://www.frontiersin.org/articles/10.3389/fpsyg.2021.633737/full
2.https://www.twn.my/title/brief2.htm
3.https://www.legalserviceindia.com/legal/article-3058-environmental-degradation-and-challenges-faced-in-21st-century.html
4.https://www.conserve-energy-future.com/daily-habits-human-beings-that-killing-environment.php
5.https://www.sciencedirect.com/science/article/pii/S2666558122000483
6.https://eponline.com/articles/2019/11/25/three-environmental-issues-and-ways-to-combat-them.aspx?m=1#:~:text=The%20list%20of%20issues%20surrounding,acidification%3B%20and%20loss%20of%20biodiversity



# Ethanol as a fuel of future

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Ethanol has long been touted as a potential fuel of the future. This biofuel is made from plant materials such as corn and sugar cane and offers many advantages over traditional fossil fuels such as gasoline and diesel. It is considered a promising alternative to traditional fossil fuels due to its favourable characteristics, including its renewability, environmental benefits, and potential to reduce our dependence on foreign oil. Further in this article we discuss the potential of ethanol as a fuel of the future, its benefits and challenges. Ethanol is a renewable fuel, unlike fossil fuels which are finite resources, ethanol can be produced indefinitely. This is because the raw materials used to produce ethanol, such as corn and sugarcane, can be harvested annually. Additionally, ethanol can also be made from other sources such as agricultural waste and switchgrass. These resources are abundant and renewable, making ethanol a sustainable alternative to fossil fuels.Another advantage of ethanol is that it is a cleaner burning fuel. Burning ethanol produces less greenhouse gas emissions than gasoline or diesel. This is because the carbon dioxide released when ethanol is burned is offset by the carbon dioxide absorbed by the plants used to make the fuel. This makes ethanol much more efficient than traditional fossil fuels, environment-friendly fuel. Additionally, ethanol has the potential to reduce our dependence on foreign oil. India, like many other countries, imports most of its oil from abroad. This dependence on foreign oil can have negative consequences for the Indian economy, including potentially destabilizing fuel prices and its supply.

By using ethanol as a fuel, India can instead rely on domestically produced biofuels. This can help to stabilize prices and ensure a steady supply of fuel for years to come. Additionally, the production of ethanol in India can create jobs in agriculture, manufacturing, and transportation, which can have a positive impact on the country's economy. Furthermore, ethanol is a versatile fuel that can be used in a wide variety of vehicles. Ethanol can be mixed with gasoline in various amounts from 10% to 85% to create fuels suitable for various vehicles. Many modern cars are designed to run on ethanol mixtures, and there are even specially designed flex-fuel vehicles that can run on any mixture of gasoline and ethanol. Using ethanol as a fuel also has economic advantages. Ethanol production creates jobs in agriculture, manufacturing and transportation. Additionally, using ethanol can reduce fuel costs for consumers. As ethanol production increases, the cost of producing ethanol is likely to drop, making ethanol an even more attractive fuel option for the future.

Although ethanol has many advantages, it also presents some challenges that must be addressed. One of the biggest challenges is the cost of producing ethanol. Ethanol production costs have fallen in recent years, but it is still more expensive than conventional fossil fuel production. This could make it difficult for ethanol to compete with gasoline and diesel on a cost basis. Another challenge is the infrastructure required for the distribution and use of ethanol. There are currently a limited number of ethanol filling stations, making it difficult for consumers to access the fuel.

Additionally, many older vehicles were not designed to run on ethanol mixtures, which could limit the market for ethanol.

Finally, there are concerns about the environmental impact of ethanol production. Ethanol is a cleaner burning fuel than gasoline or diesel, but its manufacturing process can have a negative impact on the environment. For example, corn-based ethanol production requires large amounts of water, which can lead to soil erosion and other environmental problems. Bottom line is that ethanol has real potential to be the fuel of the future due to its many advantages. It is a renewable, clean-burning fuel that can help reduce dependence on foreign oil and create more jobs in agriculture and manufacturing. Although there are challenges to be overcome, such as the cost of production and the need for infrastructure, the benefits of ethanol are significant and cannot be ignored. Governments, industries, and individuals must work together to increase the production and use of ethanol, while continuing to invest in research and development to improve the efficiency and effectiveness of this fuel source. With these efforts, ethanol can play a significant role in achieving a more sustainable, cleaner, and secure energy future for all.

SPECIALTY CHEMICALS

Will ethanol fuel a low-carbon future?

After decades of false starts, cellulosic ethanol may arrive just as the chemical and fuel industries clamor for a low-carbon feedstock

by Craig Bettenhausen

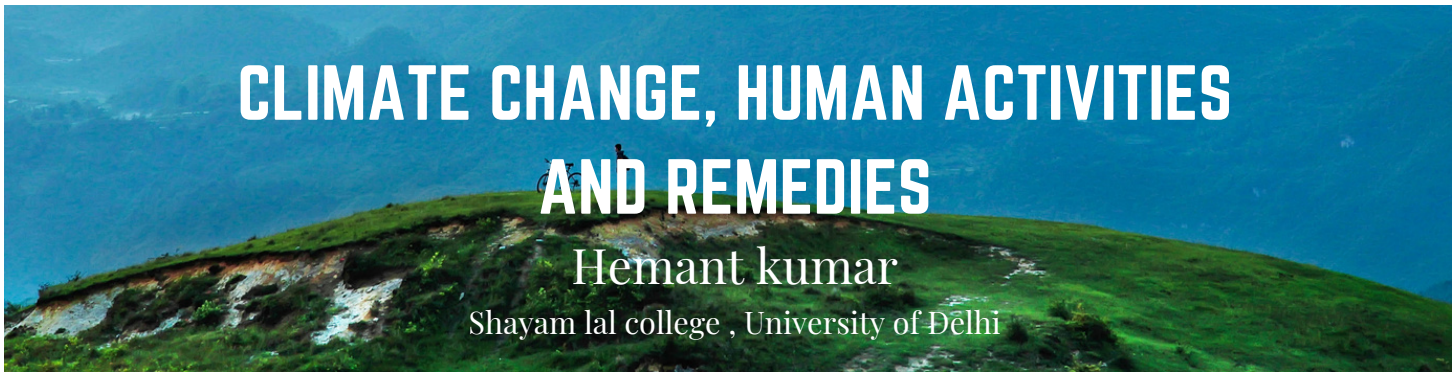
February 12, 2023 | A version of this story appeared in Volume 101, Issue 6

Credit: Braskem | Braskem is already making ethylene and derivatives from ethanol at scale in Brazil.

Cellulosic ethanol has been 5 years away for decades. It’s a trope, but it’s been true as plant after plant trying to make ethanol from corn stover and other agricultural waste has opened to great fanfare and then closed in ignominy. But this time may be different. The biobased business community seems confident that a round of companies starting up plants has cracked the feedstock problems that stymied earlier attempts and has improved cellulose depolymerization. If the technology works, a host of customers in the chemical and fuel industries is eager for ethanol as a low-carbon feedstock.

Humans have a complicated relationship with ethanol. Of course, many drink the stuff. People have also been working for decades to scale it up as a fuel and a chemical feedstock. The dream is that with the right technology for making and using ethanol, the chemical and energy industries could break their reliance on petroleum and drastically cut their climate impact.

But that dream has a troubling side. Conventional ethanol relies on sugars extracted from corn, sugar beets, and sugarcane. Growing those crops requires fertilizer and fossil-fueled farm equipment, moving them requires diesel-fueled trucks, and fermenting and distilling them requires heating fuel. To top it off, the ethanol fermentation process yields carbon dioxide as a by-product.



# CLIMATE CHANGE, HUMAN ACTIVITIES AND REMEDIES

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**INTRODUCTION**: Global communities are taking notice of the environmental degradation caused by greenhouse gas (GHG) emissions into the atmosphere. This is a necessary cause for concern, as various global meetings have been held to discuss how to reduce the amount of greenhouse gas emitted into the atmosphere. The Kyoto Protocol on Climate Change is one example. Similarly, various measures have been implemented by various nations to mitigate the climatic change that is causing global warming. Among the measures are the construction of green buildings and the implementation of programmes such as reforestation.

Environmental economics strong emphasis on climate change concerns suggests that the problem of global warming is a real threat to the sustainability of global populations. However, there are mixed feelings about climate change and global warming. Nations, for example, disagree on whether the Kyoto Protocol should be enforced. Concerns have also been raised about the commitment and role of various global actors in mitigating the two challenges. Climate change economists, for example, must consider whether they are actively keeping up with climate change. Regardless of the differing viewpoints, the paper contends that humans are the worst environmental enemies, and that the Kyoto Protocol and the concept of green buildings are the two major interventions to climatic change and global warming.

Human Activities and Global Warming: Human activities that destabilise natural flora and fauna significantly contribute to global warming and climatic change.

These two terms refer to rising global average temperatures. According to Nordhaus (2007), the increase is caused by increased greenhouse gas emissions (GHG). For example, exposing green materials or wastes generated by people to air causes them to be broken down by anaerobic bacteria in collaboration with other organisms, resulting in wastes and carbon II oxide (Galle, Samuelsson, & Borjesson, 2001). These two products naturally contribute to the greenhouse effect (Hiramatsu, Hanaki, & Aramaki, 2003).

Increased levels of GHG emissions increase the risk of global warming, which leads to increased melting of polar ice caps. The overall effect of this situation is rising ocean water levels, resulting in submerged coastal regions (Nordhaus, 2007). Furthermore, GHG emissions contribute to weather-pattern disruptions, which have resulted in catastrophic storms, flooding, and increased drought incidences around the world. These issues have an impact on local, national, and international relations because they have economic, social, and political implications (Richard Ivey School of Business, 2013).

When people's natural green wastes accumulate in landfills, the lack of oxygen causes anaerobic bacteria to break down the material into methane, carbon II oxide, mulch, and water. Carbon II oxide and methane have roughly equal magnitudes (Bogner & Matthews, 2003). Methane is then further decomposed to produce water and carbon II oxide. All of these components of green waste decomposition contribute to climate change and global warming.

. Climate changes as the planet warms. However, it should be remembered that greenhouse gases are important in trapping heat so that it does not escape into space, which can cause the earth to become colder. The issue arises when these gases build up to such high levels that more energy is trapped than is necessary. This phenomenon reduces the earth's habitability for both animals and plants, including humans.

Laxity of Climate Change Economists, Scientists, and Other Bodies: Climate change and global warming are two phenomena that have environmental costs. Smith (2016), in his article 'Economists are Out of Touch with Climate Change,' calls on climatic economists to actively participate in the fight against climate change, including global warming. He claims that climate change economists have been dormant to the point where their involvement in addressing the critical issue of climate change is not felt at all, despite the urgency of the situation and the need for policies to address it.

Smith (2016) demonstrates how proper understanding of the trend in climatic changes and the impact such changes have on the environment necessitates the participation of multiple stakeholders. Climate economists, climate scientists, and environmental organisations such as the UNEP are among the stakeholders. These parties must work together to keep the issue of climate change under control. However, for this collaboration to take place, scientific research on the effects and implications of global warming on the world's flora and fauna is required. Smith (2016), on the other hand, reveals a gap between climate science and economics. He claims that economists have abandoned the importance of science in their analysis of climate change, to the point where they only include out-of-date scientific facts that make no sense in the current debate over global warming. Is the situation now hopeless as a result of this discovery?

Smith (2016) demonstrates how most economists climate change publications fail to cite natural science opinions. This case calls into question the use of scientific facts in climate-related issues. The scientific viewpoint on climate issues entails the general consensus among scientists regarding the extent to which global warming is occurring, as well as the underlying causes and potential consequences. As a result, deliberate ignorance of the role of science in climate change implies a failure to consider the positive relationship between economic trends and natural occurrences. Scientific facts have been made available for use in substantiating claims by all disciplines. As a result, now is the time for global populations to use evidence derived from scientific research in climatic change and global warming to fight the phenomenon that threatens global sustainability collectively.

Furthermore, climatic change and global warming continue to worsen due to the laxity of nations around the world. They have failed to demonstrate commitment to the agreements made to address the problem. For example, the United States decided not to support the Kyoto Protocol in 2001 due to public concern that maximum emission limits would raise production costs. Canada claimed that it would not agree to the costly Kyoto Protocol regulations if the United States, its closest competitor, did not comply. Canada was concerned about its ability to compete in both domestic and international markets with the United States. Regardless of any nation's argument for refusing to support any pact that seeks to address the two problems, questions arise about nations' commitment to address the challenge of global warming. This is a valid concern, especially in light of the increased greenhouse gas emissions that explain the phenomenon of global warming and climatic change.

The Kyoto Protocol: The United Nations Framework Convention on Climate Change (UNFCCC) requested that all of its member countries reduce their GHG emissions in 1992. The goal was to manage the climatic effects of global warming. The UN was concerned that this issue would have negative consequences for global populations, such as hunger. This concern prompted the UNFCCC to convene in Kyoto, Japan. The goal was to reach an agreement that would require industrialised nations to set and meet targets for reducing GHG emissions. The Kyoto Protocol was the name given to the resulting agreement from the 1997 convention, which was signed by 160 UN member states (Richard Ivey School of Business, 2013).

The protocol does not require nations to have the same GHG reduction targets. In the 1997 agreement, which went into effect in 2005, nations were challenged to meet their own unique target for reducing emissions. The completion dates for this agenda were set between 2008 and 2012. The overall goal was to reduce global emissions by at least 5.2% of their 1990 levels. For example, Canada pledged to reduce emissions by 6% (equivalent to 270 megatons), while the United States pledged to reduce emissions by 7%. The EU has promised an 8% reduction. This plan meant that the world would drastically reduce greenhouse gas emissions, which had exacerbated the issue of climatic change and global warming.

The Kyoto Protocol also required countries to plan how they would meet their targets. However, when the time came for ratification in 2001, the United States and a number of developing countries failed to sign the pact. More emphasis was placed on the recruitment of additional nations into the treaty during the 2009 Copenhagen meeting, the Cancun conference in 2010, and the 2011 Durban gathering, including seeking more clarity on the intentions of various signatories.

The strategy is one of the most certain ways of dealing with climate change and global warming. It has, however, encountered difficulties. For example, many countries had not provided significant information by 2013. As a result, it is unclear how the protocol will effectively call on all nations to mitigate the problem of climate change and global warming.

**CONCLUSION:**

Considering that some countries support and others ignore the problem of global warming, the emerging question is whether all countries act as good international citizens. If all nations are to continue operating as good international citizens in the absence of any pact that protects global populations from the effects of global warming and climatic change, they must positively contribute to the resolution or prevention of problems associated with global warming. However, given the positions taken by key stakeholders on the issue, including the United States and Canada, such a possibility remains a question. Nonetheless, despite some countries taking hardline positions and arguments for the positive involvement of all stakeholders in easing the problem, the global population must remain aware that climatic change and global warming are real threats to the world's sustainability.

As a result, appropriate action, such as re-adoption of the Kyoto Protocol by nations such as Canada and the United States, which abandoned the pact, is required. The full implementation of the agreement is critical for nations that remain committed to the pact in order to save the global population from the threat of climatic change and global warming.

# MOVIE RECOMMENDATION: 2040(2019) · 1H 32M

2040 is a 2019 Australian documentary film directed by and starring Damon Gameau. The film looks at the effects of climate change over the next 20 years and what technologies that exist today can reverse the effects.

## Synopsis

2040 follows Gameau's imagining of a future for his four-year old daughter Velvet, where climate change has been solved. Described as “an exercise in fact-based dreaming” the film is structured as a letter to his daughter whereby Gameau travels around the world investigating numerous solutions that can contribute towards climate mitigation and imagining what a future would be like where they have been implemented at scale. In choosing what to feature in the film, Gameau restricted it to solutions that are either already available or have a realistic potential to greatly contribute to reversing climate change by the year 2040. The film features interviews with numerous academics, ecological experts and entrepreneurs and covers five broad areas.

It examines how renewable energy, like rooftop solar, have enabled micro-grids to form in Bangladesh enabling communities to produce, own and trade their own energy. The film addresses mobility and how a move away from car-ownership through self-driving cars and ride-sharing can enable the redesign of urban areas by promoting green spaces and more livable cities.

It also examines the role of agriculture and how a shift towards regenerative agricultural practices can not only reduce greenhouse gas emissions but also contribute to carbon sequestration while enabling greater resilience, such as through increased water retention.


The climate benefits of adopting plant-rich diets are also discussed.

The film also looks at the many uses of seaweeds and how bringing seaweed ecosystems to the open ocean through Marine Permaculture can enable the sustainable harvest of seaweeds and fish to help guarantee food security while regenerating marine life and sequestering carbon.

Finally, Gameau considers the cascading societal benefits of the empowerment of women and girls, notably through education, as it enables women to have greater control over their life-decisions thereby providing a non-coercive, human-rights based means to reduce population growth.

Source: -https://upload.wikimedia.org/wikipedia/en/5/56/2040_film_poster.jpg

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# A SUSTAINABLE FUTURE, A WAVE AWAY

Jagriti Hinduja

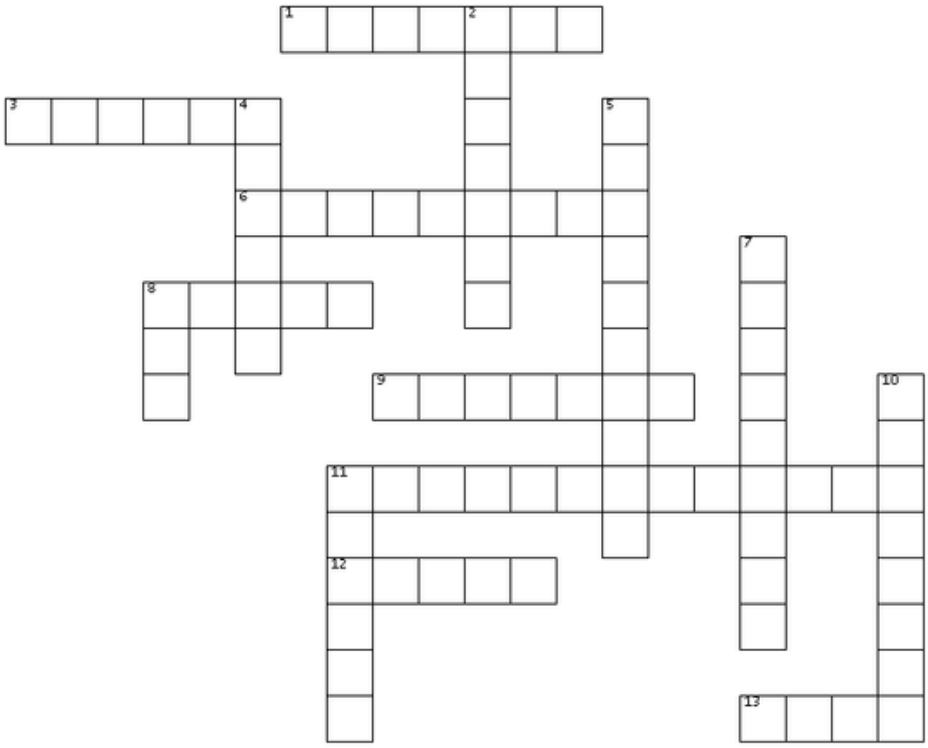
On a beach, with my eyes closed
Listening to the waves coming toward me
As if they are ecstatic and thrilled
As if they are eager to share
About their new chance to thrive
About the new way for a sustainable growth
The Blue Economy.

Beneath the waves,
Lies a vast phenomenal world
That we need to protect and preserve
For it is our responsibility
To reciprocate the love.

The blue economy proposes a vision
To use the resources of the mighty ocean
For energy, fisheries or tourism
While sustaining life underwater.

Combining innovation with
conservation
The Blue Economy makes the ocean
Even more robust than before
With a promise of no exploitation
With a promise of a bright tomorrow.

Jagriti Hinduja

**ACROSS**

**1. Don't throw that soda can away! You can _____ it.**
**3. One way to help the environment is to ride _____ transportation, such as buses or trains, instead of driving your own car.**
**6. A _____ resource is one that can be used more than once.**
**8. The _____ layer of the atmosphere protects us from the sun's most harmful rays.**
**9. Type of fuel. Refined from corn. Popular in the United States.**
**11. The process of cutting down or burning a forest.**
**12. _____ energy comes from the sun.**
**13. Black mineral. Dug from mines. Pollutes the air when burned.**

**DOWN**

**2. The average weather patterns of a region.**
**4. _____ dioxide is a gas often created by combustion. It contributes to global warming.**
**5. _____ gases such as methane contribute to global warming.**
**7. The release of harmful substances into the air or water is called _____.**
**8. Black liquid. Drawn from wells. Can be refined and turned into gasoline.**
**10. In order to harness wind energy, you need to build a _____.**
**11. This land is very dry. Almost no plants or animals live here. The sun dictates the weather: Hot during the day. Cold during the night. This land results when topsoil and plants are lost due to drought or overuse by humans.**

HINT...RENEWABLE,DEFORESTATION,DAM,WINDMILL,CLIMATE,OIL,POLLUTION,GREEN HOUSE,CARBON,COAL,ETHANOL,OZONE,PUBLIC,DESERT,SOLAR,RECYCLE

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Lecture Delivered on "Sustainability and Career Opportunities" at New Delhi Institute of Management(NDIM) by Dr. Vivek Panwar

# CREDITS



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