

Volume 12, June 2024

# **SENSE 'N' SCIENCE**

**Sustainable Science: For A  
Greener Tomorrow**



# From the Editors

**Welcome to the latest issue of Sense 'N' Science!** In this edition, we explore how the worlds of science and sustainability intersect. Inspired by James Hansen's powerful quote, 'Global warming isn't a prediction, it's happening', we delve into innovative solutions that promise an eco-friendlier future, using science as their preliminary tool. Be sure to read more about these visionary concepts, a few including Sustainable Cities, Advances in Biotechnology and Green Cement. With this magazine, we hope to introduce you to the way that science drives sustainability. As we navigate the complexities of the modern world, let us use this edition as a compass, inspiring us to take meaningful actions towards a sustainable tomorrow!

As emphasized by Mr. James Hansen, we as the youth must collectively **ACT NOW!** Together, we can foster a world where progress is synonymous with environmental stewardship and where every decision contributes to a brighter, more sustainable future. **So, young scientists, grab your critical thinking hats and dive right in!** Hope it's a good read.



**Global warming isn't a prediction,  
it's happening.**

~James Hansen

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## CHALLENGES:

Can you finish both the puzzles?  
Discuss which article is your favorite with your friends!



# Green is the New Clean!

By Neerja Bhatt, AS Level

An umbrella term that describes the usage of science to reduce human impact on the environment, 'Green Technology' includes everything from solar energy to wastewater treatment; wind power to tidal energy. The main aim of this upcoming industry is to undo the damage done to the environment in the past, preventing the Earth's natural resources from depletion. This in turn makes us more conscious and considerate citizens.

It was in the 19th Century that scientists first saw the harmful impacts of burning fossil fuels, and since then manufacturers have tried to curb their greenhouse-gas emission by being more responsible. Today, engaging in 'Green Tech' is a major goal for many businesses, as the tag of sustainability attracts potential investors. Customers too are becoming increasingly aware of consequences, and prefer businesses that avoid environmental destruction.

The actions we take today will decide if there is scope for a better tomorrow. To minimise climate change, it is crucial that we get involved in eco-friendly practices like organic farming, recycling, and using electric vehicles. Every small step will help us achieve the mammoth task of building a better world for future generations.



Photo credits:Economic Times

# Plastic Recycling is The Need of the Hour

By Tanaya Shah, 8C



Plastic recycling isn't just a buzzword; it's a crucial step towards a sustainable future. As the new generation, it is our duty to protect our planet's future. We must urgently find solutions to protect our environment before our cities choke and our streets become uninhabitable with heaps of plastic. Did you know that many of Amazon's plastic envelopes used in the USA end up in Muzaffarnagar, India? Tires from the west are sent to India and the toxic fumes from plastic recycling aren't just a buzzword; it's a crucial step towards a sustainable future. As the new generation, it is our duty to protect our planet's future. We must urgently find solutions to protect our environment before our cities choke and our streets become uninhabitable with heaps of plastic. One look at the AQI in Delhi or the state of our rivers which have been clogged with trash and you'll realize this is a problem that must be tackled by the government, businesses and responsible citizens sooner than later. We can use a number of technologies for plastic recycling.

Some of them include chemical recycling, mechanical recycling (most commonly used), dissolution recycling, organic recycling, monomer recycling and AI. We need to invest in all of these to promote a greener future. For instance, a chemical process using a catalyst based on cobalt has been found to be very effective in breaking down a variety of plastics and converting it into propane which can then be used for energy. The future of plastic recycling will be a combination of mechanical recycling, depolymerization and pyrolysis.

Companies and countries need to come together to lead the charge by innovating new recycling technologies and creating eco-friendly products. From upcycled fashion and home furnishings to sustainable building materials, the possibilities are endless. In India, start-ups such as Neeman, Thaely and others are making trendy shoes from plastic. I recently came across a company called "Without" that recycles MLP (multi layered plastic packaging) which is considered nearly impossible to recycle, with close to 0% being recycled globally. These young entrepreneurs are making trendy sunglasses from your discarded package of chips. This technology and these products will pave the way for a cleaner environment. As customers, it is on us to be aware and mindful and support these businesses. Applying technological advancements in order to find solutions to our plastic pollution is the need of the hour.

## Did you know?

Recycling one ton of plastic saves 5,774 kWh of energy, equal to 6 months of energy for an average American household.



# Technology for a Sustainable Future: Biotechnology

By Netra Dhuvad, 9D

## WHAT IS BIOTECHNOLOGY?

Biotechnology is the use of biology to develop new products, methods, and organisms intended to improve human health and society. Biotechnology, often referred to as Biotech has existed since the beginning of civilization with the domestication of plants, animals and the discovery of fermentation. In simple terms, we can say that bio is short for biology (study of all living organisms). Technology is another word for tools that use biology to make innovations. For example, biofuel, vaccines, pest-resistant crops, and many more.



Photo credits:Vidyasamachar.in

### Did you know?

Scientists have used biotechnology to create "glow-in-the-dark" plants by introducing genes from bioluminescent organisms like fireflies and jellyfish.

## Types of Biotechnology

### RED

involves medical processes such as using organisms to produce new drugs and stem cells to regenerate damaged human tissues and grow and regrow entire organs.

### WHITE/ GREY

refers to industrial processes, such as the development of new chemicals or new biofuels for vehicles.

### GREEN

covers agricultural processes, such as producing pest-resistant crops, disease-resistant animals and environmentally friendly agricultural practices.

### YELLOW

refers to processes that aid food production, the most popular application being the fermentation of alcohol and cheese.

### BLUE

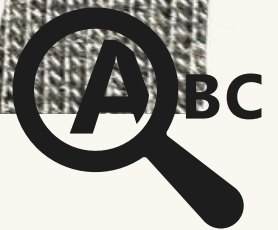
encompasses processes in marine and aquatic environments, such as converting aquatic biomass into fuels and pharmaceuticals.

### GOLD

a cross between biological processes and informatics. It refers to the methods healthcare workers use to gather, store and analyse biological data to treat patients.

# Word Search Puzzle!

B D S H B O K E I W L Y O D Y J C P B U  
U Z S X M G E G H E V R Q I D Z Z A B C  
T I M Y O H E N C A S C M X R L A S F E  
E G N A H C E T A M I L C O O A M P I N  
H E P Y C A R Z R H R Q G N G K E C O S  
L J T R A I B L T B T G N O E O A I X B  
O P M G C T S M U H L E P M N B T F M S  
E Z C C C Y Q K J D P S M N F S Z W M V  
U G A N O P G R G Q S W Y O U K I P C E  
Z R O O W C I O D I Y G A B E E E E B U  
Y D A V H W N Y Z U O M R L M J Q M U  
W T F B M C L R S O S O U A Y K W Y N M  
R Q J G H I P G J R C P P C R P S Z P X



1. Carbon monoxide
2. Electric cars
3. Climate change
4. Combustion
5. Hydrogen fuel

**“The best way to predict the future is to create it.”**

**\*Please find the answers on page 14\***



# Sustainable Cities

By Keya Patel, 9B

Eco-metropolises: The blueprint of sustainable cities. With modernization there come a plethora of environmental issues, to assure a better future, cities worldwide are shifting towards implementing sustainable practices. Sustainable cities aim to strike a balance between economic growth, social equity and accommodating an overgrowing population by creating safe, affordable, and resilient cities with positive environmental impact.

To achieve these ambitious goals a variety of measures are being initiated. Some include:

- Implementing green infrastructure using enhanced ventilation and rainwater harvesting facilities to efficiently use scarce resources.
- Harnessing renewable sources of energy like solar and wind to reduce dependency on polluting gasses and fuels.
- Minimizing greenhouse emissions via efficient public transportation using automated train control and traffic management systems.
- Using rooftop gardens and other urban farming techniques to improve air quality and aid in increasing pollination.
- Creating waste management portals that either recycle waste or burn non-biodegradable materials to release energy.

However, these changes aren't that easy to practically implement. Most of them require extensive research and technological advancement to properly function. Therefore environmentalists, engineers and architects are putting in innumerable efforts to transform metropolises to sustainable cities, for a better, brighter and cleaner future.

*Did you know?*

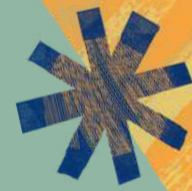
*Copenhagen, Denmark, is renowned for its commitment to sustainability and is often cited as one of the greenest cities in the world. In fact, approximately 62% of Copenhageners commute to work or school by bicycle every day!*





# Hydrogen Fuel Cell

By Chinmayi Srisunder, 10B



Humans have come a long way, from fighting for survival to developing highly advanced cities and innovations. This significant change in development is sure to be recognized. Nations around the globe are already advanced and equipped in terms of technology, and natural resources. It is majorly only a matter of utilizing them. Hydrogen, for example, although individually at a comparatively lower percentage than gasses such as Oxygen and Nitrogen, is present in abundance. How? Well, Hydrogen could be derived from Methane through Thermochemical processes, utilizing renewable feedstocks. However, this process is expensive, and may not be feasible. So why not take something abundant? Something easily divisible? Any guesses? That's right, water. Water, being composed on Earth as an approximate percentage of 70.8%, is abundantly available, and could simply produce hydrogen through its electrolysis, with Hydrogen being collected at the Cathode, and Oxygen at the Anode. Hydrogen could be utilized in a Fuel Cell to power cars, greatly reducing.

## Greenhouse Gas emissions, almost to zero:

In a basic Hydrogen Fuel Cell, there is an Anode and a Cathode, both of which are connected to a Power Supply. Hydrogen is put in at the Anode, and Oxygen at the Cathode. In the cell, both the elements combine, producing energy as they do so, as well as water vapor. Furthermore, a particular amount of Hydrogen as a fuel produces approximately 3 times as much energy as the same amount of petroleum. Moreover, almost the only product of the process is water vapor, which is non-toxic and not hazardous. However, care has to be taken for the method in which Hydrogen is derived. Utilising non-renewable sources, such as Fossil Fuels to power energy for the derivation of Hydrogen could produce Greenhouse gasses. Utilizing renewable sources such as Geothermal energy, however, will derive Hydrogen devoid of the excess production of Greenhouse gasses.




**Did you know?**

**NASA has employed hydrogen fuel cells in various missions, including the Apollo missions to the moon**

# Be Part of the Solution, Not the Pollution

By Tanaya Shah, 8C



Dan Shechtman once rightly said, “Sustainable development requires human ingenuity. People are the most important resource”. Today, we may be miles away from becoming a sustainable world, but that doesn’t stop us from getting closer. As technology improves in this expeditious world, we are beginning to uncover more new-fangled and effective methods to help achieve this global goal. There are plentiful ways by which we can take those few first steps towards a viable world, one of the most important being plastic recycling.

Simply put, plastic recycling involves taking waste plastic articles that would otherwise be sitting in a landfill and making them into something new and usable. One person’s old grocery bags may just become another’s living room rug! Plastic recycling has opened countless doors towards providing our future generations with a, in its true sense, sustainable world. When products are made using recycled rather than fresh materials, less energy is used and fewer pollutants are emitted. This can help create a cleaner atmosphere for our planet and cure it of its current brawl. Chemical recycling is a promising approach to tackle plastic waste and make it even more environmentally friendly than it is today.

Recycling plastic is the need of the hour. If we want our posterity to thrive in the world we leave behind for them, we must do everything in our power to provide them with that

# Find the Object

FIND  
12  
HIDDEN  
ANIMALS  
IN THE  
PICTURE



**“The future will be green, or not at all.”**

**\*Please find the answers on page 14\***

# Sustainable Technology : The Key To Our Future

By Tanish Agrawal, 8A

This article argues that sustainable technology is crucial for our future because it can address climate change, protect the environment, boost economies, and improve health and well-being. The article defines sustainable technology as technology that reduces environmental harm and provides environmental benefits. It highlights several key features of sustainable technology, including resource efficiency, reduced pollution, and social responsibility.

The article then discusses the benefits of sustainable technology for the environment, the economy, and society. For the environment, sustainable technology can reduce the carbon footprint, minimize resource depletion, promote clean energy sources, and mitigate climate change. For the economy, it can boost efficiency, create jobs, cut costs, foster innovation, and increase investment. For society, it can extend influence to government, ensure transparency and accountability, and ensure ethical decision-making within organizations.

The article concludes by calling on everyone to work together to build a healthier, happier planet for everyone by making sustainable choices.

*Up to 90% of the energy used during a washing machine's cleaning cycle goes into heating the water, so use the cold setting.*





# Sustainable Cities: Future or Impossible?

By Prisha Roy, 9B



Sustainable cities are critical components of a resilient and thriving future. With rapid urbanization and environmental challenges on the rise, the concept of sustainable cities has gained significant attention. These cities prioritize economic, social, and environmental factors to create livable, equitable, and environmentally friendly urban spaces. Sustainable cities prioritize the preservation of natural resources, biodiversity, and ecosystems. They implement green infrastructure, such as parks, green roofs, and urban forests, to mitigate pollution, regulate temperatures, and enhance air and water quality. But there are also multiple disadvantages to sustainable cities. The upfront costs of implementing sustainable infrastructure and technologies can be substantial, requiring innovative financing mechanisms, public-private partnerships, and long-term investment strategies.

Encouraging behavioral change and promoting sustainable lifestyles among residents, businesses, and policymakers is crucial but challenging, requiring education, awareness campaigns, and incentives, which could take years to get people even to consider the possibility. By embracing principles of environmental conservation, resource efficiency, social equity, and economic prosperity, cities can unlock numerous benefits while addressing the challenges of urbanization and climate change. We can pave the way toward a sustainable urban future through strategic planning, innovation, and concerted action.

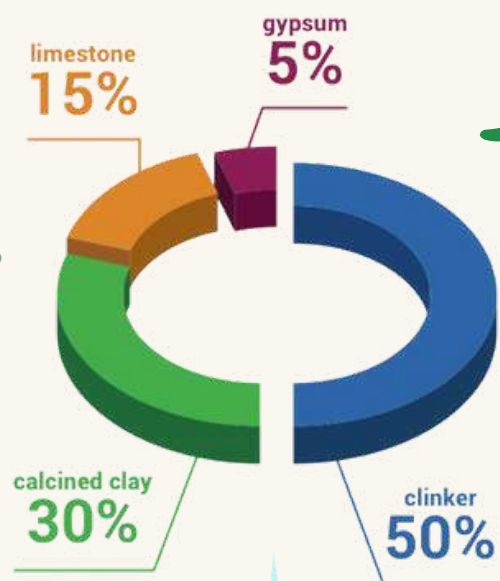
# Green Construction

By Yana Gadhvi, IBDP 1

Science has revolutionized the way that technology can be altered to create a more sustainable future. As instanced in the previous articles, advances in science build a stronger promise towards a more eco-friendly and sustainable future. In the age of rapid development, science continues to play a pivotal role in shaping the tools and materials that define our modern world; Cement plays a major part here. It forms the backbone of our infrastructure, from our own homes to towering skyscrapers. However, traditional cement production is known for its significant carbon footprint, contributing to nearly 8% of global CO<sub>2</sub> emissions. LC3, or Limestone Calcined Clay Cement, a groundbreaking innovation in green cement technology is set to revolutionize the industry; and for this we have our great researchers in the field of Chemistry to thank! To explore the science behind it: LC3, as opposed to the regular OPC or PPC cement, reduces the clinker content from 90-95% to around 50%. The clinker is a material used in cement manufacturing which is responsible for the carbon emissions. Thus, switching to LC3 has the potential to reduce global CO<sub>2</sub> emissions by 1-2%. To put it in perspective, the global cement industry produces over 4 billion tons of cement annually. A 1-2% reduction in emissions equates to saving approximately 40-80 million tons of CO<sub>2</sub> each year. By utilizing the principles of chemistry and materials science, LC3 illustrates how scientific advancements can lead to sustainable technologies that address global challenges, including climate change. All in all, the development of LC3 cement marks a significant breakthrough in the journey towards greener construction practices. Such a synergy between science and technology promises a future where progress and sustainability go hand in hand.

**Imagine this!**

The CO<sub>2</sub> emissions saved by switching to LC3 cement each year could cover over 200,000 football fields in emissions!



# Puzzle Answers:

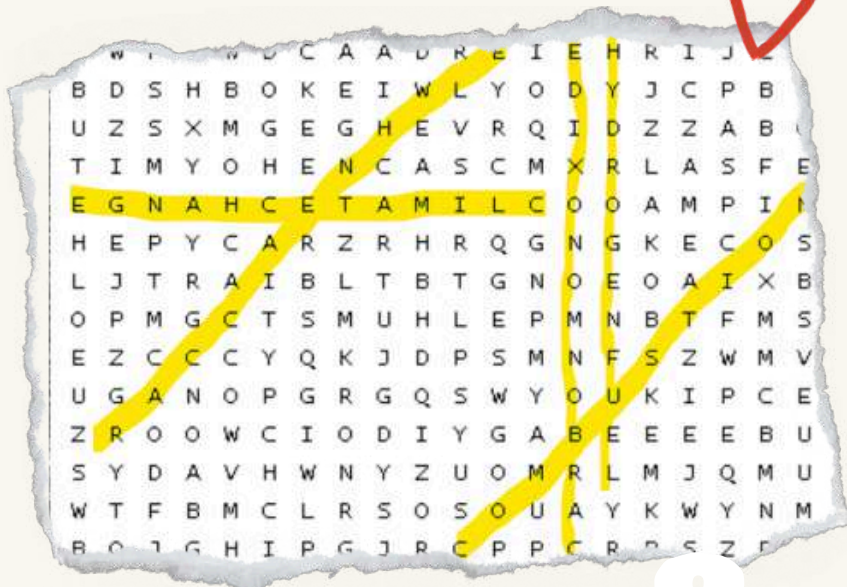


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## Find the objects

## Crossword puzzle

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