



Energy Headlines

The Energy Newsletter Of MNIT, Jaipur



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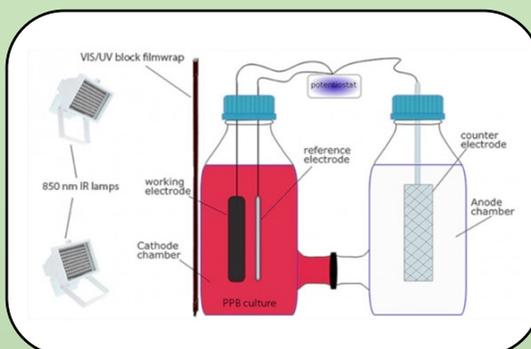
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Do You Know?

- The Earth receives enough sunlight in one hour to power the world for one year.
- Humanity uses around 15 terawatts (15 trillion watts) of energy at any given moment.
- The Tehri Hydro-electric Power Dam produces 2400 MW of power, being the largest in the country.

SEWAGE + LIGHT = CLEAN ENERGY

A particular type of purple bacteria was found by scientists which could turn the organic matter in our sewage into clean energy. There was a constant search for decades on



them an ideal tool for resource recovery from organic matter. Another advantage is that energy expenditure to break the organic matter is very low.

how to obtain beneficial matter in the sewage but an efficient system was not developed for extraction of the useful material. Moreover, factories always had discarded the sewage matter as contaminants. As of now, it seems that the search is over with the discovery of the **purple phototrophic bacteria**.

Let us know where from this purple phototrophic bacteria comes from. During the autumn season, chlorophyll leaves from the leaf and what remains behind are the yellow, orange and red hues. The phototrophic bacteria present in the hues captures energy in a variety of pigments, However, they have a strange metabolism. Normally, any general bacterium uses CO₂ and H₂O for photosynthesis, but they use organic molecules and nitrogen gas for photosynthesis.

This property gives them a great advantage over other phototrophic bacteria and algae, making them capable of producing anything from hydrogen gas to proteins to a type of biodegradable polyester. Thus, making

A very specific approach is taken into consideration for the study of purple bacteria. Living conditions are manipulated to tune the metabolism of purple bacteria to different applications. A unique fact about the approach is the use of an external electric current to optimize the productive output of purple bacteria. A bioelectrochemical system in which metabolic pathways in the purple bacteria is used to connect electrons which increases the electron flow and thereby increasing rate of synthesis of sewage by bacteria. The minimal carbon footprint in this whole process is what makes the whole process environmental friendly and efficient.

Credits to all these efforts must be given to researchers at King Juan Carlos University, Spain for making this path-breaking discovery. This concept if used by all countries can convert 70-75% of the sewage produced globally within the next 15-20 years. Who thought sewage could be such a huge resource?

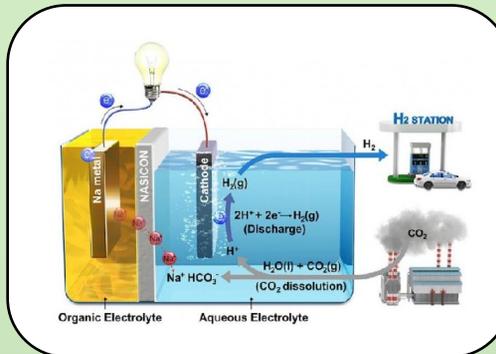
SOURCE: RESEARCHGATE



VILLAIN CARBON CAN BE A HERO

In the past half a century, carbon emissions have been touching sky high levels thanks to all greenhouse gas emissions. And till recently, we had not developed any great system of controlling it.

But, a newly developed concept, the CCUS or the **Carbon Capture Utilisation Concept** is now being held as a crucial weapon to fight against Carbon emissions and ultimately fight against global climate change. Scientists have developed a system in it which produces electricity and hydrogen while eliminating carbon from the atmosphere. The particular system is called the **Hybrid Na-CO₂** system that uses CO₂ to create electrical energy and hydrogen through an aqueous solution.



The team of researchers at the Georgia Institute Of Technology said that the system works very similar to an electrochemical fuel cell and the idea of melting CO₂ in water to induce an electrochemical reaction was worked upon. This increases the acidity in the solution leading to increase in the no. of protons. This attracts a large no. of electrons which is then used to build a CO₂ converting battery.

In the electrochemical cell, the anode is a piece of Sodium Metal which gives off Na⁺ ions when dipped in organic electrolyte. In the anode, CO₂ reacts with H₂O to dissociate into H⁺ & HCO₃⁻ ions. **NASICON (Sodium Super Ionic Conductor)** is used as a salt bridge in the cell to pass the Na⁺ ions from Anode to Cathode. The HCO₃⁻ ions react with the Na⁺ ions to produce current which can be used for domestic purposes.

The discharge reaction which takes place in the cathode releases hydrogen gas which on purification can be used as a source of clean fuel for the next generation vehicles, evolving a hero from the identity of a villain.

SOURCE : ISCIENCE

MNIT WELCOMES VEHICLE CHARGING POINTS

The demand of energy in the ever expanding world has put a huge pressure on the earth's existing natural resources which are non renewable and are getting depleted day by day. So, a push towards use of renewable energy sources was created. In the past decade the concept of electric vehicles in which the vehicle runs on electricity has become very popular. In developed countries like the United States, already 12% of the vehicles on roads are electric vehicles and the percent mark is expected to cross 70% in the next century.

Currently, there is no much use of electric vehicles in developing countries like India due to many factors. So, in a move to promote the use of electric vehicles, Malaviya National Institute Of



Technology Jaipur had recently installed several electric vehicle charging points inside its 317 acre campus. These were inaugurated on 25th December, 2018 during the Global Alumni Meet by the first pass-out batch (1963-1968) of erstwhile MREC.

The charging points are connected to the main domestic power supply line and also have an earthing and fuse system as safety devices. The points are covered in Rubber Leads to prevent shock and leakage.

Today's electric vehicles contain Lithium-Ion Batteries which provide energy to the vehicles to drive around 60 km in a single charge. Currently, Mahindra is the major producer of electric vehicles in India along with companies which manufacture e-rickshaws like Bajaj which can be seen plying in large numbers in both rural and urban areas. Foreign Companies like Tesla, Toyota and Hyundai have also started exporting electric vehicles in the country at very cheap prices.

Electricity, as a renewable source of fuel in today's world is probably the most cost efficient with least polluting effects and can be used for more than 50 years, thanks to the absolutely zero pollution released by it.

SOURCE: MNIT

ELECTRICITY CAN RESTORE GREAT BARRIER REEFS

A small part of the world's oceans is known for the beautiful and eye catching coral reefs. The most famous ones among them are the Great Barrier Reefs, near Australian Subcontinent. However, The condition of the Great Barrier Reefs today is not at all good due to the change in climatic conditions caused by human activities. Despite efforts, the reefs continue to dwindle, decreasing in size and vibrancy with every passing year.

A group of Australia based environmentalists named **Reef Ecologic** have recently developed a system which can not only save but also restore the barrier reefs to maintain the ecological balance, They plan to reverse a major main reason behind dwindling of the



reefs known as **Coral Bleaching**, a process by which coral reefs release algae in warm water especially when temperature of water at the coral depth is greater than 1.2°C.

The working of the concept is relatively very simple. This massive project involves use of high quality steel frames that emit small doses of low voltage electricity. The emitted electricity promotes growth of limestone on

the coral reefs as a result of interaction between the reefs and natural minerals found in sea water. The reefs are fitted within the steel frames which will mainly do two things, first stimulate coral growth and secondly, protect the reef from any future coral bleaching.

Moreover, the Australian Govt. along with the UNEP is planning to provide funds in an attempt to help restoration of the reef. Though reefs have a healing mechanism that helps in regrowth of coral but that process is very slow and daunting . This innovative concept can help regenerate coral reefs in a very short span of time. We just hope they rejuvenate the lost pride and beauty of our mother earth's oceans once again.

SOURCE: THE TELEGRAPH

FRESHWATER WITH THE HELP OF SOLAR ENERGY

According to a survey made by the United Nations, by 2025 nearly 2.5 billion people will not have access to clean drinking water to fulfil their daily needs. To overcome this shortage of freshwater, desalinated sea water may be used for consumption in near future. This concept is already present in some of the middle east countries such as the UAE. But there is a catch, desalination requires around 10-1000 times more energy than traditional methods depending upon the capacity.

In search for a solution, a team of engineers from the Polytechnic University of Turin in Italy devised a new lost cost efficient prototype for desalination of sea water. Compared to previously devised



solutions, this method produces **double** the amount of water at a given amount of solar energy.

It has a very simple working principle. It collects the seawater using a low cost porous material, thereby avoiding the use of expensive pumps. It is then heated up with the help of solar energy, separating salt from water. This process is facilitated by inserting membranes between the fresh and the salty water. A normal

desalination equipment needs specialised and costly construction and installation, whereas the given equipment is based on spontaneous processes, also referred as passive technology, making the cost and installation cheap and an easy to do job. Practical tests showed that it could produce up to **20 litres per day of drinking water per square meter exposed to sun**. Another special feature is that the solar heat is recycled again and again and used in repeated evaporating process, thus increasing the productivity.

This concept can help people in areas where there is lack of fresh water, abundance of solar energy, areas hit by natural calamities and in other developing countries

SOURCE: SCIENCEDAILY

ENERGY CLUB WINS RECA 2018



Dr. Kapil Pareek & Dr. Vivekanand, along with members of Energy Club receiving the Award from Mr. B.K. Dosi (Managing Director, RREC)

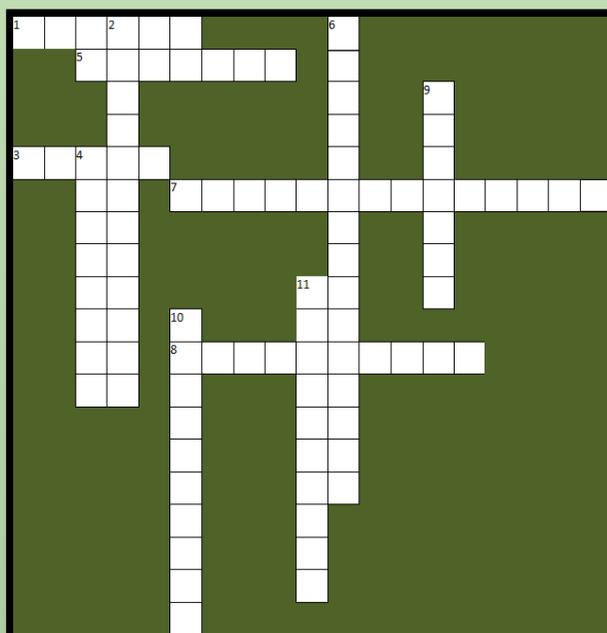
Achieving yet another feather to its cap, Energy Club MNIT Jaipur wins the **9th Rajasthan Energy Conservation Award (organised by Rajasthan Renewable Energy Corporation Limited)** for the **fourth consecutive time** and through it commits to promote high standards for conservation of energy using various sustainable energy techniques. The award ceremony was held on 14th December, 2018 on the occasion of National Energy Conservation Day at Indralok Auditorium in Jaipur.

Energy Club, MNIT Jaipur through its events **Sustainable Energy And Environment Quiz (SEEQ)** and **Greenovation**, aims to promote these objectives and have been successful in doing so since the last 12 years, with many more years to come.

ACTIVITY CORNER

Down

2. Process of removing salt and other minerals from salt water to obtain fresh water.
4. Type Of Petrol that causes less pollution.
6. Total carbon emitted by individual due to consumption of fossil fuel.
9. Equipment that harnesses energy from the wind.
10. Chemicals in detergents and fertilisers that causes eutrophication.
11. Energy from Earth's natural interior heat.



Across:

1. Sulphur & Nitrogen _____ causes acid rain.
3. Unit used to measure energy.
5. Organic Gas that increases global temperature.
7. The practice of responsibly using resources over a long period of time.
8. From what resource does Oregon, USA get most of its electricity?

**Spare a Watt
Save A Lot**

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**Life
Depends On Water
The Reservoir
Depends On You**

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