



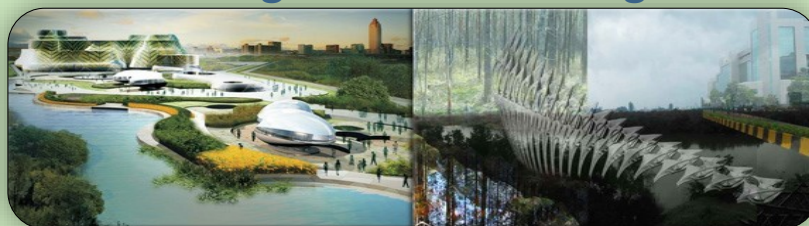
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Trending

- Kerala Government implements green protocol for making weddings more nature friendly
- India stood 75th out of 102 in a list that ranks the country in terms of human impact on environment per person.

Microalgal Culture Strategies



"Success of the energy transition needs innovations generated by research extending from fundamentals to applications"

The energy crisis, global warming and climate changes have led to an increased interest in renewable energy sources, such as feedstock production for use as biofuels. First generation biofuels are derived from edible feedstock such as wheat, palm, corn, soya beans, sugarcane, rapeseed, oil crops, sugar beet, and maize, while second generation biofuels use waste and dedicated lignocellulosic materials such as the feedstock like jatropha and switchgrass.

One of the main drawbacks of both first and second-generation biofuels lies in the fact that the cultivation of these food or non-food crops for biofuel production will compete for limited arable farmlands, which are intended to be used to grow crops for food production. Microalgal biofuels, known as third generation biofuels, are treated as a technically viable alternative energy solution that overcomes the major drawbacks related to the first and second generation biofuels. Compared to first and second-generation biofuels, microalgal biofuels offer many more advantages, such as high growth rate, high

CO₂ mitigation efficiency, non-competition for farmland, less water demand than land crops, toleration of wastewaters during cultivation and more cost-effective farming. However, the microalgal biofuels that receive ever-increasing attention lack the large scale commercial production needed for bulk application. The low economic performance is due to low productivity and the unmet requirements of overwhelming investment in capital and operation. In order to promote microalgal production for biofuel conversion, great effort has been made in fields such as the optimization of culture conditions (e.g., nutrient deprivation, mixing, etc.), harvest method development, microalgal residue utilization and biorefinery design. Of the potential efforts mentioned above, one of the most promising is the application of various culture strategies, which can greatly improve the production of desired end products. To determine the stand of the latest available microalgal culturing technologies and keep the global academic communities up-to-date to the current advances, this Research Topic focuses on the microalgal culture strategies for biofuel production.

Source : onlinelibrary.wiley.com

Underwater ghost nets posing threats to marine ecosystem

According to recent study by an NGO-FRIENDS OF MARINE LIFE, ghost nets (abandoned, lost or dumped fishing nets) have emerged as the greatest killers of the marine ecosystem off Kerala. These ghost nets may have long-term implications for marine life if no proper correctives are taken to deal with them. It may become major threat to the natural habitat and breeding ground of underwater fish.

Ghost nets have destroyed or threatened many of the underwater reefs identified with flourishing fish stock because of its 'stifling cover'. Globally, it is estimated that at least 10% of the reduced fish catch can be blamed on ghost nets, some of which have survived deep underwater for decades together.

There are four types of ghost nets that



infest the bottom of the seas. The first are the large fishing vessels that stray into the territorial waters and deploy large nets. These nets get caught in underwater reefs, forcing the fishing vessel to abandon them before leaving the territorial waters. The second type of ghost nets are smaller and are used by fishermen, but are cut off by a passing vessel. They too drift at the bottom of the ocean floor and get attached to the rough features there. The third type of ghost nets are those

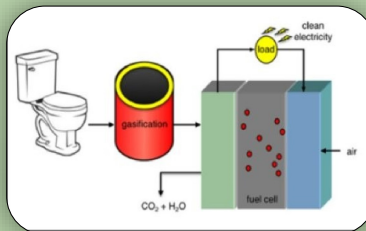
that get caught in violent currents and swivel down to the ocean floor, where they get stuck. The fourth type are ghost nets are those which get abandoned at sea after three or four uses. These nets remain under water for decades if not centuries.

Regarding the solution to the problem some of the countries have taken steps like Maldives has banned any use of fishing nets in its territory but this is not a good idea as due to ocean currents these nets can travel throughout the ocean. So many countries have started to train their fishermen to use GPS and they try to provide them the complete detail of ocean floor so that this problem can be avoided. Also they provide them expensive nets so that the fisherman have a strong incentive to preserve them.

SOURCE : THE HINDU

Electricity from waste toilet paper

Waste toilet paper can be used to generate renewable electricity through a two-step process at a cost comparable to residential solar power installations, scientists say. If implemented, the process could tackle the problems of overflowing municipal landfills and dependency on fossil fuels. Waste toilet paper is not often considered an asset. Yet it is a rich source of carbon, containing 70-80 per cent of cellulose on a dry basis. On average, people in Western Europe produce 10-14 kilogrammes (kg) waste toilet paper per person per year. Accumulating in municipal sewage filters, it is a modest yet significant part of municipal waste. At the same time, waste toilet paper is a businessman's dream because people will actually pay to take waste toilet paper off their hands. According to the researchers from the University of Am-



sterdam in the Netherlands, using waste toilet paper for generating electricity is 'the ultimate waste recycling concept'. Since the cellulose in waste toilet paper comes from trees, the electricity produced is renewable. This offers a great opportunity for matching society's demand for renewable energy. Renewable resources often show discontinuous peaks. Unlike solar and wind energy, which fluctuate with the time of the day and the weather, waste toilet paper is a continually available resource. Researchers proposed a simple two-step process

for the conversion of waste toilet paper, creating a direct route from unwanted waste to a useful product. They examined the possibility of combining devices for the gasification of waste toilet paper with high-temperature solid oxide fuel cells able to directly convert the waste toilet paper-gas into electricity. The project's goal was to assess the feasibility of such a system at a scale of 10,000 tonne waste toilet paper per year, based on real-life parameter values. Using techno-economic analysis method team presented a basic design and presented a calculation regarding efficiency which came out to be 57% similar to that of natural gas plant. Systems capital cost is high but operating cost is lower which indicates a possibility of any such project in future.

Source : Indiatoday

PLASTIC EATING CATERpillARS

Plastic is fantastic. It's cheap, durable, and doesn't react to the usual organisms that break down organic matter. This has made it incredibly useful for the packaging industry, but has also led to mountains of waste, like the trillion plastic bags dumped in landfills annually. Now, though, the fight against plastic might have an unexpected ally: a type caterpillar called the wax worm that loves to chow down on plastic bags.

The discovery of the wax worm's previously unknown diet was made accidentally by **Spanish researcher, Federico Bertocchini**. Bertocchini is a part-time beekeeper, and is used to removing wax worms from her hives, where the caterpillars like to munch on the beeswax inside. After leaving a recently evicted troupe of wax worms in a plastic bag one day, Bertocchini found that the critters had munched their way to freedom.

Bertocchini was curious as to whether the centimeter-long wax worms were



actively digesting the bag's plastic, or just chewing through it. She confirmed that they were, by mashing the creatures into a paste and applying it to a plastic film, which slowly degraded. She then teamed up with researchers from the University of Cambridge to analyze the worm paste and was able to confirm her findings. The resulting study was **published in *Current Biology***.

Bertocchini thinks that the caterpillar's digestive feat might be because of structural similarities between plastic and the wax that constitutes part of

their usual diet. The next step is to find out whether this discovery can be put to any use. It's not the first time we've found organisms capable of breaking down plastic (although the wax worms work faster than most). Some scientists working in this field has some doubts like using wax worms to recycle on an industrial scale might just create new problems. Chewing up plastics could create small fragments that "pick up toxins like a sponge, transport these toxins up the food chain, and can cause harm to the environment and human health. But Bertocchini says the next step isn't to use the wax worms themselves, but to find the enzyme in their digestive systems that's being used to break up the plastic in the first place. If scientist could isolate that, it could be used as a treatment in landfills. That would certainly be easier than dealing with millions of wriggly caterpillars.

Source : verge.com

Solar paint offers endless energy from water

This is the era of the energy crisis and the whole world is in search of such a source of energy which can meet the present demand of power consumption without compromising the need for the future generation. Solar energy is definitely one of the source which gives us a better alternative over the existing sources. So a lot of research is going on for finding the ways to exploit this immense source of energy at the global level. Solar paint is one of the result of those researches.

Researchers have developed a solar paint that can absorb water vapour and split it to generate hydrogen -- the cleanest source of energy. The paint contains a newly developed compound that acts like silica gel, which is used in sachets to absorb moisture and keep food, medicines and electronics fresh and dry. But unlike silica gel, the new material, synthetic molybdenum-sulphide, also acts as a semi-conductor and cataly-



ses the splitting of water molecules into hydrogen and oxygen.

Lead researcher **Dr Torben Daeneke**, from **RMIT University in Melbourne, Australia**, said that they have found that mixing the compound with titanium oxide particles leads to a sunlight-absorbing paint that produces hydrogen fuel from solar energy and moist air.

Titanium oxide is the white pigment that is already commonly used in wall paint, meaning that the simple

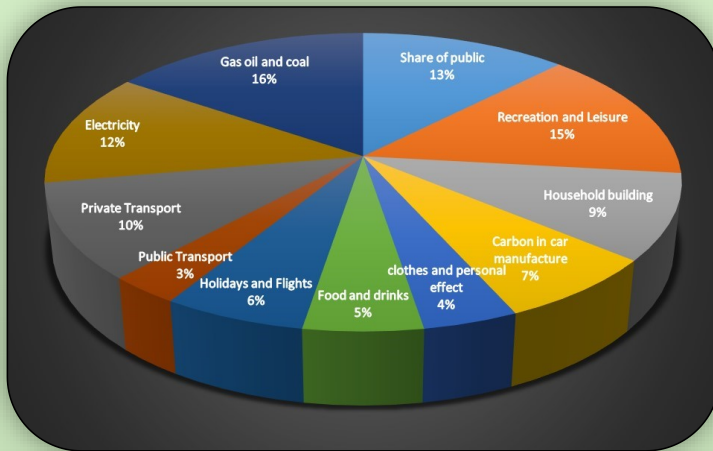
addition of the new material can convert a brick wall into energy harvesting and fuel production real estate.

He said that the team's new development has a big range of advantages and there's no need for clean or filtered water to feed the system. Any place that has water vapour in the air, even remote areas far from water, can produce fuel.

"Hydrogen was the cleanest source of energy and could be used in fuel cells as well as conventional combustion engines as an alternative to fossil fuels. This system can also be used in very dry but hot climates near oceans. The sea water is evaporated by the hot sunlight and the vapour can then be absorbed to produce fuel. This is an extraordinary concept -- making fuel from the sun and water vapour in the air." said his colleague, distinguished **Professor Kourosh Kalantar-zadeh**.

Source : Science daily

KNOW YOUR CARBON FOOTPRINT



A **carbon footprint** is nothing but total set of greenhouse gas emissions caused by an individual, event, organization or product, expressed as carbon dioxide equivalent. Pie chart shows the Carbon footprint of an individual caused due to its various activities. So now you know your activity which is the maximum contributor in your carbon footprint and hence you can help earth in restoring herself.

GO FOR IT, EARTH WILL BLESS YOU!

COMIC SENSE



Energy Facts

- The largest wind turbine in the world is 20 storeys high and is located in Hawaii.
- The most efficient appliance in a house is a microwave-it needs just 1/3 of most ovens wattage.
- In one second sun produces enough energy to meet the current needs of entire Earth for 500,000 years.

QUIZ

1. Name the country to have world's first sustainable biofuels economy?
2. Name the worm that can be used for plastic degradation?
3. What does the word 'photovoltaic' mean?

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