



ELECTRICAL

INSTALLATION ENGINEER

NEWS LETTER

TAMILNADU ELECTRICAL INSTALLATION ENGINEERS' ASSOCIATION 'A' GRADE (Regn. No. 211/1992)

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APRIL 2018

ENERGISING OUR WORLD

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EDITORIAL

Dear Members, Fellow Professionals and Friends,

Seasons Greetings To One And All!

Happy Tamil New Year “Vilambi” And Best Wishes For Happy Times Ahead In Economic And Social Activities!!

Traditional Tamil New years Day falls on the 14th April, which is known by the name “VILAMBI” (tpsk;gp) this year. The General Predictions given for the year are Good Rains, Good Crops and plentiful yields of Crops, Fruits and Vegetables etc. It is predicted that peoples spending power will increase and there will improvements in trade and commerce. In continuation of the happenings during last year, more ‘Financial Irregularities’ coming to light is also predicted. Let us all hope and Pray for the Best.

We are witnessing all around us at present, disturbances, agitations and protests for ‘**Right**’ and ‘**Apparently Right Reasons**’. The unfortunate developments are that in the name of protests, lot of anti social elements, divisive forces and anti National elements are ganging up together to create damage to the harmony of the Country and slow down the progress of our country. We are all committed to Engineering and Technology and we are also aware that with the current level of development and ongoing advances and developments, all problems can be solved to ensure Safety, Welfare, Comfort and Prosperity of all in Society. There are Standards and Technologies for all applications and solutions to ensure Safety, Pollution free atmosphere and perfect waste management. It is very unfortunate that due to an overall moral degradation and wide spread corruption and mall practices in all activities, be it Financial sanctions or Technological clearances or Control of Pollution etc, the problems are created by people with sole aim of unlawful personal gains. What we really need is strict actions to cleanse the Systems in all its spheres and activities.

“**World Earth Day**” falls on the 22nd of April and the Theme for this year focuses on Plastics Pollution. Recycling of Plastics and use of waste plastics in many uses like road laying etc are all being attempted successfully, but the biggest problem, in Indian context, seems to be plastic wastes forming an important portion in the ‘**Municipal Solid Waste**’ generated each day all over the country. There are projects to segregate MSW etc, but the percentage covered is very very small. The wide spread practice seems to be uncontrolled burning of MSW which is the cause of all problems of pollution etc. There are Technologies for controlled burning and Power Generation from MSW, but the most important part of the Technology is Treatments of smoke and wastes to remove all toxic contents. Considering the huge volumes of MSW generated each day in our country, combustion and Power Generation could be a very good solution provided absolute controls are in place to ensure pollution free operations, commencing from the design stage to clearance stage to operational stage with daily, periodical checks.

We thank all those members who have helped us by participating in the advertisement appearing for the issue March 2018 – Alfa Switchgear (I) Pvt. Ltd., Power Cable Corporation, Elecexpo – 6th Edition, Wilson Power and Distribution Technologies Pvt. Ltd. Dehn India Pvt. Ltd., Pentagon Switchgear Pvt. Ltd., Universal Earthing Systems Pvt. Ltd., Consul Neowatt Power Solutions Pvt. Ltd., Galaxy Earthing Electrodes (P) Ltd., Supreme Power Equipment Pvt. Ltd., Ashlok Safe Earthing Electrode Ltd.

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124.	Veera Electrical	Chennai	98415 85936, 98410 19649	ESA 332
125.	Vennila Electricals	Chennai	044-42024607, 98410 86269	EA 1680
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130.	Goms Electricals Pvt. Ltd	Chennai	044-24611648, 94457 50016	ESA 231
131.	Magna Enterprises	Chennai	044-4203 2732, 98409 51381	EA 1646
132.	R.V. Electricals	Chennai	94441 52300, 90805 18139	EA 2844
133.	Win Power Engineering	Chennai	044-23821818, 94440 76783	EA 2154
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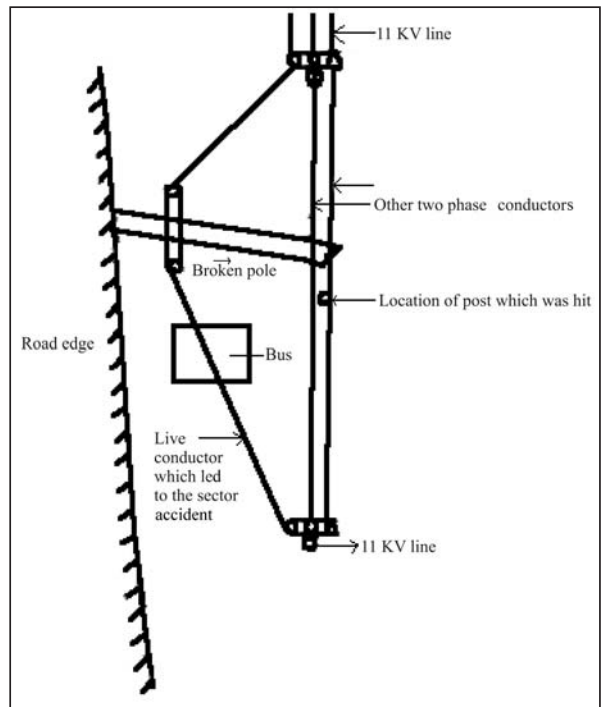
KNOW THY POWER NETWORK - 127

Our trip to electrical Accident site continues.

“Human life is short as the saying goes. No where does this play out more clearly with electrical energy usage where the service provider concentrate more on commercial interests and give priority to profit and other monetary terms over the lives of humans and other living beings and properties”.

An interesting but poignant accident happened several decades before is elaborated here so as to bring home the importance of the above message. This accident had occurred near Irinjalikuda town in Cochin in Kerala on “7th July 1950”, when “22 people” (Bus Passengers) got electrocuted. The accident happened on a road along which runs a 11KV over head line on teak wood poles. The line carries no safety devices like cradle stay wires and earthing devices nor earth wires. The teak wood post was hit by a bus which traversed to the extreme edge of the road to avoid hitting a passer – by (pedestration) who just crossed the road. After hitting the pole, the bus just stopped. The pole broke off at about 3 feet above ground level and the 25 feet tall section just fell across the road. During this process, one of the 11KV live conductors got released from its insulator support and was in contact with the metal top of the stationary bus. The other two phase conductors saving clear of the road but remained suspended at a level higher than the line of the adjacent posts.

The auto reclosure breaker controlling the 11KV in point had tripped twice; the control breaker in the main feeding station also tripped. But due to unknown reasons, both these “hold on”, when subsequently reclosed. This had acted as the main



cause for the sorrowful events that had followed the snapping of the pole. Now the 11kv line in case was “**not dead**”; it was in “**a Live**” condition which was deadly to human beings.

Now the bus in question had worked as a “**Faradays cage**”. Under such conditions none should moved out or get out of the “**charged bus**” till the fault was cleared. But nobody knowed this technical information. On seeing the fallen 11KV line conductor, everyone in the bus got panicky and rushed to the “**exit**” of the bus. Then worst thing happened, twenty two passengers gt electrocuted and died; three persons got severe burns and survived. Only three persons who had jumped clear of the bus and escaped. They had minimum injuries. The foot-board of the bus had full of “burn marks” – indicating location where flash over occurred.

Similar accident had occurred in Dindigul district also (at a place called Sembatti). Here also a live 22kv conductor had fallen on a bus which got released from the pole during heavy rains. In this case also number of passengers got electrocuted while jumping out of the bus. Those who remains inside the bus escaped.

The inferences / deduction that could be made from these accidents are,

1. In both the cases the fallen 22KV/11KV conductors were alive. No protection had come to the rescue of the fallen lines so as to make them free of the faults
2. No earthing device/earthing wire were employed at the affected locations. Had it been used, it would have reduced the impact of the accident and saved those unfortunate lives.
3. The rubber tyres/wheels of the bus in point had acted as good insulations and protected the bus and its passengers very effectively. Only when the passengers got panicky and tried to come out of the bus by climbing down/got down the foot-steps, the leakage to earth started and brought severe damages. These accidents conveyed the message that there is a big need to create awareness among the consumers about this kind of accidents so that they can move in a more disciplined way and safeguard themselves in such critical situations.

Now a question arises why the protective devices provided were not able to detect and clear such 22kv and 11kv down conductor faults in times. All 22kv and 11kv feeders are invariably provided with high sensitive reliable and selective protective relays yet they failed to come to the rescue of the affected feeder due to varied reasons.

Significant among them are,

- Improper setting of short circuit and over current protective relays. Compromises made during their selection.
- Switching transient brought by line energisation and load pick up surges.
- Inability of the current transformers in the circuit to provide the required inputs to the relays.
- Higher magnitude capacitor currents, if any present in the circuit.
- Effect of stray magnetic fields.
- Compromises made to avoid the spurious tripping of the feeders.

Presently several attempts have been made to the bridge gap now faced on this front. Among them are,

- Application of Static Earth Fault Relays and Harmonic Relays. The signals in the frequency range of 200-850Hz are derived from the harmonic content of the zero sequence currents available in the circuit and are used for the operation of these relays. This relay operates for a minimum signal strength of 3-5v for strong earth faults. The corresponding operating range for high and very resistive faults are 10Mv and 5Mv respectively. Harmonic signals are used to discriminate the faults from spurious signals.
- Micro computer based relays.
- Ratio ground relay.
- Micro processor based technique.
- Sensitive earth fault detecting devices.

It may be noted that the above protective schemes operate from “Safety view only” and not from the view point of “equipment protection”. These devices help to detect more hazardous situations than conventional residual current relays. Let me “sign off” here. Please stay tuned.

(To be continued...)



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CHERNOBYL IS BEING TRANSFORMED INTO A SOLAR ENERGY COMPLEX

More than 30 years after the Chernobyl nuclear disaster hit Ukraine and the entire site was left abandoned, solar energy farms are now offering a way to create value and supply clean electricity to the region. Solar Chernobyl – a venture developed by Ukrainian engineering firm Rodina Energy Group and German renewable energy company Enerparc, has almost completed the first solar project to be commissioned in the area.

Ukraine's minister of ecology announced a plan in July 2016 to revitalize the 1,000-mile swath of land encircling the site of the nuclear 1986 meltdown. Long-lasting radiation makes farming and forestry too dangerous, so renewable energy is seen as something productive to do with the empty area. The zone also connected to the country's major cities with transmission lines that were originally laid to carry electrons from the destroyed nuclear plant.

The 1 megawatt (MW) plant will have the ability to meet the electricity needs of a medium-sized village, or the equivalent of almost 2,000 homes. Approximately 3,800 photovoltaic panels have been installed across 1.6 hectares- approximately the size of two football fields.

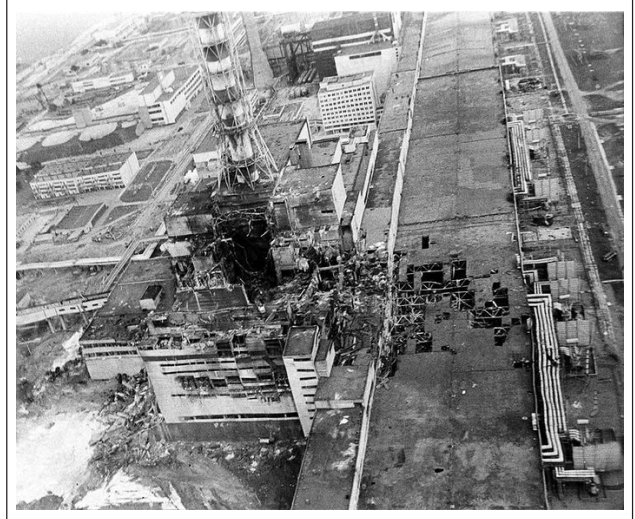
The project was plausible after a giant metal dome sealing the remains of the nuclear accident was installed a year ago. The domes act as isolators of the radiation- which after the installation decreased to one-tenth of previous levels. The particular project has cost about \$1.5 million, and it is estimated to yield a return on investment in 7 years

after it gets connected to the grid within the following weeks. Drilling and digging is still strictly prohibited, therefore the solar panels are fixed to concrete slabs and not to the ground. After the appalling disaster of 1986, when a reactor failure led to the largest nuclear accident in history, the area was evacuated and hasn't been used ever since. However, in July 2016, the Ukrainian government announced a plan to revitalise the 1,000 miles around the site of the nuclear meltdown.

As it is estimated that people cannot reoccupy the area for another 24,000 years and agriculture is obviously not an option, national authorities decided to offer the land to renewable energy developers. To incentivise investors, the government offers a very competitive price for the land and significantly attractive Feed-in Tariffs, which according to energy associations are at least 50 percent higher than the average prices in Europe at the moment. Another advantage of the area is that it has good transmission infrastructure because the former nuclear station which was decommissioned in 2000. Local authorities are currently reviewing 60 proposals from solar energy developers. Companies which have expressed interest include the French Engie, which is conducting a pre-feasibility study for 1 MW, and the Chinese GCL System Integration and China National Complete Engineering.

Rodina and Enerparc are planning on completing at least another 100 MW in solar projects. Evgeny Variagin explained: "Bit by bit we want to optimize the Chernobyl zone. It shouldn't be a black hole in the middle of Ukraine".

In order to attract investors, the government is offering cheap land and relatively high feed-in tariffs. Rodina and Enerparc have secured a contract that will pay 15 euro cents per kilowatt-hour until 2030. That's almost 40 percent higher than the upper band of Bloomberg New Energy Finance's benchmark range for the levelized cost of solar in Europe.



RENAULT AIMS TO POWER PORTUGUESE ISLAND ENTIRELY BY RENEWABLE ENERGY

Renault is working with Empresa de Electricidade da Madeira (EEM), the provider of electricity to the Madeira and Porto Santo islands off the coast of Portugal, to launch a ‘**smart electric ecosystem**’ on Porto Santo.

The project, known as Sustainable Porto Santo – Smart Fossil Free Island, will be completed in three stages, and aims to demonstrate that fossil fuels can be entirely replaced with renewable energy, using the island from the Madeira Archipelago as an example.

The first phase will see the island given 20 vehicles, each driven by a volunteer user for their daily lives, that are supported by 40 charging stations. The second phase, to be completed by the end of 2018, will establish a vehicle-to-grid system where parked electric vehicles can discharge power back to the grid. The final phase will place ‘second-life’ battery packs—former car batteries that can no longer function in cars, but can still operate as storage units—on the island to store energy generated by the island’s wind and solar farms.

“We are delighted to be teaming up with EEM today to establish this unprecedented smart electric ecosystem which demonstrates to what extent the electric revolution is changing our everyday lives beyond just transport,” said Eric Feunteun, new business and electric vehicles programme director at Renault.

“Our aim is to build a model that can be carried over to other islands, eco-districts and cities, while consistently striving to achieve large-scale rollout of electric mobility solutions that are affordable for all.”

The island will also take advantage of smart charging, a system where power is transferred between cars and the grid as need dictates. Batteries are charged when supply of renewable energy exceeds demand, notably when renewable energy production peaks, and vehicles provide energy to the grid as part of vehicle-to-grid charging during peak hours, to enable the charging stations to operate as temporary energy stores.

The initiative follows a 13% increase in the energy produced by leading Portuguese renewable energy company EDP Renováveis from 2016 to 2017 as Portugal tries to move towards cleaner energy sources.



USE RENEWABLE ENERGY - SAVE ECO SYSTEM

STUDY SHOWS SMARTPHONES AND DATA CENTERS HARM THE ENVIRONMENT

Data centres and smartphones will be the most damaging information and communications technologies to the environment by 2040, according to new research from W Booth School's LotfiBelkhir. At the end of winter term in 2014, LotfiBelkhir was approached by a student taking his Total Sustainability and Management course who asked, "What does software sustainability mean?"

The Entrepreneurship and Innovation Associate Professor at the W Booth School of Engineering Practice and Technology didn't have an answer. Belkhir teaches students to think

creatively about sustainability tools that can be applied to their entrepreneurial ventures. But his tools, at the time, mainly applied to hardware startups, not software. The student's question sparked Belkhir's latest research on the global emissions footprint of information and communications technology (ICT).

Belkhir, along with Ahmed Elmelig, a recent W Booth grad and co-founder of the startup, HiNT (Healthcare Innovation in NeuroTechnology), studied the carbon footprint of consumer devices such as smartphones, laptops, tablets, desktops as well as data centres and communication networks as early as 2005. Their findings were recently published in the 2018 Journal of Cleaner Production. Not only did they discover that software is driving the consumption of ICT, they also found that ICT has a greater impact on emissions than we thought and most emissions come from production and operation. "We found that the ICT industry as a whole was growing but it was incremental," Belkhir explains. "Today it sits at about 1.5%. If trends continue, ICT will account for as much as 14% for the total global footprint by 2040, or about half of the entire transportation sector worldwide."

"For every text message, for every phone call, every video you upload or download, there's a data centre making this happen. Telecommunications networks and data centres consume a lot of energy to serve you and most data centres continue to be powered by electricity generated by fossil fuels. It's the energy consumption we don't see."

Among all the devices, trends suggest that by 2020, the most damaging devices to the environment are smartphones. While smartphones consume little energy to operate, 85% of their emissions impact comes from production.

A smartphone's chip and motherboard require the most amount of energy to produce as they are made up of precious metals that are mined at a high cost. Smartphones also have a short life which drives further production of new models and an extraordinary amount of waste. "Anyone can acquire a smartphone, and telecommunications companies make it easy for people to acquire a new one every two years. We found that by 2020 the energy consumption of a smartphone is going to be more than that of PCs and laptops."

Belkhir has made policy recommendations based on his findings. "Communication and data centres have to go under renewable energy now. The good news is Google and Facebook data centres are going to run on renewable energy. But there needs to be a policy in place so that all data centres follow suit. Also, it's not sustainable to have a two-year subsidized plan for smartphones." With his latest research, Belkhir hopes to help students in his Total Sustainability and Management course expand their worldview.

"When they start the course, many students don't know what sustainability means. When the course ends their worldview has changed and they realize what they want to do and why they want to do it."



AN INDUSTRY FIRST – BY GE

Introducing the Haliade-X 12 MW, the **largest offshore wind turbine in the world to date**, featuring a 12 MW capacity (the world's first), 220-meter rotor, a 107-meter blade designed by LM Wind Power, and digital capabilities. In addition to being the biggest offshore wind turbine, the Haliade-X will also be the most efficient of wind turbines in the ocean. Best of all, it's capable of transforming more wind into power than any other offshore wind turbine today.

The Haliade-X 12 MW also features a **63% capacity factor***—five to seven points above industry standard. Each incremental point in capacity factor represents around \$7 million in revenue for our customers over the life of a windfarm.

POWER MEETS EFFICIENCY

The offshore wind turbine design of the Haliade-X is what makes it unique. The combination of a bigger rotor, longer blades and higher capacity factor makes Haliade-X less sensitive to wind speed variations, increasing predictability and the ability to **generate more power at low wind speeds**. The Haliade-X can capture more Annual Energy Production (AEP) than any other offshore wind turbine even at low wind conditions.

This 12 MW ocean wind turbine can also **generate 67 GWh annually**, which is 45% more AEP than the most powerful machines on the market today, and twice as much as the Haliade 150-6MW. One Haliade-X 12 MW can generate enough clean power to supply European 16,000 households according to wind conditions on a typical German North Sea site. Based on a 750 MW windfarm and an estimated AEP, the Haliade-X 12 MW could produce enough power for up to 1 million households.

BOTTOM LINE IMPACT

Haliade-X 12 MW doesn't just set a new benchmark for the size of wind turbines at sea. It can also bring higher profitability to customers. The Haliade-X 12 MW provides significant savings across offshore wind turbine manufacturing, installation cycle times, service and repairs, through its simplified process and intelligent components. While the Haliade-X 12 MW sea turbine is well-suited for high-to-medium wind speed environments, its larger capacity can produce energy even at lower wind speeds, increasing profits and dramatically **lowering the levelized cost of energy**.

With fewer machines and offshore wind turbine foundations to install, in addition to reduced cycle times and simplified operation, the Haliade-X 12 MW generates robust savings on overall project cost (CAPEX Balance of Plant**) over the life of a windfarm, saving an average of \$26 million per turbine per 100 MW when compared to Haliade 150-6MW.

Digital tools (based on GE's Predix platform) are currently being developed exclusively for the offshore environment with an operations approach, that will help customers perform remote diagnostics, improve time management (less time at sea) and optimize operations.

INVESTING IN THE FUTURE

The offshore wind market is booming and is expected to grow significantly over the next two decades; from today's 14 GW install capacity to 100 GW+ by 2030. Recognizing this need, GE is leading the field of offshore wind turbine manufacturers by investing \$400 million over the next three to five years in development and deployment of the Haliade-X.

This investment will take place over the next two to five years and includes a \$57 (•46) million investments in Saint-Nazaire to adapt the site for Haliade-X nacelle assembly. Saint Nazaire's know-how will play a crucial and leading role in the development of this innovative project, with offshore wind turbine construction at higher capacities. An additional \$93 (•75) million in Cherbourg for tooling, blade molds, assembly line and blade development. This project will create 550 direct jobs in Cherbourg over the course of the next 3 years (around 100 in 2018).

EESL TO INSTALL ENERGY-EFFICIENT LEDS ACROSS ALL AIRPORTS IN INDIA

Signs MoU with Airports Authority of India to invest Rs. 24.41 crore on installation of LED lights across all airports, buildings and facilities of AAI

Energy Efficiency Services Limited (EESL), a joint venture of PSUs under the Ministry of Power signed a Memorandum of Understanding (MoU) here today, with the Airports Authority of India (AAI) for installing energy-efficient LED lights at airports, buildings and facilities owned by AAI across India. **EESL will make the entire upfront investment of Rs. 24.41 crore on the project.**

The MoU is signed under the Buildings Energy Efficiency Programme (BEEP). The entire procurement of lighting equipment, installation and maintenance will be undertaken by EESL without any cost burden on AAI. The project will be completed within 4 months from the date of signing a definitive Energy Performance Agreement (EPA).

Under the MoU, EESL will execute the energy efficiency programme on Energy Service Companies (ESCO) model where the entire upfront investment is borne by EESL and recovery of investments is made through monetised shared savings. The contract period is five years and EESL takes complete responsibility of replacement / repair for the duration.

EESL has partnered with several leading institutions like the Indian Railways, Central Public Works Department, Delhi Metro Rail Corporation etc, to replace inefficient lighting and cooling appliances with efficient equipment. EESL has already retrofitted energy-efficient appliances in prominent government buildings such as NITI Aayog, Nirman Bhawan, Sardar Patel Bhawan, Shastri Bhawan, J&K Assembly, Jammu Secretariat, Vidyut Bhawan, and Rajiv Chowk metro station. **At present, the cost savings through 508 completed building projects across India are estimated to be over Rs. 41 crore with reduction of 38,392 tonnes of CO₂ emissions,** which is bound to increase with each completed project. Currently, the programme is being implemented at 2,862 buildings across India and will be completed by March 31st, 2018.

As part of the Buildings Energy Efficiency Programme launched in May 2017, EESL intends to bring in investment of around Rs. 1000 crore covering more than 10,000 large government / private buildings by 2020 enabling annual monetary savings of Rs. 800 crore, energy savings of 100 crore kWh per year and annual CO₂ reduction of 10 lakh tonne.

The MoU was signed by Shri Saurabh Kumar, Managing Director, EESL and Shri A.K. Sharma, Executive Director, Airports Authority of India, in the presence of Shri Ajay Kumar Bhalla, Secretary, Ministry of Power and Shri Guruprasad Mohapatra, Chairman, Airports Authority of India.

Speaking at the occasion, Shri Saurabh Kumar, MD, EESL said, **“Replacement of existing conventional light fittings with energy-efficient LEDs across airports and buildings of AAI will contribute significantly to India’s climate goals.** We have successfully transformed multiple commercial buildings in India into energy-efficient complexes. We are well on our way to radically transform the energy efficiency scenario in the country by retrofitting huge commercial complexes.”

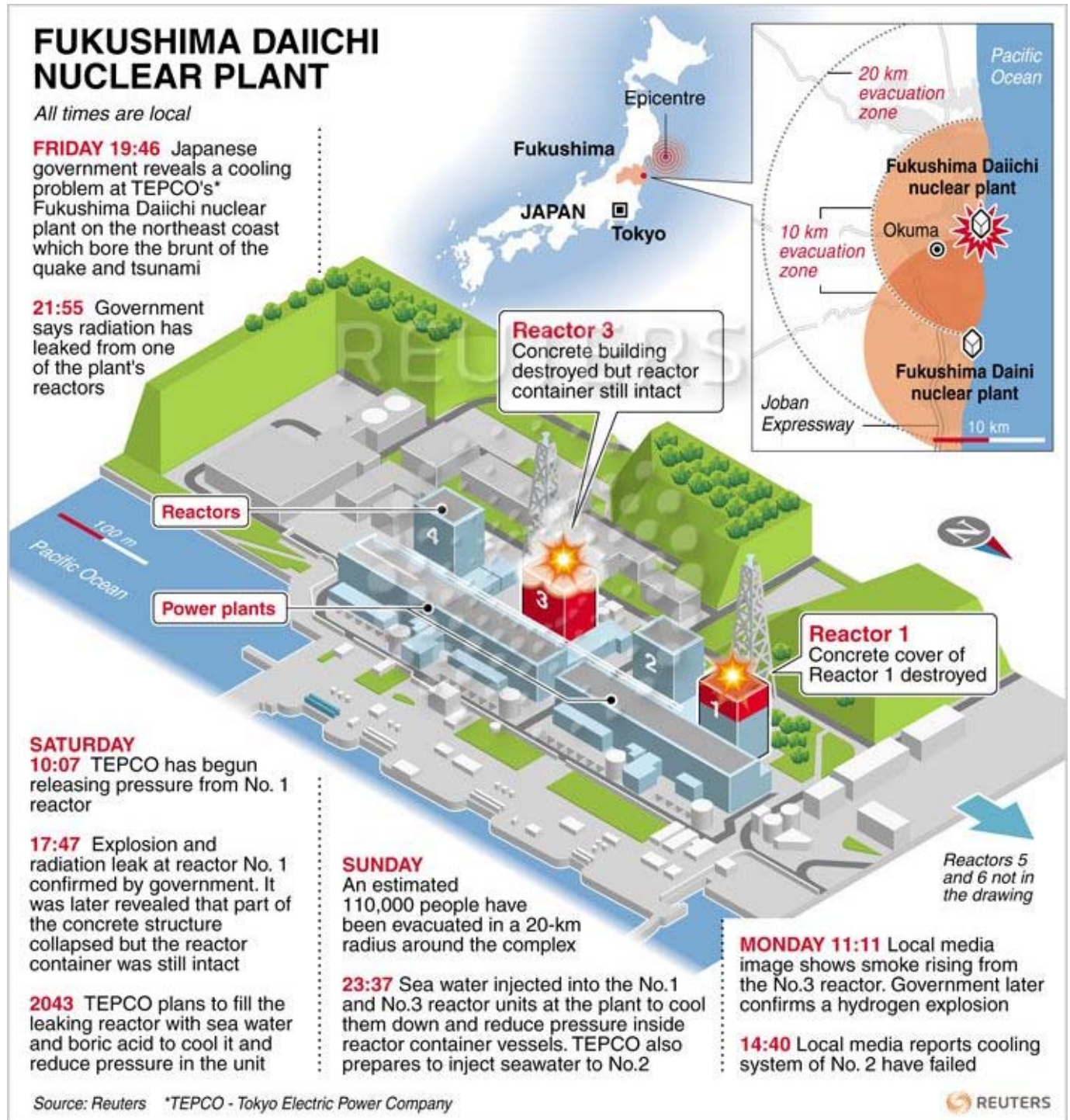
About EESL:

Energy Efficiency Services Limited (EESL), under the Ministry of Power, Government of India, is working towards mainstreaming energy efficiency and is implementing the world’s largest energy efficiency portfolio in the country. Driven by the mission of **Enabling More – more efficiency, more innovation**, EESL aims to create market access for efficient and future ready transformative solutions that create a win-win situation for every stakeholder. By 2020, EESL seeks to be a \$1.5 billion-dollar (Rs 10,000 crore) company putting together all the programmes of EESL.

Thus far, EESL has distributed over 29 crore LED bulbs and retrofitted 48 lakh smart LED streetlights across India through self-sustaining commercial models. It has pioneered innovative business approaches to successfully roll-out large-scale programmes that allow for incentive alignment across the value chain and rapidly drive transformative impact. EESL aims to leverage this implementation experience and exploit new opportunities in overseas market for diversification of its portfolio. As on date, EESL has begun its operations in UK, South Asia and South-East Asia.

NEW EVIDENCE OF NUCLEAR FUEL RELEASES FOUND AT FUKUSHIMA

Uranium and other radioactive materials, such as caesium and technetium, have been found in tiny particles released from the damaged Fukushima Daiichi nuclear reactors. This could mean the environmental impact from the fallout may last much longer than previously expected according to a new study by a team of international researchers, including scientists from The University of Manchester.



The team says that, for the first time, the fallout of Fukushima Daiichi nuclear reactor fuel debris into the surrounding environment has been “explicitly revealed” by the study. The scientists have been looking at extremely

small pieces of debris, known as micro-particles, which were released into the environment during the initial disaster in 2011. The researchers discovered uranium from nuclear fuel embedded in or associated with caesium-rich micro particles that were emitted from the plant's reactors during the meltdowns. The particles found measure just five micrometres or less; approximately 20 times smaller than the width of a human hair. The size of the particles means humans could inhale them.



The reactor debris fragments were found inside the nuclear exclusion zone, in paddy soils and at an abandoned aquaculture centre, located several kilometres from the nuclear plant.

It was previously thought that only volatile, gaseous radionuclides such as caesium and iodine were released from the damaged reactors. Now it is becoming clear that small, solid particles were also emitted, and that some of these particles contain very long-lived radionuclides; for example, uranium has a half-life of billions of years.

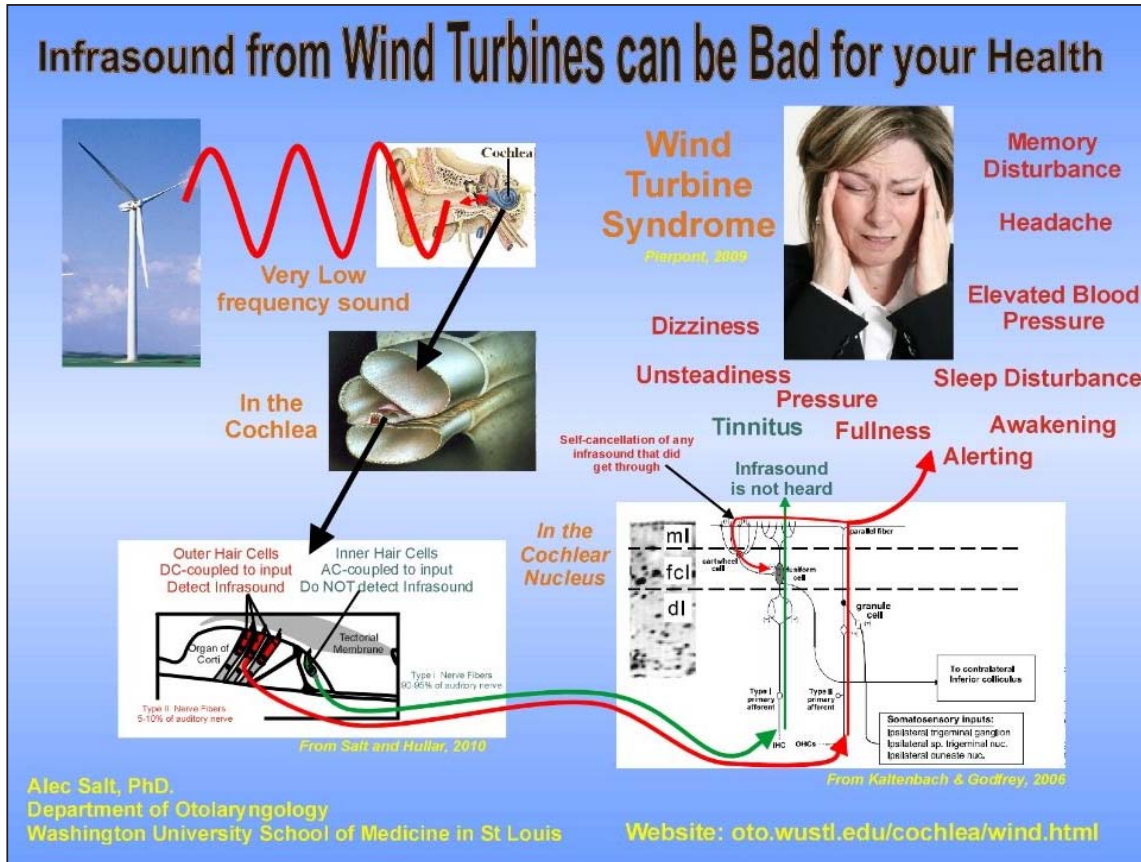
Dr Gareth Law, Senior Lecturer in Analytical Radiochemistry at the University of Manchester and an author on the paper, says: “Our research strongly suggests there is a need for further detailed investigation on Fukushima fuel debris, inside, and potentially outside the nuclear exclusion zone. Whilst it is extremely difficult to get samples from such an inhospitable environment, further work will enhance our understanding of the long-term behaviour of the fuel debris nano-particles and their impact.”

The Tokyo Electric Power Company (TEPCO) is currently responsible for the clean-up and decommissioning process at the Fukushima Daiichi site and in the surrounding exclusion zone. Dr Satoshi Utsunomiya, Associate Professor at Kyushu University (Japan) led the study.

He added: “Having better knowledge of the released microparticles is also vitally important as it provides much needed data on the status of the melted nuclear fuels in the damaged reactors. This will provide extremely useful information for TEPCO’s decommissioning strategy.”

At present, chemical data on the fuel debris located within the damaged nuclear reactors is impossible to get due to the high levels of radiation. The micro particles found by the international team of researchers will provide vital clues on the decommissioning challenges that lie ahead.

3 REASONS WIND FARMS CAUSE STRESS TO NEARBY RESIDENTS



While wind farms are a clean, renewable, and relatively cheaper source of energy, they also have disadvantages such as land use and noise. Among those people residing near a wind farm, about 30 percent are either only slightly irritated by the noise or not affected at all. On the other hand, 10 percent are reported to experiencing stress, manifested by their irritability and difficulty in falling asleep. However, noise is just one of the reasons wind farms are stressful to some people.

Starting 2012 until 2014, a group of researchers including environmental psychologists and Professor GundulaHübner and Dr. Johannes Pohl of Martin Luther University Halle-Wittenberg (MLU) studied a wind farm in northern Germany by conducting surveys of residents. Sound recordings of the wind turbines were also analyzed by their project partner UL DEWI (UL International GmbH). The results published in the current issue of the journal Energy Policy are summarized below.

Absence of Other Noises

According to the study, the distance of a resident's house to the wind farm is an insignificant factor in their irritation. The irritating sound coming from the wind farm during night time were recorded by several residents and these recordings were analyzed by UL DEWI researchers.

"The wind and the movement of the rotor blades can cause amplitude modulation, in other words, an irregular pulsating of the volume. These irregularities are what annoy some of the residents, something which they perceive to be irregular humming or swooshing," says Dr. Johannes Pohl from the Institute of Psychology at MLU.

Dr. Pohl explains that a quiet, steady background noise is easier to ignore and most of the complaints occurred in the night or in the early morning hours when there are fewer other noises.

Weather

The environmental psychologists also considered the weather in their study and concluded that the noise from wind farm tends to be more noticeable when there is frost and it is humid. The researchers also observed that

at least once a month, the symptoms of stress were experienced by the about 10 percent of the residents irritated by the wind turbines.

“Symptoms include problems falling asleep, disturbed sleep in general, a negative mood, and strong irritability,” explains Pohl. This is comparable with the number of people who are stressed with traffic noise, which is 16 percent of the same group of people surveyed.

Critical Attitude Concerning Wind Farms

The most intriguing factor to the stress brought by wind turbines is the critical attitude of residents towards a wind farm. The study reports that this attitude stimulates the experience of stress. This was evidenced by the large decrease in the fraction of residents that experience stress after two years. The repeat survey two years later showed that from 10 percent, only 6.8 percent of the residents remained irritated with the noise.

“Many residents get used to the noise from the wind farm or they have resigned themselves to it. A good one-fourth of those affected close their windows at night so that they are no longer disturbed by the noise,” says Dr. Pohl.

The residents that comprised the 6.8 percent that remained to feel stressed by the wind farms were those who were already very critical of the wind farm from the beginning. According to the researchers, the little interest in finding ways to soothe their selves and cope with the stress manifested in these people. This means that the established attitudes are difficult to change.

A proactive solution to this behavior, according to the researchers, is a better information policy during the planning phase by addressing the problems and concerns of residents. **“The way the residents experience the planning and construction phase is a decisive indicator of how strongly or weakly they will be impaired in the long run by the wind farm,”** Dr. Pohl explains.

It is critical for a community, prior the installation of a wind farm, to develop the most positive experience possible with early information campaigns and community meetings. Involving the residents in the planning stage is also highly recommended.

A LITHIUM BATTERY THAT OPERATES AT - 70 DEGREES CELSIUS, A RECORD LOW

Researchers in China have developed a battery with organic compound electrodes that can function at -70 degrees Celsius — far colder than the temperature at which lithium-ion batteries lose most of their ability to conduct and store energy. The findings, published February 28 in the journal *Joule*, could aid engineers in developing technology suited to withstand the coldest reaches of outer space or the most frigid regions on Earth. While batteries can operate in relatively cold climates, they have their limits. Most perform at only 50% of



their optimal level when the temperature hits -20 degrees Celsius, and by -40 degrees Celsius, lithium-ion batteries only have about 12% of their room temperature capacity. This can be severely limiting when it comes to operating batteries in space, where temperatures can dip to -157 degrees Celsius, or even in parts of Canada and Russia, where temperatures can be lower than -50 degrees Celsius.

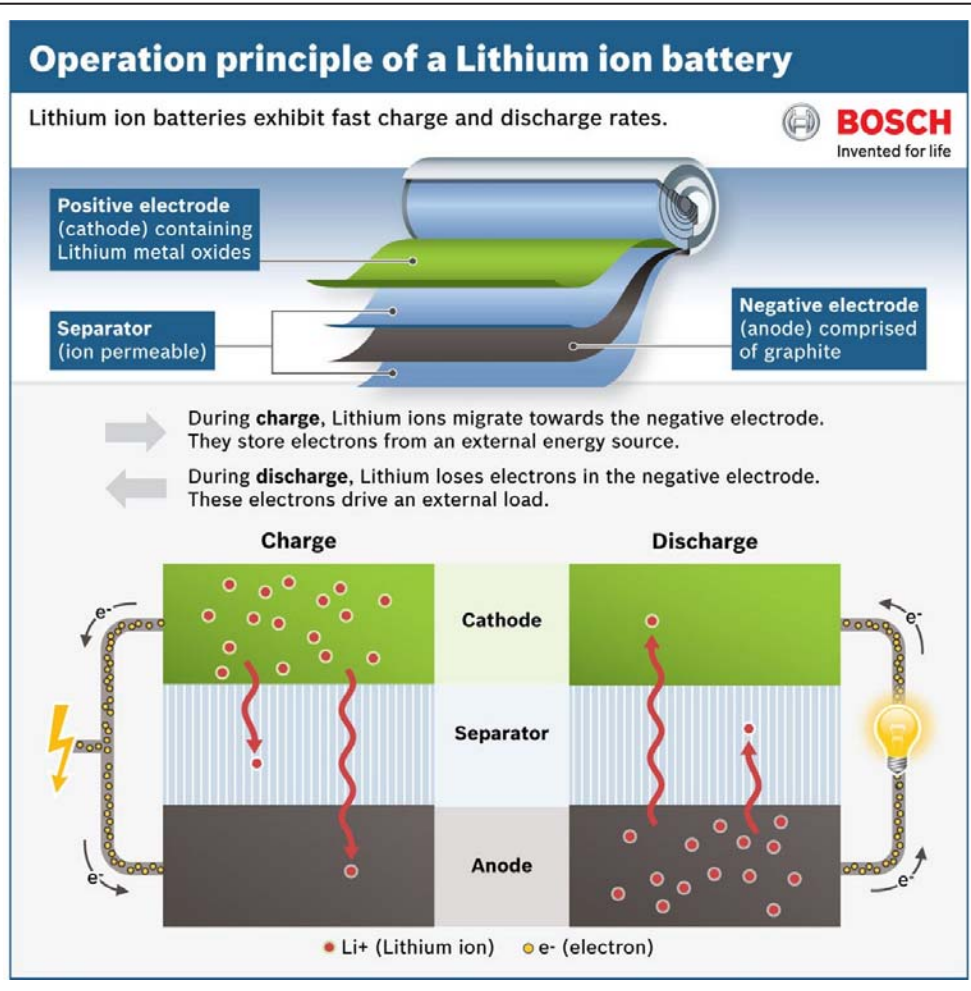
But a team of battery researchers have found a design that can function even where other batteries might fail. “It is well known that both the electrolyte (the chemical medium that carries ions between electrodes) and electrodes (the positively charged cathode and negatively charged anode) have great influence on the battery performance,” says Dr. Yong-yao Xia, a battery researcher at the Department of Chemistry of Fudan University in Shanghai, China. When it gets cold, the ester-based conventional electrolytes that lithium-ion batteries often use become sluggish conductors and the electrochemical reactions that occur at the interface of the electrolyte and the electrode struggle to continue—meaning that lithium-ion batteries don’t hold up too well in

ultra-chilly climates. It’s a problem that has consistently vexed researchers. The team experimented with using an ester (ethyl acetate)-based electrolyte, which has a low freezing point that enables it to conduct a charge even at extremely low temperatures. For the electrodes, they used two organic compounds—a polytriphenylamine (PTPAN) cathode and 1,4,5,8-naphthalenetetracarboxylic dianhydride (NTCDA)-derived polyimide (PNTCDA) anode. Unlike the electrodes used in lithium-ion batteries, these organic compounds don’t rely on intercalation—the process of continuously integrating ions into their molecular matrix, which slows down as the temperature drops.

Benefitting from the ethyl acetate-based electrolyte and organic polymers electrodes, the rechargeable battery can work well at the ultra-low temperature of -70 degrees Celsius,” Xia says. Xia and his team believe this may be a more elegant solution than alternative attempts to boost lithium-ion battery function in extreme temperatures. Other battery researchers have tried to remedy the issue by developing additives to externally heat the batteries or by using a liquefied gas electrolyte, but these solutions require additional materials that add extra weight.

Xia thinks the composition of the battery has plenty of other production-friendly qualities, too. **“Compared to the transition-metal-containing electrodes materials in conventional lithium-ion batteries, organic materials are abundant, inexpensive, and environmentally friendly,”** he says. *He estimates the price of the electrode materials at about one third of the price of electrodes in a lithium-ion battery.*

However, the battery will still require some tweaking before it is ready to leave the lab. Xia believes **the specific energy (the energy per unit mass) of the battery is still low compared with commercialized lithium-ion batteries, and the assembly process needs to be further optimized.** *“But even though it has low specific energy, it provides the most promising potential in special field applications,”* Xia says.



Do not dwell in the past, do not dream of the future, concentrate the mind on the present moment - Buddha

MENTAL HEALTH TIPS FOR WORKING PROFESSIONALS: HANDLING STRESS & DEPRESSION

Depression is a major public health problem in India, contributing to significant illness, disability as well as impermanence causing significant socio economic losses. Root cause for depression could be several, including biological, social, economic and cultural factors, which are triggered by environmental factors. Unfortunately Depression and suicide are closely interlinked. At its worst, depression can lead to suicide or attempts as well. Recognizing depression at an early stage is critical for reducing suicidal deaths and deliberate self-harm across the spectrum. People with depression often tend to under-perform in workplaces, thereby resulting in losing of job and even losing quality of life.

As per NMHS reports higher prevalence of depression is seen among women and working age adults (aged 29, 42 20–69 years) has been consistently reported by Indian studies. Depression is also common among the elderly but possibly they fall less in to this trap due to experience and wisdom. Reasons could be many for a Depression resulting from complex mechanisms; there can be no single identifiable cause. However, there is conclusive evidence to reveal that several biological, social, economic, cultural and environmental factors operate in a maladaptive individual, leading to depression. One may develop depression due to the loss of a loved one, or it may unfold in the backdrop of multiple social or financial stresses or on an account of a family history of depression or it may begin in the background of a chronic medical condition. Some individuals can experience loneliness and feeling low for no apparent reason at all. It is crucial to note that recognition of these factors is important to provide appropriate intervention for the affected individual and to support the family.

Many a times certain feelings such as sadness, hopelessness, lethargy, lack of involvement were taken lightly or rather omitted among younger generation. When such feeling are left un-attended at the right time or given a lighter approach may possibly lead to a depressed lifestyle. It is also more important to analyze, whether these feelings happen in a combination, its duration or intensity that start to interfere with day-to-day life activity. The real benefit of such identification will help in noticing when people who are in working profession are struggling and hardly find time to get the support they need. The symptoms could be either a depressed mood, or a loss of interest or loss of pleasure in things that were once enjoyable. Many times these will just be a normal part of adolescence and nothing at all to worry about, but this depression will also lead to the indirect results such as:

- *State of Anger with high degree of irritability.*
- *The person will be reluctant and avoid spending time with colleagues in the organization.*
- *Can show an Indifferent behavior leading to collapse of good relationship with colleagues or family.*
- *May make excuse to attend meetings, get-to-gethers, or events.*
- *Depression will make them exhausting and can make people more tired than usual, even after having spent good amount of time in sleeping. Such conditions could lead to **HYPERSOMNIA**.*
- *The physic may get disturbed and could lead to headaches and migraine etc.,*
- *There will be an imbalance in the brain chemicals such as **SEROTONIN & NOREPINEPHRINE** which are the primary cause for mood and pain.*
- *Due to these changes, the person may feel restless, agitated, at times excessive depression can even slow down movement and speech.*
- *Depression can create an emptiness that feels unbearable. This can make them end up with **Eating Disorder**.*
- *Various psychological studies have proven that when emotional pain feels too big or when it stops making sense, people hurt themselves by Self-Harming.*

Tips to Handle:

If you find the person is supposed to be depressed, the first step is observe his activities and try to show care and love as they expect. Discuss with them on their problems and try to give them comfortable environment in which they can come out of their problems. Remember do not Advise them on how to be and do not compare them with others. In case if the person is not coming out with proper reason or having a difficulty in opening up with you, approach a Counseling Psychologist who can try to fix the problem. Line of treatment comes next, since many people term the affected persons by the terminologies they know and take them for medication.

Depression doesn't always need medication, but it might at an aggressive state. Some sessions of counseling can heal, if not then the psychologist should observe and recommend the client to a clinical Psychiatrist. More than working hard, succeeding in work like than studies and career growth more amount of importance is to be given to them for mental relaxation by means of meditation, yoga, take a walk, games could also be a reliever in case of stressful workday. Try to connect them with more friends and colleagues. Create a positive environment around in your workplace, this is because you spend more of your time at office / workplace. In case if the above mentioned proper care is not taken there could also be a possibility of substance addiction developed during a period of time.

Keep the mental health fit and free from taking stress for a healthy and longer living. Have a happy living.

Dr. K. JANAKIRAMAN, PhD., CCP., CMH., MIAAP., MNAOP
Psychologist & Psychotherapist



EARTH DAY 2018 AIMS TO END PLASTIC POLLUTION

Earth Day Network Announces Focus of 2018 Global Earth Day

Earth Day Network, the organization that leads Earth Day worldwide, announced that Earth Day 2018 will focus on mobilizing the world to End Plastic Pollution, including creating support for a global effort to eliminate single use plastics along with uniform regulation for the disposal of plastics. EDN will educate millions of people about the health and other risks associated with the use and disposal of plastics, including pollution of our oceans, water, and wildlife, and about the growing body of evidence that decomposing plastics are creating serious global health problems.

From poisoning and injuring marine life to the ubiquitous presence of plastics in our food to disrupting human hormones and causing major life-threatening diseases and early puberty, the exponential growth of plastics is threatening our planet's survival. EDN has built a multi-year campaign to ***End Plastic Pollution***. Our goals include ending single use plastics, promoting alternatives to fossil fuel-based materials, promoting 100 percent recycling of plastics, corporate and government accountability and changing human behavior concerning plastics.



“There is a growing tidal wave of interest in ending plastic pollution and some countries and governments are already in the vanguard. Earth Day Network believes we can turn that tidal wave into a permanent solution to plastics pollution,” said Kathleen Rogers, President of EDN.

EDN's End Plastic Pollution campaign includes four major components:

- Leading a grassroots movement to support the adoption of a global framework to regulate plastic pollution;
- Educating, mobilizing and activating citizens across the globe to demand that governments and corporations control and clean up plastic pollution;
- Educating people worldwide to take personal responsibility for plastic pollution by choosing to reject, reduce, reuse and recycle plastics, and
- Promoting local government regulatory and other efforts to tackle plastic pollution.
- Earth Day Network will leverage the platform of Earth Day and the growing interest in the 50th Anniversary of Earth Day in 2020 as a catalyst for global action.

“We will mobilize our global network of NGOs, grassroots organizations, campus youth, mayors and other local elected leaders, faith leaders, artists and athletes, and students and teachers to build a world of educated consumers, voters and activists of all ages who understand the environmental, climate and health consequences of using plastic,” said Rogers.

THE SAHARA DESERT IS EXPANDING

The Sahara Desert has expanded by about 10 percent since 1920, according to a new study by University of Maryland scientists. The research is the first to assess century-scale changes to the boundaries of the world's largest desert and suggests that other deserts could be expanding as well. The study was published online March 29, 2018, in the *Journal of Climate*.

Deserts are typically defined by low average annual rainfall—usually 100 millimeters (less than 4 inches) of rain per year or less. The researchers analyzed rainfall data recorded throughout Africa from 1920 to 2013 and found that the Sahara, which occupies much of the northern part of the continent, expanded by 10 percent during this period when looking at annual trends.

When the authors looked at seasonal trends over the same time period, the most notable expansion of the Sahara occurred in summer, resulting in a nearly 16 percent increase in the desert's average seasonal area over the 93-year span covered by the study.

“Our results are specific to the Sahara, but they likely have implications for the world's other deserts,” said Sumant Nigam, a professor of atmospheric and oceanic science at UMD and the senior author of the study. Nigam also has a joint appointment in UMD's Earth System Science Interdisciplinary Center (ESSIC).

The study results suggest that human-caused climate change, as well as natural climate cycles such as the Atlantic Multidecadal Oscillation (AMO), caused the desert's expansion. The geographical pattern of expansion varied from season to season, with the most notable differences occurring along the Sahara's northern and southern boundaries.

“Deserts generally form in the subtropics because of the Hadley circulation, through which air rises at the equator and descends in the subtropics,” Nigam said. “Climate change is likely to widen the Hadley circulation, causing northward advance of the subtropical deserts. The southward creep of the Sahara however suggests that additional mechanisms are at work as well, including climate cycles such as the AMO.”

The Sahara is the world's largest warm-weather desert, roughly equal in size to the contiguous United States. (The Arctic basin and the Antarctic continent—which are each about twice as large as the Sahara—also qualify as deserts due to their low rates of precipitation.) Like all deserts, the boundaries of the Sahara fluctuate with the seasons, expanding in the dry winter and contracting during the wetter summer.

The southern border of the Sahara adjoins the Sahel, the semi-arid transition zone that lies between the Sahara and the fertile savannas further south. The Sahara expands as the Sahel retreats, disrupting the region's fragile grassland ecosystems and human societies. Lake Chad, which sits in the center of this climatologically conflicted transition zone, serves as a bellwether for changing conditions in the Sahel.

“The Chad Basin falls in the region where the Sahara has crept southward. And the lake is drying out,” Nigam explained. “It's a very visible footprint of reduced rainfall not just locally, but across the whole region. It's an integrator of declining water arrivals in the expansive Chad Basin.”

A number of well-known climate cycles can affect rainfall in the Sahara and the Sahel. The AMO, in which temperatures over a large swath of the northern Atlantic Ocean fluctuate between warm and cold phases on a 50- to 70-year cycle, is one example. Warm phases of the AMO are linked to increased rainfall in the Sahel, while the opposite is true for the cold phase. For example, the notable drying of the Sahel from the 1950s to the 1980s has been attributed to one such cold phase. The Pacific Decadal Oscillation (PDO), marked by temperature fluctuations in the northern Pacific Ocean on a scale of 40 to 60 years, also plays a role.

To single out the effects of human-caused climate change, the researchers used statistical methods to remove the effects of the AMO and PDO on rainfall variability during the period from 1920 to 2013. The researchers concluded that these natural climate cycles accounted for about two-thirds of the total observed expansion of the Sahara. The remaining one-third can be attributed to climate change, but the authors note that longer climate records that extend across several climate cycles are needed to reach more definitive conclusions.

“Many previous studies have documented trends in rainfall in the Sahara and Sahel. But our paper is unique, in that we use these trends to infer changes in the desert expanse on the century timescale,” said Natalie Thomas, a graduate student in atmospheric and oceanic science at UMD and lead author of the research paper.

The study's results have far-reaching implications for the future of the Sahara, as well as other subtropical deserts around the world. As the world's population continues to grow, a reduction in arable land with adequate rainfall to support crops could have devastating consequences.

"The trends in Africa of hot summers getting hotter and rainy seasons drying out are linked with factors that include increasing greenhouse gases and aerosols in the atmosphere," said Ming Cai, a program director in the National Science Foundation's Division of Atmospheric and Geospace Sciences, which funded the research. "These trends also have a devastating effect on the lives of African people, who depend on agriculture-based economies."

Thomas and Nigam are focused on learning more about the drivers behind desert expansion in the Sahara and beyond.

"With this study, our priority was to document the long-term trends in rainfall and temperature in the Sahara. Our next step will be to look at what is driving these trends, for the Sahara and elsewhere," Thomas explained. "We have already started looking at seasonal temperature trends over North America, for example. Here, winters are getting warmer but summers are about the same. In Africa, it's the opposite—winters are holding steady but summers are getting warmer. So the stresses in Africa are already more severe."

ORIGAMI-FOLDED HYDROGEL PAPER INSTANTLY GENERATES 110 VOLTS OF ELECTRICITY

Animal-inspired technology has gone electric. These brightly coloured, 3D-printed gels have the potential to create up to 110 volts of electricity in an instant, similar to the electric eel.

Rows of small hydrogel dots are packed with positively and negatively charged ions that combine together to mimic an electric eel's cellular structure. Printing and stacking these hydrogels produces the highest amount of voltage, while a connection to a larger contact area produces the highest current. Scientists are hoping that this system could potentially lead to a device that generates power from inside of the human body."The electric eel is able to create very, very large amounts of power. And we thought that this was remarkable," said Anirvan Guha, one of the researchers on the project, designed at the University of Fribourg in Switzerland. "So we started to think about whether or not we could create a system that could generate electricity in the same way."

An eel's unique ability comes from a specialized organ housing thousands of cells called electrocytes. The chemical make up of these cells allows for a positive or negative charge. The surrounding membranes control the charge by allowing ions to pass through, inciting an electric reaction, or by blocking the ions and returning the organ to a neutral, dormant state.

When an eel is threatened or stalking prey, a neural impulse is sent to the membranes in the electrocytes, and positive ions flood into the cells. In a second, the electric voltage in each cell can go from zero millivolts to 150 millivolts, producing a total of up to 600 volts.

This new power generator works in a similar way. It uses four different types of hydrogels to mimic the eel's electrical system. One with a high salt concentration, one with a low salt concentration, and two charged membranes—one negative and one positive. The first attempt at putting this system together involved using a fluidic autosampler that pushed the gels into sequence in tubes. The more gels in a sequence, the higher the voltage. But the researchers couldn't build an array long enough to produce the desired voltage.

So the researchers moved on to 3D printing. They printed a sequence of about 2,500 gels on two plastic sheets the size of regular printer paper. When they connected two gel papers, they were able to produce 110 volts of charge within seconds.

This was a huge jump in electricity from the previous method, but the current was still too low for most practical applications. At the suggestion of a colleague, they tried connecting the gels through a Miura-ori fold, a type of origami fold that allows the gels to stack on a folded sheet. The gels connect simultaneously with a large contact area, more closely resembling the geometry of the eel's cells. This method increased the current and prevented energy waste by decreasing the time it took for the gels to connect. Guha says he and his team would love to find a way to make the hydrogels thinner, which would allow for an even higher current. They imagine that one day this system, or one like it, could be used to power internal biological devices such as pacemakers.

NEW TECH FOR COMMERCIAL LITHIUM-ION BATTERIES FINDS THEY CAN BE CHARGED 5 TIMES FAST

Researchers at WMG at the University of Warwick have developed a new direct, precise test of Lithium-ion batteries' internal temperatures and their electrodes potentials and found that the batteries can be safely charged up to five times faster than the current recommended charging limits. The new technology works in-situ during a battery's normal operation without impeding its performance and it has been tested on standard commercially available batteries. Such new technology will enable advances in battery materials science, flexible battery charging rates, thermal and electrical engineering of new battery materials/technology and it has the potential to help the design of energy storage systems for high performance applications such as motor racing and grid balancing.

If a battery becomes over heated it risks severe damage particularly to its electrolyte and can even lead to dangerous situations where the electrolyte breaks down to form gases than are both flammable and cause significant pressure build up. Overcharging of the anode can lead to so much Lithium electroplating that it forms metallic dendrites and eventually pierce the separator causing an internal short circuit with the cathode and subsequent catastrophic failure.

In order to avoid this, manufacturers stipulate a maximum charging rate or intensity for batteries based on what they think are the crucial temperature and potential levels to avoid. However until now internal temperature testing (and gaining data on each electrode's potential) in a battery has proved either impossible or impractical without significantly affecting the batteries performance.

Manufacturers have had to rely on a limited, external instrumentation. This method is obviously unable to provide precise readings which has led manufacturers to assign very conservative limits on maximum charging speed or intensity to ensure the battery isn't damaged or worst case suffers catastrophic failure.

However researchers in WMG at the University of Warwick have been developing a new range of methods of that allows direct, highly precise internal temperature and "per-electrode" status monitoring of Lithium-ion batteries of various formats and destination. These methods can be used during a battery's normal operation without impeding its performance and it has been tested on commercially available automotive-class batteries. The data acquired by such methods is much more precise than external sensing and the WMG have been able to ascertain that commercially available lithium batteries available today could be charged at least five times faster than the current recommended maximum rates of charge. The WMG researchers have published their research this month (February 2018) in the prestigious journal *Electrochimica Acta* in a paper entitled "Understanding the limits of rapid charging using instrumented commercial 18650 high-energy Li-ion cells" see: <https://doi.org/10.1016/j.electacta.2018.01.076>

DrTazdinAmietszajew WMG researcher University of Warwick DrTazdinAmietszajew, the WMG researcher who led on this research, said: "This could bring huge benefits to areas such as motor racing which would gain obvious benefits from being able to push the performance limits, but it also creates massive opportunities for consumers and energy storage providers. Faster charging as always comes at the expense of overall battery life but many consumers would welcome the ability to charge a vehicle battery quickly when short journey times are required and then to switch to standard charge periods at other times. Having that flexibility in charging strategies might even/further down the line help consumers benefit from financial incentives from power companies seeking to balance grid supplies using vehicles connected to the grid."

"This technology is ready to apply now to commercial batteries but we would need to ensure that battery management systems on vehicles, and that the infrastructure being put in for electric vehicles, are able to accommodate variable charging rates that would include these new more precisely tuned profiles/limits"

The technology the WMG researchers have developed for this new direct in-situ battery sensing employs miniature reference electrodes and Fibre Bragg Gratings (FBG) threaded through bespoke strain protection layer. An outer skin of fluorinated ethylene propylene (FEP) was applied over the fibre, adding chemical protection from the corrosive electrolyte. The result is a device that can have direct contact with all the key parts of the battery and withstand electrical, chemical and mechanical stress inflicted during the batteries operation while still enabling precise temperature and potential readings.

WMG Associate Professor DrRohitBhagat who was also one researchers on the paper said:”This method gave us a novel instrumentation design for use on commercial 18650?cells that minimises the adverse and previously unavoidable alterations to the cell geometry. The device included an in-situ reference electrode coupled with an optical fibre temperature sensor. We are confident that similar techniques can also be developed for use in pouch cells.””Our research group in WMG has been working on a number of technological solutions to this problem and this is just the first that we have brought to publication. We hope to publish our work on other innovative approaches to this challenge within the next year.”

WORLD’S LARGEST SOLAR PARK SHAKTI STHALA INAUGURATED IN KARNATAKA



Chief Minister Siddaramaiah on Thursday inaugurated a solar power park with a 2,000 megawatt capacity at Pavagada in Karnataka’s Tumakuru district, about 70 km from here. “Karnataka has emerged as the third-largest producer of renewable energy in the country. We have set a goal to source at least 20 per cent of power requirements from renewable projects,” Siddaramaiah said.

Built on 13,000 acres spread across five villages, the park entailed an expenditure of Rs 165 billion, an official statement said. The solar park generated 600 MW power as of January 2018 while an additional 1,400 MW is expected to be generated by December. Even as the southern state claims that this solar park is the largest, Rajasthan’s Bhadla solar park coming up in Jodhpur district will have a capacity of 2,255 MW when fully operational.

“The solar park has farmers from the Pavagada region as partners and beneficiaries who have leased out land for the park,” said state Energy Minister.

ENERGY, ELECTRICAL ENERGY AND RENEWABLE ENERGY – 7

Sustainable Growth, Sustainable Electrical Energy and Renewable Energy

Thermo Chemical Technologies – Combustion Technology – Application and Cautions

Combustion is certainly the most useful technology for “Firm”, large scale and ‘Decentralized Distributed Power Generation’ using all kinds of Biomass, employing the concept of “Waste to Energy”. As dealt in some detail earlier, the wastes are available in substantial quantities from Agriculture, Plantations, Animals and Poultry activities and Municipal solid and liquid wastes. Carbon Emission from combustion of Biomass is considered as “Carbon Neutral”, but the problems of ‘Pollution’ must be taken absolute care. Unlike the burning of Coal, Biomass combustion can create floating dusts in the smoke as well as generation of ‘Toxic’ gases, particularly in case of Municipal Solid Wastes. Provision of all necessary processes to take care of dusts and treatment of combustion smoke before letting it out in the atmosphere, at the time of Design and Erection of Biomass Power Plants, and strict and periodical controls to ensure absence of pollutions, are very necessary for sustained and pollution free Power Generation.

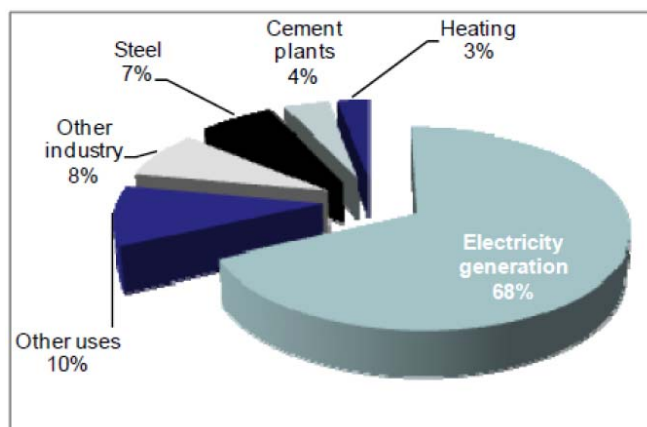
Carbonization Processes – to support Power Generation from Biomass.

General:

Technologies are developed and perfected for production of “Bio Coal” and “Bio Carbon” from solid and liquid Biomass and employing these Carbon for Combustion can help ease out the complexity of combustion and cleaning of smoke. Some of the important Carbonization technologies are explained below.

Torrefaction:

Torrefaction is one of the important Thermo Chemical Processes for Bio Energy. In essence, this is a Technology developed to produce Bio Coal from all kinds of Solid Biomass. We are all aware that all over the world, use of Coal is estimated around 8 to 9 Billion Tons at present, out of which almost 70% goes for Power Generation, other important uses being in Cement Plants, Steel making etc. The Indian scene is similar that we are almost using 500 Million Tons per annum out of which almost 80% goes for Power Generation and the balance going to Cement and other industries. Replacement of Fossils push the need for Bio Coal and more and more of it can go a long way to improve Green Energy percentage.



Uses of Coal

Biomass is already an alternate renewable energy fuel for many of these industries and Bio Coal can help much easier switching over.

In case of co-firing of Biomass along with Coal, applications, the use of biomass implies costly investments to adapt the facilities and equipment to accept this new fuel. Biomass is different from coal: lower calorific value, low grindability, lower volumetric energy density, biologically unstable, etc...Proportion of co-firing limited by biomass composition.

Coal / raw biomass co-firing in conventional coal power plants also requires strong investment in biomass specific equipment. Cannot be implemented with high mix rates (>15%) to avoid impact on efficiency.

Torrefied biomass is an improved alternative to coal in co-firing applications. Can be stored, conveyed, milled, pulverized and burnt in conditions similar to coal : little or no need for investment in new equipment or facilities.



No degradation in storage. No tars, no clogging. No technical limit in co-firing proportion rate. Torrefied biomass also has potential to replace coal or biomass as a raw material in specific applications, such as gasification.

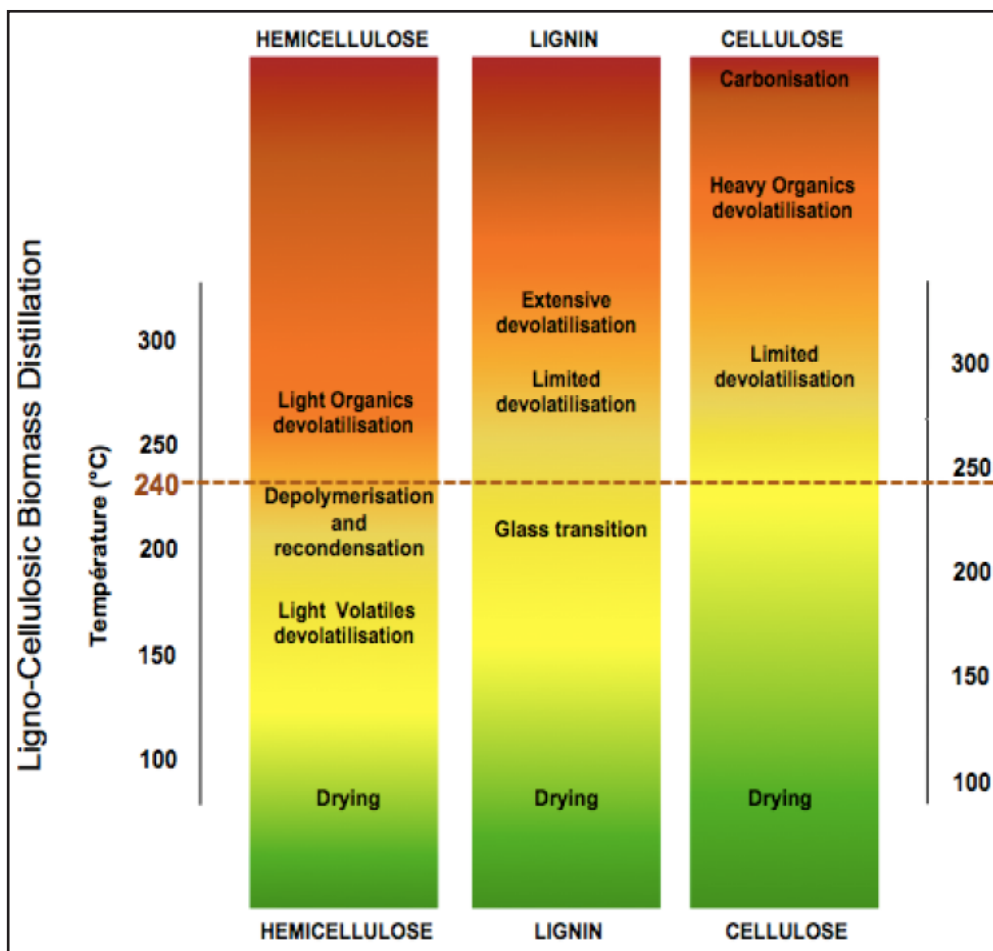
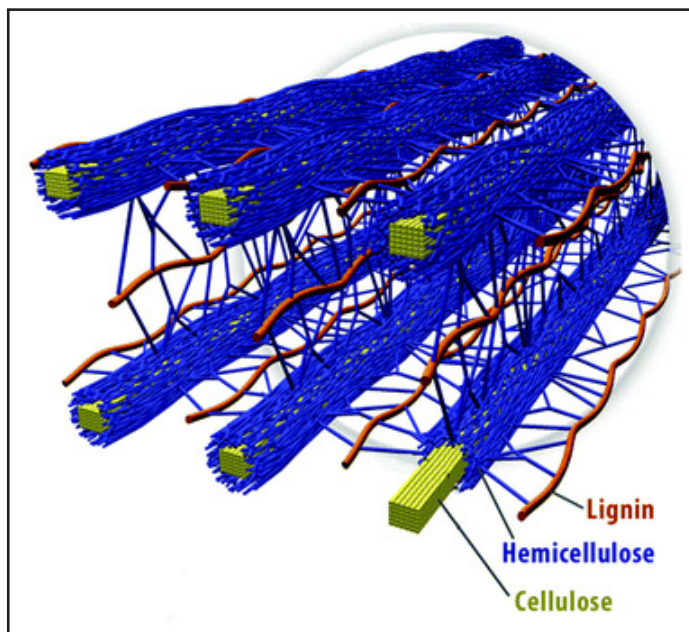
The Basics of Torrefaction

Biomass torrefaction consists in a soft thermal treatment applied up to the core of biomass particles in order to eliminate the biomass moisture content and break its fibres.

The fibres of the wood are mainly composed of: Cellulose, which forms microfibrils, Hemicellulose, whose polymers hold the cellulose microfibrils together, Lignin, that protect the fibres and give rigidity to the wood.

Once the biomass is dry, the heat triggers modifications in the wood.

The hemicellulose is the most sensitive to temperature. When the polymers of the hemicellulose are decomposed by temperature, the microfibrils are not held together anymore and the fibres become easily breakable.

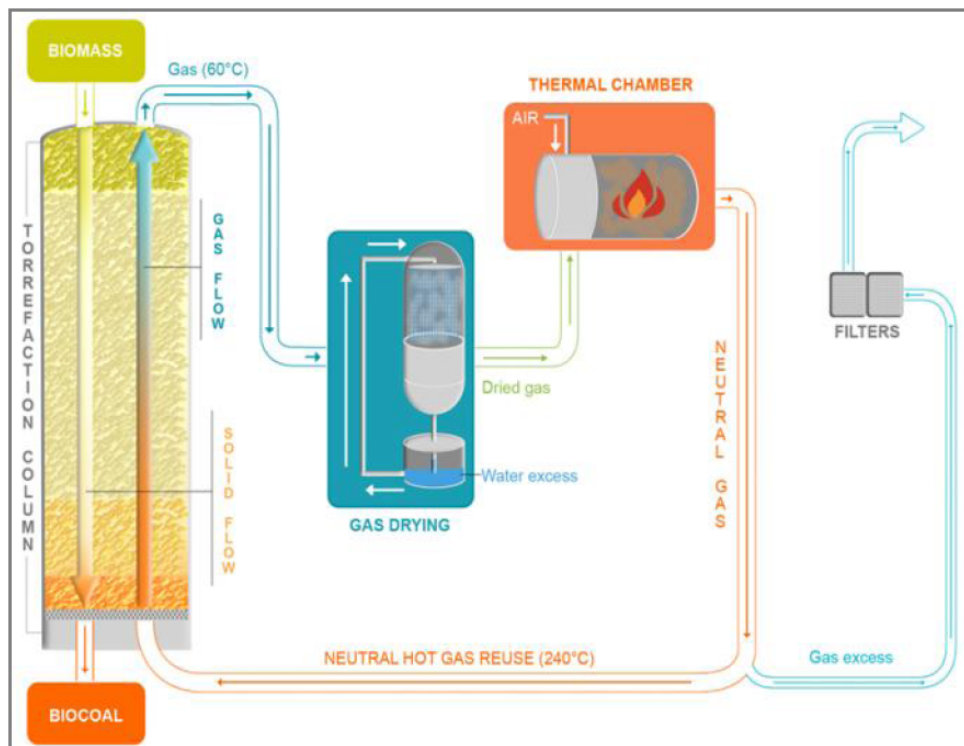


Compared Characteristics of Different Fuels



	Woodchips	Wood pellets	Torrefied wood	Coal
Moisture content (%)	30 - 55	7 - 10	< 1	10 - 15
Calorific value (LHV: MJ/kg)	7 - 12	15 - 17	20 - 24	23 - 28
Volumetric energy density (MJ/m ³)	1,400 - 3,600	8,250 - 11,050	13,000 - 19,200	18,400 - 20,400
Hygroscopic properties	Hygrophilic	Hygrophilic	Inert to water	Inert to water
Biological degradation	Fast	Medium	None	None
Grinding requirements	Special	Special	Standard	Standard
Product consistency	Limited	High	High	High
Transport costs	High	Medium	Low	Low

Torrefaction Process Basic Layout



Objectives of biomass torrefaction

Modify the characteristics of biomass, while preserving its calorific potential, so that it behaves similarly to coal.

Produce a solid fuel that is dry, stable, energy dense, highly grindable and homogeneous.

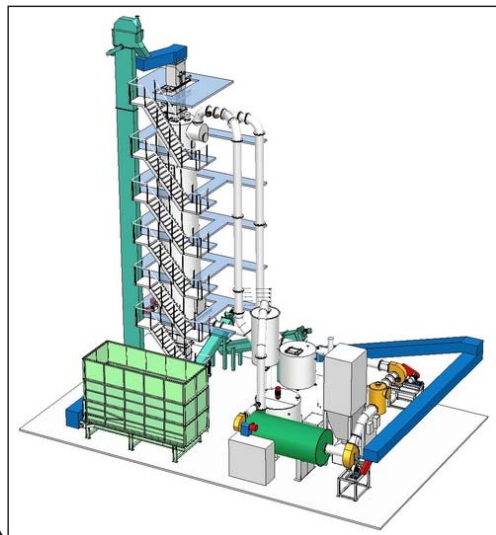
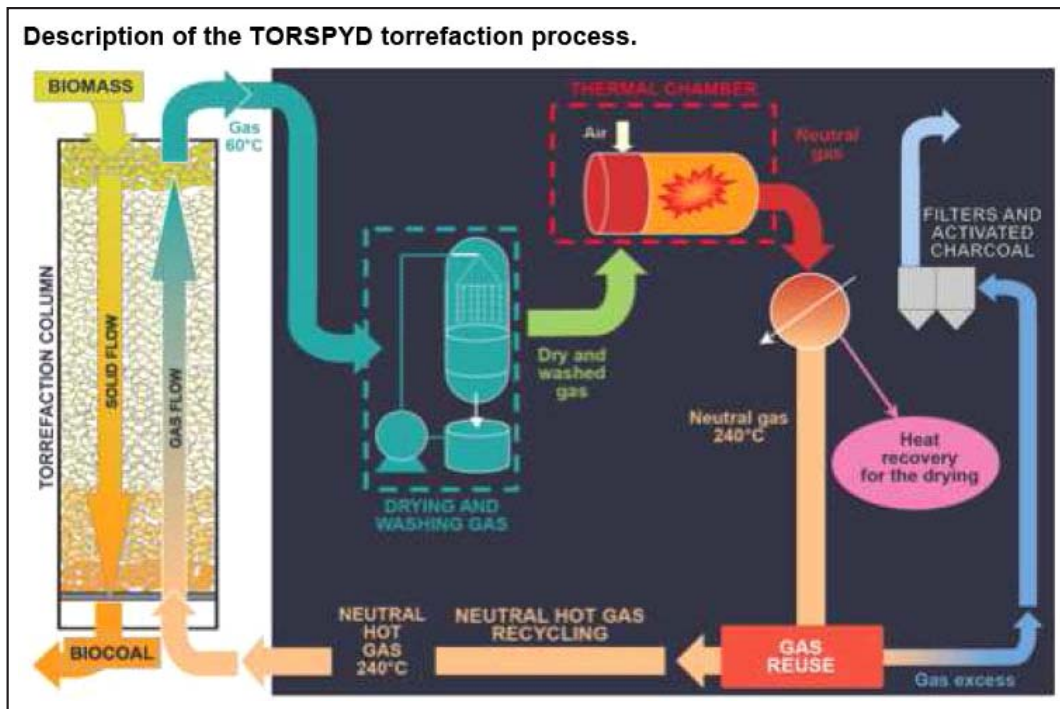
Process

The neutral hot gases are injected at the bottom of the column at the torrefaction temperature, and flow up through the biomass. A temperature gradient is maintained through out the column.

The biomass is fed at the top of the column and travels down, crossing a gradually warmer gas flow, until it reaches the torrefaction zone.

When a given biomass particle is introduced in the column, it first loses its water. Then the increasing heat triggers the devolatilisation of a small quantity of its light organics in the gas flow. When the particle reaches the torrefaction zone at the bottom of the column, the polymers of the hemicellulose are broken and the biomass is torrefied.

The neutral gases that exit the top of the column are dried, then heated back up to the desired torrefaction temperature, and re-injected in the column.



A View of a large scale Torrefaction Project

(To be continued)

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ARKUP FLOATING HOME

Dutch architect Koen Olthuis and Miami-based livable yacht company Arkup collaborated to build a 4,350-square-foot home that floats on the water. It's completely off the grid, and is capable of withstanding a category for hurricane.

We know that people are the largest source of gas emissions, with a majority of greenhouse gases coming from us burning fossil fuels for heat and transportation. These emissions led to global warming, which in turn increased the temperatures of our ocean water.

Needless to say, we've only reached the cusp of this dangerous series of events, and catastrophes are sure to worsen until proper measures to reduce carbon emissions are put into place, and most importantly: enforced. But waiting for the world to come to its senses isn't the only option people have to reduce our carbon footprint. Some, like Dutch architect Koen Olthuis, have taken to designing homes located on the water — homes that not only produce zero-emissions, but are also hurricane-proof.

The livable yachts come installed with 30-kW solar panels and 1,000 kWh of lithium-ion batteries. Rainwater is collected on the roof and transported to the home's hull, where it's then purified for future use. There's also plenty of space to comfortably move around, including the 24×12 foot sliding terrace that lets you step outside and enjoy the view.

OVERVIEW

Overall length (excl. boat lift) 75 ft (23m)
Overall beam (excl. sliding deck) 32 ft (10m)
300 Tons displacement
Semi-automated self-elevating operating system
2,300 sqft solar panels (215 m²)
2,250 sqft total indoor space (210 m²)
2,100 sqft total outdoor space (195 m²)
4 en-suite bedrooms (8 people)

GENERAL CHARACTERISTICS

US Coast Guards safety and construction standards
ABYC recreational vessel standards design
270 deg. panoramic views
High grade insulation
AC healthy and soothing indoor climate
Energy Recovery Ventilation
6 independent reverse AC zones
Floor to ceiling impact resistant bay windows
Smart house automation
Off grid with green energy generation
LED lighting system indoor & outdoor
Hurricane cat. for winds resistant design (155 mph)

NAVIGATION

2x 100kW azimuth electric thrusters (272 hp)
7 knots max
Range up to 300 nautical miles (550 km)
Depth finder
VHF marine radio and horn
Anchors

HULL CONFIGURATION

3,700 GAL fresh water tank (15m³)
3,700 GAL black/gray water tank (15m³)
Rainwater purification system
Desalination unit
Water heater
Marine Sewage Device
Lithium-Ion battery up to 1,000 kWh
DNV-GL approved Orca Energy Storage System
Electric and hydraulic power units
Central vacuum cleaning unit
Underwater lighting
All bedrooms are equipped with king size beds

ROOF CONFIGURATION

2,300 sqft solar panels | 30 kW
Communications system
Rainwater harvesting system
Lightning protection system

SAFETY

Fire extinguishers
Smoke detectors
Sprinklers
Water leak detectors
Alarms
Bilge pumps
60 kW backup generator
Video-surveillance system

CHINA BUILT THE BIGGEST AIR PURIFIER IN THE WORLD

The 100-meter high purification tower in Xian is said to cover an area of 10 square kilometers. Cutting down on the amount of air pollutants being released every day is the best approach for a cleaner local atmosphere, but in areas where massive amounts of smog are produced, finding an efficient way to clean the air is taking center stage. One effort, which at the time was touted as being the world's largest air purifier, has yielded a 7-meter tall Smog Free Tower in Rotterdam, but when your country boasts of some of the worst air quality around, you have to go bigger. Much bigger.



China's latest attempt to mitigate some of its air pollution is an experimental air purification tower standing 100 meters high, located in Xian in the north central part of the country, and preliminary tests indicate that it can improve air quality over an area some 10 square kilometers in size. The smog tower, which is a project of the Chinese Academy of Sciences, isn't a power hog, either, thanks to the design that uses large greenhouses at the base of it to heat incoming air with solar energy so that it rises passively through the tower's multiple filters before exiting the top much cleaner than before.

The tower, which was completed last year, is said to produce about 10 million cubic meters (353 million cubic feet) of clean air per day, with an average reduction in PM 2.5 (fine particulate matter measuring 2.5 microns or less in width) of 15% in local air during periods of heavy pollution. **Anecdotal evidence gathered by the South China Morning Post was mixed when it came to the efficacy of the smog tower, with some residents claiming to not notice any difference in the air quality, while others said "the improvement was quite noticeable."**

If the testing results continue to bear out over time, the Academy group behind the smog tower hopes to build a much bigger version measuring 500 meters tall and 200 meters wide, with the greenhouses feeding it covering some 30 square kilometers. It's thought that a smog tower of this size could clean the air for an entire small city.

***"Many of the advances in the sciences that we consider today
to have been made in Europe were in fact made in India centuries ago".***

- GRANT DUFF, British Historian

ORGANIC PHOTOVOLTAICS

Organic photovoltaic (OPV) solar cells aim to provide an Earth-abundant and low-energy-production photovoltaic (PV) solution. This technology also has the theoretical potential to provide electricity at a lower cost than first- and second-generation solar technologies. Because various absorbers can be used to create coloured or transparent OPV devices, this technology is particularly appealing to the building-integrated PV market. Organic photovoltaics have achieved efficiencies near 11%, but efficiency limitations as well as long-term reliability remain significant barriers.

Unlike most inorganic solar cells, OPV cells use molecular or polymeric absorbers, which results in a localized exciton. The absorber is used in conjunction with an electron acceptor, such as a fullerene, which has molecular orbital energy states that facilitate electron transfer. Upon absorbing a photon, the resulting exciton migrates to the interface between the absorber material and the electron acceptor material.

At the interface, the energetic mismatch of the molecular orbitals provides sufficient driving force to split the exciton and create free charge carriers (an electron and a hole). The low efficiencies of OPV cells are related to their small exciton diffusion lengths and low carrier mobilities. These two characteristics ultimately result in the use of thin active layers that affect overall device performance. Furthermore, the operational lifetime of OPV modules remains significantly lower than for inorganic devices.

Current research focuses on increasing device efficiency and lifetime. Substantial efficiency gains have been achieved already by improving the absorber material, and research is being done to further optimize the absorbers and develop an organic multijunction architectures. Improved encapsulation and alternative contact materials are being investigated to reduce cell degradation and push cell lifetimes to industry-relevant values.

The benefits promised by OPV solar cells include:

Low-cost manufacturing: Soluble organic molecules enable roll-to-roll processing techniques and allow for low-cost manufacturing.

Abundant materials: The wide abundance of building-block materials may reduce supply and price constraints.

Flexible substrates: The ability to be applied to flexible substrates permits a wide variety of uses.

Production

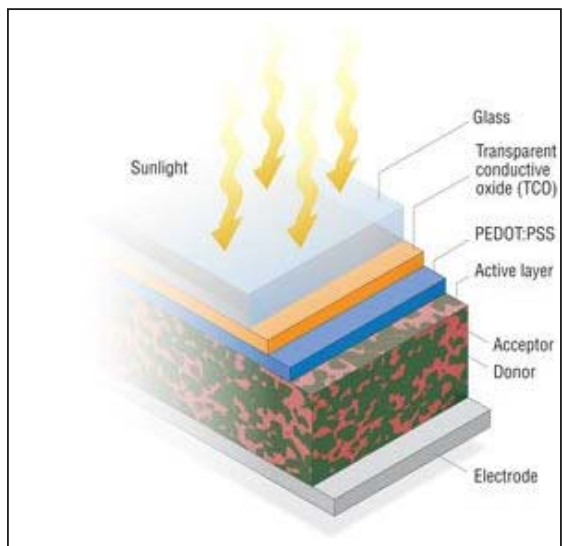
OPV cells are categorized into two classes:

Small-molecule OPV cells

Polymer-based OPV cells

Small-molecule OPV cells use molecules with broad absorption in the visible and near-infrared portion of the electromagnetic spectrum. Highly conjugated systems are typically used for the electron-donating system such as phthalocyanines, polyacenes, and squarenes. Perylene dyes and fullerenes are often used as the electron-accepting systems. These devices are most commonly generated via vacuum deposition to create bilayer and tandem architectures. Recently, solution-processed small-molecule systems have been developed. Polymer-based OPV cells use long-chained molecular systems for the electron-donating material (e.g., P3HT, MDMO-PPV), along with derivatized fullerenes as the electron-accepting system (e.g., PC60BM, PC70BM). Like small-molecule OPV cells, these systems have small exciton diffusion lengths. However, this limitation is circumvented by a high interface surface area within the active device.

Dye-sensitized solar cells are a hybrid organic-inorganic technology that uses small-molecule absorber dyes. These dyes absorb onto a suitable electron-accepting material, such as titanium dioxide or zinc oxide, along with an electrolyte to regenerate the dye.





Open Defecation: 70% of us are still doing it and therefore we have miles to go before we sleep!

Bindeshwar, like many entrepreneurs, is an accidental and truly world class entrepreneur who witnessed the life-altering experience of a newly-wed bride being forced into cleaning toilets. He had to sell his wife's jewellery and some land to start Sulabh by construction

of the first two toilets. He practices **Gandhian values**. He is M.A. in English and did ph.D. in 1985 on **"Liberation of Scavengers through Low Cost Sanitation"** and later was awarded D.Litt. (1994). His Holiness Pope John Paul-II gave him audience when International St. Francis Prize for the Environment – **'Canticle of All Creatures'** (Italy) in 1992 was bestowed upon Dr. Pathak. He has been honoured with prestigious **Padma Bhushan** award and international awards viz. **'Global Urban Best Practice'** at Habitat-II at Istanbul (1996); **'Global 500 Roll of Honour'** by UNEP at Beirut 2003; **'Habitat Scroll of Honour'** by UN-Habitat at Rio-de-Janeiro 2003. In 1970, he founded **Sulabh International Social Service Organisation** now the largest Pan-India Social Service outfit with 60,000 volunteers on its rolls who work to promote human rights, environmental sanitation, health and hygiene. It has developed a scavenging-free twin-pit pour flush toilet (Sulabh-Shauchalaya) and constructed 1.2 million such household toilets; safe and hygienic on-site human waste disposal technology; and does efficient maintenance of 8000 pay and use public toilets, used by 10.5 million people every day. Sulabh technologies invented, innovated and developed by him have been recognized by WHO, UNDP, World Bank and a number of African countries. UNCHS recognised its cost-effective and appropriate sanitation system as a global **"Urban Best Practice" (2000); which brought General Consultative Status with UN-ECOSOC**. Bindeshwar Pathak today owns a Rs. 275-crore organization called Sulabh International with 60,000 associate members. He is acknowledged as a humanist and social reformer who made meaningful interventions and changed the lives of about 200,000 scavengers from the demeaning practice of physically cleaning and carrying human excreta on their heads.

HUMOUR

An Engineering Solution

A priest, a doctor, and an engineer were waiting one morning for a particularly slow group of golfers. The engineer fumed, "What's with those guys? We must have been waiting for fifteen minutes!" The doctor chimed in, "I don't know, but I've never seen such inept golf!" The priest said, "Here comes the green-keeper. Let's have a word with him." He said, "Hello, George. What's wrong with that group ahead of us? They're rather slow, aren't they?" The green-keeper replied, "Oh, yes. That's a group of blind firemen. They lost their sight saving our clubhouse from a fire last

year, so we always let them play for free anytime." The group fell silent for a moment.

The priest said, "That's so sad. I think I will say a special prayer for them tonight."

The doctor said, "Good idea. I'm going to contact my ophthalmologist colleague and see if there's anything she can do for them."

The engineer said, "Why can't they play at night?"

Engineering in action

What is the difference between mechanical engineers and civil engineers? Mechanical engineers build weapons. Civil engineers build targets.

உலகை ஆளும் பருப்பு - மொச்சைப் பயறு

ஆசியாவில் பிறந்து, உலகெங்கும் அதிக அளவில் பயிரிடப்படும், உண்ணப்படும் மொச்சைப் பயறு வகை சோயா. புரதம் நிறைந்துள்ள சோயா, விலங்குப் புரதத் துக்கும் பாலுக்கும் சிறந்த மாற்றாகப் பரிந்துரைக்கப்படுகிறது, பயன்படுத்தப்படுகிறது.

தாவரப் புரதங்களில் மிக அதிகப் புரதச் சதவீதத்தைக் கொண்டது சோயா. வேறெந்த பயறு வகைத் தாவரமும் சோயா அளவுக்கு அதிகப்பட்சப் புரதத்தைக் கொண்டிருக்கவில்லை. சமச்சீரான உணவில் புரதத் தேவையை நிறைவு செய்வதற்குச் சோயாவை எடுத்துக்கொள்ளலாம்.



சீனாவின் கண்டுபிடிப்பு

சோயா மொச்சை சீனாவைத் தாயகமாகக் கொண்டது. 13,000 ஆண்டுகளுக்கு முன்பே பயிரிடப்பட்டதாகக் கருதப்படும் இது, சீனர்களின் அத்தியாவசிய உணவாக இருந்தது. சில நூற்றாண்டுகளுக்குப் பின்னர் ஆசிய நாடுகளில் சோயா அறிமுகமானது. 20-ம் நூற்றாண்டின் தொடக்கம் வரை மேற்கத்திய நாடுகளில் கால்நடைத் தீவனமாக மட்டுமே சோயா கருதப்பட்டுவந்தது. 1970-களில் இருந்து சோயா உணவை உட்கொள்வதும், இறைச்சி - பால் பொருட்களுக்கு மாற்றாகச் சோயா பால், சோயா வெண்ணெய், சோயா தயிர் போன்றவற்றைப் பயன்படுத்துவதும் அதிகரித்தது. இன்றைக்கு, உலகிலேயே மிக அதிகமாக விளைவிக்கப்படும், பயன்படுத்தப்படும் மொச்சைப் பயறு சோயா தான்.

பயன்பாடு

பொதுவாகப் பச்சையாக இருந்தாலும், மஞ்சள், பழுப்பு, கறுப்பு நிறங்களிலும் சோயா கிடைக்கிறது. பச்சையாகவும் சமைக்கப்பட்டுப் பயன்படுத்தப்படுகிறது. சோயா பால், டோஃபு, சோயா புரதம், சோயா மாவு, சோயா சாஸ் போன்ற இதன் மதிப்புக்கூட்டு பொருட்களும் பிரபலம்.

➤ சோயாவை சமைக்கவும், எளிதாகச் செரிமானம் ஆகவும் ஊற வைப்பது நல்லது. இதை வேகவைத்துச் சாப்பிடுவதே சிறந்தது. அந்த நடைமுறையில்

தேவையற்ற சில வேதிப்பொருட்கள் வெளியேற்றப்படுகின்றன. தைராய்டு பிரச்சினை இருப்பவர்கள், சிறுநீரகக் கல் இருப்பவர்கள், ஒவ்வாமைப் பிரச்சினை இருப்பவர்கள், மார்பகப் புற்றுநோய் இருப்பவர்கள் சோயாவைத் தவிர்ப்பது நல்லது.

ஊட்டச்சத்து

- 100 கிராம் சோயாவில் 17 கிராம் புரதம், 10 கிராம் கார்போஹைட்ரேட், 6 கிராம் நார்ச்சத்து இருக்கிறது.
- புரதச்சத்தைத் தவிர, வைட்டமின்கள், கனிமச்சத்துகள், நீரில் கரையாத நார்ச்சத்து நிறைந்தது. அதனால், மலக்கட்டு வராமல் தடுக்கும்.
- சைவ உணவை மட்டுமே சாப்பிடுபவர்களுக்கு, சோயா சிறந்த பலனை அளிக்கும் என்று ஆராய்ச்சிகள் கூறுகின்றன.
- சோயாவில் உடலுக்குத் தேவையான எட்டு அத்தியாவசிய அமினோ அமிலங்கள் இருக்கின்றன.
- விலங்குப் புரதம் உடலில் கொழுப்பு அளவை அதிகரிக்கும். அதேநேரம், சோயா புரதம் உடலில் கொழுப்பு அளவை குறைக்கிறது.
- சோயாவில் உள்ள பைட்டோஸ்டிரால்ஸ் - கொழுப்பு, ஸ்டிராய்டு ஹார்மோன்களின் வடிவத்தை ஒத்தவை. உடலில் கொழுப்பு படிவதை இவை தடுக்கின்றன.
- மலச்சிக்கல், நீரிழிவு நோய், அதிகக் கொழுப்பால் அவதிப்படுபவர்கள், இதைத் தாராளமாகப் பயன்படுத்தலாம்.
- பொதுவாகத் தாவரங்களில் காணப்படும் வேதிப் பொருட்களான ஃபைட்டோஈஸ்ட்ரோஜென்ஸ் சோயாவில் அதிகம். அதிலும் குறிப்பாக இதில் உள்ள ஐசோஃபிளேவோன்ஸ் பெண்களிடையே மார்பகப் புற்றுநோய் ஆபத்தைக் குறைக்கும் என்று ஒரு ஆராய்ச்சி முடிவு சொல்கிறது.
- புற்றுநோய், இதய நோய், எலும்பு வலுவழிப்பு நோய் உள்ளிட்டவற்றையும் ஐசோஃபிளேவோன்ஸ் மட்டுப்படுத்தும்.
- அதேபோல, பெண்களின் உடலில் அதிகமாக ஈஸ்ட்ரோஜென் சுரந்தாலோ ஹார்மோன் சமநிலையின்மை இருந்தாலோ, அதைச் சீரமைப்பதற்குச் சோயா உதவும்.

பி.எம்.எஸ்., எண்டோமெட்ரியோசிஸ் போன்ற நோய்களை மட்டுப்படுத்தவும் சோயா உதவும்.

- மெனோபாஸ் காலத்தில் பெண்கள் சோயா சாப்பிடுவது சிறந்தது. ஏனென்றால் மெனோபாலின் போது, ஈஸ்ட்ரோஜென் சுரப்பு குறைகிறது. சோயாவில் உள்ள ஈஸ்ட்ரோஜென் அதை ஈடு செய்யும்.
- சோயாவில் இரும்புச்சத்து அதிகம். அதேநேரம் உடல் அதை கிரகித்துக்கொள்வதைப் பைடேட், சோயா புரதம் போன்றவை தடுக்கின்றன. சோயாவை முளைகட்டிச் சாப்பிட்டால் இரும்புச்சத்து அதிகம் கிரகிக்கப்படும்.
- மற்றப் பருப்புகளைவிட சோயாவில் சுண்ணாம்புச்சத்து அதிகம், வைட்டமின் 'டி'யும் இருக்கிறது. மாட்டுப் பால்விட, சோயா பாலில் உள்ள சுண்ணாம்புச்சத்து உடலில் அதிகமாகக் கிரகித்துக்கொள்ளப்படும்.
- சோயாவில் வைட்டமின் பி (நியாசின், பைரிடாக்சின், ஃபோலாசின்), வைட்டமின் பி12 போன்றவை அதிகம்.
- மக்னீசியம், செலெனியம் போன்ற கனிமச்சத்துகளும் உள்ளன.
- மற்றப் பயறு வகைகளைவிட சோயாவில் கொழுப்புச்சத்து அதிகம். அதேநேரம் அதில் பெருமளவு நிறைவுறா – அன்சாச்சுரேட்டட் கொழுப்பு, அதாவது நல்ல கொழுப்பு இருக்கிறது, சோயாவில் கெட்ட கொழுப்பு இருந்தாலும், அதன் அளவு மிகவும் குறைவு.
- உடலுக்கு நன்மை பயக்கும் நிறைவுறா கொழுப்பில் ஒன்றான 'ஒமேகா 3' கொழுப்பு

அமிலம்' சோயாவில் இருக்கிறது. இந்த அமிலம் இருக்கும் ஒரு சில தாவரப்பொருட்களில் சோயாவும் ஒன்று. இந்த அமிலம் இதய நோய்களையும் புற்றுநோயையும் தடுக்கிறது.

- பால் பொருட்கள் ஒவ்வாமை (lactose intolerance) இருப்பவர்களும் 'Hereditary Lactose deficiency' நோய் இருப்பவர்களும் பால் பொருட்களுக்கு மாற்றாகச் சோயாவைப் பயன்படுத்தலாம்.

மருந்தாக...

- அறுவைசிகிச்சை மூலம் கர்ப்பப்பை மற்றும் சினைப்பை நீக்கப்பட்ட பெண்களுக்கு ஈஸ்ட்ரோஜன் பற்றாக்குறையால் திடீரென உடலின் ஒரு பாகம் சூடாகும் (Hot flash). அத்துடன் அடிக்கடி அதிகக் கோபமடைதல், பெண் பிறப்புறுப்பில் திரவ வறட்சியால் பாலுறவின்போது அடிக்கடி நீக்கிடுப்பு, முதுகுவலி போன்றவையும் ஏற்படலாம். இதைத் தீர்க்கும் சிறந்த உணவு சோயாதான்.
- வறண்ட சருமம் கொண்டவர்களுக்கும், முடி உதிர்ந்தல் பிரச்சினை உள்ளவர்களுக்கும் சோயா சிறந்த உணவு. தோல் சுருக்கத்தைக் குறைக்கும் பண்பும் சோயாவுக்கு உண்டு.
- புரஸ்த கோளம் வராமல் தடுக்கும் தன்மை சோயாவுக்கு இருப்பதாக ஆய்வுகள் தெரிவிக்கின்றன. தொடர்ந்து ஆய்வுகள் நடைபெற்றுக் கொண்டிருக்கின்றன.

சோயா தாவரவியல் பெயர்: Glycine max

ஆங்கிலப் பெயர்: Soya / Soybean

Courtesy: தி இந்து, 27.08.2016

எந்த உணவுப் பொருளை எந்த நேரத்தில் சாப்பிடுவது நல்லதுன்னு தெரியுமா?

உடல் ஆரோக்கியமாக இருக்க வேண்டுமானால் சரிவிகிதையடிகவும் இந்நிபமயசுது நல்ல ஆரோக்கியமான உணவுகளைத் தேர்ந்தெடுத்து சாப்பிடுவதன்



மூலம், உடலுக்கு வேண்டிய ஊட்டச்சத்துக்கள் கிடைத்து, உடல் பிரச்சனைகளின்றி இருக்கும். ஆனால் நம்மில் பலர் சாப்பிடும் பெரும்பாலான உணவுப் பொருட்களை தவறான நேரத்தில் சாப்பிடுகின்றனர். இப்படி தவறான நேரத்தில்

குறிப்பிட்ட உணவுப் பொருட்களை உட்கொள்வதன் மூலம் உடலுக்கு தீங்குதான் விளையும் என்பது தெரியுமா? ஆம், குறிப்பிட்ட உணவுப்பொருட்களை தவறான நேரத்தில் சாப்பிட்டால், அதன் விளைவாக அஜீரண கோளாறு, மலச்சிக்கல் மற்றும் இதர வயிற்று சம்பந்தப்பட்ட பிரச்சனைகளை சந்திக்க நேரிடும். ஆனால் நமக்கு எந்த பொருளை எந்த நேரத்தில் சாப்பிடுவது நல்லது என்று தெரியாது. முக்கியமாக அன்றாடம் நாம் சாப்பிடும் பொதுவான உணவுப் பொருட்களை எந்த நேரத்தில் சாப்பிடுவது என்று தெரியாமல் கண்ட நேரத்தில் சாப்பிடுகிறோம். உதாரணமாக வாழைப்பழம், பால், தயிர் போன்ற பொதுவான உணவுப் பொருட்களை எந்த நேரத்தில் சாப்பிடுவது நல்லது என்று தெரியுமா? இந்த உணவுப் பொருட்களை தவறான நேரத்தில் சாப்பிட்டால், அதனால் எதிர்மறை விளைவுகளைத்தான் சந்திக்க நேரிடும். இக்கட்டுரையில் நாம் பொதுவாக சாப்பிடும்

சில உணவுப் பொருட்களை எந்த நேரத்தில் சாப்பிடலாம், சாப்பிடக் கூடாது என கொடுக்கப்பட்டுள்ளது. அதைக் கொஞ்சம் படித்து தெரிந்து கொள்ளுங்கள்.

வாழைப்பழம்: வாழைப்பழத்தில் நெஞ்செரிச்சலை சரிசெய்ய உதவும். ஆன்டாசிட்டு பண்புகள் அதிகம் உள்ளது. வாழைப்பழத்தை பகல் நேரத்தில் சாப்பிடுவதன் மூலம், உடலின் ஆற்றல் சீராக பராமரிக்கப்படும். அதே வாழைப்பழத்தை இரவு நேரத்தில் சாப்பிட்டால், அதன் விளைவாக சளி மற்றும் இருமலால் அவஸ்தைப்படக்கூடும். எனவே எப்போதும் வாழைப்பழத்தை இரவு நேரத்தில் சாப்பிடக்கூடாது.

தயிர்: தயிரை பகல் நேரத்தில் சாப்பிடுவதன் மூலம் செரிமான செயல்பாடுகள் மென்மையாக நடைபெறுவதோடு, குடல் ஆரோக்கியமும் மேம்படும். இந்த தயிரை இரவு நேரத்தில் சாப்பிட்டால், அது சூட்டைக் கிளப்பிவிடுவதோடு, அசிடிட்டியை ஏற்படுத்துவதோடு, இதர செரிமான கோளாறுகளையும் உண்டாக்கும். அதோடு, இது சுவாச பாதைகளைப் பாதித்து, சளி மற்றும் இருமல் பிரச்சினையால் அவஸ்தைப்படவும் செய்யும்.

கீர்ன் டீ: கீர்ன் டீயில் ஏராளமான நன்மைகள் அடங்கியுள்ளன. ஆனால் இந்த பானத்தை சரியான நேரத்தில் கடித்தால்தான், இதன் முழு பலனையும் பெற முடியும். கீர்ன் டீயை ஒருவர் அதிகாலையில் எழுந்ததும் வெறும் வயிற்றில் குடித்தால், அது உடல் வறட்சி மற்றும் அசிடிட்டியை உண்டாக்கிவிடும். ஏனெனில் அதில் காபி.பைன் உள்ளது. எனவே இதனை வெறும் வயிற்றில் குடிப்பதை விட, பகல் நேரங்களில் குடிப்பதே சிறந்தது.

சாதம்: ஒருவர் சாதத்தை இரவு நேரத்தில் சாப்பிடுவதைத் தவிர்க்க வேண்டும் என அனைத்து ஊட்டச்சத்து நிபுணர்களும் பரிந்துரைக்கிறார்கள். ஏனெனில் இதில் ஸ்டார்ச் அதிகமாக உள்ளது. இதனை இரவு நேரத்தில் சாப்பிட்டால், வயிறு உப்புசத்தடன் இருப்பதோடு, இரவு நேரத்தில் நிம்மதியான தூக்கத்தைப் பெற முடியாமலும் செய்யும். மேலும் இரவு நேரத்தில் சாதத்தை சாப்பிட்டால், அது செரிமானமாவதற்கு நீண்ட நேரம் எடுத்து, உடல் பருமனுக்கு வழிவகுக்கும். எனவே சாதத்தை பகலில் மட்டும் சாப்பிடுங்கள்.

பால்: பாலில் அத்தியாவசிய ஊட்டச்சத்துக்கள் அதிகம் நிறைந்துள்ளது, ஆனால் இத்தகைய பாலை பகல் வேளையில் குடித்தால், அது சோம்பேறித்தனமாக இருக்க செய்யும். ஏனெனில் இது செரிமானமாவதற்கு நீண்ட நேரம் ஆகும். இதே பாலை இரவு நேரத்தில் ஒருவர் குடித்தால், உடல் முழுமையாக ரிலாக்ஸ் ஆவதோடு, அதில் உள்ள ஊட்டச்சத்துக்களும் சிறப்பான முறையில் முழுமையாக உடலால் உறிஞ்சப்படும்.

ஆப்பிள்: நம் அனைவருக்கும் ஆப்பிள் ஏராளமான முக்கிய ஆன்டி ஆக்ஸிடென்ட்டுகள் நிறைந்த மிகவும்

சிறந்த உணவுப் பொருள் என்பது தெரியும். இத்தகைய ஆப்பிளை இரவு நேரத்தில் சாப்பிட்டால், அது வயிற்றில் அமிலத்தின் அளவை அதிகரித்து. அசிடிட்டியை உண்டாக்கும். எனவே ஆப்பிளை இரவு நேரத்தில் சாப்பிடுவதைத் தவிர்த்து, பகல் நேரத்தில் சாப்பிடுங்கள். இதனால் குடலியக்கம் சிறப்பாக நடைபெறும்.

டார்க் சாக்லேட்: டார்க் சாக்லேட் ஆரோக்கியத்தை மேம்படுத்தும் முக்கிய உட்பொருட்களைக் கொண்டது. மற்றும் இதய



நோய்க்கான அபாயத்தைக் குறைக்கும். டார்க் சர்க்கரை மிகவும் குறைவு, மற்றும் கொக்கோ பொருள் அதிகம். இதனை இரவு நேரத்தில் சாப்பிட்டால். மனநிலை சிறப்பாகி, இரத்த அழுத்தத்தைக் குறைக்கும். ஆகவே டார்க் சாக்லேட்டை இரவு நேரத்தில் சிறிது சாப்பிடுங்கள்.

ரெட் ஒயின்: ரெட் ஒயினில் ஆல்கஹால் மற்றும் ஆன்டி-ஆக்ஸிடென்ட்டுகள், கரோனரி இதய நோய்களைத் தடுக்கும். இத்தகைய ரெட் ஒயினை இரவு உணவு உட்கொண்ட பின் ஒரு டம்ளர் குடித்தால், அது உடலால் விரைவில் உறிஞ்சப்பட்டு, அது ஒருவரை சுறுசுறுப்பாக்கும். ரெட் ஒயினை எப்போதும் பகல் வேளையில் மட்டும் குடிக்காதீர்கள்.

காபி: பலருக்கும் இரவு நேரத்தில் காபி குடிக்கும் பழக்கம் இருக்கும். இது மிகவும் ஆரோக்கியமற்ற பழக்கங்களுள் ஒன்று. யார் ஒருவர் காபியை இரவு நேரத்தில் குடிக்கிறார்களோ, அவர்களது செரிமான மண்டலத்தில் எரிச்சலை உண்டாக்கும். மற்றும் இதில் உள்ள காபி.பைன் ஒருவரை சுறுசுறுப்பாக வைத்துக் கொள்ளும். எனவே இந்த காபியை இரவு நேரத்தில் குடிப்பதைத் தவிர்த்து, பகல் நேரத்தில் குடிக்கும் பழக்கத்தைக் கொள்ளுங்கள்.

ஆரஞ்சு ஜூஸ்: ஆரஞ்சு ஜூஸில் வைட்டமின் சி அதிகம் உள்ளது மற்றும் இதனை பகல் நேரத்தில் குடித்தால், அது மிகவும் சுறுசுறுப்பானவர்களாக ஆக்குவதோடு, உடலின் மெட்டபாலிச விகிதத்தையும் அதிகரிக்கும். இதற்கு அதில் உள்ள பொலிக் அமிலம் மற்றும் வைட்டமின் டி தான் காரணம். ஆனால் இந்த ஆரஞ்சு ஜூஸை மட்டும் இரவு நேரத்தில் குடிக்காதீர்கள். ஏனெனில் இது வயிற்றில் அமில சுரப்பின் அளவை அதிகரித்து அசிடிட்டியை உண்டாக்கிவிடும்.

சர்க்கரை: சர்க்கரை கலந்த பானங்கள் பகல் வேளையில் குடிப்பதால், இது உடலின் ஆற்றலை அதிகரிக்கும். இதனால் நாள் முழுவதும் சுறுசுறுப்பாக செயல்பட முடியும். ஆனால் இந்த சர்க்கரை கலந்த பானங்களை இரவு நேரத்தில் குடித்தால், அது உடலில் கொழுப்புக்களின் அளவை அதிகரித்துவிடும். இதற்கு இரவு நேரத்தில் உடல் இயக்கம் இல்லாமல் இருப்பது தான் காரணம்.



Worthy leaders are needed, be it organizations or Government or Politics and they can make a difference and provide sustained growth, welfare, prosperity and happiness. Tiruvalluvar deals with what is worth and what builds worthy people and the characteristics and value of such people, very clearly and briefly in his usual way.

"Anbunaan Oppuravu Kannottam Vaimaiyodu Aithusalbu Oonndriya Thoon Kural 983

அன்புநான் ஒப்புரவு கண்ணோட்டம் வாய்மையொடு
ஐந்துசால்பு ஊன்றிய தூண் குறள் 983

"Love to all, Sensitiveness to shame, Complaisance, indilgence to the fault of others and Truthfulness, these five are the pillars that support the edifice of a Noble Character"

"Gunanalam Saandror Nalane; Piranalam Ennalaththu Ullathoom Andru Kural 982

குணநலம் சான்றோர் நலனே பிறநலம்
எந்நலத்து உள்ளதூஉம் அன்று குறள் 982

"The Worthiness of the Worthy is the worthiness of their character; all other distinctions add nothing to their worth"

"Kadanenba Nallavai Yellaam Kadanarindu Sandranmai Merkkol Bavarkku Kural 981

கடன்என்ப நல்லவை எல்லாம் கடன்அறிந்து
சான்றான்மை மேற்கொள் பவர்க்கு குறள் 981

"Behold the men that know their duties and want to cultivate worth in themselves; every thing that is Good will be a duty in their eyes"

HOME FESTIVALS - 5

வைகாசி - Vaikasi (May/June)



This month is devoted to the worship of Lord Murugan, who is honoured on Vaikasi Vishakham (above). He is shown at far left as Palani, the

renunciate, dressed in loincloth, wearing a necklace of rudraksha beads, sacred ash covering His body and holding the sannyasin's staff. To the right He is shown as a prince, with His peacock, and farther to the right as the six-headed Arumugam. Devotees approach Him doing penance by piecing their bodies with small spears and carrying various offerings, including pots of milk and a kavadi, a kind of portable arched shrine. At lower right is depicted Naga Chathurthi, celebrating an ancient story in which a young boy bit by a cobra was saved from death when his sister's prayers caused the sands of the cobra's anthill to counteract the poison.

(To be continued)

The greatest legacy one can pass on to one's children and grandchildren is not money or other material things accumulated in one's life, but rather a legacy of character and faith - BILLY GRAHAM

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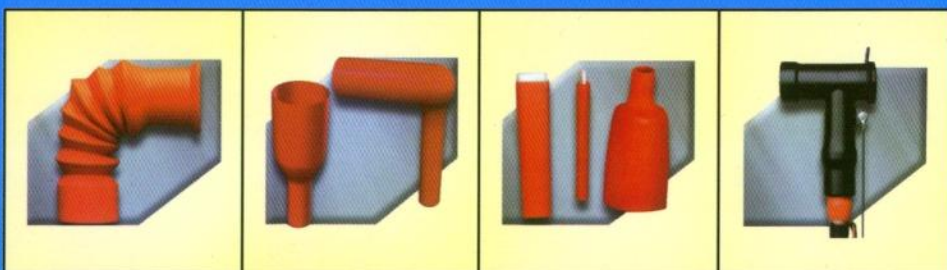
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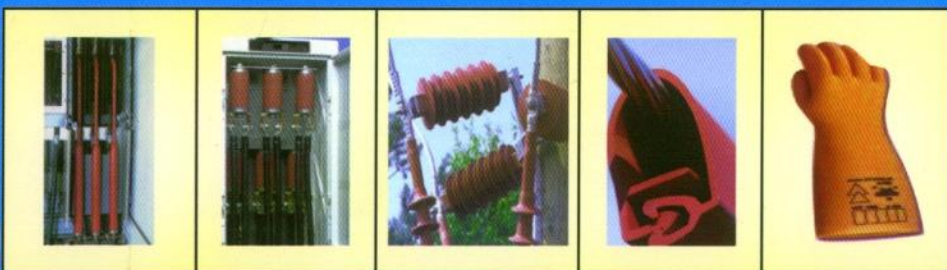
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