

Centre for Business Sustainability, IIM Lucknow  
Prabandh Nagar, Off. Sitapur Road, Lucknow- 226013  
E-mail: cbs@iiml.ac.in Phone: +91 522 2736987, +91 2736989

## Business Sustainability News

## International

### How energy economics could help electrify public transit

By Bethany Whitaker and Anmol Vanamali



At the December climate talks in Paris, it was noted that, in the absence of significant changes, the transportation sector is on track to become the fastest growing industrial contributor to global greenhouse gas emissions. However, the transportation sector continues to face serious challenges in curbing

emissions.

Although effective strategies for reducing transportation emissions exist, they have been difficult to advance, largely because of costs.

Electric vehicles, for example, have lower operating costs but are more expensive to buy than similar-model conventional fuel vehicles. With conventional fuel prices so low, it is even harder to motivate consumers and fleet managers to consider electric vehicle technology.

Another promising solution for the transportation sector is to adapt financial strategies used by the energy sector, such as energy services companies (ESCOs). These companies were unique when they first came on the market because they allowed building owners to finance energy efficiency projects with the ongoing savings generated by the project.

ESCOs also helped building owners with the technical aspects of efficiency projects, including selecting the right technology, managing installations and monitoring ongoing savings. They guaranteed to project sponsors that the savings would cover costs over the lifetime of the project. This meant that a building owner could take on an energy efficiency program with minimal risk or investment.

Energy markets benefited from ESCOs because they helped advance certain energy technologies and manage energy use. In many cases, ESCOs also proved to be profitable businesses. Today, most ESCOs are operated by the private sector.

So far, ESCOs have been not been widely used in the transportation sector, but opportunities exist, including in public transportation.

**"Operating an electric vehicle the same number of miles would use about \$6,500 worth of electricity, a savings of over \$30,000 per year per vehicle."**

Transit vehicles drive great distances every year and, in general, are not very fuel efficient. A transit bus driving 64,000 kilometers per year would consume 58,000 liters of diesel fuel, spending \$38,250 on fuel, even at today's low diesel prices.

Operating an electric vehicle the same number of miles would use about \$6,500 worth of electricity, a savings of over \$30,000 per year per vehicle. These savings may be sufficient to fund part or all of the cost of an electric transit vehicle.

While a back-of-the-envelope equation suggests that a transit ESCO (T-ESCO) may pencil out, there are challenges for transit operators, both with the technology and with the way ESCOs work. Initial experiences with electric transit vehicles in the

1990s were not good — most early-model vehicles did not perform as promised and were scrapped in demonstration phases.

Newer electric vehicle models, however, are much more promising, and slowly but surely, manufacturers have been addressing operators' concerns about vehicle range and charging needs. New electric vehicle models can travel 248.5 miles on a single charge, and upgraded charging equipment allows operators to charge vehicles while they wait at a bus stop in five to seven minutes.

The most persistent challenge, however, may be costs. For a transit agency to invest in an electric vehicle, they must pay a premium for the vehicle as well as invest in charging infrastructure. Even if some public sector funding is available, for transit operators to go electric, they need to be able to buy the same number of buses with roughly the same amount of money.

Thus, even though electric vehicles are less expensive in the long run, transit operators most likely would be unwilling to buy them if it means they get fewer vehicles. This, however, creates a perfect opportunity for a T-ESCO: A transit manager could look to the ESCO to finance all or part of the project, assist with the technology installation and monitor fuel (and emissions) savings.

Opportunities for the U.S. market

Without a lot of experience, one of the largest initial obstacles to setting up an ESCO program for electric transit vehicles is that most U.S. transit agencies purchase their vehicles outright. Federal funding rules technically allow for financing, but historically, few agencies have used the option.

As a result, the transit industry, including staff and their governing boards, is inexperienced with financing capital purchases and uncomfortable with debt.

Encouraging transit agencies to venture into electric vehicle technology, therefore, requires convincing them not only that the technology works, but also that they can and should pay for it in new ways. Despite these challenges, the ESCO concept is a good and much-needed one if the United States wants to diversify its collective vehicle fleet to less carbon-intensive and lower-emission vehicles. Some immediate actions and next steps in this effort include:

1. **Creating rules and regulations that support transit vehicle financing.** As discussed, transit agencies are not used to financing their capital purchases; they also are not sure how to mix federal, state and private funding to buy a vehicle. The federal government and state agencies need to provide guidance on transit financing that allows for more flexibility in capital purchasing, including financing and, in particular, private sector financing. This guidance also should guide development of ESCO or ESCO-like programming.
2. **Engaging electric utilities.** Electric utilities have a clear stake in electric vehicle technology. Utilities also have experience with ESCO programs and could be a potential partner to transit agencies if/when they venture into an ESCO arrangement. Partnerships with utilities will be essential as transit systems start to implement electric vehicle technology.
3. **Attracting private sector financing.** Automobile manufacturers successfully have created a variety of financing tools for consumers, and some electric bus manufacturers are offering similar products. A T-ESCO could be a way to engage the private sector in advancing vehicle technology for the private sector and making sure that the terms are equitable for all parties.
4. Looking to carbon markets for revenues. Electric vehicles, including transit vehicles, have equipment that makes it easy to track and monitor fuel savings and greenhouse gas emission reductions. Transit agencies could take this information to trade in carbon markets, such as Renewable Identification Numbers (RINS) to raise additional revenues to support their efforts. As these markets mature and grow, so will the opportunity for revenue.

[<ReadMore>](#)

## Another Reason to Get Serious About Climate Change: Your Health

### *SustainableBusiness.com News*

A study from Duke University adds to the growing evidence of the link between public health and climate change.

If the US drives down emissions enough to meet the 2°C threshold, air pollution would also drop significantly, preventing 295,000 premature deaths from respiratory and heart disease over the next 15 years.

Burning fossil fuels is literally killing people and our planet. "By curbing emissions, you score on two fronts," says lead author, Drew Shindell.

Particulates from fossil combustion are the main culprit, spewing soot and smoke into the air. When inhaled, they penetrate deeply in the lungs, increasing the risk of cancer and heart disease, while also stoking climate change in the form of black carbon. Another problem is ground-level ozone, which irritates and inflames the respiratory system, and mercury, lead, and other toxics found in carbon emissions.



Published in *Nature Climate Change*, the research by Duke and NASA Goddard Institute for Space Studies shows that by 2030:

- 75% drop in transport emissions saves 120,000 lives
- 63% drop in energy emissions saves another 175,000 lives
- \$250 billion per year boost to the economy from lower health costs, increased consumer spending and the transition to clean energy.

You can see how the costs of transitioning to clean energy pale compared to the benefits. When EPA introduced the Clean Power Plan, it also issued a report on health impacts for Americans.

Worldwide, about 7 million people died in 2012 from air pollution, according to the World Health Organization - an incredible one in eight of all deaths.

### **Lancet Report**

Last year, The Rockefeller Foundation-Lancet Commission on Planetary Health released a comprehensive review on public health impacts of climate change, calling it a "medical emergency."

Compiled by experts across medicine, climate science, engineering and economics, it points to places like the US West - where extensive drought and heat has triggered increasingly widespread, intense wildfires that releases particulates, affecting peoples' health hundreds of miles away.

They also drill down to impacts of carbon emissions few would even think about. Increased carbon in the atmosphere lowers the amount of zinc in major food crops, for example, already creating nutritional deficiencies in 1 billion people across the world.

"We have been mortgaging the health of future generations to realize economic and development gains in the present," instead of respecting the interconnectedness between human civilization and nature, they say.

"Human action is undermining the resilience of earth's natural systems, and in so doing we are compromising our own resilience, along with our health and, frankly, our future," says Dr. Judith Rodin, President of The Rockefeller Foundation.

"These environmental changes threaten the gains in health that have been achieved over recent decades and increase risks to health as diverse as under-nutrition and food insecurity, freshwater shortages, emerging infectious diseases, and extreme weather events," says report Chair Andy Haines, Professor at London School of Hygiene & Tropical Medicine.

"Whether we're talking about land use, deforestation, degradation of global fisheries, disruption of the climate system, biodiversity loss, appropriation of fresh water, changes to aquatic systems - all of the changes are profound and they're accelerating, and they represent a significant challenge to global health," says lead author Samuel Myers at Harvard University's T.H. Chan School of Public Health.

[<ReadMore>](#)

## Greenland's ice melt accelerating as surface darkens, raising sea levels

*Winnowing away of the ice, exacerbated by soot blown on to the ice from wildfires, means Greenland's ice sheet is stuck in a 'feedback loop'*

By Oliver Milman



*Sheet surface started becoming less reflective of solar radiation around 1996, and summer near-surface temperatures have increased. Photograph: John Mcconnico/AP*

Greenland's vast ice sheet is in the grip of a dramatic "feedback loop" where the surface has been getting darker and less reflective of the sun, helping accelerate the melting of ice and fuelling sea level rises, new research has found.

The snowy surface of Greenland started becoming significantly less reflective of solar radiation from around 1996, the analysis found, with the ice absorbing 2% more solar energy per decade from this point. At the same time, summer near-surface temperatures in Greenland have increased at a rate of around 0.74C per decade, causing the ice to melt.

This winnowing away of the ice, exacerbated by soot blown on to the ice from wildfires, means that Greenland's ice is stuck in what is known as a "feedback loop" that will make it ever more vulnerable to warming global temperatures. The study predicts that the ice surface reflectivity, or albedo, will drop by 10% or more by the end of the century, which will trigger further melting.

"It's melting cannibalism, basically - it's melting that's feeding itself," said lead author Marco Tedesco, of Columbia University's Lamont-Doherty Earth Observatory. "Rising temperatures are promoting more melting, and that melting is reducing albedo, which in turn is increasing melting."

It's worrying because if the ice sheet continues to get darker, it becomes more sensitive to atmospheric warming

### **Marco Tedesco**

"It's worrying because if the ice sheet continues to get darker, it becomes more sensitive to atmospheric warming. The impact of two weeks of sunshine with no clouds, for example, is far greater than it was 20 years ago. The ice is going to melt much more quickly, with more water flowing off on to the sea."

In recent years, scientists have begun to pick apart the complex, interrelated forces at play in the Arctic, which has experienced a 13.4% drop in minimum ice extent per decade, on average, since the 1980s. More than half of the Greenland ice sheet experienced some melting last summer, the largest annual melt since 2012 and well beyond the average melting seen over the past 35 years.

Tedesco's research shows that as the surface of Greenland's ice melts, old impurities, such as dust from erosion or soot that has been entombed for years, start to appear, darkening the surface.

If the summer is warm enough to remove all the snow, these dark impurities begin to spread across the surface, providing a far more heat-absorbent environment. At the same time, as this snow melts and then refreezes, the grains of snow get larger. These larger grains, invisible to the eye but detected by satellite's infrared instruments, also create a less reflective surface.

These two processes are turning Greenland into a store, rather than a reflector, of solar energy, with consequences far beyond the icy wilderness. Water from the melting flows into the sea, contributing to rising oceans around the world. This process is unlikely to reverse given the increasing concentrations of greenhouse gases in the atmosphere.

"As warming continues, the feedback from declining albedo will add up," Tedesco said. "It's a train running downhill, and the hill is getting steeper."

The research, published in the European Geosciences Union journal *The Cryosphere*, looked at satellite data from 1981 to 2012.

[<ReadMore>](#)



## NASA is Revolutionizing Aviation, Leap Frogging to Green, Quiet Airplanes

### *SustainableBusiness.com News*

The future of aviation is electric and NASA is playing a vital role in getting us there.

America stands on the cusp of a new era in aviation, NASA says, even calling it "revolutionary." Airplanes will be dramatically cleaner, quieter, and even faster.

After six years of research, demonstration airplanes use half the fuel, produce 75% less pollution and are much quieter - noise is just one-eighth of today's levels, says NASA's Environmentally Responsible Aviation team.

Researchers focused on design changes that make airplanes efficient enough to run on electricity: advanced, lightweight composite materials; advanced fans that greatly improve engine propulsion; and changes to wing flaps and landing gear that make them much quieter.

Although efficiency has been incrementally improving in the airline industry, NASA's work takes a leap forward.

"The full potential of these technologies can't be realized in the tube-and-wing shape of today's aircraft," says Jaiwon Shin of NASA Aeronautics Research.

### **Demonstration plane, developed with Boeing:**



In future airplanes, weight and drag are reduced by smaller tails and even new coatings that prevent insect residues from building up on the wings. New ways of melding airplane parts together make airplanes 20% lighter and much stronger.

Morphing wings are part of the body, eliminating the drag and noise of air flowing through gaps. Research partners FlexSys and Aviation Partners of Seattle have already announced they plan to commercialize this technology.

A new design for jet engine combustors - the chamber where fuel is burned - cuts nitrogen oxide emissions by 80%.

### **Next Steps**

President Obama's 2017 budget proposal would make these innovations a reality through a 10-year plan - will it make it through Congress?

It would enable NASA to build a variety of demonstration planes, called X-planes, to get these innovations into the commercial market - including those that fly on electricity and biofuels.

Sceptor, an experimental electric plane, integrates motors into the wing. Other planes have very light wings that can change shape to move through turbulent air.

"With this 10-year plan to accelerate the transformation of aviation, the United States can maintain its status as the world's leader in aviation for many years to come," says Shin.

### **Airlines Deliver Very Weak Climate Action**

This month, the aviation industry announced long awaited details on how it will deliver on its promise to move toward carbon neutrality after 2020. But the proposal goes nowhere fast, requiring emission cuts from new aircraft of 4% over 12 years.

The industry still plans to launch an international cap-and-trade program in 2020 to cut emissions in half by 2050.

In 2014, a program launched that certifies US airports for lowering carbon emissions, joining Europe and Asia.

Right now, aviation produces about 2% of world carbon emissions, but the industry is expected to double over the coming 15 years.

[<ReadMore>](#)

## On World Water Day, White House Water Summit

### *SustainableBusiness.com News*

Today is World Water Day, and President Obama is using it to highlight his "moonshot for water," which he began last year.

"We need to up our game on water. That's the message we have today," Obama says. "We crushed it on solar, and we're going to do the same on water."

Through research, grants, and incentives for private sector investment, solar is mainstream in the US and now he's applying that formula for water.

**At a White House Water Summit today**, \$5 billion has been pledged by 150 companies, nonprofits and the federal government to "enhance the sustainability of water in the US" over the coming 10 years.

While the recent focus has been on infrastructure and lead problems in Flint, Michigan and beyond, our water woes go way beyond that thanks to climate change. We've got both intensifying drought and floods to deal with.

We need to:

- Fix infrastructure and use better materials so that water leaks don't siphon off 16% of our water supply.
- Manage water sources much better, which alone would cut consumption by a third - through making appliances more efficient, for example.
- Accelerate research and massively deploy water technologies such as recycled water and renewable energy-powered desalination.

For too many years, federal spending on infrastructure has fallen, leaving it in ever greater disrepair. The American Society of Civil Engineers gives our drinking water infrastructure a "D+ Grade."

The problem goes beyond old pipes, however. In industrial Flint, for example, car manufacturers dumped toxic effluent into the river for decades, causing the water to be undrinkable: oils, lubricating fluids battery and paint waste, on and on.

### **Summit Announcements**

At today's Summit, the private sector, for example, stepped up with \$1.5 billion to finance decentralized, scalable water management solutions, and \$500 million to develop water reclamation and reuse systems.

- A new interagency **National Drought Resilience Partnership** will coordinate efforts on drought-resilience, response, and recovery. About 13% of the US is in drought at the moment, affecting 39 million people, and conditions are expected to intensify.
- The **Center for Natural Resources Investment** is a new division in the Department of the Interior. It will promote private investment in water infrastructure and facilitate locally led water exchange agreements in the western US.
- After spending over \$270 million last year on drought-related measures, the federal government will distribute about \$55 million in grants for projects that increase the efficiency of water use, increase energy efficiency and renewable energy (which vastly reduce water use compared to coal and gas), and make sure ecosystems get water.

It's not that progress hasn't been made. Manufacturing has become more efficient, using less energy and water, and overall, water consumption in the US is down 13% since 2005 while our population has grown, says the US Geological Survey.

Much of the challenge, is merely getting efficient technologies adopted. Less than 10% of farms use technologies that sense moisture in plants and soil or that schedule irrigation based on the weather.

Read the long list of actions the White House is facilitating in "Commitments to Action on Building a Sustainable Water Future and Water Resource Challenges and Opportunities for Water Technology Innovation."

### **The Plan for Flint?**

In Michigan, Governor Snyder released a 75-point plan to deal with the crisis in Flint, but it sounds like it does everything except address the immediate problem.

Incredibly, the plan leaves the most important action item out: replace all lead service lines in Flint!

Instead, Snyder wants legislation that creates stronger water standards than EPA's and better sharing of data between state and federal environmental agencies, for example. Oh, and he would continue the "pilot" underway to replace 30 water lines. An intermediate goal is to prioritize the next set of homes where lines would be replaced.

[<ReadMore>](#)

## Indoor and outdoor air pollution 'claiming at least 40,000 UK lives a year'

Report finds air pollution inside and outside the home is costing £20bn a year as well as causing tens of thousands of deaths

By Damian Carrington



A woman and a child stand on Parliament Hill in Hampstead Heath overlooking a smoggy central London in April 2015. Photograph: Dan Kitwood/Getty Images

irritant chemicals from new furniture, air fresheners and household cleaning products. House-dust mites, mould and dander from pets can also damage health, according to the report.

Outdoor pollution, much of it from vehicles, causes 40,000 deaths a year in the UK but the number linked to indoor pollution is not known. However, indoor air pollution is estimated to have caused or contributed to 99,000 deaths across Europe in 2012, the report states.

The report found unborn and young children were particularly susceptible to air pollution. "The developing heart, lung, brain, hormone systems and immunity can all be harmed by pollution," the report said. "Research is beginning to point towards effects on growth, intelligence, asthma, and development of the brain and coordination. Harm to babies and children will have an impact that lasts far into the future."

"When our patients are exposed to such a clear and avoidable cause of death, illness and disability, it is our duty to speak out," said Prof Stephen Holgate, an asthma expert at Southampton University who led the report. "We now know that air pollution has a substantial impact on many chronic long-term conditions, increasing strokes and heart attacks in susceptible individuals. And now there is compelling evidence that air pollution is associated with new onset asthma in children and adults."

Dr Andrew Goddard, at the Royal College of Physicians, said: "Taking action to tackle air pollution in the UK will reduce the pain and suffering for many people with long term chronic health conditions, not to mention lessening the long term demands on our NHS."

Many people in the UK are currently exposed to illegal levels of air pollution. The UK government lost a supreme court legal battle in 2015 and was forced to produce an action plan. If successful, this will cut air pollution to legal levels by 2020 in most cities and 2025 in London.

The new report found that, although the government and the World Health Organization set "acceptable" limits for air pollution, there is in fact no level of exposure that can be seen to be safe, with any exposure carrying a risk.

The report called for a wide-ranging set of measures to tackle the problem, including tougher regulations to limit air pollution such as reliable testing of emissions from vehicles. Whilst Volkswagen actually cheated emissions tests, most manufacturer's diesel cars produce far more pollution on the road than when being tested. On 3 February, the European parliament failed to veto loopholes in air pollution limits on new diesel cars.

Another measure demanded by the new report is for local authorities to have the power to close or divert roads to reduce the traffic, especially near schools, when air pollution levels are high.

The issue of indoor air pollution also needs more research, said the report: "We must strengthen our understanding of the key risk factors and effects of poor air quality in our homes, schools and workplaces." It noted: "The drive to reduce energy costs, by creating homes with tighter ventilation, could be making the situation worse."

National action to fight climate change will also help to cut air pollution, according to the report, which said meeting the UK's carbon emissions target would lead each year to 5,700 less deaths and fewer hospital admissions for lung and heart problems.

The public can play a part in cutting air pollution too, said Prof Jonathan Grigg, from the Royal College of Paediatrics and Child Health: "We ask the public to consider using public transport, walking and cycling, and not choosing to drive high-polluting vehicles."

Dr Penny Woods, chief executive of The British Lung Foundation, said: "This landmark report lays out in the starkest terms yet the devastating impact air pollution is having on our health, our children's health, our economy and society as a whole. [In particular, children] should not have to pay the price for what has happened to the air they breathe."

[<ReadMore>](#)

## TIPS

It is heartening that for last two years the CO<sub>2</sub> emissions are not increasing according to preliminary reports. This should inspire us to do more towards promoting sustainability. Even present level of CO<sub>2</sub> emission is alarmingly high. The government is trying to do a lot but without our support she can do nothing. We must adhere to rules and policies that Government implement from time to time but it would be wise step to contribute on our own towards attaining sustainability. As always we are mentioning some measures that would help promote sustainability.

1. Travel by air is faster but most carbon intensive means of transport. Therefore unless unavoidable opt for other mode of transport like train or bus. Thus you will save carbon emission as well as money.
2. Shipment of food, fruits and vegetables from distant places uses huge amount of fuel. So it would be much better if you buy from local market and if possible locally produced.
3. Buy articles with less packaging as packaging increases weight and that uses extra energy during manufacturing, shipping, and waste disposal.
4. Recycling is very important and by recycling iron and aluminum you can save a lot of metal as well as lot of energy that is required for mining and refining.
5. By composting the organic trash of our kitchen we may reduce greenhouse gas emissions. If you do not have required space for composting you may try vermicomposting at home.
6. Never buy a house or car bigger than required size that will consume more energy and fuel.
7. Alter your driving habits: Accelerate gently, reduce your speed, stop idling, thus you will burn lesser fuel which will reduce GHG emission and save money too.
8. Green clean your clothes. You don't have to do much just turn off heater of washing machine and instead of using heater dryer dry your clothes on a stand or clothesline/rope.
9. Often people burn papers, leaves and other trash in open. When we burn refuse in burn barrels or open piles, the potential cost to our health, our home, our neighbors and the environment is much higher than we think. Burning "unclean" materials can be even more hazardous.
10. Whether ordering in restaurants or cooking at home keep in mind that no food should be wasted. According to the EPA, 21% of all waste in the landfill is food waste. While we throw food in dustbins there are millions of people who do not have food to eat.
11. When throwing a party estimate cautiously the number of guests attending and get food cooked accordingly if even after that some food is saved ensure that it is distributed among poor people who consume it.
12. Plan your meals ahead of time based on what you already have. Regularly keep checking the refrigerator so that nothing goes waste. Cook meals keeping in mind if you are going out to dine. As far as possible cook food in only required quantity.



## Marie Kondo tells us to ditch joyless items but where are we sending them?

The rise of the de-cluttering icon, Ikea's "peak stuff" comments – we have an overconsumption problem but simply chucking things out won't solve it

By Rosie Spinks



A survey of UK women found that the majority of fashion purchases are only worn seven times. Photograph: Stan Honda/AFP/Getty Images

enthusiasm for the KonMari method, which is Kondo's approach of only keeping items that "spark joy", signal that attitudes in an increasingly disposable world are shifting. On Instagram and Twitter her devotees post pictures of the clothes and items they're getting rid of, often with glowing endorsements of her method's effects on wellbeing.

However, its popularity also raises important sustainability questions. Where are we sending all these joyless garments once we're done with them? And alongside our fervour to rid our lives of excess, are we addressing our patterns of accumulation at the source?

### Making your stuff someone else's problem

If Kondo's trend for decluttering results in an increase in donations to charity, that's undoubtedly a good thing for shops like Oxfam and Traid which rely on donations to make money. However, when it comes to clothes, the quality of fast fashion garments means that they're often not fit to be sold on in the shops.

A survey of women by children's charity Barnardo's found that the majority of fashion purchases are only worn seven times. "If people are buying more at lower quality – so after a wash the hems are gone or the garment is out of shape – that's really difficult for charities like us," explains Leigh McAlea, head of communications for Traid.

Most charity shop chains will sort what they can retail in their own shops and then sell the rest to wholesalers. Those wholesalers then determine what can be sold overseas, what can be downcycled into items like mattress stuffing or rags, what can be incinerated, and what can't be used at all. The UK exports more used clothing to developing world markets —\$481m or roughly 351m kilograms worth in 2014 according to UN comtrade data — than any other country besides the US. Meanwhile, according to Wrap, almost one-third of UK clothing goes to landfill.

### Changing our relationship with stuff

James Wallman, author of *Stuffocation: Living More With Less*, chronicles what he calls "the material equivalent of the obesity epidemic." He says that the large interest in Kondo's work proves there is a problem with overconsumption, but it does not address the very root of it.

"We're still using mental tools honed through millennia of scarcity. Through your grandmother telling you 'see food eat food', [we now think] see stuff get stuff," says Wallman. "It's very hard to switch our mental tools, which is why lots of people, once they've done that clearing up and feel good about it, think: 'I've got all this space on my shelves. What do I do?' And they go buy more."

Wallman says that purging your possessions using the KonMari method is really only the first step to un-learning this mindset. He recommends shifting mental focus first by purging, followed by making an marked effort not to "re-stuffocate" and then most importantly by shifting the money you would normally spend on more stuff to memorable and enriching experiences.

Outdoor apparel brand Patagonia has been at the vanguard of trying to shift patterns of consumption. Back in 2011 it was telling consumers not to buy its products and today it celebrates the adventures of its customers on its Worn Wear blog.

UK designer Tom Cridland is also appealing to a new consumer, recently launching a collection of t-shirts and sweatshirts designed to last 30 years. "The whole purpose is to encourage people to buy a little bit less and to buy better, especially

Earlier this year, Ikea's head of sustainability said at a Guardian Sustainable Business event that consumers in the developed world had reached "peak stuff". The success of Japanese de-cluttering icon and best-selling author Marie Kondo suggests he's not the only one who thinks so.

The praise and

when it's a basic item they're going to wear all the time," he explains.

[<ReadMore>](#)

## UK's Fossil Lobby Turns to Renewable Energy

*SustainableBusiness.com News*

Why does the biggest fossil fuel lobbying group in the UK suddenly support renewable energy? It's just one more sign that we are making progress and the times - they are a'changin.

Energy UK's chief executive says the shift is urgent because they don't want to be left behind!, reports *The Guardian*.

"No one wants to be running the next Nokia (referring to the mobile phone company that was squashed by forward-looking rivals), CEO Lawrence Slade told *The Guardian*. Clearly, the direction is toward distributed energy and away from centralized power stations.

Incredibly, Energy UK now officially supports the government's decision to phase out coal while criticizing its drastic cuts to incentives for renewable energy. He wants efficiency measures returned and regulatory support for energy storage to support solar and wind. He wants a long term plan for renewables so that investor confidence can return, but he also favors natural gas.

Since conservatives won last year's election they have dismantled just about every green program and subsidy for renewable energy, while bolstering them for nuclear and offshore oil.

And after emissions from power plants dropped 13.6% last year because of declining coal use, government officials have been calling to bring it back - to keep the lights on.

After shedding thousands of renewable energy jobs since the incentive cuts - and investors pulling out in droves - the government slimmed the cuts for rooftop solar by 65% instead of 87%. Why the cuts at all? Like in the US, conservatives claim subsidies for solar and wind should be temporary (except for fossil fuels and nuclear) and claim it leads to higher utility bills.

"In just one month, one nuclear plant at Hinkley would swallow up four years' worth of subsidies for the whole solar sector. Why are ministers signing a blank cheque for expensive, outdated nuclear power while pinching pennies for an energy source on the cusp of a massive investment boom? This makes no economic sense and will only put up [utility] bills in the long run," says Greenpeace.

### Fracking Becomes The Plan

Fracking is the centerpiece of Prime Minister Cameron's energy plan. A leaked letter from three Cabinet ministers even suggests that permits should be removed from local control because the majority of citizens are squarely against it. The latest

polls show 78% support for solar and wind, and 26% support for fracking. Parliament voted to allow fracking everywhere - in national parks and near drinking water supplies. In December, 159 permits were handed out, opening huge swaths of the countryside to fracking. Protests have been widespread.



### Scotland banned fracking.

"Ministers happily take credit for being climate champions on an international stage [referring to the Paris Climate Agreement] while flagrantly undermining the renewable industry here at home," Caroline Lucas, a Green Party member of the Parliament, told *Reuters*.

Meanwhile, the formerly booming renewable energy industry is about to fall off a cliff. Last year, wind supplied 11% of electricity, generating power for 30% of households, about 8.25 million homes. And most of Britain's major cities have pledged to run on 100% renewables before 2050.

And this winter has been the warmest in recorded history in England, up 7°C so far.

[<ReadMore>](#)

# Carbon is a terrible thing to waste

By David Crane



Wow.

If you read GreenBiz's State of Green Business 2016 report cover to cover, as I did, you will both learn a lot and be impressed by the breadth and depth of technology-enabled economic opportunity arising out of society's drive towards sustainability.

The business proposition that green can be turned into gold never has been more true.

Far as I could tell, every innovation and new sustainable business initiative mentioned in the report, published last month, is beneficial to society at large (unlike, for argument's sake, corn-based ethanol). But all sustainability initiatives are not created equal in terms of their potential impact.

That is the question everyone in the sustainability field has to ask themselves: Are you just doing sustainability to be true to yourself — lightening, if you will, your personal and occupational carbon footprint so that you can sleep well at night — or are we, as a collective, "in it to win it" — "it" being the global fistfight against climate change, as Bobby Kennedy Jr. likes to call it?

When it comes to winning the fight against climate change, there are many "wants" but just a few "musts": We must get solar over every parking lot and on every roof that can handle it. We must severely reduce tailpipe emissions. We must give the developing world an electrification/connectivity alternative to the fossil-fuel-driven centralized grid system.

**When it comes to winning the fight against climate change, there are many 'wants' but just a few 'musts.'**

But the must I was looking for in GreenBiz's report was found, lying unassuming, on page 30, posed as a rhetorical question:

*Can carbon recycling ... put a dent in the 36 billion metric tons (emphasis added) of carbon dioxide released globally each year from burning fossil fuels?*

We must find a way to get the vast majority of that 36 billion a year of CO2 out of the atmosphere, which means getting it out of our economic system. We either stop using fossil fuels (unlikely) or find an economic way to combust fossil fuels without emitting carbon (better). Transforming the carbon emissions from fossil fuel generation into an economic asset isn't just a good, green business opportunity; it is a moral imperative that should weigh heavily on everyone who produces or consumes fossil fuels — which, of course, is all of us.

## Coal without carbon?

We can't solve the climate problem solely by getting the carbon out of coal, but if we don't get the carbon out of coal, we have no chance of winning the fight against climate change.

The 36 billion tons was referenced in a piece on the trend towards carbon recycling. Even though I have been involved in carbon capture for many years, I had not heard the term "carbon recycling" before reading the State of Green Business.

Over the past few years I have watched the terminology morph from "CCS" ("carbon capture and storage" or "carbon capture and sequestration") to "CC-EOR" ("carbon capture and enhanced oil recovery") to "CCUS," which I believe is the American government's current preferred term for "carbon capture, utilization and sequestration." I have seen the idea of turning waste carbon into an economic asset referred to as carbon "materialization" or carbon "beneficiation," but now GreenBiz has anointed it "carbon recycling."

All this semantic progression is borne of the painful realization that there is not

going to be a price on carbon that creates a market-driven incentive for the energy industry to bury its carbon waste deep in the ground.

**"Which means that we desperately need to find an economic use for waste carbon."**

The concept of "carbon recycling" is good, but I am not sure I like the term. It triggers in my mind an association with the recycling of aluminum cans that has been a part of our everyday lives since the 1970s, but is seen by most people as a societal obligation — a good deed of inconsequential economic value — rather than as a meaningful for-profit opportunity.

And, as a result, not everyone recycles and private-sector companies don't push it. There are recycling businesses that have made a good profit over the years but certainly none of them that I know of has grown into Fortune 50 companies. It's 2016, for goodness sake, and we are still allowing most of society's solid waste to turn into methane in landfills.

We need more than the marginal economics of recycling when it comes to carbon. We need carbon to become a big business, with meaningful bottom-line impact, so that the energy companies that produce fossil fuels and the electricity companies that burn them shift their business models — and their production technologies — to enable carbon harvesting (a term that I just invented).

For this to happen at real scale, rather than at the CSR-science-project-pretty-picture-in-the-back-of-the-annual-report scale, these companies need to be motivated principally by a desire to reap the economic benefit of their carbon "assets," with the environmental benefit of keeping that carbon out of the atmosphere as a positive side effect inuring to society.

This means that beyond focusing on how to capture and separate waste carbon in the largest and most economic way possible, we need to figure out how we adhere that CO2 compound molecule to other non-carbon molecules in a manner that yields a product that our capitalist society is willing to pay for. Moreover, given the massive amount of carbon emissions we generate, this new carbon product cannot be a "specialty" product. It must be a building material or other product that is used by society in very large volumes.

[<ReadMore>](#)

## How Can 9 Billion People Get Protein Without Destroying the Environment?

### SustainableBusiness.com News

The Protein Challenge 2040 has formed to tackle how humans will be able to get the protein we need without destroying the environment.

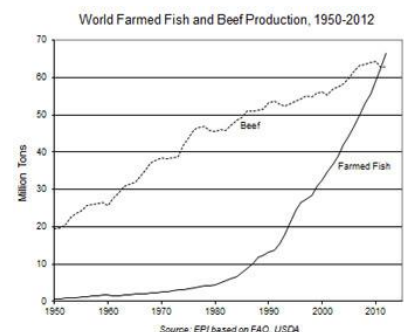
The question is, how can we feed 9 billion people enough protein in a way that is healthy, affordable and good for the environment?

Facilitated by the UK non-profit Forum for the Future, the group includes World Wildlife Fund, Global Alliance for Improved Nutrition, Target, Hershey and other corporations.

For the first time, they have mapped the interrelationships in the entire protein system around the world, and they plan to take immediate action on:

- increasing the proportion of plant-based protein consumption in diets
- scaling sustainable feed to meet demand for animal protein
- tackle the loss and waste of protein across the system

They are also looking into restoring soil health; using indigenous plants as protein sources for local communities; and scaling sustainable aquaculture for food and animal feed.



to climate change. The other major form of protein is fish, which is bringing fish populations close to collapse.

"Protein is essential for human health, but the current state of how it's produced and consumed is just not sustainable in the long term," says Andy Richardson, Head of Corporate Affairs at Volac.

When we talk about protein, that's a code word for meat. We all know we have to eat less of it for our health and the environment. Most of Latin America's soy crop is used for animal feed, driving deforestation, and conventional agriculture is a major contributor

[<Source>](#)



## The Californian craft beer brewed from waste water

*A San Francisco brewery is using Nasa technology to make beer with water from sinks and showers, while other brewers are finding new ways to go green*

By Kristine Wong



*Greywater beer (on the left) and same type of beer made with conventional municipal water.*

*Photograph: Half Moon Bay Brewing Company*

use, we have to recycle our freshwater ... and get over our psychological resistance to that."

While some microbrewers have been working hard to get their water usage down – some to three gallons of water for every gallon of beer – the industry has a high water to beer ratio. Despite this, it took Drinker about a year to find a brewer up for the challenge. But when he broached the idea with the Half Moon Bay Brewing Company, a craft brewer located south of San Francisco, owner Lenny Mendonca didn't hesitate.

Last October the brewery unveiled a version of its regular Mavericks Tunnel Vision IPA made with recycled water after a blind taste test at an urban sustainability conference in the Bay Area.

Made using the same Nasa water recycling technology as astronaut Scott Kelly used during his year long stint on the International Space Station, the tasting panel couldn't detect which of the two pints was made with recycled water.

"This is the product [where] people think that water is the most important ingredient," said Mendonca. "So if I can demonstrate to people that not only is [greywater beer] good, but it's great, then why wouldn't you use that water for everything else?"

Mendonca has only made the greywater beer available for sampling twice and says commercialising the product isn't his first priority. California can't legally directly pump treated recycled water back into the drinking water supply, so it's currently not practical (shortage of supply) or cost effective. His focus instead is on using the beer as a tool to catch the eye of both policymakers and the public.

Getting the legislation to bring recycled water directly into the drinking water supply, would be the first step for mass application, just as Singapore has done with its recycled water plant.

### Craft brewers turn green

Brewing beer from recycled water is an unusual approach. But a growing number of craft breweries in the US are finding new ways to reduce their environmental footprint.

Weak wort, a type of sugar wastewater generated by Colorado-based Avery Brewing Co, will be donated to the city of Boulder for use in its wastewater treatment plant to break down nitrogen. This will save the city \$500 (£350) per day on the acetic acid it would have purchase to do the same job, said Chris Douville, Boulder's wastewater treatment manager.

"We were looking for a local carbon source that others see as a waste," he said. "It's a mutually beneficial relationship."

Boulder is currently outfitting its plants to treat nitrogen using weak wort, says Douville, and should be ready to put the new equipment online by the end of the year.

Other craft breweries, such as Lagunitas Brewing Company and Bear Republic Brewing Co in Sonoma County, California, are using a new onsite wastewater treatment system housed in a shipping container.

The EcoVolt, developed by Boston-based startup Cambrian Innovation, is powered by electrically active bacteria that use anaerobic digestion to scrub the breweries' wastewater of up to 90% of pollutants, according to Baji Gobburi, the company's director of sales and marketing.

Each EcoVolt unit, which is targeted towards other boutique food and beverage operations such as wineries and dairies, can process up to 300,000 gallons of

In autumn of 2014 – three years into California's devastating drought– architect Russ Drinker became fixated on brewing beer from recycled greywater (that is, water that's been treated after use in sinks, showers and washing clothes).

He was increasingly frustrated that the media paid little attention to water recycling. "They were focused on conservation instead. But if Californians really want to have an impact on our water

wastewater per day, and enables the breweries to reuse water in their cleaning operations and produce methane that is converted into heat and electricity.

"When Lagunitas completes the installation of its second EcoVolt, its water footprint will drop by 40%," said Gobburi. "And the systems will also recover 20% of its facilities' energy needs."

It's also been a money, time and petrol-saver. Previously, Lagunitas had to truck over 50,000 gallons a day of its concentrated wastewater to a treatment plant in Oakland over 40 miles away.

In Dexter, a town of about 4,000 people nestled in the corner of southeast Michigan, the Northern United Brewing Company has installed a smaller version of EcoVolt to treat its wastewater onsite, helped by a \$200,000 (£140,000) innovative technology grant from the state of Michigan.

[<ReadMore>](#)

## Cleantech Incubators Expand Into Water Innovation

### SustainableBusiness.com News

Worldwide, three of every four jobs depend on water, whether it's used for farming, industry, fisheries or forestry, according to United Nations World Water Development Report 2016.

The water industry is already huge, but most of it is involved in basic activities like pumping water to homes and treating wastewater. While water recycling, nontoxic water treatment, and advanced irrigation systems are becoming more common, there's an enormous need for innovation on sustainable water technologies.

Massachusetts is home to several cleantech incubators, and they are all seeing a spike in applications from water start-ups.

In response, Cleantech Open Northeast launched CTO-H2O, noting that about a third of applicants are entrepreneurs trying to commercialize water technologies.

"As a water-innovation consultant and judge for Cleantech Open Northeast, I am excited and amazed at the increased volume of innovative water technologies and solutions applying to our Northeast regional accelerator incubator and accelerator programs," says Marcus Oliver Gay, a water-innovation consultant and member of the New England Water Innovation Network.

Greentown Labs is also expanding its mission to create a home for the world's most disruptive water startups.

"With global water use skyrocketing and availability of freshwater declining, the planet is moving closer towards an inflection point that will be challenging to return from. With this resource challenge comes an immense opportunity for water entrepreneurship, innovation, and leadership," they say.

A new cleantech incubator, Cascadia CleanTech Accelerator, just launched to assist entrepreneurs across the Pacific Northwest.

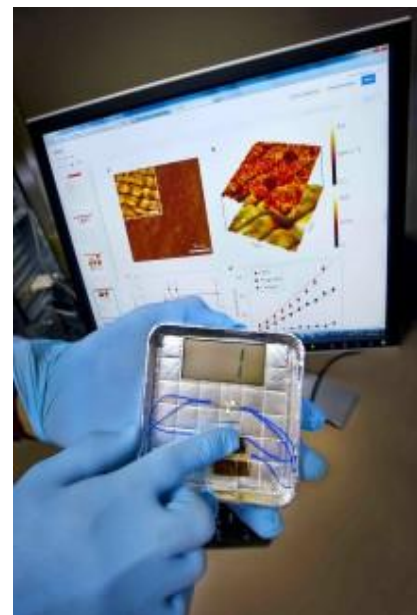
Last year, the Department of Energy (DOE) launched the US Clean Energy Incubator Network to coordinate and facilitate the work of cleantech incubators across the country. There are 12 clean energy incubators in New England alone.

Lab-Corps - which helps researchers at DOE's national labs get their products to market - is in the midst of a 7-week entrepreneurial bootcamp.

14 teams of researchers from seven national labs are participating to get help on commercializing promising technologies in energy efficiency, renewables and sustainable transportation.

Lawrence Berkeley National Lab is the first to harness a virus to generate electricity.

[<ReadMore>](#)



*The EcoVolt installation process at Lagunitas Brewing Company in Petaluma, California.*  
*Photograph: Cambrian Innovation*

## Beyond the Autobahn: Germany's new bike highways

By Christian Schwägerl

*This article was first published in Yale Environment 360.*

In November, politicians, environmentalists and bicycling enthusiasts gathered in



*A rendering of the planned bike highway set to span from Hamm to Duisburg, Germany*

Mülheim in Germany's Ruhr Valley — one of Europe's major industrial centers — to open the first 7 miles of a planned 62-mile biking highway that will run from Hamm to Duisburg. Thirteen feet wide and reserved exclusively for cyclists, the bike highway, dubbed RS1, will pass through cities, suburbs, farmland and industrial areas, and connect four major universities, with

part of its path following an abandoned railway line. The bike thoroughfare also will parallel a major highway, the A40, which project organizers hope will entice increasing numbers of the region's residents to forsake their cars and ride bikes to offices, shops and schools.

"We will introduce cycling highways as an official new type of infrastructure in our state's laws," said the transport minister of North Rhine-Westphalia, Michael Groschek, who called the construction of the bike freeways an "historic moment for transportation policy."

The Ruhr area, with more than 5 million inhabitants, is spearheading a growing movement across Germany to construct wide, protected, cycling highways designed to encourage ever-greater numbers of people to begin using bicycles as an important mode of transportation. In Berlin, bicycling enthusiasts are building public support for a plan to create a

network of at least 62 miles of cycling highways connecting the periphery of Berlin with the city center by 2025. If completed, these highways would mark a new era of cycling for the 3.5 million inhabitants of Germany's capital and beyond.

In Munich, planners are considering a network of 14 proposed bicycle highways and are moving on developing the first one, which would run between the city boundary and adjacent municipalities to the north. Other cities including Hamburg, Frankfurt, and Nuremberg are also in the process of creating this new infrastructure for cycling, known as dedicated highways. A key goal is to get commuters out of their cars.

The push for cycling highways represents a fundamental change in how cities treat bicyclists throughout Germany and in other European countries. For a long time, the Danish capital, Copenhagen, and the Dutch metropolis, Amsterdam, were lone champions of pro-cycling strategies in Europe. But that spirit is spreading across the continent, and Germany — a leader in renewable energy generation and home to a population with a deeply ingrained conservation ethos — is beginning to play an important role in the cycling revolution.

Until a few years ago, bicycling in Germany was considered a minority pastime and a decidedly hippie-like way of commuting to work.

Today, it has become a mainstream activity considered not only cool, but also something akin to a duty for anybody who says he or she cares about the environment.

Cycling highways are fundamentally different from usual cycling lanes. Highways are around 13 to 16 feet wide — twice the width of many bike paths — so faster cyclists can overtake slower ones in both directions. High-quality asphalt is often used to enable bicyclists to travel faster. These highways are designed with few or no intersections with major roads, and as few traffic lights as possible — all

intended to enable cyclists to travel effortlessly within or among cities and suburbs. Like autobahns, the biking highways are designed to allow travelers to cover large distances without leaving the network.

***The push for cycling highways represents a fundamental change in how cities treat bicyclists in Europe.***

Attracting commuters is a key goal of Germany's cycling highways. Traffic experts have found that, on average, most people will use their bicycles for distances below 3.1 miles. "So far, people who use cycling infrastructure for distances of [6.2 or 9.3 miles] are a minority," said Birgit Kastrup, an urban planner at "PV," the planning commission for the greater Munich area. "We want to change that."

Martin Tönnies, chief planner of the Ruhr Cycling Highway, has a clear goal in mind: To attract tens of thousands of commuters to the new infrastructure. Some 1.8 million people live within a 1.2-mile range of the Ruhr cycling route — a "huge potential for heavy use," said Tönnies.

"Since November you can cycle the [6.8 miles] between the cities of Mülheim and Essen in 31 minutes at standard speed, while you need 23 minutes by car in normal traffic, plus the time to find a parking space," said Tönnies. He is particularly enthusiastic about the growing popularity of electric bikes, also called "pedelecs." In Germany, more than 2 million people own pedelecs, which have the added advantage of enabling older people to move quickly on two wheels.

The Ruhr project is scheduled to be completed by 2022 and will cost about \$207 million. "That may sound like a lot, but it's nothing if you compare the cost of car infrastructure," said Tönnies.

Not long ago in Berlin, about 70 people gathered in the hall of a local church in the city's Neukölln quarter to talk about the need for a referendum to upgrade the city's biking infrastructure. "I'm Anja, I'm an all-year cyclist and have been hit by a car recently," said one woman. A man added, "I'm Kai and I want to cycle to work without fearing for my life."

Ten Berlin cyclists died in accidents last year, and on average the city's police register about 20 accidents involving cyclists every day. In the summer, the city's network of narrow cycle paths, much of it built in the 1980s and 1990s, is overcrowded, with frequent conflicts between faster and slower cyclists. While car drivers cruise on wide multi-lane streets, cyclists get crammed into narrow lanes, which often aren't well maintained and are damaged by tree roots and frost.

But that neglect may be coming to an end. In Berlin alone, cycling activity has increased by at least 40 percent over the past 10 years, to about 17 percent of all traffic, according to data collected by the city government. More companies have created dedicated parking spaces for cyclists and installed in-office showers so that employees can easily change from cycling gear to work attire.

Heinrich Strössenreuther, a transport expert who convened the group in the church hall, summed up the evening's theme in one sentence: "We're here to change this city for the better with our pro-bicycle referendum." Since late 2015, the newly formed initiative has pursued a key goal: By June it wants to collect 20,000 signatures on a petition calling for a biking referendum. That would kick-start the legal process toward a formal vote by Berlin's citizens in the fall of 2017 on a detailed plan to fundamentally change Berlin's infrastructure and public space in favor of cyclists. "What we want is not radical utopia, but something that makes a big difference," said Strössenreuther.

The 10-point manifesto developed by the initiative would, among other measures, legally oblige the city government to give priority to cyclists over cars on at least 124 miles of Berlin's residential streets, to create cycling lanes along all major avenues, to reserve preferential spaces for cyclists at traffic lights and crossings and to construct 62 miles of cycling highways.

***The number of people using bicycles is steadily on the rise, and I see it as our responsibility to create a suitable infrastructure.***

Germany's cycling revolution has only just begun — and it is not without controversy. Unswerving car drivers and some local politicians resent investments in bicycle infrastructure out of principle, as they view cyclists as a nuisance.

In Berlin, however, the new push for better cycling infrastructure has found an unlikely ally — the conservative Christian Democratic Union (CDU), party of Chancellor Angela Merkel. It wasn't left-leaning or green groups that developed the first concrete plan for a major cycling highway connecting the affluent southwest of Berlin along an abandoned railway with the political center around Brandenburg Gate. It was Thomas Heilmann, Berlin's justice minister and deputy regional leader of the CDU.

"The number of people using bicycles is steadily on the rise, and I see it as our responsibility to create a suitable infrastructure," said Heilmann. Under his plan, charging stations for electric bicycles will be built along the highway, as will kiosks offering everything from free air pumps to spare parts, refreshments or even showers.

[<ReadMore>](#)



## State of Green Business: Carbon recycling's growing promise

By Libby Bernick



Shutterstock / Vanatchanan

A new crop of companies are looking to wring more value out of would-be carbon emissions.

The following is an excerpt from the GreenBiz State of Green Business 2016 report.

Global efforts to address climate change have focused to date on reducing emissions of greenhouse gases through such measures as using energy more efficiently, switching to renewable power and electrifying vehicles.

But what if the carbon in waste gases from power plants, cement plants, waste digesters or steel works could be captured and used to make things, thereby turning pollutants into products?

A small but growing band of companies is trying to do just this through a group of technologies one could call "carbon recycling." They use the carbon in greenhouse gases, such as carbon dioxide (CO<sub>2</sub>) or methane, as a raw material to make products such as plastic or cement.

A common misconception about carbon recycling is that CO<sub>2</sub> from the atmosphere can be used, directly reducing greenhouse gas concentrations. That's not the case. The atmosphere is mostly nitrogen and oxygen; CO<sub>2</sub> makes up well under 1 percent, so extracting it from the atmosphere is costly and inefficient. Industrial emissions, however, provide a concentrated source of carbon that can be economically extracted while keeping it out of the atmosphere.

Turning CO<sub>2</sub> waste into materials is nascent technology, to be sure. Understanding the feasibility of this concept requires answering three questions before the technology seriously can be considered as a solution to climate change:

1. Wouldn't it be better to invest in technologies that don't release carbon in the first place, such as renewable energy?
2. Can carbon recycling advance beyond the R&D stage to become fully commercial businesses that put a dent in the 36 billion metric tons of carbon dioxide released globally each year from burning fossil fuels?
3. Do carbon-recycling technologies have genuine net environmental benefits that can be quantified and communicated?

In answer to the first question: The world needs every solution it can get, given the enormity of the climate challenge. Renewables are vital, of course, but many new energy-hungry economies are continuing to invest in new fossil-fuel power plants that could operate for 30 years or more.

Given that stopping greenhouse emissions altogether won't happen anytime soon, we need solutions to prevent these emissions from entering the atmosphere.

One of the most promising carbon recycling companies is Newlight Technologies. Founded in 2003, the California company developed, patented and commercialized the world's first carbon sequestration technology able to produce high-performance plastic that can match the performance and price of petroleum-based plastic.

Newlight's plastic product, which it calls AirCarbon, is made from methane, a carbon-rich waste gas from farms, landfills and water treatment plants. By taking methane from industrial and agricultural facilities and locking it up in plastic, rather than releasing it into the atmosphere, Newlight stands to make a contribution towards reducing global warming.

Several companies have started using AirCarbon, such as Sprint for cell phone cases and Dell for packaging computers. Last year, cosmetics company the

BodyShop, a unit of L'Oreal, announced a research and development partnership with Newlight to use AirCarbon to make containers and caps.

As far as carbon recycling's commercial prospects, Newlight last summer signed a deal with chemicals company Vinmar to supply more than 19 billion pounds of AirCarbon plastic over 20 years, securing the future for Newlight's planned 50 million pound per year production facility. That qualifies as going well beyond mere R&D.

**"Given that stopping greenhouse emissions altogether won't happen anytime soon, we need solutions to prevent these emissions from entering the atmosphere."**

Plastic isn't the only application of carbon-recycling technology. New Jersey-based Solidia Technologies has developed a type of cement that is produced at lower temperatures, and through a different chemical reaction that generates less CO<sub>2</sub> than conventional cement. The cement is hardened by injecting it with CO<sub>2</sub> from industrial sources.

Since 2013, global cement giant Lafarge has collaborated with Solidia to commercialize the technology, including conducting full-scale trials at two Lafarge sites in the U.S. and Europe. The cement was used to produce pre-cast concrete products, such as paving blocks and roof tiles.

In answer to the third question about the feasible environmental benefits of carbon recycling, Solidia stated that the carbon footprint of its concrete is 70 percent smaller than that of conventional concrete. Tom Schuler, Solidia's president and CEO, said that the cement industry's commitment to cut CO<sub>2</sub> emissions 20 to 25 percent by 2030 could be achieved now if cement companies switched to Solidia's cement.

[<ReadMore>](#)

## Almost Half of Global Population Could Suffer Severe Water Stress By 2030

By Joshua S Hill

Almost half of the global population could suffer severe water stress by 2030 if current levels of water consumption and pollution are not immediately addressed.

This is the damning conclusion from a new report published by the International Resource Panel (IRP), entitled *Policy Options for Decoupling Economic Growth from Water Use and Water Pollution*. Specifically, a combination of continued global population growth, increased urbanization, climate change, and a shift in food consumption, are all likely to impact and increase the future demand of water.

The IRP report points out that current trends unaltered will see water demand exceed supply by 40% in 2030. Accordingly, governments would be forced to spend \$200 billion per year on upstream water supply, up from the historic average of \$40 to \$45 billion.

**"Reliable access to clean water is a cornerstone of sustainable development," said Achim Steiner, Executive Director of the United Nations Environment Programme (UNEP).**

**"When clean water is consistently unavailable, the world's poorest must spend much of their disposable income buying it, or a large amount of time transporting it, which limits development. And since only half of one per cent of the world's freshwater is available for the needs of both humanity and ecosystems, we will need to do more and better with less if we are to ensure healthy ecosystems, healthy populations and economic development."**

The authors of the report conclude that if the world is to stave off such a drastic outcome, efforts to decouple water use from economic growth will need to be strengthened. This has already shown to be possible in some countries, such as Australia, which saw water consumption decline by 40% between 2001 and 2009 at the same time as the economy grew by 30%.

Specifically, to achieve water decoupling, the IRP recommends:

- Investing more in research and development to improve technology that reduces water waste
- Building sustainable infrastructure to improve the efficiency of water use and eliminate water contamination and pollution
- Introducing policies to curb water demand and re-allocate water to sectors where it produces goods and services most beneficial to society while ensuring vulnerable groups are protected
- Strengthening research into the value of ecosystem services and water to human welfare and economic development
- Doing more to assess "virtual water" (the water used to manufacture goods that are traded internationally), water footprints and related impacts to better
- understand how international trade patterns could be used to support decoupling where it is most needed

[<Source>](#)

## Groundwater gets a recharge from worried farmers, scientists

By Barbara Grady



Courtesy of / University of California Division of Agriculture and Natural Resources

Groundwater recharging in the almond orchards. Under a University of California at Davis and UC Cooperative Extension project, farmers divert storm waters to orchards to slowly recharge the aquifers deep below.

In California's famous water wars, who controls what water and where has been material for Hollywood movies.

But since 60 percent of the water used by agriculture and industry in this drought era is groundwater pumped up from deep aquifers, there's growing realization that the state can't rely on a Wild West approach of vigilante law for groundwater management.

Groundwater had gone largely unregulated in this state until passage of the Sustainable Groundwater Management Act of 2014. But most requirements of that law don't kick in until 2040, so a growing number of farmers and agricultural scientists are trying a more immediate route to saving the state from going dry.

When El Nino storms unleashed heavy rains in California, some farmers in the Central Valley's southern edge began capturing storm water and diverting it to flood their fields and orchards in a plan to recharge aquifers underneath.

This so-called Groundwater Banking effort is being studied by agricultural academics at the University of California at Davis for its effectiveness and funded by the UC Cooperative Extension Division of Agriculture and Natural Resources.

The idea, according to UC Davis Hydrology Professor Helen Dahlke and her colleagues, is that the fields will serve as infiltration basins, allowing the storm water to seep through the soil and layers of gravel and rocks deep into the aquifers while hopefully not damaging plants.

And the effort is drawing lots of interest from farmers wanting to participate.

"We are getting an overwhelming number of calls from farmers" eager to participate, said UC Davis Hydrology Professor Graham Fogg, also working on the project.

"I'm seeing this sort of populist change in farmers and how they use water," he said. "They are realizing they're not operating independently, but affecting each other and that they're in the same boat." Consequently they are more willing to do things collectively or have their groundwater use measured than ever before, he said.

"In the past, people pumping groundwater for irrigation didn't have to think about it. They didn't have to because there were no legal consequences to doing it and it didn't affect neighbors," he continued. But in 2014 and 2015 as wells started drying up and groundwater levels fell by 100 feet in some agricultural areas, farmers became more alarmed about the availability of groundwater and became more open to new practices and even new cooperation.

Even in normal times, groundwater supplies 30 to 40 percent of the state's water for agriculture, industry and residential needs.

### Pinpointing the best places for groundwater recharge

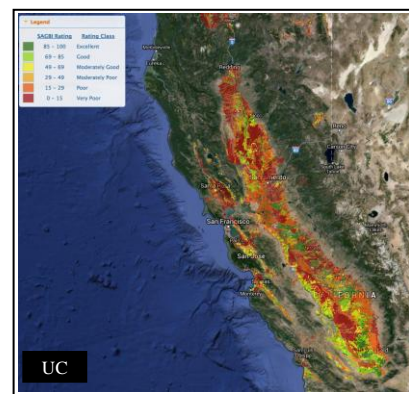
But there's a caveat to the idea of letting fields act as filtrations for captured groundwater. Many fields are laden with nitrates and pesticides, which would then be passed into the groundwater. Some of the state's more shallow groundwater aquifers are already contaminated. So the scientists are studying where it makes the most sense to flood fields to recharge underlying aquifers.

Fogg and other hydrologists are working on a data project to pinpoint which basins

are best suited for the agricultural recharge effort based on crops grown on the land and existing conditions of the groundwater.

Their Soil Suitability Index for Agricultural Groundwater Banking research led by Anthony O'Geen of the UC Cooperative Extension is identifying potential farmland suitable for groundwater banking. In the map below, the best areas are represented in green and the worst in red.

*Soil Suitability Index for Groundwater Recharging. Map created by University of California Cooperative Extension and University of California at Davis Department of Land, Air and Water Resources.*



*The Soil Agricultural Groundwater Banking Index system of UC Cooperative Extension and UC Davis maps the aquifer basins of the entire state.*

The team of hydrologists so far have determined there are 3.6 million acres of farmland with good potential for groundwater banking, based on how the soil could facilitate deep percolation of the water without harming the crop or contaminating the groundwater.

Farmers pumped nearly twice the amount of groundwater in the past year as they do in non-drought times, according to UC Cooperative Extension and several other sources.

The result is that groundwater tables fell as much as 100 feet in some areas, and essentially dried up in others. State water officials say that half a million acres of farmland was laid fallow because of water shortages due to drought. In certain farming communities in the southern Central Valley, residents experienced dry taps with no water coming through their faucets because the wells they depended on to bring up groundwater were used up.

In California's still simmering water wars, or disagreements over who should bear the brunt of water conservation, groundwater replenishment has been identified as sorely needed. Water could simply run out.

Heather Cooley, water program director at the Pacific Institute and primary author of a new report "Where we Agree: Building Consensus on Solutions to California's Urban Water Challenges," on the status of water in California, said it will be years before anyone knows if the Sustainable Groundwater Management Act will be effective.

"It is still very early in the process. SGMA was passed two years ago and it's in the very early stages. We're seeing groundwater management groups form," which is the first step the new state law requires.

"People are starting to prepare their management plans, but the requirements don't kick in in terms of achieving a more sustainable balance until 2040, so we are still quite a ways off in being able to evaluate how effective the changes will be."

Still, in that the law provides the first major attempt for groundwater management, she and Fogg both described it as significant.

In its report, the Pacific Institute identified strategies for groundwater replenishment and storage of water as key to the state's water future and to drought resistance in any locale.

"California's overdrafted aquifers provide significant water storage opportunities and could help the state respond to a changing climate, and particularly to reductions in snowpack due to warmer temperatures," the institute wrote in its Where We Agree report, published this month.

The consensus, Cooley indicated, is that the state make use of not only the Sustainable Groundwater Management Act but also of a water storage funding bond approved by California voters through proposition in 2014.

While that proposition was widely regarded as storage for surface water, the Pacific Institute said, "there is tremendous interest and opportunity in boosting groundwater recharge in California," and yet "there is no strategy so far to integrate these resources with one another, with surface reservoirs, or with the infrastructure needed to move water around."

El Nino rains have come to California, but a few rainy months can not reverse the impact of four years of drought.

"Rain helps but it doesn't get us out of severe drought. We have a long large drought and will take it more than a year to pull us out," Cooley said, particularly to recharge the depleted groundwater.

[<ReadMore>](#)



## Surge in renewable energy stalls world greenhouse gas emissions

Falling coal use in China and the US and a shift towards renewable energy globally saw energy emissions level for the second year running, says IEA

By John Vidal

Falling coal use in China and the US and a worldwide shift towards renewable energy have kept greenhouse gas emissions level for a second year running, one of the world's leading energy analysts has said.



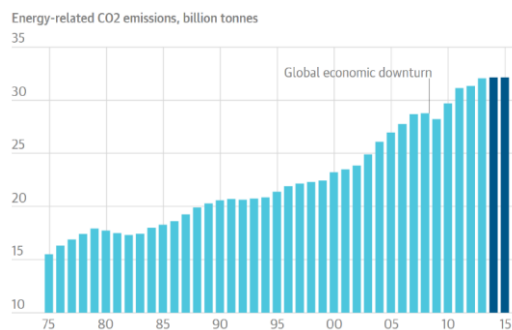
Wind power installations raced ahead in 2015, accounting for more than half of all new electricity generation worldwide. Photograph: Bryn Lennon/Getty Images

Preliminary data for 2015 from the International Energy Agency (IEA) showed that carbon dioxide emissions from the energy sector have levelled off at 32.1bn tonnes even as the global economy grew over 3%.

Electricity generated by renewable sources played a critical role, having accounted for around 90% of new electricity generation in 2015. Wind power produced more than half of all new electricity generation, said the IEA.

### Renewables and efficiency halt emissions rise

The figures are significant because they prove to traditionally sceptical treasuries



GuardianGraphic

Source: IEA

is yet another boost to the global fight against climate change" said IEA director, Fatih Birol.

The two largest emitters, China and the US, both reduced energy-related emissions in 2015. In China, they declined 1.5%, as coal use dropped for the second year running and in the US they declined 2%, as a large switch from coal to natural gas use in electricity generation took place.

However, these declines were offset by increasing emissions in most other Asian developing economies and the Middle East, said the IEA.

In the 40 years in which the IEA has reported on CO2 emissions, there have been only four short periods in which emissions stood still or fell compared to the previous year. Three of those — the early 1980s, 1992 and 2009 — came in periods of economic crisis.

But the new stall in emissions comes amid economic expansion. According to the International Monetary Fund, global GDP grew by 3.4% in 2014 and 3.1% in 2015.

"When the IEA said last year that global emissions had stalled whilst economic growth had continued, they understandably sounded a note of caution; was this a one-off, or the start of something major?" said Richard Black, director of the Energy and Climate Intelligence Unit (ECIU).

"The sense of excitement as they report similar findings this year therefore is palpable, because in essence they're showing that combating climate change is perfectly compatible with continuing economic growth, and that's hugely significant," said Black.

[<ReadMore>](#)

## Methane-eating bacteria could reduce the impact of our big appetite for fish

Conventional fish feed is hard on the environment. A California-based company is aiming to produce a non-animal, non-vegetable alternative

By Jodi Helmer

A California-based company has been busy working on a non-animal, non-vegetable feed for fish farms made using a bacterium called *methylococcus*. It may not sound like something edible but when placed in fermentation tanks and fed methane, before being spun at high speed to remove the water, it creates dried pellets that prove appetising for fish.



Seafood is the critical source of protein for more than 2.5 billion people, but sources are being depleted. Photograph: Tatyana Makeyeva/AFP/Getty Images

First developed in the 1980s, the idea has since been revisited as a potential answer to the growing demand for fish feed and fears of collapsing fish stocks.

The product, called FeedKind, is still in the pre-production stage but Calysta, the company behind it, recently secured \$30m in funding from agribusiness giant Cargill to accelerate its introduction. Approved for use in Europe, a UK research and development facility in Teeside is under construction and slated to open in autumn this year. The company is aiming to get approval and build facilities in the US by 2018.

The World Bank predicts the farmed fish sector will provide two thirds of the fish we consume by 2030. But feed is a problem. Currently it is made with a mix of wild caught fish and fish trimmings; commodities like soy, wheat and corn; and byproducts from pork and poultry farming. These are ingredients with significant negative impacts including ocean ecosystems damage thanks to overfishing and ghost gear; soil erosion caused by pesticides and fertilisers used; and deforestation.

Calysta is not the only company looking at alternative feed options; others are developing algae- and insect-based fish meal. But reaching the scale required with algae or insects has significant challenges. A conventional feed factory (producing feed from fish byproducts or agricultural products like soy) produces up to 500,000 tonnes of fish feed per year, according to Michiel Fransen, standards and certification coordinator for the Aquaculture Stewardship Council, while companies producing insect-based fish feed produce as little as 200 tonnes annually.

Alan Shaw, CEO of Calysta, says the goal isn't to replace conventional fish feed but to provide alternative sources of protein to supplement the fast-growing market. The company is, however, aiming to rapidly scale production. Once a US plant is in operation it estimates production at 15,000 tonnes of feed a year, and the company has a target of 200,000 tonnes by 2020.

The FeedKind process requires no agricultural land, no fertilisers or pesticides, little water and places no demand on wild caught fisheries. Because *methylococcus* is a living organism, just like a corn plant for example, the culture can be started from a small seed which is cheap and easy to produce. Calysta has prepared cell banks that act just like seed repositories for farmers, which allows an unlimited amount of fermentations to be run.

There is a drawback however, the production of FeedKind is reliant on access to low-cost sources of methane. In the US that has been made possible by the rapid and controversial growth of the fracking industry.

Shaw is aware of the criticisms and Calysta is exploring options for producing FeedKind with renewable sources of methane created from municipal solid waste but the current production model relies on cheap methane to be cost effective. "The company needs to be sustainable and the technology needs to be economically viable before you can save the planet," says Shaw.

It was cost that derailed the idea of using *methylococcus* to produce feed when it was first introduced in the 1980s by Norwegian oil and gas company Statoil. At that time, the price of natural gas (used to run the fermenter) was too expensive to make the project sustainable and it was taken off the market. Calysta purchased the technology in 2014 and set to work refining it for production.

[<ReadMore>](#)

# A reality check for renewable energy

By Scott Nyquist and James Manyika

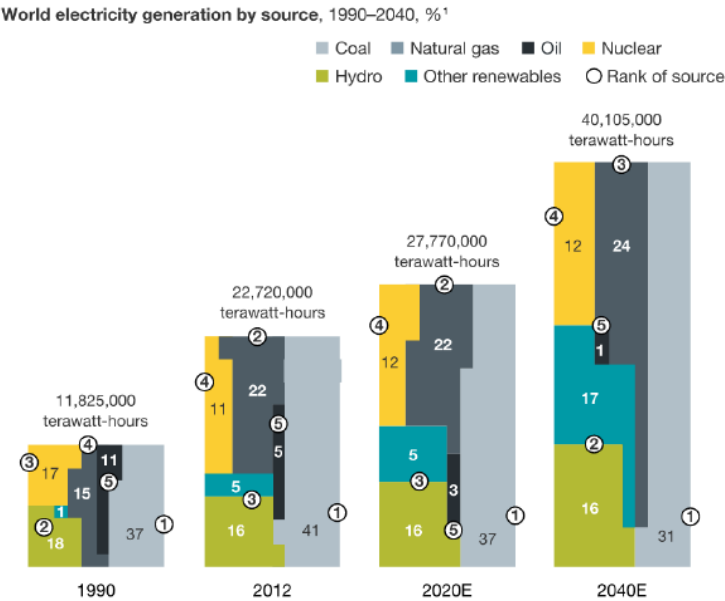
The clean- and safe-energy revolution is not imminent. In fact, according to the information compiled by Looking Ahead: The 50 Global Trends That Matter,an annual compendium of data and graphics on subjects ranging from economics to demography to energy, the majority of the planet's electricity needs will still be fueled by coal and natural gas in 2040—despite strong growth in nonhydro renewables such as wind, solar, and geothermal. The report also expects the shale phenomenon to abate, with Saudi Arabia reasserting itself as the world's leading oil producer in 2030.

Looking Ahead does not take a view on these trends; instead, it simply lays out the best available information from a wide variety of sources, including governments, consultancies, think tanks, corporations, and multilateral institutions. The overriding aim of the publication is to highlight issues that matter in compelling visualizations that make it easier for readers to grasp a large amount of interlinked data—and thus better understand both the nature of the problems the world faces and how to address them.

The book details an energy world of disruption and contradiction, mingled with continuity and a dash of hope. For example, as the world again seeks to devise ways and means to curb the greenhouse gas emissions associated with climate change, we find nonhydro renewables could more than triple their share of the global power supply by 2040. And the development of renewables isn't just a rich-country trend. Among the members of the Organisation for Economic Co-operation and Development (OECD), which mostly includes highly developed countries, renewables are expanding by 4.6 percent a year. Among those outside the OECD, the figure is 7.4 percent. In the next 25 years, renewables will account for an estimated 43 percent of Africa's new power plants, 48 percent of Asia's, and 63 percent of Latin America's. Asia alone is projected to add 1,587 renewable-power plants, almost as many as the rest of the world combined.

Here's the contradiction. Even after that boom in renewables, the sector's total share of global electricity generation is estimated to be only 17 percent by 2040, because coal (31 percent) and natural gas (24 percent) will continue to be low-cost and reliable sources of power (Exhibit 1).

## Exhibit 1 In 2040, Coal and Natural Gas will likely still be the most important sources of global power generation

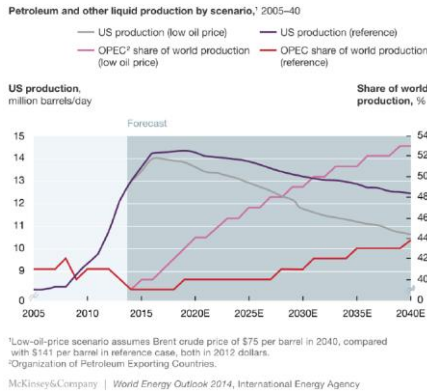


McKinsey&Company | World Energy Outlook 2014, International Energy Agency

When it comes to another big fossil fuel—oil—there has been change, but the long-term outlook is more of the same. Preliminary estimates are that the United States has overtaken Saudi Arabia as the world's largest oil producer, thanks to the gusher of production from shale assets. Indeed, the development of shale has been truly disruptive to world oil markets, contributing to sustained low prices. Yet Looking Ahead believes that history, or at least geology, will reassert itself. By 2030 or 2035, shale production is likely to begin to decline and the Organization of Petroleum

Exporting Countries (OPEC) could be back to producing half the world's oil (Exhibit 2).

## Exhibit 2 Shale production is likely to decline, and around 2030 OPEC could again be producing half the world's oil.



Africans will comprise almost three-quarters of that population (Exhibit 3). Getting more power to more people isn't just a matter of convenience, it's necessary for both economic development and health. People without electricity often burn wood or dung for cooking, which are indoor sources of air pollution that kill more people every year than malaria and tuberculosis combined.

[<ReadMore>](#)

# Defiant EV from Shockwave Offers Affordable Electric Motoring

By Steve Hanley

The Defiant EV from Shockwave Motors in Tennessee is a combination of many design influences. It is a three-wheeler, which reduces rolling resistance and improves aerodynamic performance. It has a top speed of over 70 mph and maximum range of 175 miles or more. Best of all, the company says the standard 100 amp/144 volt lithium-ion battery can be recharged in just 8 hours using a standard 120 volt household outlet.

Shockwave president John MacMillan tells Gas 2 via email, "Convenience, low operating cost, and simplicity are what set us apart. We don't need any new infrastructure or special charging stations – just a simple 120 volt outlet – at home or at work! This gives the roadster an effective range of up to 200 miles per day. The top speed is about 75 MPH. No other electric vehicle, with our level of performance, can get a complete recharge in about 8 hours from a standard wall outlet."

The styling of the Shockwave Defiant is far from ordinary. It looks like a cross between a Delta Wing racecar and something that ZZ Top would feature on an album cover, mixed in with a hint of cars that were featured on *The Munsters*. According to *Gizmag*, the Defiant seats three people. The driver rides up front with space for two passengers behind. There is also a trunk at the rear for carrying things like suitcases and picnic hampers.

MacMillan claims the long wheelbase, the wide rear stance, and the majority of its weight being located in the back all keep the Defiant stable in turns. The car weighs just 1500 pounds. 0–60 with the standard battery takes under 10 seconds. Safety features include a tubular steel frame with a built-in roll bar, along with front and rear crumple zones. Road bumps are handled by a dual A arm suspension, coil-over shocks, and dual springs in both the front and rear.

Range with the standard battery is 100 miles. MacMillan says that, with the optional battery, that can be extended to 175 miles or more. Regenerative braking can help maximize range. He is hoping to begin production of the Defiant sometime this year. The expected sale price is \$24,950, which includes a stereo system, heater, and defroster. The car may also be available in roadster form, for those who like their electric motoring experience to include that "wind in your hair" feeling.

[<VIDEO Are you ready for a ride>](#)

[<Source>](#)





# Solar + Residential Energy Storage System Launched By JLM Energy

By Jake Richardson

California-based JLM Energy has launched a new solar power and residential energy storage system which uses Lithium Iron Phosphate (LiFePO4) batteries to work with the solar array. Proprietary software helps manage the system for effective energy efficiency, and a mobile app is available as well, which can remotely control devices such as thermostats and HVAC systems. CEO and Founder Farid Dibachi answered some questions about the **Energizr 200**.



**What is the solar power capacity and energy storage capacity? For energy storage what is the kilowatt or megawatt hours?**

Energizr 200 has a solar power capacity ranging from 3.8 kW to 8.2 kW and energy storage capacity ranging from 5.2 kWh to 20.8 kWh in increments of 2.6 kWh.

Our largest installation, in a very large home in CA, will be using 4 of the 20.8 kWh units. However, an average 2,000 to 2,500 sq ft house will use a system with 10.4 kWh capacity for demand shaving, time-of-use or self-consumption applications.

**How many lifetime cycles for the energy storage?**

Our batteries have a life cycle of 5,000 cycles and are projected to last 15 to 17 years for a typical demand shaving application.

**What is the cost?**

Using JLM's patent-pending, Symmetric DC Regulation technology, our customers gain a substantial cost advantage by combining solar and energy storage.

For a 2,500 square foot house, a typical 5 kW solar system, integrated with 10.4 kWh battery, together with smart thermostats and load control, costs as low as \$18,000 after the incentives. This includes installation costs.

By design, Energizr-200 systems' batteries are charged strictly from solar and therefore the entire system qualifies for the 30% federal Investment Tax Credit (ITC).

In CA, Self-Generation Incentive Program (SGIP) provides as much as 50% of the installed system cost.

**Is the product modular? Can Energizr 200s be stacked together?**

Energizr 200 is a modular unit and is field up-gradable. For example, the 5.2 kWh system can be field upgraded to a 20.8 kWh. In addition, complete Energizr 200 systems can be placed in parallel to fit any home or lifestyle.

**Does it come with an inverter?**

Yes, Energizr 200 uses a Fronius Inverter. Other inverter types are under development.

**What is the warranty?**

JLM warranties the entire system, including the batteries, for 10 years and provides a way for customers to receive a lifetime warranty in exchange for a small monthly O&M fee.

**What is the product contained in, and can it be stored outdoors or should it be placed inside?**

Energizr-200 is rated at NEMA-3R and is suitable for indoor and outdoor installation.

**What is the installation procedure and who is qualified to do it?**

We have a team of licensed electricians working directly for JLM who are based in California, Arizona, Nevada, and Hawaii. We also work with a network of more than 260 dealers and partners who have their own licensed electricians that perform installations.

**What is the installation cost?**

Installation cost is included in the product cost. However, we project that installation takes less than 4 hours of labor and in most cases could be completed in less than one day.

**What are the product's dimensions and weight?**

Energizr 200 is 55"x32"x9". The weight of the 20.8 kWh model is 775 lbs. and is designed to be wall-mounted.

**You have sold some units to utilities. What are they using them for?**

JLM's Energizr-200 is the first product of its kind integrating solar and energy storage. The units are installed in homes by utilities to understand the impact of residential behind-the-meter energy storage on the utility's grid and the customers' monthly bill. This is important as the utilities assess the various approaches to the net energy metering. In addition to energy storage, the utility will experiment with smart thermostats and load control units that are integral parts of JLM's Energizr-200 product ecosystem.

**What kind of organizations or people are the early adopters?**

Early adopters are interested in having choice and control over their power bill and are aware of the fact that energy technologies, combining solar, storage, smart thermostats and load control systems are emerging technologies that are bound to bring the desired level of control and choice to them. They are more often than not tech-savvy and anxious to participate as front-runners in the technology changes that bring about social change.

Image Credit: **JLM Energy**

[<Source>](#)

# Bicycling Triples In London While Driving Halves

By Kyle Park Points

Originally published on **Bikocity**.

The streets of **London** have seen an increase in bike riders and a decrease in car commuters. According to an **article published by the BBC**, the number of cyclists during rush hour will outnumber cars within the new few years.

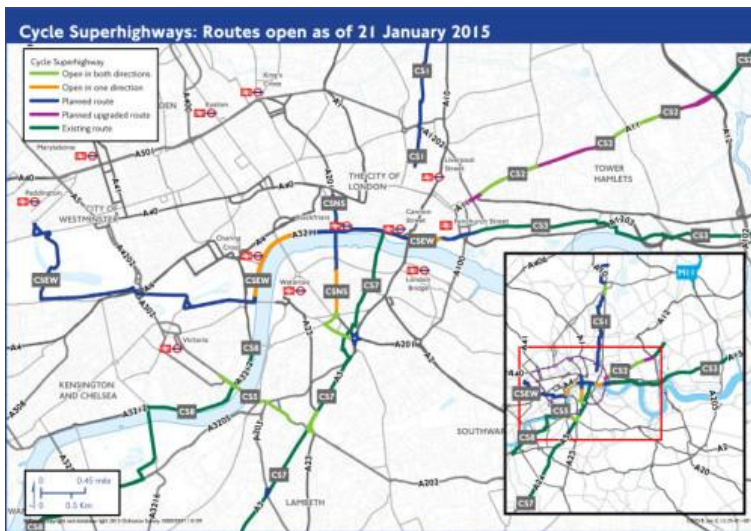
According to **Transport for London**, over the last decade and a half car drivers have decreased by almost 50% – from 137,000 in 2000 to 64,000 in 2014 – while the number of cyclists has tripled from 12,000 to 36,000. The authority touts the statistics as “a feat unprecedented in any major city.”

However, the blog *archpaper.com* points out that London lags behind other major European cities when it comes to encouraging bike travel. For example, Madrid, Spain, has gone as far as to place restrictions on what types of vehicles are allowed to enter the city center. Oslo (Norway), Paris (France), and Dublin (Ireland) will all have similar designated areas within the next few years.

The city is now concentrating effort on making the streets safer for cyclists. In 2012, 14 cyclists died on the streets of London with over 600 severely injured. Then, in 2013 six cyclists were hit and killed within a short span of three days. This began a paradigm shift for the city in regards to cyclist safety.



Photo by David Skinner



Source: *Transportation for London*

While proponents had been campaigning for segregated **bike lanes** for years, in late 2013, things slowly began to change. Mayor Boris Johnson has helped to introduce cycle “superhighways,” though critics have been quick to note that they fail to provide a physical barrier between motorist and cyclist. Recently, the city added a segregated bike lane across Vauxhall Bridge with other similar lanes to open over the summer.

Other changes include lower traffic lights for cyclists, early release for cyclists at traffic stops, and a two-stage right-turn system.

Detractors are claiming the lane construction is ‘politically motivated’ and adding to the city’s congestion.

[<Source>](#)

## BioMason Makes Bricks from Bacteria without Heat or Clay



BioMason is a North Carolina startup company that manufactures bricks without heat or clay. About 8% of global carbon emissions come from making bricks, according to the company's co-founder, Ginger

Krieg Dosier, citing information from the **EPA**. The BioMason process not only creates no carbon emissions, it even re-uses the water needed to make its bricks.

Founded in 2012 by Dosier and her husband, Michael, the building-materials company grows bricks and masonry from scratch without the need for any heat. While traditional brick making requires heating clay in kilns at 2,000 degrees for several days — which releases massive amounts of carbon emissions into the atmosphere — BioMason injects sand with microorganisms to initiate a process like the one that creates coral. The technique takes four days. Once completed, the bricks are strong enough for use in houses, commercial buildings, and other structures.

If the whole thing sounds a little weird to you, Dosier understands. "I knocked on a lot of doors of scientists and microbiologists," she says of her time spent researching BioMason's brick-making method, "and they were kind enough to not tell me I was crazy." Investors agreed. BioMason raised \$2.8 million in seed funding, grants, and awards, most of it during 2013. The money included more than \$500,000 from the Postcode Lottery Green Challenge, which featured a jury chaired by Richard Branson.

Dosier studied architecture at Auburn University then became a graduate student at the Cranbrook Academy of Art in Michigan. While working for an architectural firm in 2005, she was asked to explore green alternatives for building materials. When it came to brick and masonry, her searches came up empty. "That kind of stuck with me for a little while," she says.

She thought coral might hold the answer. "I looked at how coral was able to make these incredible structural formations that could withstand water and erosion and began really researching how it was able to grow." She asked scientists at Research Triangle Park in North Carolina if the process could be used to make bricks. It could be done, they said. It's just that no one had ever tried it before.

"This required a rare combination of talents and areas of intelligence," says Patrick Rand, professor of architecture at N.C. State, who advised Dosier on the project. "She sparked the whole process by imagining that biochemistry could do in days what geological processes have taken millennia to accomplish." Dosier then assembled a team of employees that includes biologists, architects, engineers, and experts in fermentation.



Every bricks starts with sand packed into rectangular molds. The molds are then inoculated with bacteria, which wrap themselves around the grains of sand. With each bacteria covered grain of sand acting as a nucleus, calcium carbonate crystals begin to form around it. An irrigation system feeds the bricks nutrient rich water over the course of several days to facilitate the process. The

crystals grow larger and larger, filling in the gaps between the grains of sand. After three to five days, the bricks are ready for use.

Sustainable building materials currently amount to a \$36.1 billion industry. It is expected to grow by more than 10% annually until 2020, according to market researcher IBISWorld.

Finding customers is a daunting task. "The design and construction industry is a big dinosaur," says Ihab Elzeyadi, a professor at the University of Oregon's Ph.D. in architecture program. "It moves very slowly. It doesn't embrace change very easily." There are also building codes to be met and building inspectors to convince. While there are industry standards for traditional bricks and masonry, no such measures yet exist for biological products.

But Dosier says once potential customers see the results of durability testing performed by third-party labs, they're convinced. The bricks have proved to be as durable as

sandstone. They also can be made in many shapes and sizes. BioMason has licensing agreements with two US-based manufacturers of construction materials and is in talks with several more, including two European companies. Her bio-bricks are expected to be competitive with standard bricks by the time they hit the market in 2017.

Dosier is committed to finding ways to reduce greenhouse gas emissions. "I really wanted to pursue a different approach to how materials were made," she says. "It just didn't seem right for us to essentially extract material from the ground and then fire it with quite a large amount of fossil fuel just to make a hard product." She says, "Our goal is to impact. It's a global goal," says Dosier. "We wanted to do what had never been done before, to push the boundaries. And instead of being 'less bad,' we wanted to completely redo it—the hard way." Elon Musk couldn't have said it any better.

[<Source>](#)

## Plastic-Munching Bacteria Can Make Trash Biodegradable

By Charles Q. Choi,



Credit: alterfalter | Shutterstock.com

A durable plastic called PET is considered a major environmental hazard because it's highly resistant to breakdown. But researchers have found a potential new match for this hardy plastic: a newly discovered microbe that is astonishingly good at eating it.

An estimated 342 million tons (311 metric tons) of plastic are produced annually worldwide, and currently, only about 14 percent is collected for recycling, according to the World Economic Forum.

Most plastic degrades extraordinarily slowly, but PET — short for poly(ethylene terephthalate) — is especially durable, and about 61 million tons (56 metric tons) of the colorless plastic was produced worldwide in 2013 alone, according to the researchers.

Previously, the only species found to break down PET were rare fungi. Now, scientists in Japan have discovered bacteria that can biodegrade this hardy plastic.

"The bacterium is the first strain having a potential to degrade PET completely into carbon dioxide and water," said study co-author Kohei Oda, an applied microbiologist at the Kyoto Institute of Technology in Japan.

The researchers collected 250 samples of PET debris from soil and wastewater from a plastic-bottle-recycling site. They scanned these samples for bacteria that could eat PET.

The scientists identified a new species of bacteria, which they named *Ideonella sakaiensis* 201-F6, that could almost completely break down a thin film of PET after six weeks at a temperature of 86 degrees Fahrenheit (30 degrees Celsius). Appendages from the cells might have secreted compounds that helped to dissolve the plastic, the researchers said.

Genetic and biochemical analyses identified two key enzymes involved in the breakdown of PET. One enzyme worked with water to break down the plastic into an intermediate substance, which the other enzyme broke down into PET's basic building blocks, the scientists said.

These findings could have a wide range of real-world applications, because bacteria should be easier to incorporate into devices to break down PET than fungi is. "We hope that we can develop a technology to handle such a lot of wasted PET," Oda said.

In the future, the researchers would like to "improve the ability of the microorganisms to degrade," Oda said.

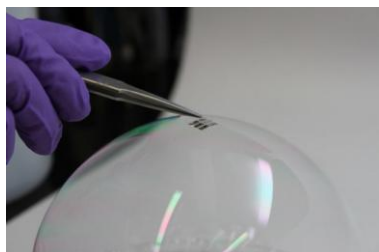
It's not known how these enzymes evolved, Oda said, and both enzymes bear little resemblance to the enzymes most closely related to them.

[<Source>](#)



## Flexible solar cells light as a Soap Bubble developed

By Amrit Pandey



The engineers at MIT have developed the thinnest ever solar cell that is light as a soap bubble which could be placed on almost any material as well as a surface including clothings, smartphones even on a thin sheet of paper.

With the breakthrough the ongoing trend of the miniaturizing technology will be completely revolutionized, the laboratory proof of concept states a new approach to

the development of solar cells that can help the future generation of portable electronic devices. Through the use of a flexible polymer known as parylene, for both the substrate and protective over coating along with an organic material named DBP accessed for the absorption of light the small chip is prepared.

Researchers aimed to make the solar cell, the substrate that supports it and a protective overcoating in order to safeguard it from the environment, all in one process. For fulfilling the task, the laboratory process helped both the substrate and solar cell to grow inside a tube filled with the vacuum where the temperature was set at room temperature and there was no effect of external solvents.

The innovative step is the realization that growth of the substrate can be done at the same time as you grow the device. Parylene is a commercially available coating of plastic that is widely accessed for the protection of implanted bio-medical devices and printed circuit boards from the environmental damage.

In order to show that how thin and light the developed cells are, the researchers placed a working cell on the top of a soap bubble-making sure that the bubble doesn't pop. The newly devised technology also boasts the highest power to weight ratio.

The project is currently in beginning stage and requires further development before being launched into the market.

[<Source>](#)

## A 'Fitbit for the oceans' aims to boost ailing seas

**Source Name: Conservation International**

A tool recently developed by Conservation International (CI) and partners can accurately isolate the ocean's ills — and even help prescribe a cure.

"Measuring and understanding the state of our oceans is a first step toward ensuring that they can continue to provide benefits to humans, now and into the future," said CI's Johanna Polsenberg, director of the Ocean Health Index (OHI), a global monitor of the state of our seas.

A partnership with the National Center for Ecological Analysis and Synthesis at the University of California, Santa Barbara, the OHI provides an essential method for gauging ocean health, enabling its users — including governments, businesses and researchers — to zoom in on problem areas.

"With our own health, most of us have a general sense as to whether we are healthy overall or not," Polsenberg said. "But, as we might infer from the explosion in the use of personal fitness monitoring devices, such as the Fitbit [fitness tracker], many of us want help understanding more precisely what exactly is going well and where we need to focus our attention.

"The OHI is like a Fitbit for the oceans."

### 10 goals for healthy oceans

Just as a fitness tracker monitors a range of your daily activities — including number of steps taken or calories burned — the OHI measures against 10 goals for a healthy ocean, such as food provision, carbon storage or coastal livelihoods.

By compiling the best available global data from multiple sources — satellites, habitat surveys, economic reports, tourism studies, U.N. fishery reports and many more — the OHI generates "scores" for 221 Exclusive Economic Zones (countries' coastal waters) and 15 territories, including Antarctica.

A perfect bill of health is 100. In 2015, the OHI gave the oceans an overall global score of 70. While this score offers a snapshot of the health of the ocean as a whole, diving into the data can provide a far more revealing portrait — and spur action.

The 2015 global ocean health score calculated by the Ocean Health Index, broken down into the global scores of each of the OHI's 10 goals.

### A turnaround in Colombia

The OHI's first report card in 2012 gave Colombia a low score of 52 — citing its poor performance on coastal protection, tourism and water quality, among other categories —

prompting a news outlet in the South American country to proclaim, "Colombia fails in health of its oceans."

"The headline caused a major stir, and our office in Colombia started getting phone calls from the government first thing in the morning," said Sebastian Troëng, the senior vice president of CI's Americas division. "There was a real sense of concern that our working relationship with the government agencies may have been damaged, but the challenge was turned into an opportunity to work together to improve ocean health."

The government invited the OHI team for a debriefing. What happened after a two-hour meeting with high-level government officials and NGO representatives epitomizes the ultimate goal of the OHI. The Colombian government pledged to increase their regional score and embraced the OHI approach as a way to do so, aiming to increase the nation's score by five points by 2018 and, to help get there, launching a "Blue Agenda" that draws on the OHI method to identify priority actions.

The country's score in 2015 was 61, with major improvements seen in some of its problem areas. To continue improving, Colombia has now strapped on its own "fitness tracker," taking the monitoring of its oceans into its own hands.

### Drilling down

It's all but impossible to manage ocean health at a global level, so the OHI was designed to be most effective in the hands of individual countries, at the scale where actual ocean policy is made.

Enter "OHI+."

Using free instruction and open-source software available online, any country can conduct its own OHI+ assessment. This way, countries such as Colombia can focus on local goals — and still help advance ocean health globally — by doing their own data collection, analysis and reporting.

Over time, a clearer and more reliable picture of ocean health in specific regions will emerge, with better evidence from which countries and organizations can make policy.

"The ultimate purpose of conducting an assessment is to improve ocean health, with intermediate steps of informing decision-making and tracking changes through time," Polsenberg said.

[<Source>](#)

## World Average Temperature Could Rise By 1.5 Degrees As Early As 2020

By Joshua S Hill

A new study based on new modeling has shown that the average global temperature could rise by 1.5 degrees as early as 2020.

According to a new study published by researchers from the University of Queensland and Griffith University in Australia, global warming could occur much more quickly than previously thought. The study is based on a new first-of-its-kind model which includes "energy use per person" as a predictive factor, rather than solely on economics or populations. The model forecasts that population and economic growth, combined with rising energy use per person could dramatically impact global energy demand, and subsequently CO2 emissions, making for an increase in the global average temperature by 1.5 degrees as early as 2020.

"Nations at the 2015 UN Conference on Climate Change agreed to keep the rise in global average temperature below 2 degrees Celsius, preferably limiting it to 1.5 degrees to protect island states," said Professor Hankamer, who along with Dr Liam Wagner developed the model. "Our model shows we may have less time left than expected to prevent world temperature from rising above these thresholds."

"World population is forecast to increase to over 9 billion people by 2050, which, together with international 'pro-growth' strategies, will lead to continually increasing energy demand."

As a result, according to Professor Hankamer, the global energy sector must transition away from fossil fuel-based energy sources towards renewable energy sources in an attempt to control global temperature averages.

"The sun is by far the largest renewable energy source," said Hankamer, a professor from the University of Queensland's Institute for Molecular Bioscience. "In just two hours it delivers enough solar energy to the Earth's surface to power the entire global economy for a year — and now is the time to make the switch."

Hankamer also believes there currently exists a quick first step to bolster such a transition. "A cost-neutral strategy that governments should consider to fast track this transition is diverting the \$500 billion used to subsidise the fossil fuel industry internationally to assist the global renewable sector."

"We have a choice: leave people in poverty and speed towards dangerous global warming through the increased use of fossil fuels, or transition rapidly to renewables," added Dr Liam Wagner, who partnered with Professor Hankamer in developing the model. "As 80 per cent of world energy is used as fuels and only 20 per cent as electricity, renewable fuels in particular will be critical."

[<Source>](#)

## United Flights from LA to San Francisco Now Use Biofuel, Create 60% Less Emissions

By Sustainable Brands



Image Credit: United Airlines

Regularly scheduled **United Airlines** flights between Los Angeles and San Francisco will be fueled by a blend of 30 percent biofuel and 70 percent traditional fuel, reducing an estimated 60 percent of greenhouse gas (GHG) emissions compared with regular fuel.

Other airlines have tested biofuel, but United says it has “made history ... by becoming the first U.S. airline to begin use of commercial-scale volumes of sustainable aviation biofuel for regularly scheduled flights,” with this new initiative.

The flights are made possible by a deal with **AltAir Paramount**: United has agreed to purchase up to 15 million gallons of sustainable biofuel from the Paramount, Calif.-based renewable fuels company over a three-year period, with an option to purchase more. United claims that 15 million gallons is enough to power the equivalent of 12,500 flights from Los Angeles to San Francisco.

The Chicago-based carrier made the announcement on Friday before the first flight under the agreement took off from the **Los Angeles International Airport**.

“Today’s historic launch of regularly scheduled service utilizing advanced biofuels represents a major next step in our ongoing commitment to operate sustainably and responsibly,” said **Angela Foster-Rice**, United’s managing director of environmental affairs and sustainability.

“Los Angeles is a global leader in sustainability, so it’s no wonder that the first U.S. flights to use commercial-scale, renewable jet fuel are taking off from our airport,” said Los Angeles Mayor **Eric Garcetti**. “Today, we set a new standard for sustainability in aviation — an example I hope the rest of the industry will follow in the coming years.”

United has been using biofuels in various amounts since its first biofuel demonstration flight in 2009. In 2011, United and **Alaska Airlines** were the first U.S. carriers to operate commercial flights powered in part by advanced biofuels. Last year, United struck a \$30 million equity investment deal with U.S.-based alternative fuels developer **Fulcrum BioEnergy, Inc.**, a company which is developing a method of converting municipal solid waste – household garbage – into low-cost sustainable aviation biofuel.

United’s EcoSkies program includes a Sustainable Supply Chain (SSC) initiative to ensure its biofuel is sourced responsibly.

[<Source>](#)

## Powering Fuel Cells with Wastewater



By: Jessica Lyons Hardcastle

As companies and facility managers are increasingly recognizing the benefits of monetizing wastewater, two Virginia Tech researchers say they have found a way to maximize the amount of electricity that can be generated from the wastewater that would otherwise be flushed down the toilet.

In an article published in *Scientific Reports*, Xueyang Feng and Jason He traced bacteria, which led them to discover that the working relationship between two specific substrates produced more energy than either did separately. This work could help in the development of new treatment system called a microbial fuel cell, the researchers say.

“Tracing the bacteria gave us a major piece of the puzzle to start generating electricity in a sustainable way,” said Feng, an assistant professor of biological systems engineering. “This is a step toward the growing trend to make wastewater treatment centers self-sustaining in the energy they use.”

The team found that when the two substrates — lactate and formate — are combined, the

output of energy is far greater than when they are working separately. The organics work in tandem with receptors in fuel cells.

The results of this work encouraged the further development of microbial fuel cells, especially system scaling up. The He lab is currently operating a 200-L microbial fuel cell system in a local wastewater treatment plant for evaluating its long term performance with actual wastes.

One company that has commercialized a system to recover resources from wastewater is International Wastewater Systems.

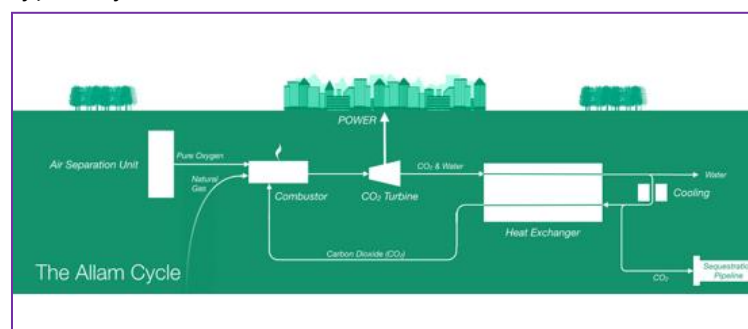
At IWS’ largest residential installation to date, the 172-unit Sail condos by Adera Development Corp. at the University British Columbia, its SHARC system (SHARC stands for sewage heat recovery) provides hot water for all of the units at about 550 percent efficiency. This saves residents about 70 percent on their hot water heating bills. It also reduces emissions by about 100 metric tons per year, IWS says.

Photo Credit: wastewater treatment via Shutterstock

[<Source>](#)

## First Emissions-Free Fossil Fuel Power Plant under Construction

By Jessica Lyons Hardcastle



A power plant that will produce low-cost electricity with zero emissions is being built in La Porte, Texas.

Net Power, a collaboration between Exelon Generation, CB&I, and 8 Rivers Capital, today said it has broken ground on the 50-megawatt demonstration plant, which it says it a “first-of-a-kind” power plant.

The plant will demonstrate Net Power’s Allam Cycle technology, which the company says uses carbon dioxide as a working fluid to drive a combustion turbine, eliminates all atmospheric emissions without requiring expensive, efficiency-reducing carbon capture equipment, and produces pipeline-quality CO2 that can be sequestered or used in various industrial processes, including enhanced oil recovery.

The \$140 million program — which not only includes demonstration plant design and construction, but also ongoing technology advancement, a full testing and operations program, and commercial product development — is funded by a combination of cash and in-kind contributions from Exelon and CB&I. Toshiba has developed and is now manufacturing a new supercritical CO2 turbine and combustor for the project. CB&I is performing the engineering, procurement, and construction of the plant. Exelon is providing operations, maintenance, and development services. 8 Rivers invented and continues to advance the technology behind the project.

Net Power uses an oxy-fuel, supercritical CO2 power cycle to produce electricity efficiently while inherently eliminating all air emissions. The system burns natural gas with oxygen, as opposed to air, and uses high-pressure carbon dioxide, as opposed to inefficient steam like most power plants, to drive a turbine.

Net Power produces only electricity, liquid water and pipeline-ready CO2, while operating as efficiently as the best natural gas power plants available today, the company says. Additionally, for a small reduction in efficiency, the technology can operate without water, actually becoming a net water producer.

The company says this clean energy producer does not mean more expensive energy, “and, as a result, our global climate goals are within reach.”

The plant will be a fully operational unit that will generate power to the grid while demonstrating all key aspects of the Allam Cycle. Net Power expects commissioning to begin in late 2016 and be completed in 2017.

The company says the 50MW plant will also provide the validation to begin constructing the first 295MWe, commercial-scale Net Power plants. NET Power is already engaged with customers across several industries on the design and development of these projects, the company says.

[<Source>](#)



## 8 crore in India deprived of safe drinking water: Study

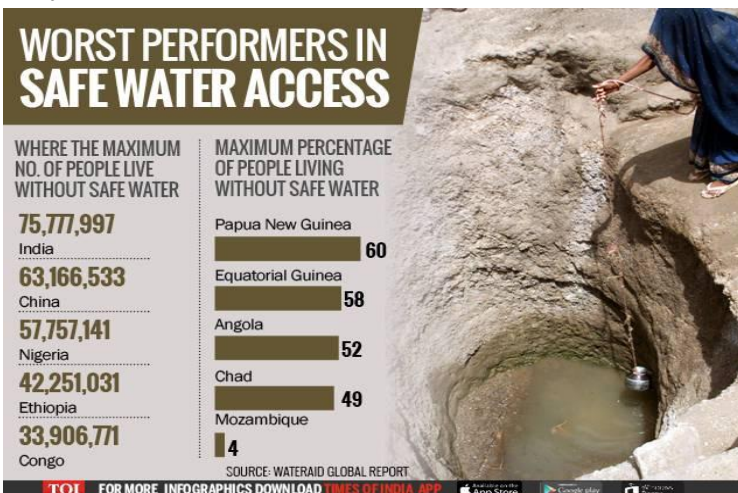
By Dipak Kumar Dash | TNN



The report has pointed out poor management of water resources as the biggest problem while mentioning how over-extraction of ground water has aggravated the crisis

NEW DELHI: India has the world's largest number of people without access to safe water, according to a report released to mark World Water Day on Tuesday. China, Bangladesh and Pakistan are also among the top 10 countries where maximum number of people are living without uncontaminated drinking water.

According to the report "Water: At what cost?" released by WaterAid, about 7.6 crore people, which is 5% of India's total population, are deprived of safe water and the country registers around 1.4 lakh child deaths annually due to diarrhoea, a mainly water-borne disease.



The findings come at a time when there are reports of several parts of Maharashtra facing acute water crisis and even in urban areas people are often forced to use contaminated water. "Most of these people (without access to safe water) are living in around Rs 285 per day. If they have the opportunity to buy water from a tanker, it can cost 1 rupee per litre; sometimes double if supplies are scarce," the report said.

It has pointed out poor management of water resources as the biggest problem while mentioning how over-extraction of ground water has aggravated the crisis. "Aquifers provide 85% of drinking water, but levels are falling in 56% of the country. Hand pumps are exacerbating the crisis in many areas by depleting shallow aquifers. Misappropriation in planning and execution of water supply projects is another key factor," it said.

The global report said that because of this water crisis, communities fall back on a single or distant source of drinking water, often leading to disputes and increased discrimination against the main water fetchers, particularly women. The report also shows that in the developed world, a standard water bill is merely 0.1% of the income of people earning minimum wage. But in a country like India, anyone reliant on a water vendor (tanker) would end up spending around 17% of their daily income to get daily minimum supply.

[<Source>](#)

## Climate change may kill over 130,000 Indians in 2050

The study evaluates the impact of climate change on diet composition and bodyweight, and estimates the number of deaths caused by this in 155 countries in

By Nikita Mehta



According to the study, if the level of global emissions remains unchanged, then the projected improvement in food availability could be reduced by about a third by 2050. Photo: Getty Images

**New Delhi:** Climate change could kill over 130,000 people in India in 2050 because of changes in diet and bodyweight from reduced crop productivity, according to a study in the British medical journal *The Lancet*.

The changes could lead to nearly 529,000 extra deaths globally in 2050, as opposed to a future without climate change in which adequate food availability and consumption could prevent 1.9 million deaths, it predicts.

Carried out by researchers from the University of Oxford, the study evaluates the impact of climate change on diet composition and bodyweight, and estimates the number of deaths caused by this in 155 nations in 2050.

"Changes in food availability and intake also affect dietary and weight-related risk factors such as low fruit and vegetable intake, high red meat consumption and high bodyweight. These all increase the incidence of non-communicable diseases such as heart disease, stroke and cancer, as well as death from those diseases," said Marco Springmann, a postdoctoral researcher at the Department of Population Health, University of Oxford. Springmann is working on the Oxford Martin Programme on the Future of Food.

The study says that if global emissions remain unchanged, the projected improvement in food availability could come down by about a third by 2050, and lead to average per person reductions in food availability of 3.2%, 4% in fruit and vegetable intake and 0.7% in red meat consumption.

Low- and middle-income nations are likely to be worst affected, predominantly in South-east Asia and the Western Pacific, with almost three-quarters of climate-related deaths predicted in China and India. On a per capita basis, Greece and Italy are expected to be badly affected.

The researchers used an agricultural economic model with data on emission trajectories, socioeconomic pathways and possible climate responses to evaluate the effects on global food production, trade and consumption for 2050.

They calculated the additional deaths linked to changes in diet and bodyweight under four climate-change scenarios, compared to a world without climate change.

[<Source>](#)



## These Newly Launched Solar Powered Autorickshaws Will Help Bengaluru Fight Pollution

By Tanya Singh

Autorickshaws that run on solar power have been launched in Bengaluru to fight the problem of pollution caused by diesel or gas consuming vehicles.

*Launched on March 5, the electric auto is named ElecRic and it does not emit any air pollutants.*



Picture for representation only.  
Source: Kenny Lam/Flickr

ElecRic has been designed by RJMS-EV, a private company that manufactures electric vehicles and their components in Bengaluru. The company came up with the design by converting a normal auto running on gas to a solar auto. They also have a patent for ElecRic and one auto costs only Rs. 2 lakh.

The first batch of autos has been launched for a pilot project. ElecRic can run for 110 km with five hours of charge. Umesh Chandra, one of

the directors of RJMS-EV, suggested that the government should create charging points near metro stations or government offices and banks. This will help drivers get easy access to charging points and will also help solve the last mile commute problem, wherein people have difficulties finding a mode of transportation after getting off a metro or a bus.

"The government is giving the opportunities for entrepreneurs, solar power sector and mobility providers. Two stroke auto owners should be enabled to accommodate the technology in their autos to make the transition happen," Umesh Chandra told The Times of India

A two-stroke engine is an internal combustion engine in which a power cycle is completed in two strokes. Such engines lead to a lot of exhaust pollution, which is caused when the two-stroke oil used for lubrication is burned in the combustion chamber.

Featured image credit: The Times of India

[<Source>](#)

## Central Water Commission report shows, water levels in reservoirs decline to alarming levels

Source Name: livemint

NTPC Ltd has been forced to curtail electricity production at a plant in West Bengal because of low water levels in the Farakka feeder canal. After two consecutive drought years, this could be the beginning of a new set of woes for India.

Water levels are depleting fast in India's reservoirs. Weekly data published by the Central Water Commission show that storage availability at 91 major reservoirs in the country is a mere 29% of their total storage capacity. The same measure last year was a respectable 40%. These reservoirs account for about 62% of the estimated capacity to have been created in India.

As the chart alongside shows, the current level is 71% of last year's capacity. It's also below the average level of the last 10 years.

What are we in for?

"It is already a big crisis and very alarming for places where the reservoir capacity is much lower," says Anil Jain, managing director, Jain Irrigation Systems Ltd. Whenever water availability is low, the first to suffer is industry, followed by agriculture and then drinking water, adds Jain.

Dhananjay Sinha, head-research, institutional equities, Emkay Global Financial Services Ltd, says, "Low water storage capacity levels at major reservoirs in the country will definitely have an adverse impact on construction, real estate, roads and hydel power."

Water is a feedstock for thermal power plants. It generates steam to spin turbines and is also used as a coolant. The problems at NTPC's Farakka plant could be the canary in the coal mine. Hydel plants, too, run on river water.

Having said that, all thermal plants are not dependent on reservoirs. Many are located on riverbanks and close to seashores. Similarly, in hydel, plants in the

Himalayan region are mostly run-of-the river projects. Problems occur for reservoir-based plants, which are mostly controlled by state utilities.

According to the Central Electricity Authority, production at state sector plants dropped by one-fifth in February and by the same amount for the current fiscal till February. The state sector has 25,151 megawatts (MW) capacities accounting for 10% of total capacities in India. In the 11 months to February 2015, production had dropped almost 8%. The production loss is substantially higher this time.

What of the farmer?

Weak monsoons have had an impact on groundwater levels and that has already taken a toll on the farmer, says Jain. Simply put, farmers will now suffer from a double whammy of lower price realizations and less moisture content in the soil. "That, in turn, has affected the rabi crop," according to Sinha.

Needless to say, given the sustained distress in the farm sector over the past years, a normal rainfall in the coming monsoon season is crucial. "It will be critical in fulfilling the central government's promise of improving farm sector economics. And in my view, there is a likelihood of the central government announcing a higher increase in minimum support prices of major crops this time to the tune of ~10%," reckons Sinha.

[<ReadMore>](#)

## India to formally adopt Sustainable Development Goal

By PTI

MUMBAI: Top 50 domestic corporate leaders will be assembling here on Saturday under the aegis of the UN to formally adopt the Sustainable Development

Goals (SDGs) of the world body and discuss the way forward for implementation.

The SDGs are the continuum of the 8 Millennium Development Goals (MDGs) which were under implementation from January 2000 to December 2015. These 17 SDGs are being implemented from January 2016 to December 2020.

UN Global Compact' is the implementing agency for SDGs.

The Mumbai meeting assumes significance as this is for the first time the UN is involving private and public sector corporates globally to drive its development agenda. This is the first such meeting being held globally.

The companies that are attending the meeting include the Tatas (14 group firms), Reliance Industries, Vedanta, ONGC, Essar Group, the Birlas, L&T and the Adani group. Several MNCs like Mercedes will also be attending the session.

"The leaders of conglomerates will discuss ways and means to push the SDGs which aims at broadening the horizon for growth and transformation under the theme of people, planet and prosperity," United Nation's Global Compact Network India executive director Pooran Pandey told PTI here.

He added that India Inc will be the first in the world to adopt the SDGs and implement them at their companies.

"Corporate India will take the global lead to draw up an agenda for broadening the horizon for the country's growth and transformation as envisioned under the SDGs," said Lalit Gupta, the convener of the national convention of the UNGCNI and MD and CEO of Essar Oil.

Gupta also said the day-long meeting will be inaugurated by Union environment minister Prakash Javadekar. UN Global Compact global executive director Lise Kingo will be there too.

"These goals (SDGs) encompass a wide range of global issues with underlying targets directing signatories to imbibe the goals in their way of operations. What sets SDGs apart is their emphasis on leveraging partnerships between public and private enterprises to drive the agenda forward," Pandey said, adding 348 SDG signatories from the country and 230 members will be paying a membership fee.

[<Source>](#)



Representative image



## 5 Ways the Indian Railways Is Adopting Renewable Energy to Reduce Its Carbon Footprint

By Neeti Vijaykumar

In an effort to feed at least 10% of its energy requirements, the Indian Railways has been vigorously changing its policies since 2010. With its power consumption growing by 5% every year, as it adds more trains and routes, it is the highest single consumer of electricity in the country. Recognising how deep an impact it can make on the environment (and also counting its rising costs on electricity and fuel), the Indian Railways commenced its journey towards a sustainable and economical change.

*It plans to reduce at least Rs 3000 to 4000 crores of its power consumption in the coming years.*



*Representational image. Source: Wikimedia Commons.*

annually on electricity bills. The water supply for the Perugamani station and its adjacent railways quarters is driven by solar powered water pumps since April 2015. In Thiruvananthapuram, railway gate signals are run on solar power. At Ratnagiri, Maharashtra, a solar plant was built to feed electricity for the station. In Birur, Karnataka, a 15kW wind and solar harnessing plant was set up in 2015, which produces about 20,000 units of electricity. Similarly, a 26 MW windmill in Jaisalmer was inaugurated in December 2015.

### Trains That Light up without Electricity

To power up trains, the Railways installed solar panels on the top of coaches. Estimates state that installing solar panels on its 63,511 coaches could save the Railways Rs 10.8 crores worth of diesel. In June 2015, the first solar powered coaches ran on the Rewari-Sitapur, Pathankot-Jogindernagar and Kalka-Shimla lines. The panels powered the lighting requirements of the train.

*When the test runs bore good results, in September 2015, the government announced that it would provide subsidies to promote the installation of solar panels on 500 train rooftops.*



*Representational image. Source: Wikimedia Commons.*

With the help of a certain kind of bacteria, human waste is converted into non-corrosive water and gas, and is released through outlets. As of 2015, nearly 17,000 coaches were fitted with these toilets, and all newly built coaches will have this system integrated into its design. On the Mangalore Express and the Pune-Jammu Tawi Jhelum Express, the Central Railways has also introduced biodegradable waste bags for long distance journeys in its A/C coaches. In his Railway Budget speech this year, Suresh Prabhu said that Railways plan to set up 'waste to energy' conversion plants near major coaching terminals to dispose waste in an environment-friendly manner.

### No More Chug-Chugging on Diesel

In 2013, the Railways announced that it had started developing designs for trains that run on LNG, a move that was said to bring about 50% reduction in operating costs.

*India has come a long way from steam engines to diesel engines, and on to trains that run on renewable energy.*



*Representational image. Source: Wikimedia Commons*

currently collaborating with foreign firms for its research and design. Bio-diesel, known to be cleaner for the environment, has also been in use since 2014, attributing to 5% of the diesel requirement.

### Water, Water, Everywhere

Taking water conservation seriously, the Railways installed rainwater harvesting systems at nearly 50 stations, as a start. These systems are low maintenance, at a nominal cost. In the 2016 Railway Budget speech, Suresh Prabhu said, "We have launched a mission for water conservation. Water recycling plants will be set up at major water consumption centres after conducting water audit. Expansion of water harvesting systems will also continue." In Mumbai's Lokmaniya Tilak Terminus, rainwater harvesting yields up to 40% of its water requirement.

Besides these major structural changes, the Railways has also worked on growing plants along railway routes and introducing e-ticketing to save paper. That's a lot being done to reduce its Rs 13,000 crore power bill!

[<ReadMore>](#)

## India's new climate model works best for South Asia

Copyright: Chris Stowers / Panos

NEW DELHI India has embarked on a programme of developing its own climate models since existing ones are inadequate to study the increase in extreme rainfall and correlate it with human-induced climate change, top scientists say.

Existing models do predict an increase in extreme rainfall events as observed in historical records, but these cannot be attributed to human-induced climate change, explains Arpita Mondal, assistant professor at the Indian Institute of Technology-Mumbai. "One of the major reasons behind this gap is because India does not have its own climate models," she tells *SciDev.Net*.

M.N. Rajeevan, secretary in India's ministry for earth sciences, tells *SciDev.Net* that by the end of 2016 India will have the computational power to make its own climate assessment model, allowing the country to participate in next assessment of the UN's Inter-governmental Panel on Climate Change (IPCC).

According to Mondal, an author of a paper on the gap published in the *Journal of Hydrology* in September 2015, what is problematic is that the trends of extreme rainfall events projected by model simulations over the last 100 years do not match trends in observed rainfall events.

She and her co-researchers used global climate model simulations based on data from natural as well as anthropogenic emissions under different eras for their study. Rainfall predictions from the models were compared with the rainfall data spatially aggregated from 1,800 rain gauges scattered across the country by the India Meteorological Department using sophisticated mathematical tools.

In particular, the team looked at very heavy rainfall received in a single day against that in a five-day span, which is most likely to cause floods and found a need for fine-tuning climate models to simulate hydro-climatic variables at the South Asia regional level. "Human knowledge about the climate system is still inadequate and we need to take account of as many factors as possible," Mondal says.

India's Earth System Model (ESM), developed by the Indian Institute of Tropical Meteorology (IITM) and slated for use with IPCC assessments this year, has already shown more than 90 per cent agreement with observed results, according to findings published in the *Bulletin of American Meteorological Society* in August 2015. The IPCC mandates that every country tries to quantify how human activities are influencing climate.

"The ESM will help to create projections of the future monsoon climate and its uncertainties and will be useful for understanding observed changes in the climate caused by natural and man-made effects," P. Swapna, a scientist at the IITM tells *SciDev.Net*.

[<ReadMore>](#)

## Two Dutch Students Spread Awareness about Plastic Waste in Delhi Using a Mural

By Neeti Vijaykumar

*Two students from Netherlands came to India and saw the abysmal state of plastic waste and littering. They stayed, and decided they would raise awareness against it, starting with a mural in Delhi.*

If you happen to walk through Hauz Khas Village in Delhi, you might run into a mesmerising blue-green mural with a face that has its eyes closed, little pink plastic bags all around it. You'll also realise, if you happen to notice it, that there's lesser trash lying around. All those plastic bags, cans, rotting food, and whatever else that makes up the usual scene of polluted streets, have vanished.

*There's a bright green trash can that catches the eye, much like the mural.*

When Elise Littooi and Wesley van Manen came from the Netherlands to Delhi in March 2015 for a student exchange program, they were stumped. The students from the Willem de Kooning Academy in Rotterdam keenly observed the littering problem that plagues most of India's metro cities.



The mural in Hauz Khas Village, Delhi

*Instead of walking away disgusted, they decided to do something about it.*



Manen and Littooi

combining their passion for art and their will to raise awareness.

*They picked a barren wall in an area where people never thought twice before littering.*

"We choose this particular area (Hauz Khas Village) in Delhi because we saw that the plastic problem kept increasing there," Manen said. "We saw that people just threw their garbage onto the street without anyone noticing it.

"One of the biggest environmental problems India is facing is the menace of plastic waste," said Manen. "In fact, according to statistics, 60 cities in India generate 15,000 tonnes of plastic waste per day. Isn't that alarming? So we asked ourselves, how can we respond to this with a creative intervention?"

The duo chose to finish their graduation project in Delhi. They started out by



Before the mural

*"We wanted to convert it into a place where one can use it as a nice spot to chill."*



Manen working on the mural

Their campaign, #ikeepdelhiclean, began in full swing to make people aware about littering, its adverse effects on the environment, and how it spoils the beauty of an area. "We noticed that the problem starts when people receive a bag after a purchase. They use this plastic bag for approximately 20 minutes, after which it ends up on the street."

*The duo, continuing with their campaign, also created a collection of bags made out of waste plastic, to show the many ways one can utilise waste.*

In 2013, the Central Pollution Control Board released a report that checked the rate of plastic waste generation in India. The report said that while India generated

about 5.6 million metric tonnes annually, Delhi topped the charts. The daily count in Delhi was 689.5 metric tonnes of waste generated.

Manen and Littooi are keeping their hopes up on the youth of the country to do something about the littering situation. "We think that a younger group of Indians can make the difference for the plastic waste problem in the future.

We are working on trying to make them have a different outlook on sustainability order to reach a larger group of people. They are the solution for the future."

[<ReadMore>](#)

## This Udupi College Collects Used Cooking Oil from Hotels to Produce Biodiesel & Fuel Its Buses

By Neeti Vijaykumar

In five-star hotels, hundreds of litres of used cooking oil is thrown away as waste. Sometimes, they sell the oil to street-side food vendors at Rs 20 per litre. Or, soap manufacturers buy it from them. But now, a college in Nitte, about 50 kilometres from Mangalore, uses the wasted cooking oil as fuel for its vehicles.

*The Mahalinga Adyanthaya Memorial Institute of Technology (NMAMIT) in the Udupi district is converting used cooking oil into biodiesel, which they use to fuel their buses.*



NMAMIT, Nitte, Karnataka. Source: Wikimedia Commons

The biotechnology engineering department of NMAMIT, head by C Vaman Rao, and his team of students, are on a mission to promote alternative sources of fuel for a cleaner environment.

In India, most of the biodiesel is produced from seeds such as simaruba, neem, castor and jatropha.

However, sourcing these seeds is sometimes difficult and expensive in areas where it does not grow. The cost of transporting the seeds, along with its sale price of Rs 22 to 26, makes it an unviable option for conversion to biofuel.

"In the end, the production cost of biodiesel made from seeds ends up at Rs 65 per litre, whereas petrol diesel costs Rs 47," he said. "Because of this, we started looking for an alternative source." Used cooking oil can be bought from hotels at a rate of Rs 20 per litre.

"We approached hotels and tried to convince them of the benefits of our project to convert it into biodiesel," he said. When they agreed, they placed barrels in five-star hotels, large restaurants and bakeries to procure their used cooking oil, which is set to collect once every month.

*Through a process called transesterification, this oil is converted into biodiesel.*

Used oil is already processed, which cuts down on production time and effort. One litre of oil can produce 95% biodiesel and 5% glycerine. After this, diesel and biodiesel are mixed in the ratio of 80:20.

Besides being economical (at Rs 40 per litre, compared to Rs 47 for diesel), the institute claims that biodiesel can increase mileage by 1 to 1.5 kilometres. "It also reduces the emission of noxious gases like carbon and hydrocarbon by 35%," said Rao. Biodiesel is also good for machines, owing to its cleansing properties.

The institute plans to use biodiesel in generators and its buses. They are already using it on one of their buses on an experimental basis for the past two months. "Right now, we have a 50 litre reactor. Once we can increase the capacity of production, we will use it in all our buses," Rao adds.

[<ReadMore>](#)



The setup for the process of converting used cooking oil to biodiesel



## India's Biggest Automaker Sets 100% Renewable Electricity Goal

*SustainableBusiness.com News*

India's biggest auto maker, Tata Motors, is the latest corporate behemoth to commit to using 100% renewable electricity.

Tata is the 54th corporation in RE100, joining BMW, Coca-Cola, Starbucks, Nike, Google, Microsoft and Adobe and many others.

"The RE100 movement is giving a clear signal that the transition to renewable energy is achievable. The world's leading sustainable companies are getting prepared for this major change by committing to go for renewable electricity and Tata Motors is proud to join such an initiative," says Arvind Bodhankar, Chief Sustainability Officer.

Solar and wind supply just 8% of Tata Motors's electricity for manufacturing, and it plans to ramp quickly. Last we heard, Tata is working on the AIRPod, a tiny urban car that runs on compressed air.

In an interview with RE100, Bodhankar says:

"Our approach towards climate change mitigation and pursuing low carbon growth is three-fold - develop cleaner and more efficient vehicles, reduce environmental impacts of manufacturing operations, and build awareness among stakeholders."

With energy-intensive manufacturing switching over, it will accelerate demand for renewables and "send a positive signal to the market", he says.

They have already upgrade energy efficiency through heat recovery systems, optimized pumps and furnaces, that saved over 44,000 megawatt-hours last year. Now they are conducting life cycle assessments of car products to minimize environmental impacts.

During the Paris Climate Summit, Tata joined 77 CEOs from 150 countries to call for an international price on carbon and promising to take a bigger role in speaking out about climate change.

And Ratan Tata, Chair of Tata Group is a member of Richard Branson's B Team, which is working on FINALLY making business a "force for good." In February, the group called for world leaders to commit to net-zero greenhouse gas emissions by 2050 - and urged corporations to match the goal in their own long-term targets.

Other divisions of Tata are also pursuing renewables, such as Tata Solar, which will be rolled into Tata Power's new renewable energy arm, TPREL.

Indeed, India plans to double the coal tax (which finances clean energy) to \$6 per ton this year, even as it doubles output.

India's incredible goal is to install 175 GW of solar and wind by 2022, up from 36 MW now. Last year, Prime Minister Modi began calling on investors to ante up \$100 billion to meet his goals, and since then they have done exactly that, according to the Institute for Energy Economics and Financial Analysis.

[<Source>](#)

## Delhi's air pollution is a classic case of environmental injustice

*India's new tax on car sales is a step in the right direction, but can the country address the wealth and power imbalance driving the health disaster?*

By James K Boyce and Aseem Shrivastava



*Rush hour in Delhi. India's capital has the world's most polluted air, according to the World Health Organisation. Photograph: Roberto Schmidt/AFP/Getty Images*

The news that India is introducing a new tax on car sales to help combat severe air pollution and congestion problems has unsurprisingly been decried by the country's car industry.

The chair of India's largest car manufacturer, Maruti Suzuki, says the tax "is going to hurt the industry, and will impact growth and affect job creation". Following the announcement, shares in Maruti Suzuki traded more than 5% lower.

But others have celebrated the move, recognising that business as usual cannot continue in a country home to the four most polluted cities in the world. "Once Indians owning cars was seen as a sign of economic success. Now this sort of tax is seen as Indians being responsible," a senior research fellow at a Delhi-based thinktank told the Guardian.

The tax comes on the heels of the Delhi government's unprecedented step this winter of imposing an emergency "odd-even" license plate number rule to restrict private car use to alternate days.

Reports of extreme air pollution in Delhi and other Indian cities are nothing new. The World Health Organisation estimates that more than 600,000 people die each year as a result of outdoor air pollution in India. Much less discussed is the fact that not all residents are equally affected, nor equally responsible.

Delhi's low-income residents - who don't travel by car - bear the brunt of the city's toxic air. This is partly because of where they live. A 2011 study found levels of suspended particulates to be generally higher in the city's poorer neighbourhoods.

The poor also spend more time outdoors, where pollution is most intense. A study in the scientific journal Atmospheric Environment reports that men from low-income households spend on average about seven hours outdoors daily, compared to virtually zero for those at the top of the income scale.

What's more, affluent households can afford air conditioning, better nutrition and better healthcare, all of which insulate them, to some extent, from dirty air.

Some of the highest pollution exposures are inflicted on those who make their living on the streets, including traffic police and drivers of three-wheeled autorickshaws. These rickshaws have been converted to compressed natural gas, a cleaner fuel source, as a result of a 1998 supreme court ruling in a case brought by environmental advocates.

Many of Delhi's cars, by contrast, continue to burn particulate-heavy diesel. Researchers have measured concentrations of hazardous ultra-fine particles on the city's arterial roads that are eight times higher than those recorded on rooftop monitors just a kilometre away.

The health impacts on residents are becoming more and more evident. Children's developing bodies are especially susceptible to long-term harm. A 2008 study for India's Central Pollution Control Board reported that more than two-fifths of Delhi's schoolchildren have reduced lung function, damage that is likely to be irreversible.

[<ReadMore>](#)

## Bajoria E-motors launches e-mobility vehicles

Nagpur, Mar 5: City-based Bajoria E-motors, a unit of Rajesh Steel and Wire Industries today launched a wide range of electric mobility vehicles, including three-wheelers. Union Minister for Road Transport and Shipping Nitin Gadkari today launched the new range at the newly-constructed showroom in Cotton Market area here today.



E-rickshaws "The main objective of establishing the industry is to encourage people to become environment friendly by providing it increased output and a host of other facilities with these e-vehicles," founder, Rajesh Steel & Wire Industries, Suresh Bajoria said.

India's maiden e-vehicle store, Bajoria E-motors' showroom has various BAAJ models classified into three categories - passenger e-carts, school

e-carts and commercial e-carts for their respective purposes.

All vehicles are adequately equipped with facilities needed for a particular set of utilities. "It will lead to a stronger and more powerful nation in terms of employment generation, independent business establishments, decreased pollution levels and a largely beneficial revenue model for a major part of the society," Bajoria told reporters.

"We are more than willing to customise the cart bodies in order to fulfill particular requirements as need be. Customised vehicles are the need of the day for commercial purposes," he said. PTI

[<Source>](#)

## In Award Winning Invention, Mangalore Boy Uses Kites to Harness Wind Power & Generate Electricity

By Neeti Vijaykumar

A young boy in Mangalore bagged the Gandhian Young Technological Innovation Award for his innovative project that harnessed the power of wind, through kites.

22-year-old Royston Vijay Castellino, who studied at the Srinivas Institute of Technology, Mangalore, looked into the impact of wind power systems, and concluded that they have limitations to produce electricity. However, his innovative model, which uses a kite to harness wind from high altitudes, wipes out those inefficiencies.

*Calling it the "Winds of Change", he has also applied for a patent.*



*Representational image*

**Source: Wikimedia Commons**

In 2015, he had completed a project on this as part of his BE electronics and electrical engineering course in his final year. The aim of his project, according to Castellino, was to make wind power generation low cost, increase efficiency, and make it useful in generating electricity in rural areas.

When he experimented on kites, he discovered that the power is at its peak from a kite when it is rotated to make an infinity symbol in the sky. "I also observed that a four-line kite gives more power than a dual-line kite. So, I started to build a strong base with a four-line kite control system," he said.

To work on the model, he said that he first ordered a four-line power kite from China. Then, he found bicycle parts, crank wheels and sprockets to use as materials. He modified a ceiling fan with permanent magnets, and then wound the rims of the bicycle wheel with threads. He used a wireless transmitter and receiver circuit to control the kite through a motor, and a chain drive to increase the speed. "The output can be improved by increasing the area of the kite," he explained, "And the project can be made fully automatic by installing sensors on the kite which determine the position of the kite and send data to the base station."

Since wind energy can be intermittent, he said that two similar kites can produce continuous power. "By installing two kites, energy can be transferred to the utility grid directly. This project can be made highly portable by using a vehicle as a base station which consists of a generator and control system."

Last year, he was awarded the Project of the Year Award by Karnataka State Council for Science and Technology, at a competition organised by Indian Institute of Science in Bengaluru.

[<Source>](#)

## Electric Autorickshaws launched in Bengaluru

TNN

BENGALURU: If auto rickshaws in the city are blamed for polluting, here's a simple solution to replace the diesel/gas consuming autos. ElecRic, as the name goes runs on solar power, emits nothing and cost Rs 2 lakh only.

RJMS-EV, a private company that is into manufacturing of electric vehicle and components in Bengaluru has a patent in their name for their innovation in switching a typical auto that runs on gas to a solar-run auto rickshaw. The rickshaw was launched officially in Bengaluru on Saturday.

Umesh Chandra, one of the directors of the company says, "This is a pilot project that we have to spend money for Rs 4 crores. The government is giving the opportunities for entrepreneurs, solar power sector and mobility providers. Two stroke auto owners should be enabled to accommodate the technology in their autos to make the transition happen."

The company claims that the maintenance cost of a solar auto rickshaw will cost Re 1 per kilometre while it is Rs5 per km. ElecRic can go 110 km with five hours of charge if batteries are charged fully one time. Umesh suggested that if the



government can create charging points underneath each metro stations or at government offices and banks, there will be two benefits—accessibility to charging points will be easier for all types of electric vehicles and secondly metro commuters can hop off the stations and find an EV to get home (serves last mile commute).

[<Source>](#)

## Green penalty may go up from Rs 1 lakh to Rs 5 crore

**Source Name: The Economic Times**

Seeking to impose a serious and effective deterrent to prevent violation of environmental laws, the Centre plans to introduce an amendment bill proposing to scale up the fine to a minimum of Rs 5 crore up from Rs 1 lakh and imprisonment up to seven years for causing 'substantial' environmental damage.

The bill will be introduced during the second half of the budget session between April 25 and May 13.

The bill sets the the upper limit of fine as high as Rs 20 crore and imprisonment may be extended to a life term. If the damage has been unabated over a period of time, violators may have to pay additional Rs 1 crore a day.

While the government has moved to ease what has been described as "green tape" and make clearances faster and more transparent, it expects industries to adhere to the law or face stiff penalties if caught violating regulations. "The law ministry has already cleared the draft of the Environment Laws (Amendment) Bill - meant to amend the existing Environment (Protection) Act, 1986 and the National Green Tribunal Act, 2010 - and sent it back to the environment ministry. It will now go to the Cabinet and will be introduced in the Parliament after the recess", said an official.

The proposed amendment suggests that the penalty amount will be used for remediation and reclamation of polluted sites and improvement of environment - measures that also seem intended to counter criticism that the government has been keen to cater to big business.

At present, a violator has to pay a fine of Rs 1 lakh and faces imprisonment up to five years (can be extended to seven years in certain cases) on conviction. In case the violation continues, the offender has to pay additional fine up to Rs 5,000 a day during which the contravention continues.

Officials argue the stiff fines will force polluting industries to take corrective measures that they are willing to avoid. "At present, many violators find it easier to pay fine and carry on with their activities," an official said.

Under the existing law, state pollution control boards act as appellate authorities for assessing environmental damage and impose a fine. But the proposed amendment has separate provisions of categorisation of violations into 'minor', 'non-substantial' and 'substantial' on extent of damage. "It will minimise the discretion of the state boards. In absence of the process of quantification or assessment and corresponding provision of penalty, some cases land up in a long legal battle", said the official.

There is also a proposal of setting up an adjudicating authority, comprising of a district judge and two technical/environmental experts, that will assess the damage on the basis of quantified parameters and impose fines accordingly.

Under the proposed amendment, the violator will be allowed to appeal before the National Green Tribunal against the order of the adjudicating authority. But then, the violator will have to deposit 75% of the amount of penalty imposed by the adjudicating authority.

[<Source>](#)





### INTERNATIONAL CONFERENCE ON BIOLOGICAL AND ENVIRONMENTAL SCIENCE

**June 8-9, 2016**

**New Jersey (Near NEW YORK), USA**

2016 International Conference on Biological and Environmental Science (BIOES-16) on June 8-9, 2016 at New Jersey (Near NEW YORK), USA is aimed for the scientists, scholars, engineers and students from the Universities all around the world and the industry to present ongoing research activities, and hence to foster research relations between the Universities and the industry. This conference is being organized in association with UNIVERSITY CONSORTIUM OF THE AMERICAS. This conference provides opportunities for the delegates to exchange new ideas and application experiences face to face, to establish business or research relations and to find global partners for future collaboration.

BIOES-16 is sponsored by Universal Researchers in Environmental & Biological Engineering (UREBE). Among topics of interest features Ecology and Air pollution, Environmental Sciences and Engineering, Waste management and Water Engineering feature among topics of interest.

Speakers and delegates from countries like Egypt, France, Iran, Iraq, India, Japan, Malaysia, Pakistan, Serbia, Spain, Sudan and Turkey. The conference is chaired by Prof. Dr. BILEY TEMANEL, Isabela State University, Phillipines and Prof. Dr. Ait Barka Essaid, Reims University, France.

[<ReadMore>](#)

### Environmental Impact 2016

#### 3rd International Conference on Environmental and Economic Impact on Sustainable Development

**8 - 10 June 2016**

**Valencia, Spain**

The 3rd International Conference on Environmental and Economic Impact on Sustainable Development follows the success of the two previous meetings held in the New Forest, UK, home of the Wessex Institute in 2012 and Ancona, Italy in 2014.

The meeting will provide an international forum to discuss the most serious problems affecting sustainable development. The Conference will consider the impact of economic constraints on the environment, taking into account the social aspects as well as the over-use of natural resources. Uncontrolled development can also result in damage to the environment in terms of the release of toxic substances and hazardous waste. The meeting will examine issues related to whether some forms of development are compatible with environmental protection, particularly in cases of possible serious contamination and toxicity.

The conference will address problems of great importance discussing more constructive and progressive approaches to ensure sustainability. A major motivation for the meeting is to learn from past failure, to avoid repeating similar mistakes, while attempting to prevent emerging threats to the environmental and ecological systems.

The list of topic covers very important issues to be presented at Environmental Impact 2016. Environmental policies and planning, Environmental assessments, Development issues, Sustainable cities, Economic impact, Natural resources management, Energy and the environment, Food production systems and policies, Soil contamination, Water resources management, Air and water pollution, Pollution and public health are a few of the topics that shall be covered.

[<ReadMore>](#)

### The Asian Conference on Sustainability, Energy and the Environment 2016 (ACSEE2016)

**June 9 - June 12, 2016**

**Art Center of Kobe, Kobe, Japan**

This international and interdisciplinary conference will bring together a range of academics and practitioners to discuss new directions of research and discovery in education. As with IAFOR's other events, ACSEE2016 will afford the opportunity for renewing old acquaintances, making new contacts, and networking across higher education and beyond.

The conference theme for ACSEE2016 is "Justice and Sustainability", and the organisers encourage submissions that approach this theme from a variety of perspectives. However, the submission of other topics for consideration is welcome and we also encourage sessions across a variety of interdisciplinary and theoretical perspectives.

The conference theme is "Justice and Sustainability". Approach to conference theme from different perspectives is welcome by the organizers. The thematic streams also include streams like. Environmental Sustainability & Human Consumption: Food and Water, Hunger and Thirst, Environmental Sustainability & Human Consumption: Waste, Environmental Sustainability & Environmental Management: Freshwater, Oceans and Seas, Environmental Sustainability & Environmental Management: Atmosphere and Air etc.

Keynote Speakers in the conference are Professor Jun Arima, Japanese Ministry of Economy Trade and Industry/The University of Tokyo and Professor Gregory Clark, Tama University & Akita International University, Japan. Conference Chair and Featured Speaker, Professor Stuart Picken, Chairman of the IAFOR IAB, Order of the Sacred Treasure, M.A. (Hons), B.D., Ph.D. (Glasgow), F.R.A.S.

[<ReadMore>](#)

The Times of India, Delhi dated  
February 26, 2016

## New bio-inspired material to harvest water from thin air

**Boston:** Harvard scientists have designed a new material inspired by organisms such as cacti, pitcher plants and desert beetles that can effectively harvest water from thin air. The research is the first step towards developing a system that can efficiently collect water and guide it to a reservoir, researchers said.

Certain organisms can survive in arid environments because they have evolved mechanisms to collect water from thin air.

The Namib desert beetle, for example, collects water droplets on the bumps of its shell while V-shaped cactus spines guide droplets to the plant's body. Researchers from Harvard have drawn inspiration from these organisms to develop a better way to promote and transport condensed water droplets.

"Our research shows that a complex bio-inspired approach, in which we marry multiple biological species to come up with non-trivial designs for highly efficient



The system is inspired by the bumpy shell of desert beetles, the asymmetric structure of cactus spines and slippery surfaces of pitcher plants

materials with unprecedented properties, is a new, promising direction in biomimetics," said Joanna Aizenberg from Harvard. The system is inspired by the bumpy shell of desert beetles, the asymmetric structure of cactus spines and slippery surfaces of pitcher plants.

The material harnesses the power of these natural systems, and Slippery Liquid-Infused Porous Surfaces (SLIPS) technology, to collect and direct the flow of condensed water droplets. The study was published in the journal Nature. *PTI*

## Road-railers to ease snarls, cut emission

Anvit.Srivastava  
@timesgroup.com

**New Delhi:** In a bid to expand freight operations in a significant way, the Delhi division of Northern Railways has signed a pact with a private company to start a road-railer service by next month.

Road-railers are specially designed trailers that have wheels to operate both on road and rail tracks, helping transport goods from door to door. A string of such trailers is used to form a rake, which is then pulled using a locomotive, to move it from one place to their destination. After reaching the destination, these trailers can be separated from each other and can be driven off to respective areas of the city.

This is part of the roll-on, roll-off (RORO) system that Union minister Suresh Prabhu announced during the presentation of the Railway Budget 2016-17 on Thursday. Senior official said once launched, the facility will be the first of its kind in the country.

One rake will comprise 50 trailers, which has been developed at a cost of Rs 10-15 crore. Senior officials said that the initiative would help bring down the level of pollution caused by diesel-operated vehicles. The service would revolutionise the concept of transportation as it is a "new form of rail service with added speed, better safety and more economical operations", officials claimed.

"This would be like a train coming to our doors. Road-railer is a bimodal transportation product, which operates as a covered wagon on rail while on road; the same unit operates as a semi-trailer. It provides seamless

### RAILWAY ON GREEN TRACK

**1** India's first road-railer service likely to be operational in the Delhi-Chennai sector by next month

**2** Govt claims this will be the first bimodal door-to-door rail service in Asia

**3** Developed by Kirloskar Pneumatic Company (KPCL)

**4** Max speed limit 100 kmph

**5** A train of 50 road-railer units costs ₹10-15 crore

#### HOW IT WORKS

➤ A road-railer (trailer) unit collects goods from designated consignor's place, a factory or a warehouse

➤ All units loaded with cargo are then brought to a rail terminal to form a road-railer train

➤ The rail-road wheel sets attached to the aft portion of the trailer are lowered pneumatically, enabling them to move on the track

#### BENEFITS

➤ Faster transportation

➤ Reduction in pollution

➤ Reduction in fuel consumption

➤ Decongestion of roads & highways



door-to-door transportation of goods because it does not require any handling or trans-shipment at rail terminals. Road-railer will be able to serve even in the remote areas, where rail access is not possible," said Arun Arora, divisional railway manager of Delhi division, Northern Railway.

He said that earlier there were a number of logistic arrangements to be made to transport goods from one place to another. "Now, we can get rid of such time-consuming things," Arora added.

Officials said the initiative will help in reducing pollution caused by heavy diesel trucks moving on long routes. They said that road-rail-

ler would also lead to a reduction in fuel consumption, that could help save foreign exchange.

"The project is being jointly launched by the Indian Railways and KPCL under public-private partnership (PPP) mode, and the first service will commence shortly in the Delhi-Chennai sector. Railways is responsible for hauling of train and provide its underutilized terminals while KPCL is responsible for development of technology, investment in rolling stock, modification of terminals and marketing. After the pilot project, the railways will formulate a general policy on road-railer operation," the DRM said.

The Times of India, Delhi dated  
February 27, 2016

## Now, 3D cyberforests to study climate change

**Washington:** Scientists have created 'cyberforests' — computer simulation that grows realistic 3D forests down to the branches, leaves and roots of individual trees — to determine how drought, wildfires and other climate-related changes may affect real forests.

The model, called LES, uses computing power to grow 100x100-metre stands of drought and shade tolerant trees that can then be scaled up to actual forest size.

"It is a tool that forest managers can use to create 3D repre-



**DIGITAL POWER:** The computer simulation grows realistic 3D forests down to the branches, leaves and roots of individual trees

sentations of their own forests and simulate what will happen to them in the future," said Niko-

lay Strigul, assistant professor at Washington State University (WSU) Vancouver in the US.

It is the only forest-growing simulator that creates intricate root systems and canopy structures for each tree. Previous forest simulators could either grow one or the other.

Below ground, the roots of different trees in LES compete for water resources in each pixel of the model. Above ground, the leaves in each tree's canopy compete for sunlight.

Over time, the trees' cano-

pies change shape to expose their leaves to more sunlight.

The researchers used a combination of data from the US Department of Agriculture's Forest Inventory and Analysis Programme and other forestry databases, as well as aerial reconnaissance from Unmanned Aerial Vehicles (UAV) or drones, to customise their model to particular forests.

The simulator lets scientists project how changing climate conditions will impact forests over thousands of years. *PTI*



*The Times of India, Delhi dated  
February 28, 2016*

## Emission norms for bikes to get tougher

Dipak.Dash@timesgroup.com

**New Delhi:** Ending speculation, the government has issued draft notification for stricter emission norms (BS-VI) for all categories of vehicles, including two-wheelers and three-wheelers, which will come to effect from April 1, 2020. The road transport ministry has gone ahead with stricter norms for two-wheelers, which will be on a par with emission standards set in Europe.

At present, the nitrogen oxide (NOx) emission limit for a BS-IV petrol car is 0.08 gram/km, while for a two-wheeler it is 0.39 gram/km. BS-IV norms for two-wheelers have been notified and will become effective from April 2016 for new models and April 2017 for the existing models.

But once the BS-VI emission norms are enforced, the NOx emission will be limited to 0.06 gram/km and it will be equivalent to Euro norms. Long-term NOx exposure may decrease lung function and increase the risk of respiratory symptoms. According to studies, most of the NOx pollution in cities come from motor vehicle exhaust. The decision gains importance



Norms for two-wheelers will be at par with emission standards in Europe

considering the findings of certain studies pointing at more pollution being caused by two-wheelers in cities, including Delhi.

On January 25, TOI had first reported how the emission norms for two-wheelers was being tightened since at least 80% of all types of vehicles sold annually in India fall under this category, which emit nearly four to five times more oxides of nitrogen (NOx) than petrol cars. Of the 1.97 crore vehicles sold in India in 2014-15, two-wheelers accounted for 1.6 crore. The trend was almost similar between 2013 and 2014. All these years, the government has been enforcing lenient emission norms for the two-wheeler manufacturing industry.

*The Times of India, Delhi dated  
March 01, 2016*

## Going clean comes at a green cost, solar is sunny side up

TEAM TOI

**P**ower tariff will go up by 10-15 paise per unit on doubling of clean energy cess on coal to Rs 400 per tonne, even as it is rechristened 'Clean Environment Cess'.

Tariff will go up as the average price of supplies from Coal India, the main supplier for nearly all the coal-fired power stations, will increase by 20%.

Higher cess is expected to improve attractiveness of solar projects but will have a negative impact on Coal India



POWER POINT

amid falling global prices.

On a positive note, Sterlite Grid chief Pratik Agrawal said the revised tax framework on infrastructure trust would exempt distributions by SPVs to infrastructure trusts from dividend distribution tax (DDT). "The final changes announced in the budget will put into effect the original idea of granting DDT exemption to listed infrastructure trusts. This amendment will ensure there is single level taxation, thereby making the structure tax and cash flow efficient," Agrawal said.

## Sops On Cards for Junking Old Four-wheelers

A draft policy for modernising fleet has been readied to encourage scrapping of polluting vehicles

Rajat.Arora@timesgroup.com

**New Delhi:** The road transport and highways ministry has prepared a draft voluntary vehicle fleet modernisation policy for four-wheelers older than 12 years.

As per the policy, anyone voluntarily scrapping his pre-Bharat stage II vehicle (older than 12 years) will get up to 15% discount (including manufacturer discount and rebate on excise duty) on new vehicles. Both commercial and passenger vehicles will be covered in this policy and government will give certificates of discounts those scrapping their old vehicles. Those certificates could be produced at the time purchasing new vehicles. The roads ministry will also certify the scrapyards for old vehicles, a senior government official said.

**Road transport & highways minister Nitin Gadkari has given his final nod to the policy**

In phase-II, government will provide similar incentives to owners of old two-wheeler vehicles as well. In India, there are over 40 lakh Pre BS-II four-wheeler vehicles in both commercial and passenger segment. With two-wheeler, the total goes to almost one crore vehicles that are older than 12 years. "We'll be proposing a 60% rebate on excise duty to finance ministry for people going for modernisation of their fleet. A draft policy would soon be made public for comments from stakeholders," a senior government official said.

Pre-BS II vehicles are almost 10 times more polluting than BS V vehicles, a transport ministry study has found. "It's a multi-ministry exercise so it could take some time. But roads ministry has finalised it from its side. It will now be taken up with finance, law and environment ministries," the official added. Road transport and highways minister Nitin Gadkari gave his final nod to



FILE PHOTO

### Time to Switch to Green Lane

**THOSE WHO** scrap pre Bharat stage II vehicle (older than 12 years) will be given discount certificates

**THESE CERTIFICATES** have to be produced at the time of buying new vehicles to avail 15% discount

**BOTH COMMERCIAL** and passenger vehicles will be covered in this policy

**IN PHASE-II** govt will offer similar incentives to owners of old two-wheeler vehicles

**PRE-BS II** vehicles are almost 10 times more polluting than BS V vehicles

the policy on Wednesday.

The government has already held several meetings with auto companies on the upcoming policy. Earlier, the policy was only being made for commercial vehicles but now it will cover passenger vehicles as well since it will be mandatory. According to a senior government official, such policy would not only reduce pollution by 80% but will also increase sales of auto companies by almost 30%. The government has already notified April 2016 as the date for implementation of environment friendly Euro VI norms.



Deccan Chronicle, Hyderabad  
dated March 04, 2016

# GHMC, SCB fight junk wars

■ Cantonment Board questions GHMC's ₹27 lakh fee per month to dump waste at Jawaharnagar yard

COREENA SUARES | DC  
HYDERABAD, MARCH 3

The Secunderabad Cantonment Board and GHMC are fighting over a dumping yard. The SCB had earlier been dumping its entire waste on land belonging to the Board at Turkapally.

However, the area MLA protested and the property was seized following resistance by locals. Currently, the SCB pays GHMC to collect its waste and dump it at Jawaharnagar dumping ground. The SCB, however, has asked why it should pay for garbage collection and dumping when its land has been seized. It wants land in exchange of the seized property or space in Jawaharnagar.

The standoff between the two civic bodies had

■ The SCB demanded that the state provide land in exchange or provide it another dumping yard due as it is not responsible for colonies that came sprung at Turkapally

been going on for months, which resulted in Malkajigiri MLA C. Kanaka Reddy staging a protest to stop dumping of SCB garbage in the Turkapally trench. As colonies under the Malkajigiri are adjacent to the Turkapally yard, the MLA and residents protested dumping of garbage there and had directed the SCB to dump garbage at Jawaharnagar. This was not to the liking of SCB as the Turkapally yard is within its limits. M. Devender, sanitary

superintendent of SCB, said, "Turkapally trenching area is a notified centre, spread over 18 acres and is viable and well equipped for waste management. Jawaharnagar in GHMC limits is 30 km away and it is a costly affair to pay ₹27 lakh per month to the GHMC. Why should we do that when our own Turkapally yard is available to us in our jurisdiction? We can dump garbage at Jawaharnagar if no charges are levied by the GHMC. The SCB is not responsible for colonies coming up near Turkapally."

The issue came up for discussion during a SCB meeting on February 27. The ward members demanded that the state should provide land in exchange or provide SCB a separate dumping yard.

## THE KEY IS SEGREGATION

SEGREGATING GARBAGE AT HOMES AND KEEPING THEM IN THE BINS PROVIDED CAN HELP IN KEEPING THE CITY CLEAN



4,000

■ Metric tonnes of waste is produced in the twin cities every day which needs to be disposed

■ Wet waste should be collected in green bins and dry waste in blue bins before it is given to the waste collectors who come to your home

2,000

■ Garbage carrying tippers can carry segregated wastes. They are beginning to operate within Hyderabad limits

## No action taken on Ramky contract

DC CORRESPONDENT  
HYDERABAD, MARCH 3

The state government has not proceeded any further regarding terminating Ramky Group's contract for disposal of garbage in Greater Hyderabad.

The Chief Minister in June 2015 had announced that the government would scrap the contract and take over the disposal, which is currently done by the Ramky Group.

Due to the GHMC elections held in February this year, the government had kept the decision on Ramky pending.

The GHMC had

entered into an agreement with Ramky in 2008.

However, this had been largely objected to by the municipal unions. Door-to-door collection of garbage and transportation is, however, being done by the GHMC.

A senior official of the municipal administration and urban development department said, "The state government has now streamlined the process of door-to-door collection with the two-bin policy and specialised auto tippers. While the legal team has to study the agreement before scrapping it, the government should first chalk out an alternative to deal with garbage disposal."

## No solution for waste collection

DC CORRESPONDENT  
HYDERABAD, MARCH 3

The GHMC authorities are themselves disappointed with the garbage collection method in the city.

The problem lies with both the public and the sanitation workers, they say. Many do not follow the segregation rule at home while the sanitation workers too don't insist on it.

In several colonies the specialised vehicles do not transport garbage and the old, blue tricycles are still used. Also, 44 lakh bins are yet to be distributed.

Ms Kanika Gupta of Sainikpuri said, "My family segregates waste at home. The green bin is used for kitchen waste and plastics go in the blue one. But we get the blue tricycle, which is not specialised to accept segregated waste. Contents of both the bins are dumped into the vehicle and our efforts are wasted. The sanitation worker says

they are yet to get the specialised vehicle."

Meanwhile, complaints of garbage being burnt continue to pour in. GHMC commissioner B. Janardhan Reddy, during a recent meet with the mayor and corporators had said that door to door garbage collection was not up to the mark. "Involvement of citizens and Residential Welfare Associations will help the GHMC take up the civic works, the door-to-door garbage collection is not up to expectations. Proper awareness is needed for the people and the sanitation staff," he added. The GHMC has appealed to residents who got the bins to follow the two-bin policy as the state government has spent ₹41.40 crore to procure the bins. Tippers will transfer garbage to transfer stations where waste will be collected in two piles. Segregated waste will then be transported to Jawaharnagar.



READER REPORTS

DC reader Spandana Jagtap sent us this photograph of an impaired garbage van that was spilling garbage all along its journey on people and clean roads.



6 The state government has now streamlined the process of door-to-door collection with the two-bin policy and specialised auto tippers. The legal team has to study the agreement before scrapping it

OFFICIAL IN MAUD



The Economic Times,  
Delhi dated 04  
March, 2016

# Chandigarh May Make Solar Rooftops Must

All houses and buildings occupying plots larger than 100 square yards to install plants

Kaavya.Chandrasekaran  
@timesgroup.com

**New Delhi:** Chandigarh may soon make solar rooftop plants mandatory for all houses and buildings occupying plots larger than 100 square yards in a first of its kind clean energy drive in the country. A notification to this effect is expected shortly, said Santosh Kumar, director of Chandigarh Renewable Energy Science and Technology Promotion Society (CREST), an arm of the union territory's department of science and technology.

CREST is in talks with Chandigarh administrator Kaptan Singh Solanki to get the urban planning department to issue a notification to this effect. "They are likely to issue it within this month," said Kumar.

According to the proposal, houses on plots of 100-500 square yards will have the option to install either a 1 kW solar plant or a 100-litre solar heating system. Larger houses will have no such choice. Those on plots of 500-1,000 square yards must set up solar rooftops of 1 kW, while those on 1,000-3,000 square yards will need 2 kW solar plant and those above 3,000 square yards must set up 3 kW solar plant.



FILE PHOTO

A 1 kW solar plant would generate 4-4.5 units of power a day. Haryana had passed a similar order in early 2015, but only for new buildings occupying more than 500 square yards. Chandigarh has gone a step further by making it applicable to all buildings, old and new. While no new house or building will be given a completion certificate unless it has a rooftop solar plant installed, existing buildings will need to comply with the new requirement within two years.

"The idea is that everyone should do it. The focus will be on residential buildings," said Kumar. "Houses on plots of the size of 500 square yards, say, are worth Rs 2-3 crore. People owning such houses can surely afford to put up a solar rooftop plant," he said. A 1 kW solar plant costs around ₹85,000. The Union

ministry of new and renewable energy provides a 30% subsidy for rooftop solar panels, which would bring the price down to around ₹60,000. This subsidy, however, does not extend to industrial and commercial establishments. The Chandigarh administration is not providing any additional incentive. However, the subsequent reduction in the building owner's power bills will cover the entire capital cost within a few years, Kumar said.

If the rooftop plant of any building produces surplus power it can be sold to the grid at Rs 8.51 per unit. "That is the tariff till the end of the current financial year," said Kumar. "After March this could be revised by the Joint Electricity Regulatory Commission." Currently, Chandigarh has an installed capacity of 6.5 MW of rooftop solar. Another 3

MW is expected to be installed in the next three months. However, these plants are almost exclusively on government buildings, including 58 schools and 10 colleges. Very few private homes and commercial buildings have installed such plants.

Kumar wants it changed. "If solar targets are to be achieved, there must be active participation by the states," he said. "We want Chandigarh to have around 100 MW of rooftop solar capacity by 2022," he said. India has set itself a target of 100,000 MW of solar power by 2022, including 40,000 MW of rooftop solar. Its success will depend on government policies and how strictly they are implemented.

The experience in Haryana so far does not inspire confidence. Shaurya Bajaj, analyst at solar energy consultancy Bridge to India, recently noted in a blog post that despite the government order Haryana's current solar rooftop capacity is just 17 MW.

"This is nowhere close to the target the policy had initially envisaged," he said. "The reasons for this could be unavailability of net metering connections and/or lack of information available to consumers about how to comply with the regulation," Bajaj said.

The Times of India,  
Delhi dated  
March 06, 2016

# Now, Metro hit by rising pollution

DMRC Upgrading Its OHE Set-Up To Improve Reliability Of The System

Rumu.Banerjee  
@timesgroup.com

**New Delhi:** Believe it or not, the rising pollution levels in the city have taken a toll on the Metro infrastructure. DMRC has had to redesign its electrical overhead equipment (OHE) set-up for the phase III to withstand the increasing pollution. Its spokesman Anuj Dayal said, "Heavy pollution in Delhi and the rest of NCR has been posing challenges in reliable maintenance of power supply system."

To improve the reliability of the system, DMRC is upgrading its OHE set-up. According to Dayal, Delhi Metro had conducted a pollution mapping of the localities through which the Metro network goes. The survey by the Bengaluru-based Central Power Research Institute had identified 22% of the areas as "very heavily polluted" while another 76% were found to be "heavily polluted". The survey, which was done in 2014-15, also showed that most of the "very heavily polluted" areas were located near the Yamuna or near industrial areas like Azadpur and Kirti Nagar.

The high pollution levels had an impact on the running of the trains, said Dayal. "Due to pollution, a conductive layer of pollutants is formed on the surface of the insulators, resulting in increased leakage of current and sometimes, flashovers on the

## BAD AIR THROWS YOUR GREEN RIDE OFF TRACK

► By conservative estimates, Delhi Metro has in the last 10 years taken nearly 4 lakh vehicles off the roads, cutting annual fuel consumption by 2.76 lakh tonnes and reducing pollutants by 5.8 lakh tonnes a year. However, the Metro service itself is not insulated from the ills of pollution.

### HOW POLLUTION AFFECTS METRO

- Pollution leads to disruptions in the overhead equipment (OHE) that powers the trains
- Pollutants form conductive layers on the surface of insulators
- These result in leaking of currents and tripping of power supply



### MAGNITUDE OF CHALLENGE

OHE network covers approx 200 km

In phase III, the another 150 km of OHE to be added

Two-third of the network is on elevated corridors, using flexible OHE. The rest is in tunnels, using rigid OHE system

### THE STUDY

- For phase III, DMRC got a pollution mapping done by Central Power Research Institute, Bangalore, in 2014-15

### RESULTS

22% areas in Delhi/NCR are 'very heavily polluted'

76% 'heavily polluted'

### VERY HEAVILY POLLUTED AREAS

Locations surrounding Yamuna area and industrial areas

Line 1 | Mansarovar Park-Shahdara; Shastri Park-Kashmere Gate  
Line 2 | Azadpur-Jahangirpuri

Line 3/4 | Kirti Nagar-Moti Nagar  
Line 5 | Rajdhani Park - Nangloi Railway station

### LOOKING AHEAD

- In Phase-III, DMRC will put in place special measures to tackle pollution
- These include sturdier insulators; aluminium cantilevers, instead of galvanised steel ones; copper magnesium wires, instead of alloy; and doing away with booster transformers

insulators and tripping of power supply," added Dayal. This obviously led to delays in trains.

In phase III, the Delhi Metro is now planning to change the set-up of the OHE in order to protect it from the corrosive pollution levels. "For instance, we will have higher creepage distance (shortest distance between

the metal parts at each end of the insulator) in the OHE in place of the current ones, which will help in avoiding unwanted trippings or flashovers," said Dayal.

DMRC will also use aluminium cantilevers instead of galvanised steel cantilevers to hold traction wires. "Aluminium offers higher resistance to pollutants as compared to gal-

vanised steel," said Dayal. Even the material of the wires which supply the power to the trains will be changed, he said. Copper magnesium for one set of wires will be used, while copper silver wires will be used for another set. Copper silver wires, said Dayal, have "inherent advantages of better reliability".

The decision to overhaul

the OHE comes as an additional 150km of overhead electrification will be added to the network in phase III. At present, there are 200km of OHE in the system. While two-thirds is elevated, using flexible OHE, one-third is underground with a rigid OHE system. The OHE is the system through which power is supplied to the trains to run.



The Times of India, Lucknow dated March 09, 2016

## Solar energy to power villages, all the way from US

TIMES NEWS NETWORK

**Lucknow:** The US-based Rockefeller foundation has knocked on UP's doors for electrifying 1,000 villages by setting up mini-grids powered by solar energy. The development comes almost a week after the state government gave its nod to a mini-grid policy that aims to provide electricity to the rural households.

Rockefeller has tied up with Gurgaon-based OMC Power — the company that specialises in small-scale power plants with renewable sources — to invest US \$ 4.5 million (around Rs 30 crore) for retro-fitting of 100 solar power plants with mini-grids in rural Uttar Pradesh.

A mini-grid is a decentralised power distribution infrastructure meant essentially for the rural areas where power access is either unavailable or inadequate.

Ashwin Dayal, vice-president of Rockefeller Foundation, said there was a need to invest in off-grid energy access that can power both domestic and business activities. "We can subsequently en-

courage the growing pool of renewable energy financing," he said. OMC managing director Rohit Chandra dittoed: "There is a quest to bring affordable and reliable power to millions of power-deprived people."

While the BJP-led NDA government at the centre has been projecting an ambitious target to provide "power to all by 2022", the ruling Samajwadi Party government in UP has been claiming of increasing power supply to urban and rural pockets up to 24 and 16 hours respectively by October later this year.

Both the centre and the state government have been giving ample thrust to promotion of solar power. The centre came up with National Solar Mission. Soon, the UP government chipped in and announced a mini-grid policy. The policy makes way for private developers to get subsidy from the state government. The impetus on solar energy stems from acute shortage of power generated from conventional sources like coal fired thermal power plants.

The Times of India, Delhi dated March 11, 2016

## Found: A way to make plastic from CO<sub>2</sub> & agricultural waste

**Washington:** Scientists, including one of Indian origin, have discovered a new way to make plastic from carbon dioxide and agricultural waste and grasses, that may dramatically lower carbon footprint of the plastic industry.

The new technology could provide a low-carbon alternative to plastic bottles and other items currently made from petroleum, researchers said.

Many plastic products are made from a polymer called polyethylene terephthalate (PET), also known as polyester. "The use of fossil-fuel feedstocks, combined with the energy required to manufacture PET, generates more than four tons of CO<sub>2</sub> for every ton of PET," said

Matthew Kanan, a professor at Stanford University. Researchers, including graduate student Aanindeeta Banerjee, focused on an alternative to PET called polyethylene furandicarboxylate (PEF). PEF is made from ethylene glycol and a compound called 2,5-Furandicarboxylic acid (FDCA). "PEF is an attractive replacement for PET, because FDCA can be sourced from biomass instead of petroleum," said Kanan. The researchers have been experimenting with furfural, a compound made from agricultural waste that has been widely used for decades. About 400,000 tons are produced annually for use in resins, solvents and other products. *PTI*

### GO GREEN

Matthew Kanan, a professor at Stanford University

Researchers, including graduate student Aanindeeta Banerjee, focused on an alternative to PET called polyethylene furandicarboxylate (PEF). PEF is made from ethylene glycol and a compound called 2,5-Furandicarboxylic acid (FDCA). "PEF is an attractive replacement for PET, because FDCA can be sourced from biomass instead of petroleum," said Kanan. The researchers have been experimenting with furfural, a compound made from agricultural waste that has been widely used for decades. About 400,000 tons are produced annually for use in resins, solvents and other products. *PTI*

The Times of India, Delhi dated March 10, 2016

## 30 years on, Chernobyl still poisoning lives

Food And Water In Affected Region Continue To Be Contaminated With High Levels Of Radiation

**Moscow:** Economic crises convulsing Russia, Ukraine and Belarus mean testing in areas contaminated by the Chernobyl nuclear disaster has been cut or restricted, Greenpeace said, and people continue to eat and drink foods with dangerously high radiation levels.

According to scientific tests conducted on behalf of the environmental campaigning group, overall contamination from key isotopes such as caesium-137 and strontium-90 has fallen somewhat, but lingers, especially in places such as forests.

People in affected areas are still coming into daily con-

tact with dangerously high levels of radiation from the April 1986 explosion at the nuclear plant that sent a plume of radioactive fallout across large swathes of Europe.

"It is in what they eat and what they drink. It is in the wood they use for construction and burn to keep warm," the Greenpeace report, entitled 'Nuclear Scars: The Lasting legacies of Chernobyl and Fukushima' says.

The research report published on Wednesday said Ukraine "no longer has sufficient funds to finance the programmes needed to properly protect the public... this means the radiation expo-



The damaged fourth reactor at the Chernobyl nuclear power plant in Ukraine. A Greenpeace report says that Ukraine no longer has funds to finance the programmes needed to protect the public from exposure

sure of people still living in the contaminated areas is likely increasing".

Ukraine is suffering economic hardship, worsened by

a pro-Russian insurgency in its eastern territories, while Russia and Belarus are also experiencing financial pressures. The report found that

in some cases, such as in grain, radiation levels in the contaminated areas — where an estimated 5 million people live — had actually increased.

"And just as this contamination will be with them for decades to come, so will the related impacts on their health. Thousands of children, even those born 30 years after Chernobyl, still have to drink radioactively contaminated milk," the report says. Russia's ministries of health and natural resources did not immediately respond to a request for comment on the report. In Ukraine, the health, agriculture and ecology ministries did not immediately respond.

Greenpeace said it had also conducted tests in areas contaminated by the 2011 Fukushima disaster in Japan. It added that the Japanese government's decontamination efforts had so far been inadequate and left the door open to recontamination of areas deemed to have been cleaned. Long-term exposure to radiation can lead to severe illnesses. Doctors in the areas worst affected by Chernobyl have long reported a sharp rise in certain cancer rates.

Victor Khanayev, a surgeon in Russia, said many people were too poor to ensure they only ate food that was not contaminated. *REUTERS*



*Deccan Chronicle, Hyderabad  
dated March 12, 2016*

# Greens support TS waste power

■ Private sector role in garbage handling

DC CORRESPONDENT  
HYDERABAD, MARCH 11

Coming out in support of waste-to-energy plants, environmentalists on Friday urged the Electricity Regulatory Commission to see the private promoters are not treated as commercial entities but as a solution to 90 per cent of the garbage disposal problem.

The city generates nearly 4,000 metric tonnes of garbage daily, and the rest of the state another 3,000 metric tonnes. Providing higher tariff for power generated from municipal solid waste will allow these plants to sustain themselves and reduce pollution, Ms Alia Khatoon, an environmentalist and activist of Basti Vikas Manch, told DC after making a submission to the TSERC at the public hearing on Friday. "Or else, the government should set up its own waste-to-energy plants and deal with municipal solid waste," she said.

Mr Gade Venkatesh, environmentalist and activist working in the municipal solid waste management sector, said the cost of setting up a waste-to-energy plant is about ₹10 crore per MW. "By supporting such power plants, more money can be saved as ULBs don't need to spend on collection, segregation and transportation, compared to higher tariff, if given," he said.

Advocates and consultants appearing for

## Kodanda bats for power staff

DC CORRESPONDENT  
HYDERABAD, MARCH 11

Telangana Joint Action Committee convener Prof. M. Kodandaram on Friday urged Electricity Regulatory Commission chairman Ismail Ali Khan to reconsider its letter that restricted participation of power utility employees in its public hearings.

Based on the letter, Transco had issued a memo cautioned its employees of departmental action if the commission's advisory was not followed.

Sources said Transco had issued the memo mainly to silence its senior employee K. Raghu, TS Electricity Employees Union leader, as he has been questioning the



M. Kodandaram

loopholes in the power purchase agreements and the higher cost at which power was being purchased by TS discoms.

In his letter to Mr Khan, Prof. Kodandaram said employees do not have any avenue to express their opinions on the policy. "Denying an opportunity to such a group would be a loss to society at large and power utilities in particular," he said.

Shalivahana and Hema Sri, the two waste-to-energy plants that are operational in TS, and several other firms whose plants are in the pipeline, said the Central Electricity Regulatory Commission had suggested a tariff of over ₹7 per unit of energy generated from municipal waste.

Considering the costs involved in setting up plants, segregation, col-

lection, transportation, processing, landfill facility sites etc., the ERC should consider fixing the maximum tariff as per the CERC guidelines, they added.

Commission chairman Ismail Ali Khan and member (technical) L. Manohar Reddy observed during the hearing that they needed to ensure that the tariff hike burden was not more on the consumers.

*The Times of India, Delhi  
dated March 12, 2016*

## Air pollution tied to top two causes of death in India

TIMES NEWS NETWORK

New Delhi: Air pollution is an important risk factor for top two causes of death in the country—ischemic heart disease and chronic obstructive pulmonary disease—health minister J P Nadda told Lok Sabha on Friday.

Nadda said water and soil pollution were associated with acute diarrhoeal diseases, typhoid, cholera, gastroenteritis, worm infestations, hepatitis and others. "Air pollution is one of the several risk factors in occurrence of such acute respiratory conditions (childhood pneumonia, bronchial asthma), chronic respiratory diseases, lung cancer and cardiovascular diseases," he said.

In an assessment made during the World Health Assembly last year in Geneva, WHO for the first time discussed the impact of air pollution on health. The UN agency estimated that one in eight deaths around the globe was due to the same. Nadda said the government has taken various measures to prevent diseases caused by pollution, including provision of safe drinking water.

*Deccan Chronicle, Hyderabad  
dated March 14, 2016*

## Green Tribunal wants ban on micro-plastics

DC CORRESPONDENT  
NEW DELHI, MARCH 13

Hearing a plea that sought the ban on use of micro-plastics in cosmetic and body care products, the National Green Tribunal (NGT) has issued notices to the ministries of environment and water resources asking them to respond on the matter.

The use of micro-plastic is said to be extremely dangerous for aquatic life and environment.

A bench, headed by NGT chairperson Swatanter Kumar, sought the Centre's reply on the next date of hearing, April 18.

■ The plea sought ban on the use of microbeads or micro-plastics in the manufacture, import, sale of various cosmetic or personal care products and imposition of fines on the defaulting companies causing environmental pollution

Micro-plastics are plastic pieces or fibres measuring less than five millimeters, which are extensively found in personal care products.

During the hearing, the bench asked advocate Sumeer Sodhi whether the matter is

covered under Drugs and Cosmetics Act and how does the issue comes under the jurisdiction of the Tribunal.

To this, the counsel replied that these micro-plastics are plastic pieces or fibres, according to recent United Nations reports, are dangerous for the aquatic life and the environment.

"Due to the unregulated production and usage of plastics in micro beads in various cosmetic products available in the market and the excessive usage of such products by the end users is leading to water pollution across the globe," the plea said.



Deccan Chronicle, Hyderabad  
dated March 15, 2016

## LOOSE SYSTEM

# Pollution check takes backseat

■ Carbon emissions rise since 1990

M. ROUSHAN ALI | DC  
HYDERABAD, MARCH 14

Environmentalists have blamed traffic cops for not looking into vehicular pollution that affects the health of all — motorists and non-motorists — as they have been focussing on helmetless driving. They feel the police is neglecting the pollution aspect.

Expressing concern over the rising pollution, environmentalists said state government agencies like traffic police, RTA and PCB should act with "efficiency and force" before the situation turned worse. Citing a recent study by the Central pollution control board, they said as high as 212 tonnes of carbon monoxide (CO) is produced a day in the city from vehicular emissions. This was against the 126 tonnes in the late 1990s. "The situation is not better with hydrocarbons too causing global warming. Particulate matter increased from 1.94 tonnes to 11.9 tonnes a day over the last two decades," they said.

Environmentalist K. Purushotham Reddy said, "The traffic police is not equipped to tackle vehicle pollution. 'Of late, no traffic cops is found checking for pollution certificates,' he said.

Environmentalist S. Jeevanand Reddy said the policy of phasing out of vehicles older than 15 years has not been implemented. Over 8,00,000 such vehicles were polluting the city.

"The RTA, PCB and traffic officials should take the blame for roadside mobile pollution checking units turning into mere certificate issuing centres," he said.

TS pollution control board senior scientist N Ravinder admitted that vehicular pollution was on the rise and that the air quality index at high traffic density corridors like Punjagutta was over 150. He said traffic cops, PCB and RTA officials would jointly work to curb vehicle pollution.

## VEHICULAR POLLUTION



■ In all, there are over 45 lakh vehicles in Greater Hyderabad.

■ Of this over 8 lakh are more than 15-year old vehicles.

■ In 2014, over 7.50 lakh new vehicles were registered with RTA offices.

■ In 2015, 7.98 lakh new vehicles were registered.

In ongoing special drive against helmets, every day about 10,000 cases being booked manually and e-challan way.

### TRAFFIC COPS BOOKED CASES FOR NOT HAVING PUC.

2013: 1,603 cases were booked.

2014: 4,250 cases booked.

2015: 13,651 cases booked.

## Pollution check to turn modern

DC CORRESPONDENT  
HYDERABAD, MARCH 14

Road Transport Authorities in cooperation with officials of Pollution Control Board, Traffic Police and Telangana State Technical Services will soon invite tenders for replacing existing roadside mobile vehicular pollution testing units with the latest equipment.

The new system is proposed to be linked with the master servers of RTA and traffic cops to know which vehicle has undergone the pollution test and its validity. Additional commissioner of police (Hyderabad Traffic) Jitender said the existing road-side mobile pollution checking units will either be updated or

replaced with latest four-gas based analysers and connected on-line with traffic and transport department servers.

This will allow enforcement personnel to cross-check on their cellphone whether the vehicle being checked is within pollution control norms. "Existing units with two-gas analysers have become outdated," he admitted.

Deputy commissioner of police (traffic) Mr A.V. Ranganath said they are also going to purchase hand-held equipment to be carried by traffic cops allowing them to check the pollution being spewed by vehicles on the spot.

"We will strictly enforce pollution control norms for vehicles," he added.

The Times of India, Delhi  
dated March 15, 2016

## Biodegradable polymer grafts to help repair spinal column

Washington: Scientists have developed biodegradable polymer grafts that, when surgically placed in damaged vertebrae, can grow to be just the right size and shape to fix the spinal column.

"The overall goal of this research is to find ways to treat people with metastatic spinal tumours," said Lichun Lu of Mayo Clinic in US. "The spine is the most common site of skeletal metastases in cancer patients, but unlike current treatments, our approach is less invasive and is inexpensive," said Lu.

Researchers started by cross-linking oligo (poly fumarate) to create a hollow hydropillic cage — the scaffold of the graft — which could then be filled with stabilising materials, as well as therapeutics. "When we designed this expandable tube, we wanted to be able to control the size of the graft so it would fit into the exact space left behind after removing the tumour," Lu said.

The researchers also needed to control the kinetics of the expansion, because if the cage expands too quickly, a surgeon may not have enough time to position it correctly. "By modulating the molecular weight and charge of the polymer; we are able to tune the material's properties," Lu said. ■

The Times of India, Delhi  
dated March 16, 2016

## 'Environment behind 1/4th of global deaths'

The lead in the water in Flint, Michigan, is a devastating reminder of how closely human health is intertwined with the environment. While the Flint crisis may be an egregious example of cruelty and neglect, the damaging consequences of a broken environment are all around us, a new tally by the World Health Organization shows.

Nearly a quarter of all deaths worldwide are caused by environmental risks like polluted air, dirty water, hazardous workplaces and dangerous roads, according to the WHO report. The global health authority estimates that 12.6 million deaths in 2012, or about 23% of the total, were attributable to such factors. The burden is greatest on the poor and the youngest. Mortality from environmental risks is highest in sub-Saharan Africa and low- and middle-income countries in Asia.

The risks disproportionately affect children "because of their innate vulnerability," said Frederica

### Pigeons to track London pollution

A team of sensor-equipped pigeons has taken to the skies over London in order to monitor pollution levels. Pigeon Air Patrol, as the project is known, was created by Plume Labs. The birds carry a device in a lightweight 'backpack', which constantly measures levels of nitrogen dioxide, ozone and other volatile compounds around the city. THE INDEPENDENT

Perera, director of Columbia Center for Children's Environmental Health.

The WHO report — which doesn't count risks such as smoking and diet — focuses on environmental risks that are the product of the societal decisions that shape the world we live in. "Some of these are well known, such as unsafe drinking water and sanitation," the report says.

To get to those numbers, the WHO examined studies on risks for more than 100 types of diseases and injuries. BLOOMBERG



*Deccan Chronicle, Hyderabad*  
dated March 18, 2016

*The Times of India, Delhi dated*  
March 18, 2016

# Biz jets face turbulence of web, climate change

DC CORRESPONDENT  
HYDERABAD, MARCH 17

Given the 21st century pace of internet speeds, the question for the business jet is straightforward — do we really need a jet?

According to a report by Akamai, the worldwide average stands at 5mbps. So given the provisions of technology, the need for austerity and the scientific worries around climate change, should we as a species encourage a mode of transport beneficial for a select few?

Consider the numbers. Reports say of the 15,000 business jets registered in the USA, only three per cent are in use by Fortune 500 firms. This reveals a possibility of world business and sustainability co-existing.

In India, business jet builders account for not over 30 active customers.

We now come to fossil fuels. Planes don't burn fuel in a linear method. Fuel is burnt depending on operating height, range, weather and weight. According to the Air Transport Action Group, the global aviation industry is responsible for two per cent of anthropogenic carbon dioxide emissions. Given how exclusive the market for



Global aviation remains the fastest rising contributor of greenhouse gas emissions

business jets are, they account for just 0.20 per cent of annual worldwide CO2 emissions from burning fossil fuels. But remember this. Aviation is the fastest rising contributor of greenhouse gas emissions.

Planes are also delivering a concoction in emissions directly into the upper reaches of our precious atmosphere. Which is why the Intergovernmental Panel on Climate Change said aviation emissions have about two times the impact as ground-based emissions.

Manufacturers maintain

they are being careful. "The Web turned the world into a global village and sometimes it's important to meet people in the village, rather than a conference call," said Vadim Feldzer of Dassault. The company currently has 22 clients in India.

Another operator handling Indian operations for a manufacturer said, "Makers are increasingly focusing on how to make planes cheaper and cleaner. The latest technologies going into engines address concerns voiced by environmentalists. We have our ears out."

## For 2nd straight year, no rise in CO<sub>2</sub> emissions

Preliminary data shows global carbon dioxide emissions from burning of fossil fuels did not increase for the second straight year in 2015 — a surprising bit of good news related to global warming that's being attributed to growth in renewable energy production, reports Subodh Varma.

While the stagnation indicates the emissions from fossil fuels can be controlled, it does not mean global warming has stalled. That's because there is already excess greenhouse gases in the atmosphere. **P11**

## N-fusion sun in China emits longest pulse at 50 million°C

**Beijing:** In a breakthrough, a 'man-made' sun experiment in China has successfully produced long pulse plasma discharge at a temperature of more than 50 million degrees Celsius — the longest discharge at such a high temperature.

The Experimental Advanced Superconducting Tokamak (EAST), an artificial sun experiment developed by Hefei Institute of Physical Science of the Chinese Academy of Science, realised an ultra-high temperature (UHT) long pulse plasma discharge for 102 seconds as of January.

"An artificial sun can provide limitless clean energy through controlled thermonuclear fusion," Xu Jiannan, from the China Academy of Engineering Physics, told People's Daily Online.

The light and heat of the Sun come from two of hydrogen's radioactive isotopes — deuterium and tritium.

These release a huge amount of energy during the process of fusion into a helium atom. The artificial sun imitates this fusion process. **P71**

The Times of India, Delhi dated  
March 18, 2016

# No rise in CO<sub>2</sub> emissions globally for 2nd yr in a row

## Trend Being Linked To Surge In Renewable Energy Production

Subodh Varma  
@timesgroup.com

In a surprising bit of good news concerning the bleak climate change scenario, preliminary data shows that global carbon dioxide (CO<sub>2</sub>) emissions from burning of fossil fuels did not increase in 2015.

This was the second year in a row when carbon emissions from energy-related use stayed flat.

Burning of fossil fuels contributes nearly two-thirds of all carbon dioxide emissions globally with the rest arising from agriculture, deforestation etc.

While this stagnation is welcome news, and an indication that emissions can be controlled, it does not mean that global warming has stalled. That's because there are already excess greenhouse gases in the atmosphere.

Released by the International Energy Agency (IEA) in Paris on Tuesday, the data pegged 2015 CO<sub>2</sub> emissions at 32.1 billion tonnes, virtually the same as in 2014.

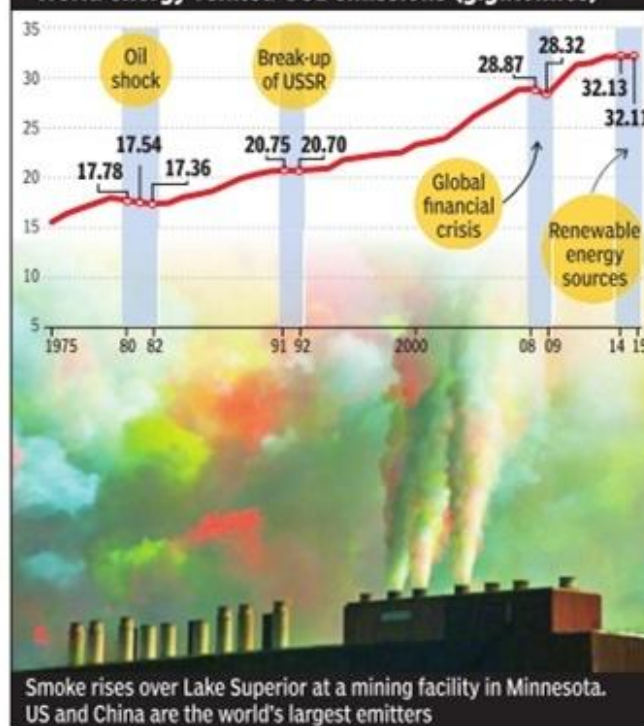
This led several experts to claim that economic growth and emissions are no longer coupled or linked to each other because average global economic growth in these two years was over 3% per year, and yet carbon dioxide emissions were not increasing.

"The new figures confirm last year's surprising

Photo: © Layne Kennedy/Corbis

### GOING FLAT ON GREEN ENERGY

World energy-related CO<sub>2</sub> emissions (gigatonnes)



but welcome news: we now have seen two straight years of greenhouse gas emissions decoupling from economic growth," said the energy agency's executive director Fatih Birol.

In absolute terms, the total carbon dioxide release from energy use in 2015 was more than double what it was in 1975, and over a third more than in 2001. But the average 4% per year rate of growth seems to have been checked.

The main reason for stalling of CO<sub>2</sub> emissions from energy consumption appears to be the surge in renewable energy production, the slowdown in the Chinese economy and replacement of oil with natural gas in the United States. China and the US are the world's largest emitters.

In 2015, 90% of new electricity generation was from renewable sources, with wind energy alone producing half of it, preliminary

date of the International Energy Agency suggests.

In the more than 40 years that the energy agency has been providing information on carbon dioxide emissions, there have been only four periods when emissions stood still or fell compared to the previous year. Three of those occasions — the early 1980s, 1992 and 2009 — were associated with global economic weakness.

But the current brake on emissions increase is the first time that this has happened during a global economic expansion. However, this link is still tenuous as China did slow down from the zooming growth it has enjoyed in previous years.

In China, emissions declined by 1.5%, as coal use dropped for the second consecutive year. In 2015, coal generated less than 70% of Chinese electricity, ten percentage points less than four years ago (in 2011).

Over the same period, low-carbon sources jumped from 19% to 28%, with hydro and wind accounting for most of the increase.

In the US, emissions declined by 2%, as a large switch from coal to natural gas use in electricity generation took place.

In the European Union, too, renewables accounted for 15% of energy generation, up from 11% in 2011, according to a report of the EU released recently.



*The Times of India, Delhi dated  
March 18, 2016*

# Trees adapt to warming, limit CO<sub>2</sub> release: Study

## Plants May Have Smaller Role In Temperature Rise

**Oslo:** Trees can adapt to rising temperatures and limit their natural emissions of greenhouse gases, according to a study published on Wednesday that suggests plants may have a smaller than expected role in stoking man-made global warming.

Trees, plants, people and other animals produce carbon dioxide as a waste product from burning energy. As temperatures rise, trees use more energy in respiration and emit more carbon dioxide from their leaves.

"Plant respiration results in an annual flux of carbon dioxide to the atmosphere that is six times as large as that due to the emissions from fossil fuel burning, so changes in either will impact future climate," scientists wrote in the journal *Nature*.

They found that 10 types of North American trees, in artificially heated outdoor forest plots, adapted to higher temperatures without drastically boosting the amount of carbon produced by their leaves.

"Plants play less of a role than previously thought in speeding up global warming through accelerated respiratory carbon dioxide emissions," lead author Peter Reich of University of Minnesota in the US said.

"Given the number of plants on Earth this is a big deal," he said

Photos: Reuters



**UNDERGROUND REFUGE:** A man has built an underground home in San Isidro de Perez Zeledon, Costa Rica, to stay away from noise pollution and avoid effects of climate change. He started digging through red soil and volcanic rock on his farm 12 years ago to build the subterranean house, between 15 and 63ft underground. The dwelling, he says provides a peaceful and comfortable life for him and his family. The house, which has bedrooms, a dining area, a hallway and bathrooms, now spreads over 185.8 square metres

of their role in the carbon cycle.

Apart from respiration, trees also absorb carbon dioxide to build roots, branches and leaves, and release it when they rot or burn. The study, and other experts, cautioned that the research only focused on respiration by leaves.

Martijn Slot, of the Smithsonian Tropical Research Institute in Panama who was not involved with the study, said respiration was only part of the story.

"Global warming will also affect other plant properties — photosynthesis, growth, mortality and reproduction — and we are a long way from a complete under-

standing of the effects of rising temperatures on any of those processes," he said.

Pierre Friedlingstein, a climate expert at Exeter University, said the study drew too many conclusions from leaf respiration.

In the study, scientists placed heaters, both above the ground and in the soil, around trees and raised the average temperatures by 3.4° Celsius above normal in experiments that lasted from three to five years.

They found the trees raised their respiration by just 5%, against a predicted 23% with no acclimatisation, indicating that trees can adapt to higher temperatures. REUTERS

*The Times of India, Delhi dated  
March 19, 2016*

# Emails, tweets too causing climate change

## High Electricity Consumption By E-Devices Contributes Significantly To Our Carbon Footprint

**Paris:** Even as people world over symbolically dim lights to fight global warming on Saturday, many will join email and social network campaigns that invisibly contribute to climate change.

The 10th edition of Earth Day, organised by the WWF and backed by other NGOs to raise awareness about the threat of climate change, will see landmark monuments — from the Eiffel Tower to the Empire State building to Taipei 101 in Taiwan — go dark at 8.30pm local time.

Individuals are also enco-



**UNDER THE RADAR:** A short email is estimated to add about four grams of CO<sub>2</sub>-equivalent (CO<sub>2</sub>e) into the atmosphere

uraged to participate and adjust lifestyles to trim their carbon footprints, thus incre-

mentally reducing the greenhouse gas emissions that drive global warming.

Biking or carpooling to work, eating less meat, turning down the thermostat a notch in winter; becoming an 'eco-responsible' consumer — these are some of the many ways folks can make a small difference, especially in rich countries with higher per-capita CO<sub>2</sub> emissions.

At the same time, however, a parallel realm of carbon-polluting activity — ranging from email exchanges to social network chatter (tweets, posts etc) to streaming movies on smartphones — has slipped largely un-

noticed under the climate change radar. In isolation, these discrete units of our virtual existence seem weightless and without cost.

A short email, for example, is estimated to add about four grams of CO<sub>2</sub>-equivalent (CO<sub>2</sub>e) into the atmosphere.

By comparison, humanity emits some 40 billion tonnes of CO<sub>2</sub> every year.

But as the digital era deepens, the accumulated volume of virtual messages has become a significant part of humanity's carbon footprint. "Electricity consumption

related to the growth of digital technologies is exploding," notes Alain Anglade of the French Environment and Energy Management Agency. In France it already accounts for more than 10% of total electricity use, he said, a percentage that holds for many developed countries. To see the big picture, it helps to break it down.

Sending five dozen of those four-gram emails in a day from your smartphone or laptop, for example, is the equivalent of driving an average-size car a kilometre. AFP



*The Times of India, Delhi dated  
March 20, 2016*

# Ind vs Pak comes in handy, 229MW saved

TIMES NEWS NETWORK

**New Delhi:** The Earth Hour made the Indo-Pak cricket match experience even more exhilarating, said residents who watched it with friends and family, making sure all other electrical fixtures except the TV remained turned off on Saturday evening.

In fact, the match offered a unique opportunity to save energy in the city as residents from more than a hundred RWAs watched it on bigger screens in their colonies after switching off lights and fixtures at their homes between 8.30pm and 9.30pm. Delhi saved 229MW of power this year compared to 200MW last year. Of this, BSES' share was 207 MW (BRPL: 130 MW; BYPL: 77 MW). But the overall participation seemed to be declining as many felt it was a "token" effort in the face of global warming.

Various colleges, including St Stephen's organised "glow in the dark" match screenings. The Air Force colony in Subroto Park also observed the Earth Hour. Many RWAs used the opportunity to bring residents together—Aralias in Gurgaon, for example, organised a potluck dinner. "The theme this year is 'Go Solar'. I think more people are connect-



**EARTH HOUR:** South block and North block moments before (top) and after (above) lights were turned off

ing with the Earth Hour this year because of the Paris climate deal. They are aware that they need to bring the issue to the fore," said Rituparna Sengupta, senior manager (campaigns), World Wide Fund For Nature, which is behind the global initiative.

"We believe environmen-

tal causes can bring residents together. We sent out WhatsApp messages to more than a thousand residents to observe the Earth Hour and all of them switched off their lights. They watched match on screenings organised by individual RWAs," said A S Gulati, secretary of 80

RWAs in Faridabad. About 200 residents in Ambedkar Nagar watched the match in their colony park.

"The Earth Hour pushed us to organise this common screening. People had fun and cheered together," said Shashi Pal of an Ambedkar Nagar RWA, who invited the

**Last year, Delhi had saved 200MW from the Earth Hour. But the overall participation this year seemed to be declining as many felt it was a token effort in the face of global warming**

residents to join in the green campaign and put up posters to draw their attention. It's the volunteers of 'You're Wonderful' project who mobilised the RWAs over several weeks on this issue.

"The rain in Kolkata dampened the spirit a little because some cafés and restaurants cancelled the screening, thinking the match will not happen. But the plan was to have at least 130 events with participation from more than a hundred RWAs. Whoever we approached was very forthcoming in observing the Earth Hour," said Akash Saxena, a volunteer.

Celebrities like Amitabh Bachchan pledged their support to the cause. Bachchan tweeted, "Support #EarthHour2016, watch #IndVSPak with friends on one screen, join campaign #TogethervsClimateChange".

*The Times of India, Delhi dated  
March 21, 2016*

## Investors May Shun Thermal Projects for Solar Energy

**Increase in coal cess and stricter pollution norms responsible for the preference**

**Debjoy Sengupta**  
@timesgroup.com

**Kolkata:** The private sector may be giving up on greenfield thermal power projects and looking to solar energy instead. Installation and generation costs have risen for thermal plants following an increased coal cess and stricter pollution norms, experts said, adding that are likely to go even higher.

Also, there's uncertainty over coal availability and distribution companies are shying away from announcing power purchase agreements. That could put a dent in the country's plans for large thermal units.

On the other hand, solar power installation and generation costs are expected to fall.

"With solar turning out to be a viable option, ultra-mega power projects might not attract enough interest from private players," said Salil Garg, director, India Ratings & Research. "Banks are reluctant to lend for thermal power projects while most private players have shelved new project plans. They are diverting money into solar power projects. Some of the developers, who were relatively new to the sector and are stuck with existing projects, are trying to exit either on an as-is-where-is basis or are considering completing them and then exiting."

Solar power tariffs, which hit a low of ₹4.34 per unit at a recent project auction, are likely to fall further with a reduction in capital costs and access to competitive funding, according to India Ratings.

Currently, a megawatt of thermal power requires an investment of ₹63.65 crore against ₹55.57 crore

for solar. A new coal-fired unit running at 60% capacity utilisation generates power at ₹4.45 per unit while the lowest tariff quoted by solar companies is ₹4.34 per unit.

The average thermal power tariff at NTPC, is around ₹3.15 per unit while the actual cost of generation ranges from ₹2.5 per unit for old plants to ₹4.50 for new ones. NTPC too is setting up solar power plants.

The Ministry of Environment and Forests (MoEF) recently tightened emission norms for thermal plants, requiring them to retrofit equipment that could cost ₹50,000 to ₹1 crore per MW, depending on their age and efficiency.

"MoEF's new norms, desirable as they may be, will increase costs of thermal power generation, running at 60% capacity utilisation, by at least 60 paise per unit," said Anish De, partner, infrastructure and government services, KPMG India. "The coal cess, which was doubled in the recent budget, will raise power prices at least by another 15

paise per unit."

Water availability is also expected to add to the challenges facing thermal power. Solar power won't be affected by this, experts said.

"Solar prices have been falling on reduced prices of solar photovoltaic cells, which comprise 70% of cost of installations, lower return expectations by investors and lower capital costs for large business houses," said Garg of India Ratings.

Girish Kadam, vice-president, corporate sector ratings, Icra, said: "Solar costs may fall further and the sector may witness faster capacity addition in the near future. However, we assume solar generation mix could touch 8% by 2022 in line with renewable power obligation requirement of the government. Nevertheless, thermal power is needed as base load that will offer stability to the grid since solar power isn't available all day."





*Deccan Chronicle, Hyderabad  
dated March 22, 2016*

## UN: Climate changing at an 'unprecedented rate'

**Geneva, March 21:** January and February 2016 smashed temperature records, the World Meteorological Organisation (WMO) said on Monday as it warned that climate change was advancing at an "unprecedented" rate.

Temperatures in the first two months of 2016 followed a year that broke "all previous records by a wide margin," the UN's weather agency said. The WMO pointed to record 2015 sea surface tempera-

tures, unabated sea-level rise, shrinking sea ice and extreme weather events around the world.

"The alarming rate of change we are now witnessing in our climate as a result of greenhouse gas emissions is unprecedented in modern records," the WMO's new chief, Petteri Taalas, said in a statement.

Dave Carlson, head of the WMO-co-sponsored World Climate Research Programme, said, "the startlingly high tempera-

tures so far in 2016 have sent shockwaves around the climate science community."

The US agency determined that last month was the warmest February since modern records began, with an average temperature that was 1.21 degrees Celsius above the 20th-century average.

The hike in temperatures during the first two months was especially felt in the far north, the agency said.

—PTI

## New genset norms to rein in noise and air pollution

TIMES NEWS NETWORK

**New Delhi:** The Centre has notified norms for gensets running on LPG or natural gas or in combination with diesel or petrol aimed at controlling air and noise pollution that emanate from them.

These standards were recommended by the Central Pollution Control Board after consultations with industries and stakeholders. It will be implemented in all states by their respective state pollution control boards.

"These standards have mandated certification for gensets in terms of 'type approval' and 'conformity of production' for air emission as well as noise emission," said the environment ministry.

The draft standards were issued in July last year for seeking views and comments of stakeholders. "Based on the recommendations of an expert committee, these standards have been notified by the gazette on March 7," said an official. Recently, the ministry had notified improved environmental standards for thermal power plants, common effluent treatment plants and cement and sugar industries.

## Govt notifies environment norms for new gensets

TIMES NEWS NETWORK

**New Delhi:** The Centre has notified stringent environment standards to make cities and towns shift to less polluting and quieter gensets. This is the first time such mandated certifications have been notified for gensets running on LPG or natural gas or in combination with diesel and petrol.

"The primary aim is to control air and noise pollution emanating from the gensets. These standards will be revisited in 4-5 years once air and noise emission quality

### CNG rider ahead of odd-even 2

Only BS-III and BS-IV compliant vehicles will now be eligible for conversion to CNG, an order issued ahead of the second leg of the odd-even scheme in Delhi has mandated. **P2**

data and technological details pertaining to the gensets are available," the environment ministry said.

Manufacturers are required to obtain certification for engine products by empanelled agencies which will help in regulating the unorganised sector. It will also help in curbing illegal import of gensets, which are seen to have higher air and noise pollution levels.

## WATER WOES TO WORSEN BY 2040

**WORLD WATER Day** is held annually on March 22 to focus attention on the importance of freshwater and advocating for the sustainable management of fresh water resources.



**AN INTERNATIONAL** day to celebrate freshwater was recommended at the 1992 United Nations Conference on Environment and Development.

**THIS YEAR'S** World Water Day theme focuses on the central role that water plays in creating and supporting good quality jobs.

### WATER WOES

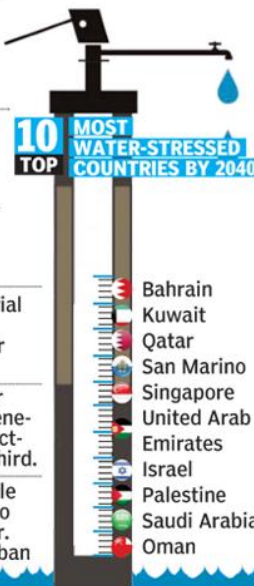
**750 mn** people lack access to clean water, which is over double the population of the United States.

**900** children are killed every day across the world due to dirty water and poor sanitation which causes severe diseases according to UN

**75%** of all industrial water withdrawals are used for energy production.

**2035** By this year the global energy demand is projected to grow by one-third.

**82%** of rural people lack access to clean drinking water, while it is 18% in Urban



### CAN WE TURN SALTWATER INTO DRINKING WATER?

**A TEAM** from Massachusetts has proven that salt water can be converted

**7,950**

It has been testing the system which can remove salt from 7,950 litres of water in 24 hours in villages in India

**90%** per cent of salt water can be converted with an electro-dialysis machine. It's much more than a reverse osmosis system

*The Times of  
India, Delhi dated  
March 23, 2016*



*The Economic Times, Delhi dated 23 March, 2016*

# For sustainable urban infrastructure

Development stands at the heart of India-Japan relationship and India has benefitted greatly from Japan's engagement with its development aspirations

India's urban population is currently around 31% of the total population, but it contributes over 60% of India's GDP. It is projected that urban India will contribute nearly 75% of the national GDP by 2030, according to a study on Smart Cities by Jones Lang LaSalle.

As India evolves from an agrarian economy into one led by more rounded manufacturing and services, a new set of challenges have emerged. Today's cities face problems of increasing population, lack of physical and social infrastructure, environmental and regulatory requirements, and increased costs. They have to learn to identify new and smart ways to manage the complexity of urban living and problems.

With a view to modernise India and accelerate the process of urbanisation, Prime Minister Narendra Modi has envisioned the creation of 100 Smart Cities in the next five years. The project has the potential to propel our country onto a global stage as a progressive economy and we stand on the verge of change. But while India has made significant progress in urban areas over the last 25 years, shortfalls in 24x7 power, water, gas, security, etc., and automated infrastructure prevent it from truly taking the next step forward. Hence, the mission requires assistance of experts in various fields such as consultation, development, operation, financing and management backed up

by state-of-the-art technology.

The government is encouraging PPP model for effective implementation of Smart Cities. There is a vast opportunity for private players in every sector to make the mission possible. They can also help to explore new, collaborative ways of working and alternative business models necessary to unlock further investments and innovation.

As the economic engagement between India and Japan has been growing at a rapid pace, Japanese technology can prove to be of critical help to India. "Under the Smart Cities mission, Japanese companies can invest in water and sanitation management, mass urban transit systems, and IT-enabled infrastructure management," says Chandrajit Banerjee, Director General, Confederation of Indian Industry (CII).

Japanese major Hitachi's

association with India dates back to 80 years. The company has been part of the Indian growth story right from the pre-independence era and has powered the country's economy since then. Today India stands at the threshold of becoming a self-reliant and robust economy with factors like demographic dividend in its favour; and it is ready to take a giant leap towards its next phase of growth. Hitachi is well-equipped to partner in the ambitious 'Make in India' and other Smart City projects with its world-class practices, sophisticated technology and the bandwidth to mitigate challenges and risks faced by India in becoming a developed nation.

Hitachi signed an MoU with CII in March 2015 which will enable the implementation of the vision of 100 Smart Cities in India.

The company is breaking new grounds towards making sustainability and Social Innovation a way of life. With its diversified range of business, Hitachi is well-equipped to address the massive challenges that India faces today.

In order to deliberate on



how Social Innovation can propel India's growth, Hitachi organised a two-day event titled 'Hitachi SOCIAL INNOVATION FORUM 2015' in New Delhi recently, in partnership with NDTV. The highlight of the event was social infrastructure with specific focus on Smart Cities, water, railways and healthcare. Hitachi reiterated its mission to partner with India in the latter's quest to overcome social and infrastructural roadblocks and emerge

as a global, digitally-driven economic powerhouse.

Corporate leaders, experts, policy makers, academia and representatives of industry during several panel discussions focussed on challenges arising due to rapid urbanisation in India. The discussions revolved around the role of state-of-the-art technology that would meet the challenges and contribute to infrastructure development in Smart Cities encompassing modernisation by automating and making consumer-centric solutions that provide 24x7 multi-utility transmission and distribution of power, water, gas, security and IT networks.

The Japanese major can help plug in the gaps in infrastructure in India in different ways. Hitachi is a key

**AS THE ECONOMIC ENGAGEMENT BETWEEN INDIA AND JAPAN HAS BEEN GROWING AT A RAPID PACE, JAPANESE TECHNOLOGY CAN PROVE TO BE OF CRITICAL HELP TO INDIA**

contributor towards the acquisition and high-level use of water resources worldwide. In healthcare, the company has a strong reputation for providing reliable, stable and user-friendly healthcare and medical treatment facilities. The medical fraternity opined on promoting the concept of "Green Hospitals" through Energy Management Systems and IT. They also discussed aspects related to healthcare, mental wellness and Optical Topography.

Good physical connectivity and mobility in urban and rural areas are essential for India's economic growth. India also needs faster, safer and energy-efficient transportation systems to decongest roads and tackle health and ecological concerns of the nation.

At the Railway panel discussion, experts shared their experiences on strengthening the wide rail network in India by delving deeper into signalling technologies.

Hitachi's focus on Social Innovation Business can definitely go a long way in helping India realise its vision of Smart Cities.





*The Times of India, Delhi dated  
March 23, 2016*

## Your old car may not be eligible for CNG conversion

Rumu Banerjee  
@timesgroup.com

**New Delhi:** For those planning to convert their old petrol or diesel car into a CNG-powered one ahead of the odd-even campaign, the catch here is that only BS-III and BS-IV compliant vehicles are now eligible for conversion. An order issued recently further says that the retrofitting kit, with the required paperwork, will also need to be issued by agencies approved by the government to be considered valid.

The latest move puts a dampener on the excitement of several vehicle owners who have been approaching the regional transport offices (RTOs) for registering their vehicles as CNG-run ones after retrofitting. Said a senior government official, "A number of owners have been converting their vehicles into CNG, especially after the government announced that the odd-even campaign will be carried out in phases."

According to officials, a majority of these cars that are being turned into CNG mode are older vehicles. "Since most are old vehicles, they are either BS-II or even BS-I compliant," said an official. Now, the vehicles will have to be BS-III or BS-IV compliant to be

considered for retrofitting.

S P Singh of the Indian Foundation of Transport Research and Training said that the benefits of conversion to green fuel was lost if the vehicle was old. "The retrofitting kits are best suited for BS-III or later vehicles," said Singh. "Just because it's green fuel doesn't mean that it won't add to congestion. We have been recommending to the Delhi

### STRICTER NORM

government to do away with the exemption to CNG vehicles as these add to the congestion, which has an impact on environment."

According to officials in the transport department, the number of requests for vehicles being registered as CNG ones has gone up though they refrain from giving the exact number. Said a senior government official, "There has been an increase in the number of CNG vehicle registration. Also, people have shown an interest in particular registration numbers, perhaps because of the odd-even rule."

The decision to allow only BS-III or IV vehicles to be converted into CNG comes following the recommendations of a committee set up by the Delhi government.

## Soon, clean clothes with sunlight

Nanostructures On Textiles Degrade Organic Matter When Exposed To Light

© Annie Engel/Corbis



NO MORE LAUNDRY

**Melbourne:** A spot of sunshine is all it could take to clean your clothes within minutes, as scientists, including those of Indian origin, have developed a low-cost, efficient way to grow nanostructures on textiles that can degrade organic matter when exposed to light.

The research from RMIT University in Australia paves the way towards nano-enhanced textiles that can spontaneously clean themselves of stains and grime simply by being put under a light bulb or worn out in the Sun.

The process has a variety of applications for catalysis-based industries such as agrochemicals, pharmaceuticals and natural products.

"The advantage of textiles is they already have a 3D structure so they are great at absorbing light, which in turn speeds up the process of degrading organic

matter," Rajesh Ramanathan from RMIT University said.

The researchers, including Dipesh Kumar and Vipul Bansal, also from RMIT University, worked with copper and silver-based nanostructures, which are known for their ability to absorb visible light. When the nanostructures are exposed to light, they receive an energy boost that creates "hot electrons." These release a burst of energy that enables the nanostructures to degrade organic matter.

The challenge for researchers has been to bring the concept out of the lab by working out how to build these nanostructures on an industrial scale and permanently attach them to tex-

tiles. The team's approach was to grow the nanostructures directly onto the textiles by dipping them into a few solutions, resting in the development of stable nanostructures within just a few minutes.

When exposed to light, it took less than six minutes for some of the nano-enhanced textiles to spontaneously clean themselves.

"Our next step will be to test our nano-enhanced textiles with organic compounds that could be more relevant to consumers, see how quickly they can handle common stains like tomato sauce or wine," Ramanathan said.

The research was published in the journal *Advanced Materials Interfaces*. ■

*Edited by: Prof. Sushil Kumar  
Centre for Business Sustainability,  
IIM Lucknow*