



ELECTRICAL INSTALLATION ENGINEER

NEWS LETTER

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

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EVENTS



Events Profile: Myanmar holds great promise as the next big market. Notwithstanding its plentiful hydroelectricity resources and incredibly rich cache of biodiversity, Myanmar faces unique and daunting set of energy access and security challenges.

Date: 17th – 18th August 2015

Venue: Sule Shangri-la Hotel, Yangon, Myanmar

Website: <http://www.myanmargreenenergysummit.com/>



Events Profile: Ministry of New and Renewable Energy, Government of India: pushing top agenda with a 2022 generation target of projects in Renewables Energy Sectors in India 100 GW of Solar, 60 GW of Wind, 10 GW of Bio-Energy & 5 GW of Small Hydro

Date: 21st – 23rd August 2015

Venue: Expo & Convention Centre, Manekshaw Centre, Delhi, India

Website: <http://wretc.in/>



Events Profile: Spread over a period of three days, the event brings together decision makers and influencers as well as technical experts and professionals from leading companies involved in the power and energy generation, transmission and distribution sectors within Africa and around the globe.

Days & Timing: 27th – 29th August 2015 & 10am to 06pm

Venue: The Mlimani Conference Centre, Dar-es-Salaam, Tanzania

Website: <http://www.expogr.com/tanzania/powerenergy/>



Events Profile: ASEAN's Premier Power Conference keep up to date with the latest trends, issues and developments by regional and global expert speakers. Renewable Energy World Asia includes a world-class exhibition floor fill with many of the industry's largest players showcasing their latest technologies and innovations.

Date: 1st – 3rd September 2015

Venue: Impact Exhibition & Convention Centre, Bangkok, Thailand

Website: <http://www.renewableenergyworld-asia.com/index.html>



International Green Building Conference 2015
Singapore

Events Profile: The Singapore Green Building Week (SGBW) will play host to international green building experts, policy-makers, academics, built environment practitioners, tenants and end-users, including members of the public and students, for a congregation of ideas, collaboration, partnership and learning, to achieve a shared vision of a greener planet through the green building movement.

Date: 2nd – 4th September 2015

Venue: Marina Bay Sands, Singapore

Website: <http://www.sgbw.com.sg/en>

EDITORIAL

Dear Members, Fellow Professionals, Friends and Well wishers,

SEASONS GREETINGS TO ONE AND ALL!!

International Yoga Day was celebrated in a Grand Manner all over the World on the 21st of June, setting Guinness Record in places like Delhi. It is a very Good News that almost 200 Countries of the World celebrated, proclaiming recognition for the age old Indian Solution for the Global Health and Peace. India possesses a Great Tradition, Heritage and Great Way of Life and a name of Religion was given to it after many Religions were founded in the World. Vivekananda can be remembered at this point, whose Samadhi Day comes in July. Vivekananda was advised to go to Chicago, US, to establish the Greatness of Indian Thoughts and Approaches abroad, so that Self Realization will start in India. Rest is History that he became very popular in the US and that made people of India hear him more and he became a Great Master. This is also the story in a nutshell of the popularity and acceptance of Yoga World over. India has many Good Things to offer to the World like Tolerance of all Faiths, but the World today is torn by intolerance and murder and bloodshed. Many people from many countries with the perversion of violence phobia seem to have got together in the name of a group indulging in mass murders. There can really be no place for it in the World. Let Peace and Goodness spread in the World.

It is History that India was one of the two richest countries of the World till about three hundred years ago and is certainly in the path of regaining it in another 20 or 25 years. But the greatest problem or the sore is the degradation of moral standards in all walks of life. In the Words of Vivekananda, Selfishness is Immoral and Unselfishness is Moral. The selfish immoral lot has created havoc in this Country through corruption and black money and siphoning out the wealth of the country and hoarding it elsewhere. Apart from law following its slow path, establishing back the Indian Value Systems, Faiths, Beliefs and Ways of Life are also a must. Attempts to give it a religious colour can be ignored as India really had no religion but only a way of life of accepting all Good Faiths.

World Population Day is celebrated on the 11th of July and India has a great responsibility and challenge as we are the second largest populated country of the World. We can feel proud that we are also one of the largest Democracies, but that makes it a challenge to implement the Right and Good Solutions fast. It is heartening that the Government at the Centre is coming out with lot of Programs to ensure Cleanliness, Sanitation, Housing for all, Focus on Infrastructure etc etc and all of it requires understanding and support by all. Rivalries and Groupism and Fanatism create obstacles, but we pray and hope that the public at large will support and benefit from all the Programs.

It is our pride and responsibility to realize and play our constructive and supportive role in the Nation Building, as Electricity is a part and parcel of any kind of economic and progress activity of any kind anywhere.

We thank all those members who have helped us by participating in the advertisements appearing for the issue June 2015 – Abirami Electricals, Supreme Power Equipment Pvt. Ltd., Universal Earthing Systems Pvt. Ltd., OBO Bettermann India Pvt. Ltd., Power Links, Faith Power Solutions - I.P.L. Products, The Motwane Mfg. Co. Pvt Ltd., Ashlok Safe Earthing Electrode Ltd., Pentagon Switchgear Pvt. Ltd., Cape Electric Pvt. Ltd., Max Electric Co., Galaxy Earthing Electrodes Pvt. Ltd., Ledgeo Ligts Pvt Ltd., P2 Power Solutions Pvt. Ltd.,

EDITOR

“Safety First” is “Safety Always.” - Charles M. Hayes

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EVENTS	6
Editorial	7
Contents	8
Members Details	9
Solar Installations Cross 2,000 MW in 2015	10
Know Thy Power Network – 94	11-12
Mercedes follows Tesla, will offer Home Energy Storage Batteries too	12
IKEA to Bank on Renewable Energy for its Indian Operations	13
Ecocapsule	14-15
Osram Demonstrates Wirelessly Steerable LED Downlight	16
Seas Generate Rising Tide of Renewables Ideas	17-18
Scientists Create World's First Fully-Artificial Molecular Pump	18
State Gets Power to Chase and Predict Wind Energy	19
Toyota's Single-Seat Electric Cars Debut at Japan Post Offices	19
Clean' Renewable Energy Alliance Launched to Expand Energy Access to 300 Million People in India	20-21
2018 Porsche Pajun Electric Car to Rival Tesla Model S, BMW 5 Series	21
SunEdison Eyes \$600 Million Wind Energy Buyout in India	22
The Kymogen Wave Energy Generator	22
Time to Tap Solar Thermal Energy	23-24
Supreme Court Upholds Applicability of Renewable Purchase Obligation on Captive Power Plants; order a Positive Development and Will Help Renewable Energy Growth in the Country	24
Product of the Month - Flir Systems Announces C2, Compact Full Featured Professional Thermal Camera	33
Powering Engineers through Training – L & T	34-35
Energy Conservation Through Energy Efficiency – 5	36-38
Book Price List	39
வந்து பாருங்கள் – சுண்ணாம்பாறு	40
20 Most Peaceful Countries in the World – 8	40
தூக்கம் எவ்வளவு நேரம் கட்டாயம் தேவை?	41
Power Your Mind	41
John Napier	42-43
India Sets two Guinness Records with Yoga Event at Delhi's Rajpath	44-45
Puan Sri Janaki Athi Nahappan	45
வீட்டைக் காக்கும் காப்பீடு	46-47
Humour	47
வேலையும் ஓய்வும்	48
Tirukkural and Management in a 'Nutshell' – 27	49
Home Festivals – 8	49
GE Lighting Illuminates London's Tower Bridge	50-51

ADVERTISEMENTS**PAGE NO.**

Abirami Electricals	26
Ashlok Safe Earthing Electrode Ltd.	1
Cape Electric Pvt. Ltd.	53
DEHN India Pvt. Ltd.	4
Electrotherm India Ltd.	28
Faith Power Solutions – I.P.L. Products	2
Flir Systems India Pvt. Ltd.	32
Galaxy Earthing Electrodes Pvt. Ltd.	25
JL Seagull Power Products	54
Ledgeo Ligts Pvt. Ltd.	31
OBO Bettermann India Pvt. Ltd.	5
P2 Power Solutions Pvt. Ltd.	30
Pentagon Switchgear Pvt. Ltd.	29
Power Links	9
Sun Sine Solution Pvt. Ltd.	27
Supreme Power Equipment Pvt. Ltd.,	52
The Motwane Mfg. Co. Pvt. Ltd.	3
Universal Earthing Systems Pvt. Ltd.	55
Wilson Power and Distribution Tech P Ltd.	56

MEMBERS DETAILS

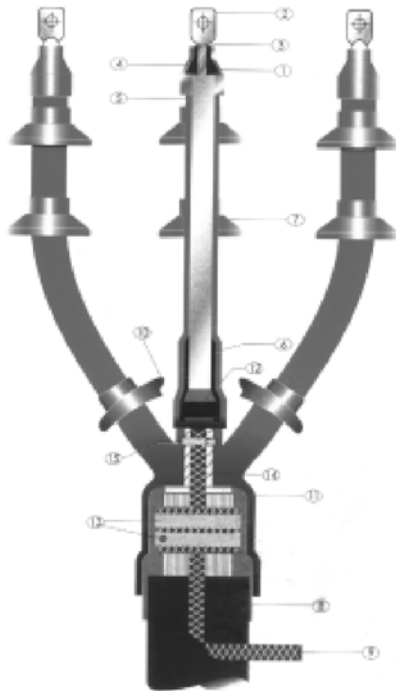
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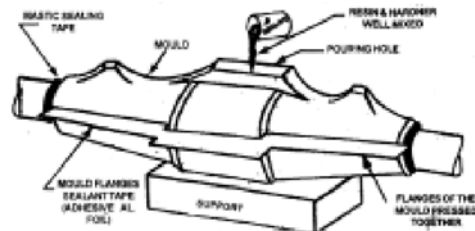
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SOLAR INSTALLATIONS CROSS 2,000 MW IN 2015

Ministry of New and Renewable Energy is very close to announcing Phase II Batch 2 programme

Solar installations in India have gone up to more than 2,000 Mw so far in 2015 due to positive developments in Tamil Nadu. The Modi administration has continued to announce various solar programmes, goals and policies during its one year in office, but has yet to call an auction.

According to a report by Mercom Capital Group, a clean energy communications and research firm, the Ministry of New and Renewable Energy (MNRE), is very close to announcing the Phase II Batch 2 programme.

“While all of these announcements have raised market sentiments, the Indian solar industry is looking for a streamlined auction process at regular intervals to better plan investments and manufacturing capacity,” Raj Prabhu,

CEO and Co-Founder of Mercom Capital Group, said in a statement.

Tamil Nadu Generation and Distribution Corporation (Tangedco) has signed PPAs in the range of 400 Mw to 1,000 Mw. The commissioning of these projects is scheduled to be as early as September 2015 all the way up to March 2016.

The Solar Energy Corporation of India (SECI), which was originally formed to implement the Jawaharlal Nehru National Solar Mission (JNNSM) projects, is evolving into a government-owned power generation unit. It announced a programme to establish and own 2,000 Mw of solar projects with sizes ranging from 250 Mw to 500 Mw to be auctioned as EPC contracts.

Projects installed under the JNNSM have now overtaken solar installations under Gujarat’s solar policy for the first time.

The Reserve Bank of India (RBI) added renewable energy under priority lending, but with a cap of Rs 15 crore (\$2.5 million) for renewable energy generators and Rs 10 lakh (\$16,393) per borrower for residential customers. The impact of this policy will likely be minimal in the short-term as the Indian solar market currently is comprised mostly of large-scale projects, Mercom report said.

“We commend the government for this decision which is a step in the right direction,” commented Prabhu. “We urge them now to consider increasing the cap to benefit large-scale projects which will greatly accelerate the implementation and execution of solar installations in the country.”

The MNRE has also proposed a subsidy cut on rooftop solar power plants from 30 per cent to 15 per cent, reasoning that the lower price of components would offset the proposed subsidy reduction. Individual states have been asked to come out with their own favourable policy and regulatory framework to support rooftop solar. This proposal comes against the background of another goal set by the government to target 40 Gw of grid-connected rooftop solar over the next five years.

The Ministry of Power has proposed several changes to the National Tariff Policy. Some of the proposed amendments include promoting renewable generation as a policy objective, and abolishing interstate transmission charges for renewable energy sources. The most notable change proposed by the Ministry is the increase in the solar Renewable Purchase Obligation (RPO) to eight percent by 2019 from the current goal of three.

“Without strict enforcement of RPO, it doesn’t matter what the percentage requirement is. It is more important to put mechanisms in place which will support strict enforcement of the policy,” Prabhu added.

Courtesy: Business Standard



“We have actively sought and are actively seeking to make the United Nations an effective instrument of international cooperation”

KNOW THY POWER NETWORK - 94

Our next trip across power network starts rolling now. Prior to our step in the network, shall I make a simple but a meaningful question? Hope it will “Stump” you all. What does the term “FOREST” refers to? Does it refer to an area covered with dense trees or anything else? If you feel that the answer to this question is not that easy or complex, then wait for a moment to get the right answer will you? Kindly pause for a moment and then read this effective but simple answer. “FOREST..... A dynamic term that represents the flora and fauna of a densely populated area which is beyond description. It covers everything from that lies under its belly – right from tiny insects to the largest trees, all kinds of animals and water flows. You cannot count the living and non-living things that exist in its territory with well marked boundaries. When you enter / visit a thick forest, it will certainly be a thing of “beauty” and a thing of “joy”. Just like “FOREST”, our POWER NETWORK is also a fascinating place. It covers everything from “coal to plug”. You will never feel tired, when you make trips across this dynamic network. Everyday visit presents a new energetic and enthusiastic experience. Now you can feel how “fortunate” you are to make trips across this dynamic world with the aid of articles like this. One point needs repeated emphasis. That is, you can never reach any destination or boundaries or an end station in a power network. It never stops its expansion i.e. it has no end / boundary. Like universe, it is “infinite” – an ever receding horizon. The closer you move, further it goes. Shall we revert to our regular topic now?

In the last article we discussed one of the hot topics in cyber space viz Net Neutrality and Net Equality. This time let us learn about “Cyber Espionages”. Attackers in the cyber space operates with different or varying motivations and intentions. Among them are cyber crimes, extortions and warfares; nations also at times perform cyber attacks or threaten to make cyber attacks. Good example in this regard is the behaviour of Russia and China. With the creation / formation of cyber space, we cannot totally avoid / avert cyber attack. But the basic question that stands before us is how to protect our valuable information and how to safe guard our networks, systems and how to reduce / moderate our losses, if any attack occurs. Of late cyber attacks are more often than not performed for the thefts on information and not for data like credit card data. The cyber criminals understand the real value of medical data and other personal records. Fraudsters use the data thus stolen for the creation of fake IDs to buy costly medical equipment or drugs that can be resolved for higher amounts or for the purpose of making claims with insuring companies. This being the case with petty cyber attackers, the state sponsored hackers are interested in more confidential and valuable information about other countries. This will help them to get a clear picture of their target and arrange successful e-mail and other cyber attacks.

By the by. Kindly learn the latest definition of “Hacking”. “A hacker is one who breaks into any system to find its security flaws and make the owners aware of it”. It is an activity that manifests playfulness, cleverness and exploitation. It helps to explore the limits of all possibilities of breaking in. It also helps us to go for all kinds of protective steps to guard against it.

In the last article, we learnt the three signature properties of cyber tools viz. confidentiality, integrity and availability. A general approach to achieve these properties is to design develop and deploy proper cyber security tools that are used for protection, detection and response systems. Protection system deal with security components like key management authentication and authorization. To cite examples encryption tools help provide confidentiality, cryptographic message authentication tools provide integrity and finally the availability is made possible by redundancy. Among other forms of essential protection are secure software and hardware development techniques. Even after these stops, we are still exposed to cyber attacks. To meet this situation, detection tools that would identify malicious activities and attacks are employed. (eg) intrusion detection systems look for malware signatures on the network. Finally response tools are provided to help the administration to deal with the detected attacks and activities. Thus the measures adopted for protection, detection and response create an environment in which secure and safe operations can be carried out with out any fear / worry from possible threats. Added to this is the appropriate training of operating people which will entrance the security situation to a high level. As regards the history of the cyber security, it starts its presence from the year 1960 itself when SCADAs got into prominence. Then it was based on electro mechanical telephone switching technology. Later it slowly moved to digital communications front. The introduction of master stations, RTUS, local area networks (LANS) and wide area networks (WANS) and the linking technology like satellite, telephone, wireless, powerline carrier, fiber optics and micro wares make it more complex. The present architecture for modern SCADAs systems, especially with traditional IT hardware and software and the vast areas of electric grid systems expand the possible attack surface to a larger level and thus make it more vulnerable to cyber attacks. All these lead to the employment of a “layered protective system” with multiple levels of firewalls and demilitarized zones to ward off all the expected / anticipated cyber attacks in electric grid systems.

Now let us peep into the methods adopted by the cyber attackers. These methods vary depending on the objectives and motivation of the cyber intruders. Some attackers are physically able to access a site through local surveillance

by browsing wireless networks within close physical proximity or by accessing the site physically as part of their attacks; some others preferred to perform their entire attacks through computers located at a distance. In all these cases, they won't start the attack immediately. To begin with, they will make "Recce" and gather as much information as possible through the sources like internet and then target specific components and systems using malwares and other types of entries. There are many attack vectors for getting access to a SCADAs system. It varies from a "brute force attack" through the business network to intercepting non-encrypted communications and playing them back either to mimic control actions or to mask from the operator's view the control actions that are really being performed.

From the studies thus far made, it is easily discernible that we can create a common set of high ranking vulnerabilities and take necessary corrective measures to nullify or mitigate them. Further we can include all kinds of security aspects in the designs of products itself. Now we reach the end of this topic "Cyber Security"

I would like to sign off here. Next month, let us take a new topic for our probing.

(To be continued...)



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MERCEDES FOLLOWS TESLA, WILL OFFER HOME ENERGY STORAGE BATTERIES TOO

As the newest carmaker on the block, it's perhaps not surprising that Tesla Motors likes to do things differently. That includes reaching beyond the automotive sector with its recently-announced plans to sell standalone battery packs for home and commercial energy storage. Yet that seems to be an idea the world's oldest car manufacturer is pursuing as well. Mercedes-Benz now plans to enter the energy-storage business as well. A division of parent company Daimler has been testing battery packs that can power houses, and plans to launch commercially in September, according to Australia's *Motoring*. Like Tesla, Daimler has tested quietly energy-storage systems for some time. The company created a subsidiary called ACCU motive in 2009 to develop lithium-ion batteries. It built an energy-storage array that is now operated by German electricity joint venture Coulomb. The system's 96 lithium-ion "modules" boast



a combined 500 kilowatt hours of storage capacity, which is used to stabilize the Saxony Kamenz power grid. There are plans to expand this installation to 3,000 kWh of storage capacity. To date, ACCU motive has reportedly delivered more than 60,000 lithium-ion cells to customers—which may include Mercedes-Benz itself—and employs more than 250 people. Now though, Mercedes is looking to enter the commercial energy-storage market in earnest. It claims to be testing battery packs for "light industrial, commercial, and private" applications, with sizes ranging from 2.5 kWh to 5.9 kWh. The individual packs can also be combined to provide more storage capacity for a given site, the company says.

Daimler's decision to enter the energy-storage business seems less straightforward than Tesla's. Tesla's energy-storage plans are fueled by its massive Nevada "Gigafactory," the primary goal of which is to provide large quantities of cheap lithium-ion cells for the upcoming Model 3 electric car. While Daimler currently offers the Mercedes-Benz B-Class Electric Drive, Smart Fortwo Electric Drive, and—soon—a full range of plug-in hybrid models, it probably isn't aiming for the same battery-cell volumes as Tesla. And without a Giga factory of its own, it's less clear how Daimler will supply a larger-scale energy-storage operation.

However, a visible presence from Daimler might provide some much-needed competition for Tesla's high-profile Power wall batteries—and the advantage of a globally known brand name, which none of the newer, smaller companies that sell energy storage batteries can claim.

The possibility of Daimler jumping into the market relatively soon after Tesla's announcement shows just how big a business energy storage could become over the next few years.

IKEA TO BANK ON RENEWABLE ENERGY FOR ITS INDIAN OPERATIONS

Swedish multinational and world's leading home furnishing retailer, IKEA, isn't just looking at **India** as a market for its products. The Swedish major, which is looking to kick off its **India** retail operations with as many as four stores became the first multinational to put down money to reduce carbon pollution. Over the next five years, IKEA will spend a total of 1 billion euros to cut down carbon pollution and slow down the rate of global warming by investing in renewable —**wind** turbines and solar - energy. That IKEA is yet to finalise the locations of its stores in **India**—it is in various stages of finalising locations in Telengana, Haryana, Maharashtra, and Uttar Pradesh, and an announcement expected in the next one month or so—isn't preventing it from deepening its sustainability partnership with **India**.

Speaking to ET, Steve Howard, Chief Sustainability Officer, IKEA Group, said, “When we do open up our stores in **India** we will set up renewable energy sources for our stores, including solar panels on the roof tops and car parks. But in the meantime, we are working in partnership with our suppliers, sometimes even co-financing efforts to reduce our carbon footprint, improve energy efficiencies. The Swedish major's partnership with **India** is not a new one. It has been sourcing from **India** for nearly three decades. It is presently working with nearly 50 suppliers. IKEA's **India** office works with these suppliers, monitoring their competence levels concerning quality, compliance, sustainability especially the use of water, energy, chemicals. When it comes to energy intensive practices, and the amount of carbon pollution the performance of the **Indian** suppliers has been a mixed one. But the story is definitely not a bleak one, and IKEA says that it will be ramping up their efforts. “Our textile supplier, Asian Fabrics, has a fantastic performance record. They have successfully decoupled from grid, which is dominated by coal-fired power by moving to solar and **wind** sources. Asian Fabrics installed a 1.5 MW photovoltaic array and four **wind** turbines generating 20 MW of energy and in doing so achieved 100% energy independence,” Howard said.

At another supplier, the company is saving over 285 MW of energy and 69 million litres of water. IKEA's sustainability boss said that there were similar efforts being made by other suppliers, but there was plenty of work still left to do. Howard said that if the existing initiatives are replicated by other South Asian suppliers then there is a potential to save more than 241 million euros (\$300 million) in energy, water, and resources cost over the next five years. As part of the company's Supplier Goes Renewable Initiative, energy audits at four suppliers in **India** have identified potential savings of 11,199 MW, which translates into reduction of 4,813 tons of carbon dioxide emissions. The 1 billion euros that IKEA will spend globally on climate action, has been clearly earmarked — 500 million euros on **wind** energy, 100 million euros on solar panels, and 400 million euros through the IKEA Foundation to help vulnerable communities which are already dealing with the adverse impacts of climate change. The IKEA Foundation, which the company's charitable arm, already works with communities in **India**, particularly in the cotton growing belt. Of the 120,000 cotton farmers it works with globally, a large section comprises **Indian** cotton farmers. The foundations work in **India** has been focused on ensuring that children of cotton farmers are in schools and not working and in empowering women with job skills.

While the Foundation plans to increase its ambit of operations in **India**, there are no specifics yet. “We will take some time to get a better sense of what communities need and then take a considered view. We will focus on recovering from and preventing disasters, and on building the resilience of communities through proactive strategies, Jonathan Spampinato, Head of Communications and Strategic Planning, IKEA Foundation told ET. Another area in which IKEA is expected to ramp up its efforts is in improving water management. Howard said that water management in the context of climate change was a long term need and that the company had been working with partners to reduce develop waterless dyes”. “Through our Better Cotton Initiative, in which we partner with WWF, we have focused on reducing our water footprint—resulting in as much as 50% savings in water consumption,” Howard said. The IKEA officials were clear that these measures would not raise the cost of their products, instead these were measures that would be good for their customers, IKEA and the planet. In a written statement, IKEA group President and CEO Peter Agnefjall said, “climate change is one of the world's biggest challenges and we need bold commitments and action to find a solution. That's why we are going all in to transform our business to ensure that it is a fit for the future and we can have a positive impact. This includes going for 100% renewable energy, by investing in **wind** and solar, and converting all our lighting products to affordable LED bulbs, helping millions of households to live a more sustainable life at home.”

Source: ET

In times of great stress or adversity, it's always best to keep busy, to plow your anger and your energy into something positive - LEE IACocca

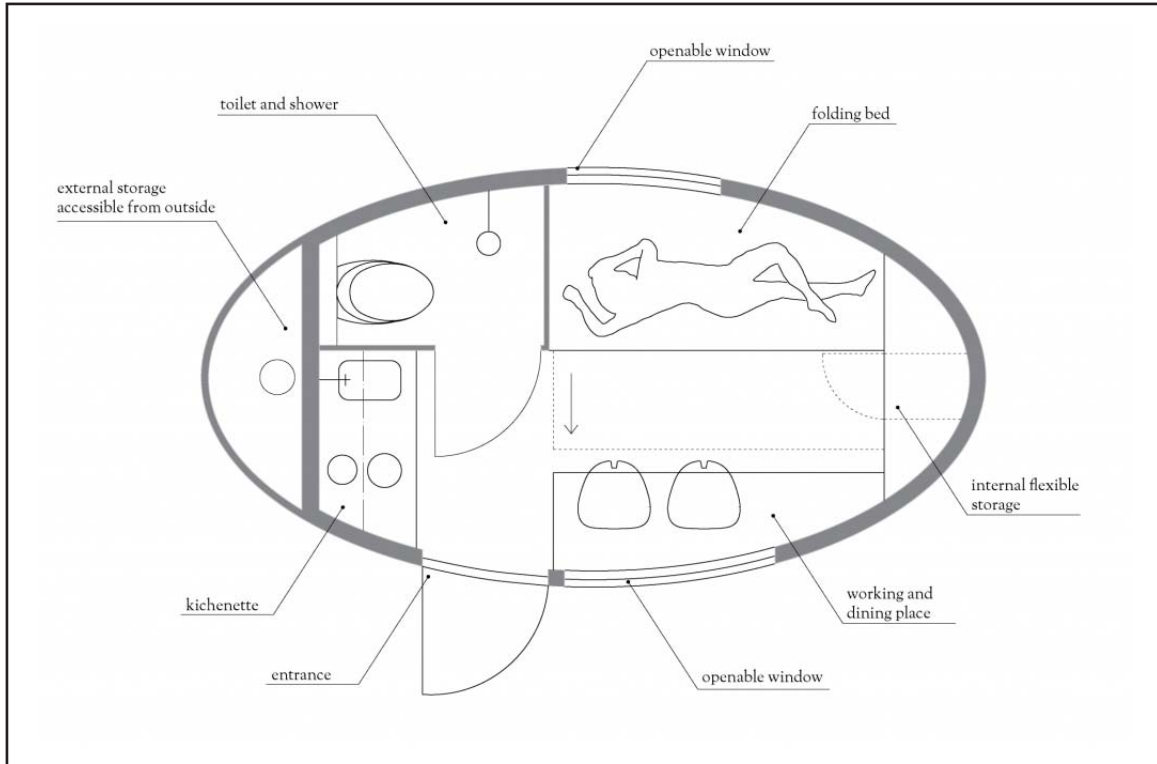
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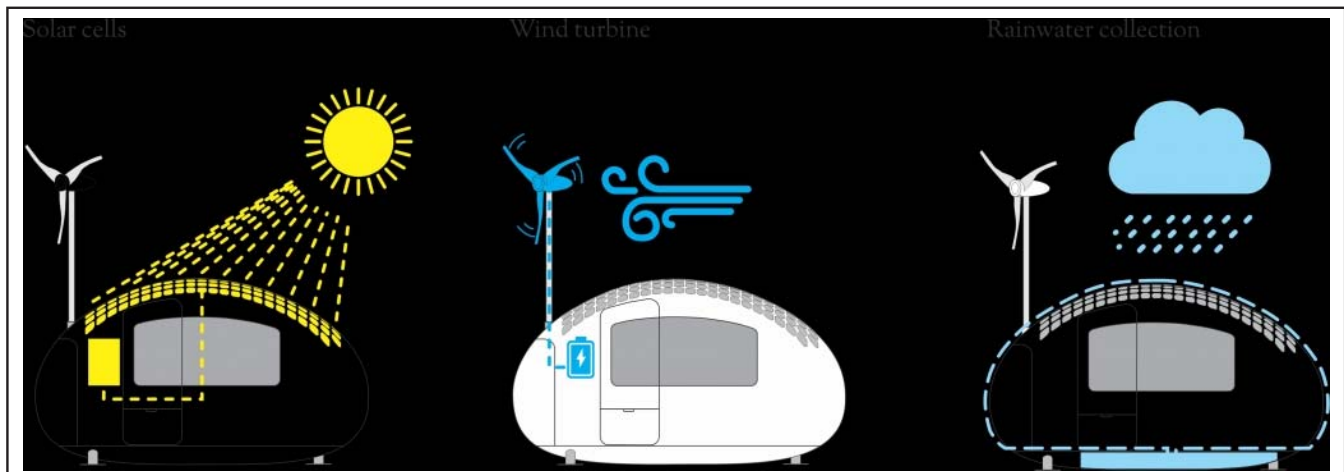
Plenty of storage space also fits all your sport or research equipment.



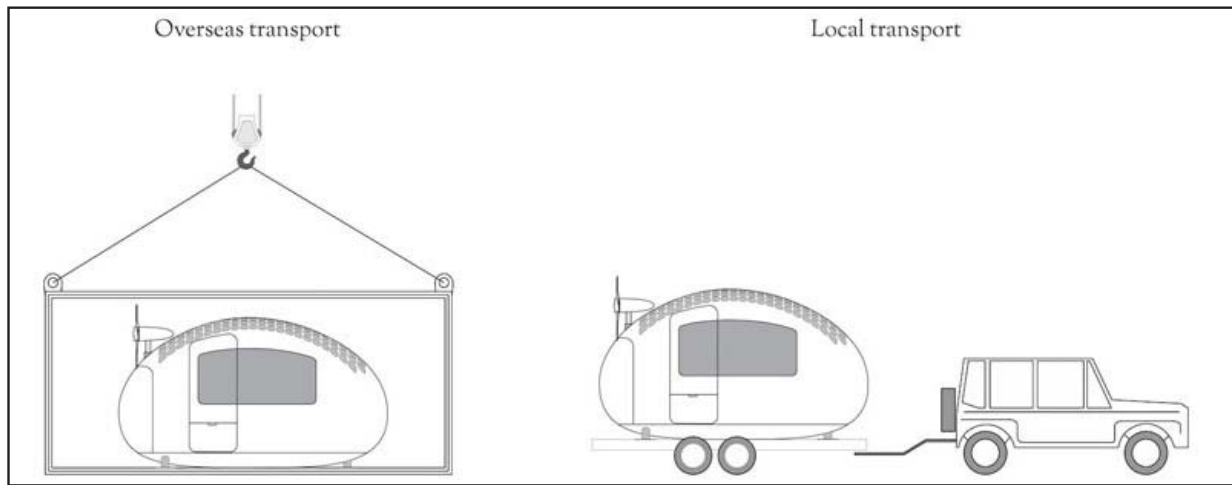
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Ecocapsule fits into a standard shipping container and no special preparations and precautions are necessary to transport Ecocapsule worldwide. It can be shipped, airlifted, towed or even pulled by a pack animal.



OSRAM DEMONSTRATES WIRELESSLY STEERABLE LED DOWNLIGHT

At LightFair International (LFI), Osram demonstrated a new LED downlight with a controllable or steerable beam. The OmniPoint prototype solid-state lighting (SSL) product enables a user to narrow or broaden the beam pattern, or even to direct light to a specific area in a space with no light in other areas. The luminaire is wirelessly configured over a Wi-Fi link using an Apple or Android app on a smartphone or tablet.

Understand that OmniPoint is still in development, although Osram said it could come to market in as little as ten months. The company demonstrated the LED downlight in a space the size of a typical office, a small retail space, or perhaps a dining area. The prototype is the size of a 5-in. downlight and delivers 3000K, 90-CRI light. Target applications include retail, museums, and hospitality.

Osram achieved the steerable beam by using 61 individually-controllable LEDs in the fixture. The granular control enables the fixture to light a small area within the maximum potential beam area, or even to produce brighter accent lighting in one area and dimmer ambient lighting in other areas of a space.

With Osram OmniPoint, “lighting designers can do things never before possible, like create circular or elliptical highlights easily and move them anywhere in the interface to see the results of their design in real time,” said Jerry Ryu, principal lighting designer at Osram Sylvania. “They can shape and combine multiple beams to create nearly limitless lighting designs for various applications.”

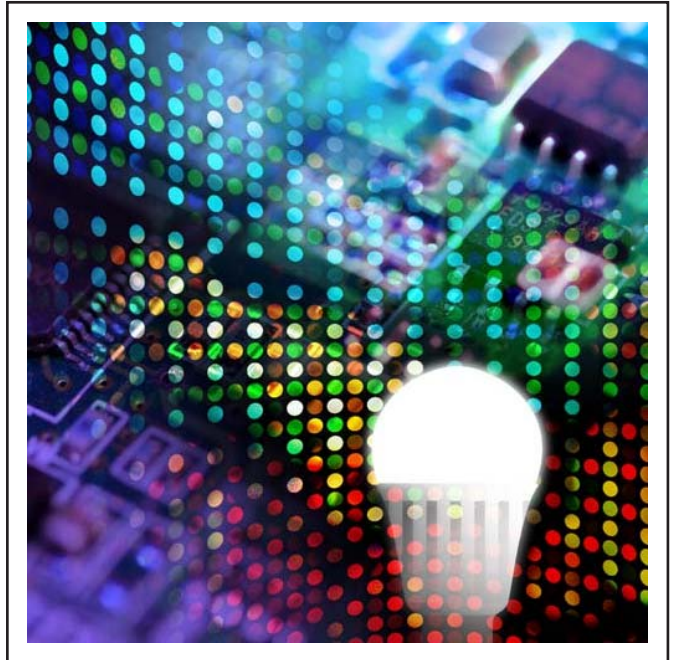
The idea of directing a beam is certainly not new, but most such downlights require a user to mount a ladder and make a mechanical adjustment – for instance, when a display in a retail store is changed or to highlight a new exhibit in a museum. In other cases, lights have been equipped with motors for remote steering. With the OmniPoint LED downlight, the app allows control over where light is produced and at what level with no mechanical movement.

The most-similar example of an electronically steerable beam that we have covered is the Audi Matrix headlamp used in European models of top-end Audi sedans. But OmniPoint includes control of LEDs at an even more granular level. We also saw a steerable luminaire demonstrated by Terralux in a Strategies in Light 2015 session. But that Terralux design segmented LEDs into seven channels, providing good ability to configure a luminaire but far less granular control relative to the Osram demonstration.

The challenge for Osram will be finding an economical driver architecture that is capable of the individual control. The company was a partner to the Audi headlamp design, and therefore has some expertise in the area. Ryu said the team is exploring a number of potential concepts including the possibility of integrating an LED and some driver electronics in one semiconductor device. But we’d suspect that to deliver a product in the next year, Osram will have to take a more brute-force, conventional approach to the driver electronics.

There are driver ICs on the market that can control as many as three to four LEDs separately. But it would still take well over ten such ICs to realize the OmniPoint design. What you can read into the driver requirement, and the fact that there are 61 high-power LEDs in the fixture, is that the product will sell for a premium price that’s commensurate with the feature set.

Osram, meanwhile, is contemplating other features that can be added to a product like the OmniPoint LED downlight, given the presence of a microcontroller (MCU) of some type that will inevitably be in the fixture and the presence of a wireless link. For example, a camera could provide the user with a live floor-plan view of a space.



“The trick to having good ideas is not to sit around in florious isolation and try to think big thoughts. The trick is to get more parts on the table.” - Steven Johnson

SEAS GENERATE RISING TIDE OF RENEWABLES IDEAS

A race is on worldwide to harness the tides and waves for electrical power, with more than 100 different devices being tested by companies hoping to make a commercial breakthrough.

And a new report from the European Union's Joint Research Centre expresses confidence that the Atlantic Ocean will soon be an important contributor to the continent's energy mix.

It adds that many other countries with big tidal ranges and long coasts are also banking on this form of renewable energy to help reduce fossil fuel use.

For years, it has been predicted that the vast quantities of energy available in the oceans would be harnessed by human ingenuity to provide without the need for burning fossil fuels, but progress has been slower than expected.

Different techniques

While it has proved possible to generate electricity with many different techniques, scaling these up into large-scale power stations to supply the electricity grid has not so far been economic.

The two most promising basic ideas are to use the currents and the build-up of water at each tide to drive turbines to make electricity, or to convert the power in wave motions to energy.

In Europe, the countries with Atlantic Ocean coastlines – such as the UK, Ireland, France, Spain, Portugal, Denmark, the Netherlands and Norway – are all developing technologies. And in 2014, the EU launched what it called its Blue Energy Action plan to finance and encourage development. The latest report details progress so far.

Most of the technologies are not new ideas, but the trick is turning a demonstration model into a viable power station.

The one exception is tidal energy in the form of a barrage across a river, which has been in use for years.

The best known is the 240 megawatt (MW) La Rance tidal barrage in France, operating successfully since 1966. Another 254 MW tidal plant has opened in Sihwa in South Korea, and other barrages producing at total 2,680 MW are planned worldwide “ although many have proved controversial because of their effects on fish and birds.

Tidal lagoons “ reservoirs that stand in an estuary or close to the shore, and which fill and then empty with each tidal cycle “ have now won much more favour, and one is being developed in Swansea Bay in south Wales.

The worldwide potential of this technology is estimated at 80 gigawatts (GW), or the equivalent of 80 large coal-fired power stations.

Already in successful operation at some sites, but yet to be scaled up to full commercial development, are underwater turbines “ similar to wind turbines “ that use the energy in tidal streams to make electricity.

In Europe, these devices will be viable in countries with high tides and strong tidal streams “ particularly France, Ireland, Norway and the UK, but also in some parts of Belgium, Italy and the Netherlands. These are believed to offer the highest net potential contribution to the European energy system, according to the report.

The first large-scale tidal array is being built in the Pentland Firth, off northern Scotland. It will provide power to 175,000 homes.

New connections

Like the deployment of wind farms, potential tidal power arrays are often in remote locations far from cities. The report points out that these technologies will require new grid connections and integration into the European grid to get most value from them.

A new generation of devices not placed on the sea bed, but either floating like kites on a string or operating from platforms, is under development. Their advantage is that they avoid the cost of being built on the sea bed, and can also exploit the greater strength of the tides nearer the surface of the sea.

Some of the materials being used to build devices to withstand the power of the sea, and the methods that are being used, are being kept secret for commercial reasons, but they have some of the biggest companies in Europe as their backers.

Another new generation of micro-turbines, owned by coastal communities and anchored offshore to take advantage of tidal flows, is under development. These could give communities isolated from the grid their own power source, like solar panels do in remote parts of Africa and Asia.

There are an estimated 100 companies developing tidal energy devices worldwide, half of them in the EU, where many are supported by development grants. Four tidal energy stations are already in operation in Europe, and another 31 are expected to be completed by the end of 2016. Many more are in the planning stage.

The commercial advantage of tidal devices is that, unlike some other forms of renewable energy, the tides are predictable years in advance. Wave power, on the other hand, suffers because of its unpredictability and the need to make devices robust enough to stand up to the battering they receive.

Potential supply

That has not stopped a large number of development projects being built, principally because the potential energy supply is vast – 30 times higher than tidal energy.

Some devices have already been operating successfully for 10 years, producing regular quantities of electricity, but they were built as demonstration models and not on a commercial scale.

Building structures large enough to produce a regular power supply at a cost that could be commercial has proved elusive, but the report describes a number of devices that are close to achieving commercial viability.

There are at least nine different technologies using wave power, and 170 wave energy developers worldwide.

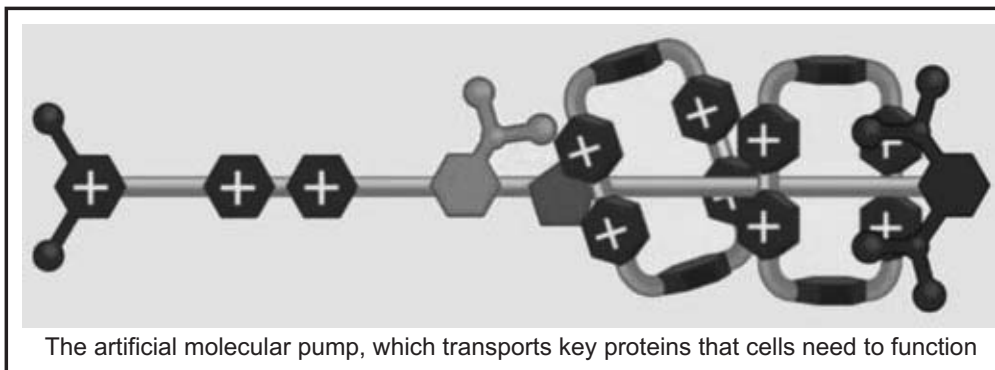
The report also discusses technologies that use the different gradients of salinity in the sea to produce power, and the different water temperatures to generate energy.

However, it argues that both these ideas, while viable in theory, are further away from commercial operation in Europe than tidal stream or wave power.

– Climate News Network

SCIENTISTS CREATE WORLD'S FIRST FULLY-ARTIFICIAL MOLECULAR PUMP

All living organisms – human, animal, or otherwise – continuously move molecules around their cells. It's a crucial mechanism of life, vital for feeding cells the proteins they need to function. And now scientists at Northwestern University have created a machine that mimics this pumping mechanism.



Their molecular pump is the world's first such machine developed entirely through chemical engineering in the laboratory, and it could one day power artificial muscles and other molecular machines.

“Our molecular pump is radical chemistry – an ingenious way of transferring energy from molecule to molecule, the way nature does,” said study senior author Sir Fraser Stoddart.

The pump uses small molecules made in the laboratory to replicate the actions of carrier proteins. It draws its power from chemical reactions, which it uses to drive molecules out of equilibrium – from a low to a high-energy state.

That extra energy is necessary to make it work because the ring-shaped molecules normally repel each other, like magnets with the same polarization. “The artificial pump is able to syphon off some of the energy that changes hands during a chemical reaction and uses it to push the rings together,” explained the study's first author Chuyang Cheng.

The machine then threads the rings around a nanoscopic chain (an axle) and squeezes them together. Right now the artificial molecular pump can only force two rings together, but the researchers believe they may soon be able to make the process work with tens of rings and more energy storage.

The technology is primitive compared to the natural mechanisms of living organisms, and it will take some time for the pump to be scaled up to the point where it could power artificial muscles and other molecular machines, but it's a great step forward for what study co-author Paul R. McGonigal calls “one of the major challenges for science in the 21st century.”

Stoddart also noted that the process of designing molecular machines is nothing like that of the mechanical ones we are used to seeing. “In a way, one must learn to see things from the molecules' point of view, considering forces such as random thermal motion that one would never consider when building an agricultural water pump or any other mechanical device,” he said.

A paper describing the research was published in the journal *Nature Nanotechnology*.

STATE GETS POWER TO CHASE AND PREDICT WIND ENERGY

The nation's first wind power forecasting micro pilot project was launched in Tamil Nadu on Wednesday.

Speaking to reporters here, Prof. K. Kasturirangan, chairman of the Indian Wind Power Association, said that three billion units of wind energy worth '900 crore were lost due to change in the grid frequency, which was reduced after the northern grid tripped and blacked out 22 States in 2012.

The Tamil Nadu Transmission Corporation Limited (TRANSCO) was cautious about scheduling wind power due to fluctuations as nobody had an idea of how much wind power was available to be scheduled for the State load dispatch centre. As a result, three billion units of wind power was lost, he said.

But now, with wind power forecasting, TRANSCO would have the data of wind power available every 15 minutes through the sub-stations, he said.

"Now, TRANSCO will know the availability of wind power and have a proper mix by using the total wind energy resources available," he said.

Talking about the project, K. Boopathi, additional director and head Wind Resource Assessment Unit, National Institute of Wind Energy, told reporters that the micro-project would be effected in four sub-stations in Ayyanaruthu in Kayathar and Udumalpet.

"From there it will be expanded across the State in 134 sub-stations," he added.

Although there were many service providers of wind power production forecasting, this is the first such project by the Ministry of New and Renewable Energy (MNRE).

Varsha Joshi, Joint Secretary (Wind Energy), MNRE, said the National Institute of Wind Energy (NIWE) and MNRE, in collaboration with Vortex Factoria de Calculs, Spain, was ready to provide its wind power forecasting services initially in Tamil Nadu. "This will be extended to the entire country," she added.

Boopathi said the project aimed at providing forecasting services to the wind industry every 15 minutes up to 10 days ahead.

"This will support the load dispatch centres for scheduling and dispatching of electricity from wind farms for demand supply management with ease," Bhoopathi added.

The State power distribution company wants wind power forecasting service in order to manage grid properly and effectively.

The project will provide forecast on wind and quantum of energy from a wind farm or sub-station.

The equipment in the sub-station will accumulate data every 15 minutes and send it to the National Institute of Wind Energy through FTP.

The data will then be transferred to State Load Despatch Centre, which will know how many units of wind energy is available to be transferred to the grid.

This will ensure high level of wind energy routing and mitigate effects on the stability of the grid and security of energy supply.

Courtesy: Indian Express

TOYOTA'S SINGLE-SEAT ELECTRIC CARS DEBUT AT JAPAN POST OFFICES

A subsidiary of Toyota Motor Corp. said it **began providing four of its single-seat electronic vehicles** to post office branches in central Japan for pickup and delivery duties on a trial basis.

Aichi prefecture-based Toyota Auto Body Co. said **its vehicles, called Coms**, will be the first electric vehicles in Japan to be used for mail delivery. The cars can reach a maximum speed of 60 kilometers an hour, and can run about 50 kilometers between charges. The all-electric cars can be fully charged in about six hours using regular household AC sockets, the company said.

Coms are about 2.5 meters long and 1.1 meter wide and have no doors. The cars received special permission from the land ministry to carry double the load of similar sized vehicles, or up to 60 kilograms.



Toyota Auto Body said it hopes to study how the cars can be used to deliver mail in urban areas during the trial.

A spokeswoman at Toyota Auto Body said the trial will last until March, after which it will determine whether to expand the use of EVs for delivery.

CLEAN' RENEWABLE ENERGY ALLIANCE LAUNCHED TO EXPAND ENERGY ACCESS TO 300 MILLION PEOPLE IN INDIA

Building on pioneering efforts by clean energy practitioners to expand access to affordable and reliable energy solutions for **India's** "last mile" – which includes over 300 million people who have not been reached by the national grid and do not have access to electricity – a broad alliance formed by 12 key stakeholders in the decentralized energy access sector in **India** today announced the launch of the Clean Energy Access Network (CLEAN) in New Delhi.

Of the 1.2 billion people without access to electricity globally, one-third are in **India**. Another 800 million people in **India** don't have access to modern cooking solutions. Through the collective experience and innovation of its alliance members, CLEAN will work to expand access to affordable and reliable energy services by systematically addressing the barriers that the decentralized clean energy sector in **India** currently faces, supporting the global vision of the United Nations-led Sustainable Energy For All initiative to achieve universal access to modern energy by 2030. This initiative aims to achieve three interlinked objectives by 2030:

- Ensuring universal access to modern energy services;
- Doubling the global rate of improvement in energy efficiency; and
- Doubling the share of renewable energy in the global energy mix.

"We believe that the Clean Energy Access Network is a critical effort to support **India's** decentralized clean energy sector in delivering the benefits of sustainable development to some 300 million people across **India**, in support of the UN's global energy access goals. The Network's activities will help to accelerate the delivery of modern energy services and support improvements in health care, education and economic empowerment that come with access to clean, safe, reliable and affordable energy solutions," said Richenda Van Leeuwen, Executive Director, Energy Access, United Nations Foundation. The UN Foundation's Energy Access Practitioner Network, along with 11 other organizations, is a founding partner of CLEAN.

As an influential body for the decentralized clean energy sector in **India**, CLEAN will represent and advocate on behalf of the sector to important public and private stakeholders, particularly the government at the central and state levels. Among the highlights of its launch activities on April 8 is a dialogue with the Ministry of New and Renewable Energy (MNRE) in New Delhi on finance and policy issues surrounding renewable energy for off-grid household and community electrification. The Ministry of New and Renewable Energy is the central government body responsible for renewable energy in **India**. The Secretary of the MNRE, Mr Upendra Tripathy, will grace the official launch of CLEAN where he will talk about his ideas for the off-grid renewable energy sector and take the audience through some major initiatives and experiences of MNRE. Eminent practitioners working in the space of off-grid biomass and solar energy will discuss broad sectoral issues and challenges related to policy-making and access to finance; two strategy reports commissioned by CLEAN to outline the roadmap for these issues will also be launched.

CLEAN aims to address four challenges that are specific to the decentralized clean energy sector in **India** at present – issues around the policy and regulatory environment, limited financial access for both end users and enterprises, dearth of skilled capacity across various levels of competence, and technology standardization for clean energy products and services.

CLEAN will provide the following core services to social enterprises and other organizations in the decentralized clean energy sector in India:

Facilitate critical information, learning and networking opportunities for its membership and the wider sector.

Support innovative technology while developing universal quality and certification standards.

Provide guidelines for skills, training and capacity building across the ecosystem.

Engage with policy makers at all levels of government.

Increase access to finance for practitioners and consumers alike.

CLEAN will expand its membership to represent a wide spectrum of social enterprises across a range of technologies and scales of operation – from those specializing in the sale of household renewable energy systems to enterprises that focus on the installation of community-level mini-grids.

The founding signatories to the network are:

1. Ashden **India** Collective
2. Council on Energy, Environment and Water
3. GIZ **India**
4. **Indian** Renewable Energy Federation

5. SELCO Foundation
6. Shakti Sustainable Energy Foundation
7. Small Scale Sustainable Infrastructure Development Fund
8. The Climate Group
9. The Energy and Resources Institute
10. The Nand and Jeet Khemka Foundation
11. United Nations Foundation Energy Access Practitioner Network
12. World Wide Fund for Nature - **India**

2018 PORSCHE PAJUN ELECTRIC CAR TO RIVAL TESLA MODEL S, BMW 5 SERIES

German sports car automaker Porsche is looking to diversify its offerings with a new model that will take on the BMW 5 Series and the Tesla Model S. According to AutoCar, the upcoming Porsche Pajun could have a battery electric model as well as a hydrogen fuel cell model.



The Tesla Model S is definitely a target benchmark for the new Porsche Pajun. Reports claim the new electric model will deliver performance specifications that will closely match the standard Tesla Model S. The four-door Porsche Pajun is expected to boast 420 bhp as well a range of 265 miles.

Unlike the Tesla Model S, the Porsche will not design a brand new chassis for the Pajun. Instead, the Porsche EV and hydrogen fuel cell will utilize the same front and rear crash structure and side sill as the MSB platform that underpins the Panamera. However, the MSB chassis in the new vehicles are modified to accommodate rear-mounted electric motors. The Porsche patent for the new rear-mount architecture was filed back in December last year.

The Porsche Pajun's modified MSB platform is internally known as the "eMSB." Reports also reveal that the rear-mounted electric motors will be designed to be a part of the eMSB structure, lending an increase of overall rigidity and extra reinforcement against rear-end impact. Finally, the rear-mounted powertrain design will also be applied in the future Audi R8 e-tron electric sports car.

Details regarding the hydrogen fuel cell Pajun are limited but Volkswagen R&D boss Ulrich Hackenberg first announced plans to develop a hydrogen fuel cell vehicle during an annual VW conference back in March. Volkswagen is the parent company of Porsche.

The Porsche Pajun could arrive as soon as late 2017 or early 2018.

SUNEDISON EYES \$600 MILLION WIND ENERGY BUYOUT IN INDIA

SunEdison, which controls the world's largest renewable energy capacity, is planning to expand its footprint in India through a massive wind energy acquisition.

Continuum Wind Energy, an independent power producer in India, is on the acquisition radar for SunEdison. The US-based project developer plans to buy out Continuum Wind Energy for up to \$600 million in an effort to expand its footprint in the wind energy market in India. Continuum Wind Energy currently has a portfolio of 1,000 MW capacity, including 145 MW of operational and 270 MW of under-contract capacity. The majority shareholder in the company is Morgan Stanley Infrastructure Partners.

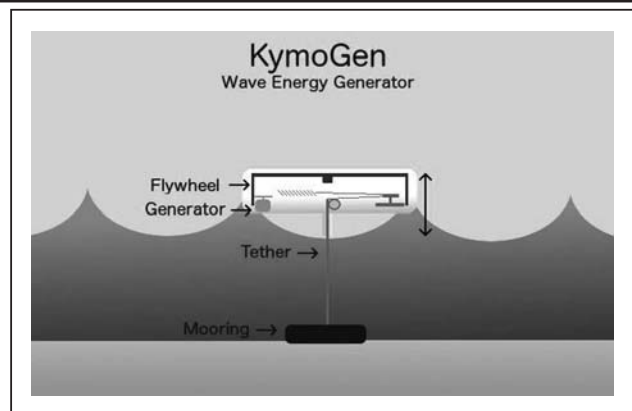
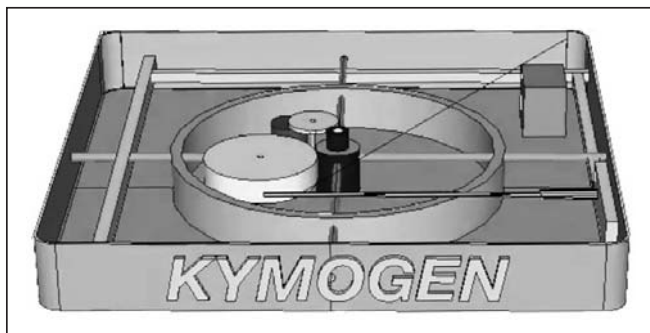
SunEdison committed to the largest renewable energy expansion during India's first-ever international renewable energy investors summit in February. The company plans to add 15.2 GW of renewable energy capacity — 10 GW solar power and 5.2 GW wind energy — over the next 7 years. SunEdison has already signed an agreement with the state government of Rajasthan to develop 5 GW of solar energy capacity over the next 5 years. In a similar deal with the southern state of Karnataka, the company plans to install 5 GW of wind and solar power capacity over the next 5 years.

India plans to add around 140 GW of renewable energy capacity over the next 7 years. Apart from the capacity addition targets, SunEdison has already announced plans to invest in India's largest solar modules manufacturing facility, worth \$4 billion. In addition, earlier this year, SunEdison acquired 100 MW wind energy projects in India from Spain's FersaEnergias Renovables SA.



THE KYMOGEN WAVE ENERGY GENERATOR

Mechanical Engineer David Hartmann and Craftsman Jason Ballash have designed a new wave power technology called the KymoGen, which has the potential to produce clean, low-cost energy using the constant power of waves. Key to the design is its simplicity. A portable 8'x8' platform is tethered to a mooring on the sea floor. Inside the floating platform, the tether is connected to a drive system which spins a flywheel as the waves rise and fall, providing constant power between waves. The generated electricity can then either be stored, or connected directly to existing power grids.



Weighing in at an estimated 800 lbs, the KymoGen can output 2 hp in as little as 12 inch waves and 8hp in 4 foot waves. Larger KymoGens could generate substantially more in rougher waters. The estimated average output per day is 25 to 100 kilowatt hours. It will be constructed of high strength Marine Composites, and the platform can accommodate wind or solar technologies to increase the energy output.

TIME TO TAP SOLAR THERMAL ENERGY

A discussion on solar energy would naturally veer towards solar photovoltaics (SPV). Chances are few would have heard of solar thermal energy (STE), and rightly so, as PV panels dot the **Indian** landscape. Generating electricity from STE is similar to a conventional thermal power plant, the only difference being that instead of coal or gas, sunlight is concentrated by mirrors to generate steam, much like our childhood experience of burning paper with a magnifying glass.

The possibility of a 24×7 operation is the biggest USP of solar thermal plants. Moreover, unlike solar PV, which can only generate electricity, STE can be used to produce electricity, high temperature heat for process industries, refrigeration, and even fuels such as hydrogen. Clearly, STE is a dormant energy giant waiting to explode.

Despite its inherent advantages, STE is still in a state of infancy in **India**. Godavari Green Energy's 50 MW parabolic trough plant, **India's** first commercial solar thermal plant, went on stream in 2013, while the world's first commercial solar thermal plant started operation in California in 1984.

At R14 crore/MW, a solar thermal plant is about 80% more expensive to build than a solar PV plant. STE currently is in the same state that solar PV was 15-20 years ago. Then too, solar PV was being castigated as being too expensive, a far cry from today when it is on the path to grid parity.

What stands in good stead for STE is that **India** has the expertise in many generic technologies that are used in the production of solar thermal energy. Companies like Bhel have the expertise to design and manufacture components for the power block that converts steam into electricity.

The solar block for converting sunlight into steam makes up 50-60% cost of a solar thermal plant, and is the biggest impediment in the path for cost-effective, indigenous development of STE. For example, expertise for making low-cost iron glass mirrors is not available in **India**. What should be our development strategy to make **India** a prominent technology provider in the global STE map? Let me outline a four-pronged strategy, which would go a long way in meeting the nation's energy needs, while increasing the indigenous engineering expertise and components manufacturing base.

- * First, it is essential to set up a domestic manufacturing base for the solar block to drive down the costs. Making component would require significant infusion of technology and funding, which, alas, would depend on order volumes. So a viable solution is to hybridize a solar thermal plant with an existing coal/gas-fired plant. This should reduce the financial risk by 40% since the turbine will be shared.
Another advantage is fuel compensation. When the sun is strong during the day, a larger proportion of the power can be generated through STE, thus saving on coal/gas. To incentivize hybridization, the National Solar Mission should extend the incentives of stand-alone solar plants to hybridized plants. This also fits in neatly with the renewal purchase obligations of thermal plants and also for carbon dioxide emitting manufacturing plants that have captive thermal power plants.
- * Second, efforts should be made to develop expertise for designing and manufacturing critical components of the mature STEs, namely, parabolic trough and solar tower, as they are most likely to be installed for supplying bulk power to the grid. This would require expertise for developing new materials like alloys, low iron glass, specialised coatings, vacuum tubes, etc. Of greater importance is the engineering expertise for large-scale production of critical components—an **Indian** weakness— which last 15-20 years.
- * Third, value added applications of STE should be looked at. Production of hydrogen gas and multi-utility chemicals such methanol using STE holds great promise. STE-based sea water desalination demonstration plants have been set-up; the main challenge is to drive down the costs. Cold storages are generally located in semi-urban and rural areas where power supply is irregular. Here one possible solution is to set-up a self-compensating, hybrid solar-conventional (electricity-based) air-conditioning system. When the sun is high, STE provides cooling, and as the day progresses, the proportion of conventional cooling increases. In the absence of sunlight, biomass boilers power solar cooling.
- * Four, R&D should begin right now on disruptive innovation related to development of both STE and value-added applications, two examples of which are: (i) adaptation of current STE for generating electricity using supercritical carbon dioxide or simply from pressurised air, and (ii) use of STE for “green” production of metals from its ores, thereby cutting coal dependency. Work is also progressing on integrating STE and solar PV where the former extracts process heat and the latter generates electricity simultaneously. One major deficiency is the absence of small-scale STE units for deployment in distributed electricity generation and in commercial and housing complexes, one example of which is the MIT solar thermal system that can be used to create electricity without turbines.

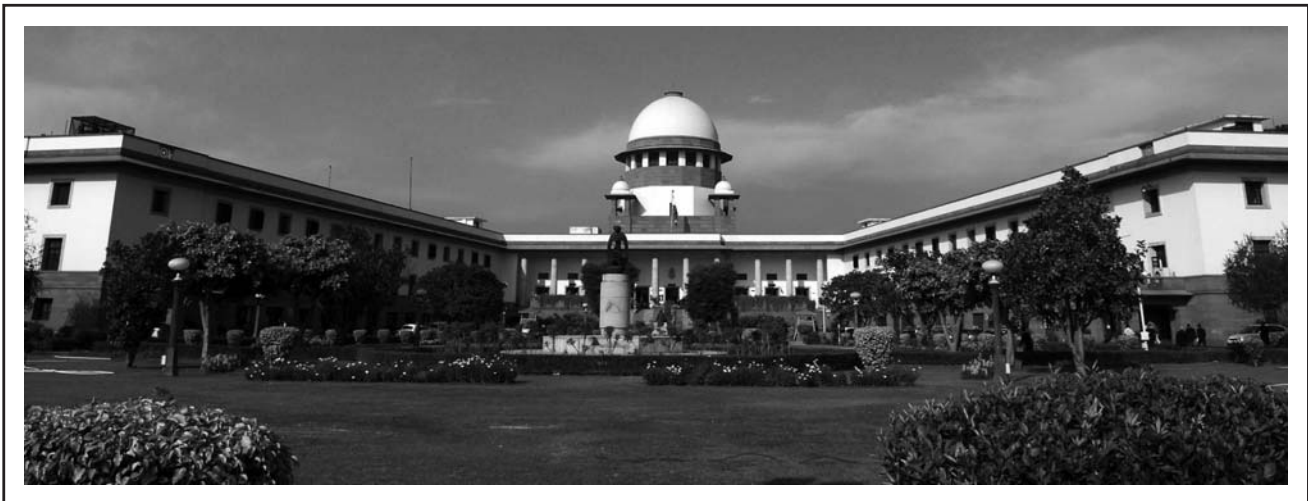
How do we move forward? The main challenge is to synergise the expertise in generic STE technologies spread across several industries and move forward in a consortium mode. Materials and processes developed in laboratories have to be engineered and scaled-up by industry partners. Academic and R&D institutions have to work with industry to jointly design and develop manufacturing facilities for critical solar block components.

One noted scientist remarked “STE is not rocket science, but getting **Indians** to work together is the real rocket science.” So, who will fire this rocket? In essence, we have to take a call whether the PM’s “Make in **India**” campaign for STE will be about Chinese companies manufacturing components in **India**, or **Indian** companies manufacturing indigenously designed components?

Source: Financial Express

SUPREME COURT UPHOLDS APPLICABILITY OF RENEWABLE PURCHASE OBLIGATION ON CAPTIVE POWER PLANTS; ORDER A POSITIVE DEVELOPMENT AND WILL HELP RENEWABLE ENERGY GROWTH IN THE COUNTRY

The Supreme Court order dated 13 May 2015 in the case between the Hindustan Zinc vs Rajasthan Electricity Regulatory Commission on the applicability of Renewable Purchase Obligation (RPO) regulations has ruled that RPO on captive consumer is justified and interpreted it in the context of Article 51A (g) of the Constitution of **India** that cast a fundamental duty on the citizen to protect and improve the natural environment, and the mandate of Article 21 that guarantee right to live with healthy life.



The Section 86 (1) (e) of the Electricity Act (EA) 2003 provides for Renewable Purchase Obligation (RPO) on consumption of energy and the RPOs are determined by respective State Electricity Regulatory Commissions. The applicability of RPOs is on the Distribution Companies (Discoms) Captive Power Plants (CPP) and also on Open Access (OA) consumers.

In August 2012, the Rajasthan High Court had dismissed an appeal by Hindustan Zinc Ltd., Ambuja Cements Ltd., Grasim Industries Ltd., and 14 other companies that challenged RPO regulations enacted by the Rajasthan Electricity Regulatory Commission (RERC) for put RPOs on Captive Power Plants. The key Captive Power Plants and Open Access users had contested that RERC did not have the authority to pass the order of RPO and impose surcharge (penalty) as CPP and OA were completely de-licensed activities under the Electricity Act 2003. Further that EA 2003 only allows RPO on the ‘total consumption in the area of the distribution licensee’ and therefore intends to apply RPO on distribution licensees only. The Hindustan Zinc had appealed in the Supreme Court against the High Court.

The Supreme Court order is a positive development and will help in enhancing RPO compliance and further contribute to renewable energy growth in the country.

Take up one idea. Make that one idea your life – think of it, dream of it, live on idea. Let the brain, muscles, nerves, every part of your body, be full of that idea, and just leave every other idea alone. This is the way to success. – SWAMI VIVEKANANDA

PRODUCT OF THE MONTH

FLIR SYSTEMS ANNOUNCES C2, COMPACT FULL FEATURED PROFESSIONAL THERMAL CAMERA

Compact design and radiometric imagery for the fast troubleshooting and powerful reports that professionals need

WILSONVILLE, OR –FLIR Systems, Inc. (NASDAQ: FLIR) announced today at the 2015 International Consumer Electronics Show (CES) the release of the FLIR C2, the first full-featured, pocket-sized thermal camera designed to help professionals find and see hidden heat patterns that can clearly show where problems are, such as sources of over heating electrical connections and more.

Its compact and slim design enables the C2 to fit comfortably into any pocket, available for immediate use to uncover invisible electrical & HVAC issues and to show customers where potential problems are located. In fact, at 4.9 × 3.1 × 0.94 inches and .13 kg, the sleek architecture makes the C2 the most convenient, full featured thermal camera to carry available on the market.

Featuring FLIR's patented MSX® real-time image enhancement and a brilliant, simple-to-use touch screen with auto orientation, the camera creates thermal images with stunning details to help identify problem locations easier. MSX adds key details

(captured by the on board visible camera) to the C2's thermal images so numbers, letters, texture and other features are clearly recognizable without compromising the thermal image.

The C2's 4800-pixel resolution, high sensitivity detector captures and displays subtle thermal patterns and small temperature differences useful in electrical & HVAC applications, and a wide 41° field-of-view frames in more of the scene. Plus, the C2 includes a built-in worklight and flash that helps illuminate poorly lit areas common in various inspection environments. The extra illumination also ensures that a brighter visible photo is able to be captured along with the C2's thermal image.

With simple point-and-shoot operation, the C2 can store radiometric JPEGs with the push of a button. The images can be downloaded later using the free FLIR Tools software that allows the user to adjust thermal image levels, isolate and add temperature measurements, change colour palettes, and create persuasive reports.

"The C2 is not only a convenient tool to help you get more done and take advantage of every opportunity to uncover issues, but also helps you verify the success of completed repairs for your customers," said Rickard Lindvall, FLIR Vice President and General Manager of FLIR's Instruments business segment.

FLIR C2 will be available from FLIR partners. *For more information, please visit www.flir.com/C2.*

About FLIR Systems

FLIR Systems, Inc. is a world leader in the design, manufacture, and marketing of sensor systems that enhance perception and awareness. FLIR's advanced thermal imaging and threat detection systems are used for a wide variety of imaging, thermography, and security applications, including airborne and ground-based surveillance, condition monitoring, research and development, manufacturing process control, search and rescue, drug interdiction, navigation, transportation safety, border and maritime patrol, environmental monitoring, and chemical, biological, radiological, nuclear, and explosives (CBRNE) detection. For more information, go to FLIR's web site at www.FLIR.com.



POWERING ENGINEERS THROUGH TRAINING – L & T

The Switchgear Training Centres have been set up with an aim to impart knowledge related to the selection, application, installation, operation and maintenance of Low and Medium Voltage switchgear, Industrial and Building Automation products. Depending on the kind of professional enrolled and course content, the programmes involve a blend of classroom sessions, practical training and case studies. These programmes offer participants an invaluable experience, thereby promoting good engineering and management practices among Electrical and Automation professionals, panel builders, project professionals and electrical consultants.

CODE	PROGRAMME NAME	DAYS	JUL 2015	AUG 2015	SEP 2015	FEES Rs.
LT 01	SELECTION OF LV SWITCHGEAR AND APPLICATIONS Need for switchgear, LV switchgear terminologies, product standards, fault current calculation for LV system, Selection & application of low voltage switchgears - like contactors, thermal overload relays, motor starters.	5		3-7		14000
LT 02	BEST MAINTENANCE PRACTICES IN LV SWITCHGEAR Safety & good maintenance practices, complete hands-on workshop sessions on testing, troubleshooting & maintenance of low voltage switchgear.	5	6-10		7-11	12500
LT 03	BREAKER MAINTENANCE WORKSHOP - C POWER ACB Thorough hands-on training on C-Power range of Air Circuit Breakers, testing, setting & programming of various types of ACB microprocessor based protection releases like SR-71/SR21i.	3	20-22			6750
LT 04	BREAKER MAINTENANCE WORKSHOP - U POWER OMEGA ACB - Complete hands-on training on U-Power Omega range of air circuit breakers. Including pole assembly replacement, Fixing & testing of various accessories. Testing, setting & programming of various types of microprocessor based releases.	2	23-24			4500
LT 05	SWITCHBOARD ELECTRICAL DESIGN - Introduction to various standards for LV switchboard assembly including IEC 61439, types of panels, forms of separation, fault current calculations as applicable to low voltage switchgear, bus bar selection & design.	3			2-4	10000
LT 06	POWER DISTRIBUTION IN BUILDINGS Design parameters relevant to large buildings. Procedure for load estimation; sizing of transformers and DG sets. Sizing of Low Voltage switchgears.	3	1-3			10000
LT 07	ELECTRICAL SAFETY - Basics – Safety, Importance of Safety, Electrical Safety, Types of Hazards, Fire, Shock, Effects of Fire and Shock, Safety in Residences, Safety in Industrial and Commercial premises.	1		24		2500
LT 08	SELECTION & APPLICATION OF DRIVES - Basics of LV motors, inverter duty motor, basics of LV AC VFDs, selection & application of AC VFDs, wiring diagram, parameter setting, salient features, energy conservation with AC VFDs, VFD vs soft starter. Classroom sessions supported by workshop demonstrations.	3		24-26		10000
LT 09	REACTIVE POWER & HARMONICS MITIGATION What is PF, types of LV capacitors, selection criteria, power factor improvement - concepts, methods & advantages, APFC panels, dynamic compensation.	2	9-10			6750
LT 10	INTRODUCTION TO MEDIUM VOLTAGE SWITCHGEAR Selection & application of vacuum circuit breaker, specification of vacuum circuit breaker, fault current calculation, vacuum vs SF6 as a medium of CB.	2				6750
LT 11	INDUSTRIAL PROTECTION WITH NUMERICAL RELAYS Introduction to protective relaying, terminologies,	4				12500

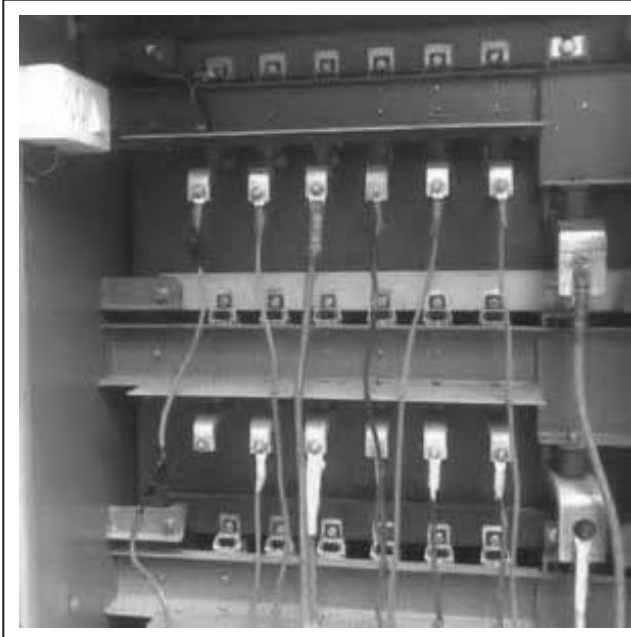
CODE	PROGRAMME NAME	DAYS	JUL 2015	AUG 2015	SEP 2015	FEES Rs.
	ANSI codes, CTs, PTs, Fault current calculations, relay co-ordination, feeder protection, motor protection, transformer protection, generator protection.					
LT 12	CONSERVATION & MANAGEMENT OF ELECTRICAL ENERGY Importance of energy conservation & management, fundamental concepts of ECM, terminologies, software, energy efficient technologies in electrical installations, Energy Conservation Act, ECBC, etc. including some case studies.	2				6750
LT 13	REQUIREMENT OF SYSTEM & EQUIPMENT EARTHING - Need & purpose of earthing, various types & methods of earthing, selection of earthing system, system & equipment earthing, sizing of earth conductors, generator earthing, transformer earthing, earthing of sensitive electronic equipment.	2				8000
LT 14	INTRODUCTION TO INDUSTRIAL ELECTRICAL SYSTEMS Overview of Indian power system, typical industrial electric power distribution scheme, classroom sessions with workshop demonstrations giving exposure to a wide range of low voltage switchgear like contactors.	3	13-15, 27-29	10-12, 19-21	21-23, 28-30	3000
LT 15	FIRE DETECTION & SECURITY SOLUTIONS - Basics of Fire Alarm System, Conventional & Addressable FAS, Field devices, Panels & Software, Design / BOQ from Floor plans.	1		27		3500
LT 16	BUILDING MANAGEMENT & ENERGY MANAGEMENT SYSTEMS - Basics of BMS, Components of BMS, Input & output devices, Controllers & Software, Installation & Commissioning, Energy Saving and Green building certification through BMS, Basics of Energy management, hardware and software features.	1		28		3500
LT 17	SELECTION, PROTECTION & MAINTENANCE OF TRANSFORMER - Selection, Classification, Operation of Power and Distribution transformer, Vector groups, Transformer protections, Routine tests for transformer, Testing of transformer oil, Transformer maintenance, Earthing of transformer, relevant IS/IEC standards.	2		13-14		6750
LT 18	INDUSTRIAL ELECTRICIAN TRAINING PROGRAMME - Safety & good maintenance practices, hands-on workshop sessions on testing, troubleshooting & maintenance of low voltage switchgear such as contactors, overload relays, motor starters, switch disconnector fuse, good termination practices.	2	29-30			2000
LT 19	ELECTRICIAN TRAINING PROGRAMME FOR RESIDENTIAL BUILDINGS - Basics of electricity, Selection of MCB, ELCB, domestic Switches, Wires and accessories e.g. Time switch, Introduction to Distribution boards, wiring demo staircase, godown lighting etc.	1	31			1000
LT 20	SWITCHGEAR SELECTION - MOTOR CONTROL CENTRE (MCC) - Motor control and protection techniques, Selection of Controlgear product range includes Contactor, O/L Relay, starter - Type-2 coordination.	2	14-15		22-23	5500
LT 21	SWITCHGEAR SELECTION - POWER CONTROL CENTRE (PCC) LV Power distribution, Latest trends and selection of ACB, MCCB, SDF, Changeover and related accessories.	2	16-17		24-25	5500
LT 22	DESIGN OF CONTROL CIRCUITS - Control Circuits & Schemes Fundamental Graphical Symbols & Nomenclatures of Various Components, Guidelines for Control Circuit Diagram.	2				6750

For more information about the Training Calendar and programmes.

Contact:- **Coonor** Larsen & Toubro Limited Switchgear Training Centre, Ooty-Coonor Main Road Yellanahalli P.O., The Nilgiris - 643 243 Tel. : 0423 251 7107 Fax : 0423 251 7158 E-mail: stc-coonor@lntebg.com.

ENERGY CONSERVATION THROUGH ENERGY EFFICIENCY – 5

In-Plant Distribution System Voltage Drops study to Save Energy



This is yet another important area of substantial Energy Losses and the studies indicate that in-plant electrical distribution system losses—due to voltage unbalance, over- and under voltage, low power factor, undersized conductors, leakage to ground, and **poor connections**—can account for less than 1% to more than 4% of total plant electrical energy consumption.

In a study at three industrial facilities, average electrical distribution system losses accounted for 2% of plant annual energy use. **Losses due to poor connections represented one-third of these losses** and accounted for 40% of the savings after corrective actions were taken.

Inadequate conductor sizing will result in an excessive voltage drop accompanied by increased energy losses and reduced motor torque. The National Electrical Code (NEC) calls for a 3% limit on voltage drop. Increased resistance due to undersized conductors and poor connections converts electrical energy into heat and imposes additional loads on the plant distribution system.

Maintenance of connections is generally referred to as termination maintenance.

“Peace is not the absence of war but the presence of justice.”

Termination maintenance is generally a cost-effective electrical distribution system energy savings measure. Causes of poor connections include:

- Loose or corroded cable terminals and bus bar connections
- Poorly crimped connections to conductors
- Loose, worn, or poorly adjusted contacts in motor controllers or circuit breakers
- Loose, dirty, or corroded fuse clips on manual disconnect switches.

Distribution system losses due to poor electrical contacts appear as hot spots caused by increased resistance or electric power (I^2R) losses. These hot spots may be detected by infrared thermography or a voltage drop survey. Inexpensive hand-held infrared thermometers can quickly and safely reveal hot spots.

Terminations should be regularly inspected. The cost of replacing fuse clips or cleaning breaker fingers is low compared with the significant energy savings resulting from such measures in addition to the secondary benefits, including less downtime during unscheduled equipment outages and improved safety due to reduced fire hazards.



Conducting a Voltage Drop Survey

A voltage drop survey can usually be done in-house with existing equipment such as a handheld voltmeter. Voltage drop measurements should be taken from the input of each panel to the panel output for each load. For a typical motor circuit, measure the voltage drop from the bus bar to the load side of the motor starter. Compare the magnitude of the voltage drop for each phase with the voltage drop for the other phases supplying the load. A voltage drop difference of more than 15% indicates that testing should be initiated to identify poor circuit connections. Even with good balance, an excessive voltage drop indicates that component voltage drop testing should be initiated. It is to be noted that motor efficiencies are determined at rated voltage with balanced phases. Under voltage operation can result in increased currents, reduced starting torque, and lower efficiency.

Suggested Actions

- Conduct a voltage drop survey.
- Voltage drop information can be used to determine energy losses and excess energy consumption due to loose and dirty connections. Voltage drop measurements should be taken at each phase. The voltage drop is simply the voltage difference across the connection. The total energy loss in a three-phase component is determined by summing the losses for each phase. Limit the load on each circuit or install larger-than-code-minimum conductors if the in-plant distribution system voltage drop still exceeds 3%, following termination maintenance.

Example of a Motor Control Centre is taken to illustrate.

Measurements at a Motor Control Center (MCC) breaker indicate voltage drops of 8.1, 5.9, and 10.6 volts on L_1 , L_2 , and L_3 respectively.

The driven equipment is continuously operated.

Measured line currents are 199.7, 205.7, and 201.8 amps for L_1 , L_2 , and L_3 .

Voltage drop measurements for circuits serving similar loads indicate that a voltage drop of 2.5 volts should be obtainable.

I challenge you to make your life a masterpiece. I challenge you to join the ranks of those people who live what they teach, who walk their talk. – ANTHONY ROBBINS

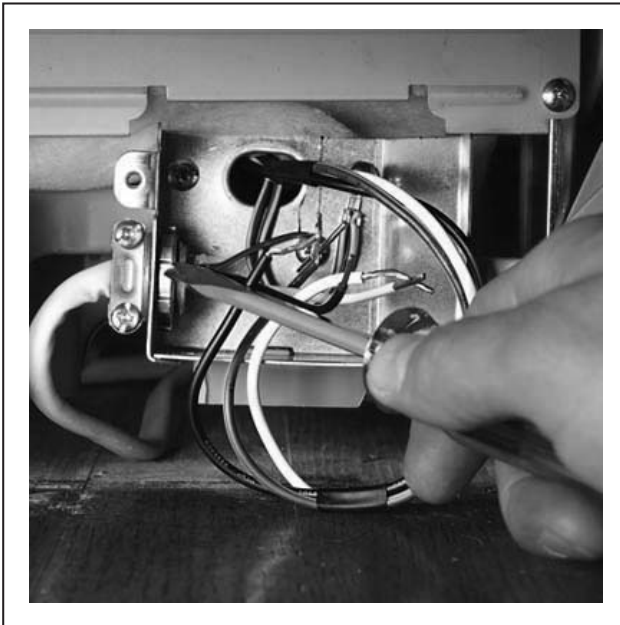
The potential annual energy and electrical demand savings from correcting the problem are shown in the table below.

Table of Excess Energy Consumption at an MCC Breaker Circuit Measured.

Permissible Voltage Drop is 2.5 which is taken as standard and the Power and KWhr is calculated taking continuous working for 24 Hrs per day

	V Drop	Excess V Drop	A	Excess KW	Excess KWhr/Year
L ₁	8.1	5.6	199.7	1.12	9,796
L ₂	5.9	3.4	205.7	0.7	6,126
L ₃	10.6	8.1	201.8	1.63	14,318
Totals:				3.45	30,240

Assuming an Energy Rate of Rs 6/- per Kwh, the savings can be as much as Rs. 1,81,440/- per Breaker per Annum.



In order to work towards achieving the savings of Rs. 1,81,440/- per Breaker per annum, steps have to be both in the form of improving Terminations of Cables and Wires and working on optimum cable sizes to optimize the Voltage Drops.

By studying and correcting the entire Distribution System for excessive Voltage Drops, there is good scope to save on Maximum Demand of the Industrial Unit, which can contribute to further savings. *(To be continued)*



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TAMILNADU ELECTRICAL INSTALLATION ENGINEERS ASSOCIATION 'A' GRADE

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4	(1) Installation of Captive generator (2) Electricity H.V. & M.V. Installation Proposals (3) Precautionary Measures to be taken in Design & Installation of building services including Electrical Services (4) The Indian Standard Specification	110
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PLEASE NOTE: Outstation members are requested to send the payment by D.D. only in favour of "TAMILNADU ELECTRICAL INSTALLATION ENGINEERS ASSOCIATION 'A' GRADE"

வந்து பாருங்கள் — சுண்ணாம்பாறு



கடற்கரையையும் காணலாம். மர வீடுகளிலும் இளைப்பாறலாம்.

மரக் கிளைகளுக்கு இடையே அமைக்கப்பட்டுள்ள மர வீடுகள் மிகவும் பாதுகாப்பானவை. வெளிநாட்டுப் பயணிகள் தொடர்ந்து வரும் இந்த இடத்தில் படகுப் போட்டிகளும் நடக்கின்றன. இதன் அருகில்தான் அரிக்கன் மேடு என்ற சுற்றுலா இடம் அமைந்துள்ளது. பண்டைய ரோமானியர்களும், பிரெஞ்சு அரசாங்கமும் வாணிபம் நடத்திய இடம் அரியாங்குப்பம் நதிப் படுகையான அரிக்கன்மேடுதான். கரையிருக்கும் இடம் இருளிலும் புலப்பட மக்கள் தீப்பந்தம் பற்றி, மணல்மேட்டில் நின்று அசைத்துக் காட்டியதால் அரிக்கன் மேடு எனப் பெயர் பெற்றது.

சாலையிலிருந்து ஆற்றுப் படுகை நோக்கிச் செல்லும்போது. மாந்தோப்பினை ஊடுருவித்தான் செல்ல வேண்டும். இங்கு ஆண்ட பல்வேறு அரசுகளின் கலை மற்றும் கலாசார சின்னங்கள் இன்னமும் மிஞ்சி இருக்கின்றன. அரியாங்குப்பம் ஆற்றில் வெள்ளப் பெருக்கெடுத்து ஓடி, வடிந்த பின் தேடினால் அணிமணிகள் இன்றும் கிடைப்பதாக மக்கள் சொல்கின்றனர். சுண்ணாம்பாறு புதுச்சேரியில் இருந்து எட்டு கி.மீ தூரத்தில் உள்ளது.

Courtesy: தி இந்த, ஜய வருட மலர் 2014

மர வீடுகளும் மிதக்கும் உணவகங்களும்

சுண்ணாம்பாறு நதிக்கரையில் அமைந்த சுண்ணாம்பாறு ரிசார்ட் சுற்றுலாப் பயணிகள் தங்கிக் களிக்க மிகவும் உகந்த இடம். சுண்ணாம்பு ஆற்றில் இருந்து படகு எடுத்துக் கொண்டு கடலின் வாயிற்பகுதிக்குச் சென்றால், நடுவில் உள்ள தீவும், அதன் பசமையும் உள்ளத்தைக் கொள்ளை கொள்கின்றன.

இங்குள்ள மணற்பாங்கான கடற்கரையில், தனிக் கூடாரம் அமைத்துக்கொள்ளலாம். பகலில் மட்டுமல்ல, இரவும் தங்கி சுண்ணாம்பாற்றையும் கடலையும் கண்டு களிக்க வசதியாக மரத்தின் மீது வீடுகள் அமைக்கப்பட்டுள்ளன. மிதக்கும் உணவகத்தை முன்பதிவு செய்துகொள்ளலாம். நீரின் மீது படகில் மிதந்து தீவையும், வெள்ளியைப் பொடி செய்து இறைத்தது போல உள்ள மணற்

20 MOST PEACEFUL COUNTRIES IN THE WORLD - 8

CZECH REPUBLIC



A relatively new country, the Czech Republic gained its independence from the Soviet Bloc in 1989 due to the Velvet Revolution and its subsequent split with Slovakia. After the division of Czechoslovakia, the Czech Republic has largely concentrated on building a strong capitalist economy and creating a stable climate for investment. In 2009, the Human Development Index (HDI) ranked the Czech Republic as a country of 'Very High Human Development.' Renowned mostly for its magnificent capital city Prague and breathtaking natural beauty, the Czech Republic draws tourists from all over the world. *(To be continued)*

Courtesy: Amerikanki

தூக்கம் எவ்வளவு நேரம் கட்டாயம் தேவை?

சரியாகத் தூங்காவிட்டால் நம்மில் பெரும்பாலோருக்கு சரி, நாம் போதிய அளவு தூங்கவில்லை என்று தெரியும்.

ஆனால் எது போதிய அளவு தூக்கம்?

இதற்கு விடை உங்கள் வயது என்ன? என்பதில்தான் இருக்கிறது, என்கிறது வாஷிங்டனில் இருந்து இயங்கும் **தேசிய தூக்க நிறுவனம்** சமீபத்தில் நடத்திய ஒரு ஆய்வு. குறிப்பிட்ட நேரத்தில் குறிப்பிட்ட வேலையைச் செய்யும் பழக்கமின்மை, மது மற்றும் காபி அல்லது பிற உடனடி சக்தி தரும் பானங்களை அருந்துவது போன்றவையும், அலாரம் கடிக்காரங்கள் மற்றும், சூரிய வெளிச்சம் போன்றவை உடலில் தூக்கத்தை குறிப்பிட்ட நேரத்தில் வரவழைக்கும் இயல்பான உணர்வுக்கு இடைஞ்சல் தரும் என்கிறது இந்த ஆய்வு. தனிப்பட்ட மனிதர்களின் சொந்த வாழ்க்கை முறைதான் இந்த தூக்கத்துக்கான தேவைகளை புரிந்துகொள்ள உதவ முக்கியமான அம்சம் என்று கூறும் **அமெரிக்க தேசிய தூக்க நிறுவனம் (The US National Sleep Foundation)** ஆனால் ஒருவரது வயது என்ன என்பதைப் பொறுத்து பொதுவான பரிந்துரைகளைத் தரலாம் என்கிறது.



பிறந்த குழந்தைகள்

(0 முதல் மூன்று மாதங்கள் வரை) புதிதாக பிறந்த குழந்தைகள் நாளொன்றுக்கு 14 லிருந்து 17 மணிநேரம் வரை தூங்க வேண்டும். ஆனால் 11லிருந்து 13 மணி நேரம் தூங்கினால் கூட போதும். ஒரு

நாளுக்கு 19 மணி நேரங்களுக்கு மேல் தூங்கவிடக்கூடாது.

குழந்தைகள்

(4 முதல் 11 மாதம் வரை) தினசரி 12லிருந்து 15 மணி நேரங்கள் வரை தூங்கவேண்டும். குறைந்தது 10 மணி நேரங்கள் தூங்கினால் கூட போதும். ஆனால் 18 மணி நேரங்களுக்கு மேல் தூங்கக்கூடாது.

தளிர்ப்படை பயிலும் குழந்தைகள்

(1லிருந்து 2 வயது வரை) தினமும் 11லிருந்து 14 மணி நேரங்கள் வரை தூங்க வேண்டும். ஆனால் 9 லிருந்து 16 மணி நேரங்கள் வரை தூங்கலாம்.

பள்ளி செல்லும் முன்வயதுக் குழந்தைகள்

(3லிருந்து 5 வயது வரை) தினமும் 10லிருந்து 13 மணி நேரங்கள் தூங்கவேண்டும் என்பது வல்லுநர்கள் பரிந்துரை. ஆனால் 8 மணி நேரங்களுக்கு குறைவாகவோ அல்லது 14 மணி நேரங்களுக்கு மேலாகவோ தூங்குவது பொருத்தமற்றது என்று கூறப்படுகிறது.

பள்ளி செல்லும் வயது சிறார்கள்

(6லிருந்து 13 வயது வரை) ஒன்பது மணி நேரத்திலிருந்து 11 மணி நேரம் வரை தினமும் தூங்கவேண்டும் என்கிறது இந்த நிறுவனம்.

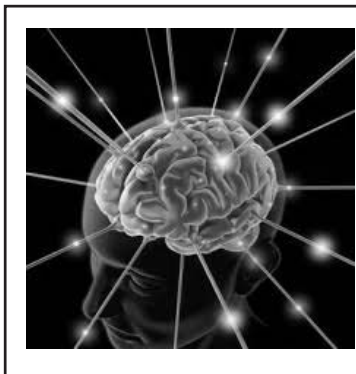
தினமும் 7மணி நேரத்துக்குக் குறைவான அல்லது 12 மணி நேரத்துக்கு மேலான தூக்கம் ஆரோக்கியமானதல்ல என்றும் அது கூறுகிறது.

Courtesy: Pesot, April 2015

POWER YOUR MIND

SILENCE IS YOGA

Talking to a fool is gossip
Talking to a Sadhu is Satsang
Talking to a friend is chat
Talking to a boss is communication
Talking to a student is teaching
Talking to a voter is canvassing
Talking to the depressed is counseling
Talking to an enemy is anger
Talking to oneself is brooding
Talking to God is prayer
Talking to none is silence
And silence is **YOGA**.



Courtesy: Swami Srikantananda

FREEDOM THROUGH MEDITATION

Reading a newspaper is to pass time
Reading one's textbooks is study
Reading novels is entertainment
Reading scriptures is swadhyaya
Reading great biographies is Enlightenment
Reading notes is preparation
Reading one's own mind is Introspection
Reading the soul is meditation
Meditation leads to **FREEDOM**.

JOHN NAPIER

Napier's father was Sir Archibald Napier of Merchiston Castle, and his mother was Janet Bothwell, daughter of the politician and judge Francis Bothwell, Lord of Session, and a sister of Adam Bothwell who became the Bishop of Orkney. Archibald Napier was 16 years old when John Napier was born.



As was the common practice for members of the nobility at that time, John Napier did not enter schools until he was 13. He did not stay in school very long, however. It is believed that he dropped out of school in Scotland and perhaps travelled in mainland Europe to better continue his studies. Little is known about those years, where, when, or with whom he might have studied, although his uncle Adam Bothwell wrote a letter to John's father on 5 December 1560, saying "*I pray you, sir, to send John to the schools either to France or Flanders, for he can learn no good at home*", and it is believed that this advice was followed.

In 1571, Napier, aged 21, returned to Scotland, and bought a castle at Gartness in 1574. On the death of his father in 1608, Napier and his family moved into Merchiston Castle in Edinburgh, where he resided the remainder of his life.

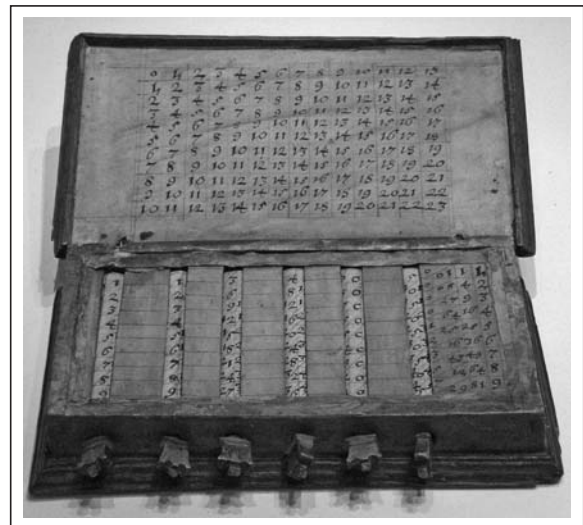
Advances in mathematics

His work, *Mirifici Logarithmorum Canonis Descriptio* (1614) contained fifty-seven pages of explanatory matter and ninety pages of tables of numbers related to natural logarithms (see Napierian logarithm). The book also has an excellent



discussion of theorems in spherical trigonometry, usually known as Napier's Rules of Circular Parts. Modern English translations of both Napier's books on logarithms,

and their description can be found on the web, as well as a discussion of Napier's Bones (see below) and Promptuary (another early calculating device). His invention of logarithms was quickly taken up at Gresham College, and prominent English mathematician Henry Briggs visited Napier in 1615. Among the matters they discussed were a re-scaling of Napier's logarithms, in which the presence of the mathematical constant e (more accurately, e times a large power of 10 rounded to an integer) was a practical difficulty. Napier delegated to Briggs the computation of a revised table. The computational advance available via logarithms, the converse of powered numbers or exponential notation, was such that it made calculations by hand much quicker. The way was opened to later scientific advances, in astronomy, dynamics, and other areas of physics.



Napier made further contributions. He improved Simon Stevin's decimal notation. Lattice multiplication, used by Fibonacci, was made more convenient by his introduction of Napier's bones, a multiplication tool using a set of numbered rods.

Napier may have worked largely in isolation, but he had contact with Tycho Brahe who corresponded with his friend John Craig. Craig certainly announced the

discovery of logarithms to Brahe in the 1590s (the name itself came later); there is a story from Anthony à Wood, perhaps not well substantiated, that Napier had a hint from Craig that Longomontanus, a follower of Brahe, was working in a similar direction. It has been shown that Craig had notes on a method of Paul Wittich that used trigonometric identities to reduce a multiplication formula for the sine function to additions.

Theology

Napier had an interest in the *Book of Revelation*, from his student days at St Salvator's College, St Andrews. Under the influence of the sermons of Christopher Goodman, he developed a strongly anti-papal reading. He further used the *Book of Revelation* for chronography, to predict the Apocalypse, in *A Plaine Discovery of the Whole Revelation of St. John* (1593), which he regarded as his most important work; he also applied the Sibylline Oracles, to calculate the date of the end of the world. Napier believed that would occur in 1688 or 1700. He dated the seventh trumpet to 1541. In his dedication of the *Plaine Discovery* to James VI, dated 29 Jan 1594, Napier urged the king to see "that justice be done against the enemies of God's church," and counselled the King "to reform the universal enormities of his country, and first to begin at his own house, family, and court." The volume includes nine pages of Napier's English verse. It met with success at home and abroad. In 1600 Michiel Panneel produced a Dutch translation, and this reached a second edition in 1607. In 1602 the work appeared at La Rochelle in a French version, by Georges Thomson, revised by Napier, and that also went through several editions (1603, 1605, and 1607). A new edition of the English original was called for in 1611, when it was revised and corrected by the author, and enlarged by the addition of *With a resolution of certain doubts, moved by some well affected brethren.*; this appeared simultaneously at Edinburgh and London. The author stated that he still intended to publish a Latin edition, but it never appeared. A German translation, by Leo de Dromna, of the first part of Napier's work appeared at Gera in 1611, and of the whole by Wolfgang Meyer at Frankfurt-am-Main, in 1615. Among Napier's followers was Matthew Cotterius (Matthieu Cottière).

The occult

In addition to his mathematical and religious interests, Napier was often perceived as a magician, and is thought to have dabbled in alchemy and necromancy. It was said that he would travel about with a black spider in a small box, and that his black rooster was his familiar spirit.

A contract still exists for a treasure hunt, made between Napier and Robert Logan of Restalrig. Napier was to search Fast Castle for treasure allegedly hidden there, wherein it is stated that Napier should "...do his utmost

diligence to search and seek out, and by all craft and ingine to find out the same, or make it sure that no such thing has been there."

Influence

A m o n g Napier's early followers were the instrument makers Edmund Gunter and John Speidell. T h e development of logarithms is given credit as the largest single factor in

the general adoption of decimal arithmetic. The *Trissotetras* (1645) of Thomas Urquhart builds on Napier's work, in trigonometry.

Eponyms

An alternative unit to the decibel used in electrical engineering, the neper, is named after Napier, as is Edinburgh Napier University in Edinburgh, Scotland.

The crater Neper on the Moon is named after him.

Family

In 1572, Napier married 16-year-old Elizabeth Stirling, daughter of James Stirling, the 4th Laird of Keir and of Cadder. They had two children. Elizabeth died in 1579, and Napier then married Agnes Chisholm, with whom he had ten more children. His father-in-law James Chisholm of Cromlix was later mixed up in the Spanish blanks plot, over which Napier with others petitioned the king.

List of works

- (1593) *A Plaine Discovery of the Whole Revelation of St. John*
- (1614) *Mirifici logarithmorum canonis descriptio* (Edward Wright's English translation was published in 1616).
- (1617) *Rabdologiae seu Numerationis per Virgulas libri duo* (published posthumously) Rabdology (Wikipedia)
- (1619) *Mirifici logarithmorum canonis constructio* (written before the *Descriptio*, but published posthumously by his son Robert)
- (1839) *De arte logistica*



INDIA SETS TWO GUINNESS RECORDS WITH YOGA EVENT AT DELHI'S RAJPATH



The Narendra Modi government's **Yoga Day event in Delhi broke two world records on Sunday** but it will have to wait for more than a year before officially gaining an entry into the Guinness book.

Officials said the showcase **yoga programme at Rajpath saw the largest number of participants at 35,985 people and the most number of participating nationalities (84).**

"The deadline for this year's book has passed so the record won't appear on the book until September 2016 at the earliest. We receive 40,000 record applications per year and our editorial team decides which 3,800

records appear in the book based on a number of factors," Doug Male, the Guinness World Records public relations manager told HT in an email late in the evening, in response to a questionnaire.

The ministry of ayurveda, yoga and naturopathy, unani, siddha and homeopathy (AYUSH), which was in-charge of Modi's pet project, had already set its sights

on breaking the previous world record that was set in 2005, when 29,973 students from 362 schools performed yoga at a Gwalior university.

"It is a matter of pride for India that we have broken two records on one day," minister of AYUSH, Shripad Naik, told reporters, saying Prime Minister Narendra Modi congratulated all for the successful record event.

Modi, an avid yoga practitioner for many years, led the event at Delhi's Rajpath early in the morning by joining the huge gathering in performing asanas.



The entire 2-km stretch from Rafi Marg crossing near Vijay Chowk to India Gate was lined with blue and red mats over green carpets with people of all ages performing various yoga exercises.

The event broke the earlier record set on November 19, 2005, when 29,973 students from 362 schools had performed a sequence of 'yogic kriyas' for surya namaskar simultaneously for 18 minutes led by Vivekananda Kendra at Jiwaji University Gwalior.

The awards were received by Ayush Minister Shripad Yesso Naik from representatives of Guinness World Records — Victoria from Britain and Marco Frigatti from Italy.

Yoga events were held across all states in India and most major cities across the world — from New York to London and Tokyo and Sydney.

Dubai man's attempt

In Dubai, a 40-year-old man of Indian origin stood on his head for 61 minutes in an attempt to set a new Guinness World Record.

Ivan Stanley, a Dubai-based advertising professional, broke his own previous record of 34 minutes of Shirasana. “It feels nice but a little disorienting. Those last five minutes were impossible, perhaps the longest of my life,” Stanley was quoted as saying by the Emirates 247 News.

According to the Guinness World Records, a headstand attempt has not been registered as a challenge so far.

“When I contacted the Guinness World Records international office and the Dubai one, there was no such challenge registered with the organisation. We have registered the attempt and will send the video to them. Hopefully, we should know soon enough,” Stanley said.



Courtesy (text): Hindustan Times, dt:22.06.2015

PUAN SRI JANAKI ATHI NAHAPPAN



Puan Sri Janaki Athi Nahappan, also known as Janaky Devar (born February 25, 1925), is a founding member of the Malaysian Indian Congress and one of

the earliest women involved in the fight for Malaysian (then Malaya) independence. Nahappan grew up in a well-to-do Tamil family in Malaya and was only 16 when she heard Subhas Chandra Bose’s appeal to Indians to give whatever they could for their fight for Indian independence. Immediately she took off her gold earrings and donated them. She was determined to join the women’s wing, the Rani of Jhansi Regiment of the Indian National Army. There was strong family objection especially from her father. But after much persuasion, her father finally agreed.

She is among the first women to join the Indian National Army organised during the Japanese occupation of Malaysia to fight for Indian independence with the Japanese. Having been brought up in luxury, she initially could not adapt to the rigours of army life. However, she gradually got used to military life and her career in the Regiment took off. She became second in Command of the Rani of Jhansi Regiment. After World War II she emerged as a welfare activist.

Nahappan found the Indian National Congress’s fight for Indian independence inspiring and joined the Indian Congress Medical Mission in then Malaya. In 1946 Nahappan helped John Thivy to establish the Malayan Indian Congress, which was modelled after the Indian National Congress. The party saw Thivy as its first president. Later in life, she became a senator in the Dewan Negara of the Malaysian Parliament.

வீட்டைக் காக்கும் காப்பீடு



சொந்த வீடு என்பது எல்லோருக்கும் வாழ்வில் ஒரு பெருங்கனவு. அந்தக் கனவை அடைய ஒவ்வொருவரும் படும் கஷ்டங்கள் ஏராளம் ஏராளம். கடனை வாங்கி. வீட்டில் உள்ள நகைகளை விற்று, கையைக் கட்டி வாயைக் கட்டிதான் சொந்த வீடு என்ற கனவைப் பலரும் அடைகிறார்கள். அப்படிக்கஷ்டப்பட்டு அடையும் வீடு இடிந்தாலோ, தீப்பிடித்தாலோ அல்லது வேறு காரணங்களால் பிரச்சனைக்கு உள்ளதனாலோ வாயிலும் வயிற்றிலும் அடித்துக்கொள்வோம். இதைத் தவிர்க்க முடியாதா?

நிச்சயம் முடியும். வீட்டுக்குக் காப்பீடு எடுப்பதன் மூலம், வீட்டுக்கும் பாதுகாப்பு, நமக்கும் பாதுகாப்பு. காப்பீடு என்றவுடனே ஆயுள் காப்பீடு போலவா என்ற கேள்விகள் எழும். ஆயுள் காப்பீடு என்பது ஒரு மனிதரின் வாழ்நாளுக்கான காப்பீடு. ஆயுள் காப்பீடு எடுத்த ஒருவர், இடையில் இறந்தால், அவர் எடுத்த காப்பீட்டுத் தொகை மனைவிக்கும் வாரிசுகளுக்கும் கிடைக்கும். வீட்டுக்கான காப்பீடு என்பதும் இதேபோலத்தான்.

வீட்டுக்குப் பாதுகாப்பு

இன்று பெரும்பாலும் வங்கியில் கடன் வாங்கி தான் பலரும் வீடு கட்டுகிறார்கள் அல்லது வாங்குகிறார்கள். இப்படி வீடு வாங்கியவர்கள் மாதந்தோறும் வங்கிக்குத் தவணை (இ.எம்.ஐ.) செலுத்திக் கொண்டிருப்பார்கள். இந்தக் காலகட்டத்தில் வீடு வாங்கியவருக்கு அசம்பாவிதம் ஏதாவது ஏற்பட்டால் என்ன ஆகும்?

எஞ்சிய பணத்தை வழங்கும்படி மனைவியையும், வாரிசுகளையும் வங்கிகள் நெருக்கும். பணத்தைச் செலுத்த முடியவில்லை என்றால் வங்கிகள் வீட்டை ஜப்தி செய்துவிடும். அப்போது அவர்கள் நடுத்தெருவுக்கு

வரும் சூழ்நிலை ஏற்படலாம் இல்லையா? இதைத் தவிர்க்க வீட்டுக்கும், வாங்கிய கடனுக்கும் காப்பீடு எடுத்துக்கொண்டால், அது நிச்சயம் பாதுகாப்பாக இருக்கும். எனவே வீட்டுக்கான காப்பீடு மிகவும் அவசியம். கடன் வாங்கியவருக்கு அசம்பாவிதம் ஏற்பட்டால் மட்டுமே காப்பீட்டுப் பணம் கிடைக்கும் என்று நினைத்துவிடாதீர்கள். புயல், மழை, வெள்ளம், நிலநடுக்கம், தீ விபத்து, தீவிரவாதத் தாக்குதல் போன்ற பிரச்சினைகளில் வீடு பாதிக்கப்பட்டாலும் மொத்தக் குடும்பமும் இடிந்து போய்விடும் அல்லவா? ஆனால், வீட்டுக்குக் காப்பீடு எடுத்திருந்தால், அந்தப் பிரச்சினையே இல்லை. இந்தப் பாதிப்புகளுக்கும் காப்பீட்டுப் பணம் கைகொடுக்கும்.

குறைவான பிரீமியம்

வீட்டுக்கான காப்பீடு என்றால் மிகவும் அதிகமாக இருக்குமோ என்று நினைக்க வேண்டாம். உதாரணமாக ஒருவர், சுமார் 20 லட்சம் ரூபாய் வீட்டுக் கடனாக வாங்குகிறார் என்று வைத்துக்கொள்வோமே. அவர் 15 ஆண்டுகளுக்கு வீட்டுக் கடனைத் திருப்பிச் செலுத்துகிறார் என வைத்துக் கொண்டால், இந்தக் கடன் தொகைக்குக் காப்பீடு எடுத்தால் ஆண்டுக்குச் சுமார் 7 ஆயிரம் ரூபாய் முதல் 8 ஆயிரம் ரூபாய் வரை பிரீமியம் கட்ட வேண்டியிருக்கும்.

இதை மாதமாகவோ, மூன்று மாதங்களுக்கு ஒரு முறையோ, ஆறு மாதங்களுக்கு ஒரு முறையோ, ஓராண்டுக்கு ஒரு முறையோ செலுத்த வசதி உள்ளது. ஒரே சமயத்தில் மொத்தமாகக் காப்பீடு எடுத்துக்கொள்ளவும் செய்யலாம். அப்படி மொத்தமாகக் காப்பீடு செலுத்தும்போது இடையில் பிரீமியம் செலுத்தத்

தேவையில்லை. ஒட்டுமொத்தமாக பிரீமியம் செலுத்தும்போது தள்ளுபடியும் கிடைக்கும். அது மட்டுமல்ல, சம்பளதாரர்கள் கட்டும் காப்பீடு பிரீமியத்துக்கு வரிச்சலுகை பெற்றுக் கொள்ளவும் முடியும்.

திரும்ப பெறும் வசதி

தொடர்ந்து வீட்டுக்கான காப்பீடு பிரீமியம் செலுத்தி வருகிறோம். வீடு வாங்கியவருக்கு அசம்பாவிதம் எதுவும் ஏற்படவில்லை. வீட்டுக்கும் பாதிப்பு ஏற்படவில்லை என்று வைத்துக் கொள்வோமே.. அப்படியானால், நாம் கட்டிய மொத்தப் பணமும் வீணாகிவிட்டதே என்றுதானே நினைப்பீர்கள். இதற்கும் இப்போது வீட்டுக்கான காப்பீடுகளில் தீர்வு காணப்பட்டிருக்கிறது.

காப்பீடு பணத்தைத் திரும்பப் பெறும் வசதி, காப்பீடு பணத்தை திரும்பப் பெற முடியாத வசதி என இரு பிரிவுகளில் இப்போது வீட்டுக்கான காப்பீடுகள் வழங்கப்படுகின்றன. காப்பீடு பணத்தைத் திரும்பப் பெறும் வசதியைத் தேர்வு செய்தால் போதும். வீட்டை வாங்கியவருக்கு அசம்பாவிதமும், வீட்டுக்குப் பாதிப்பும் ஏற்படவில்லையென்றால், காப்பீடு எடுத்த காலத்துக்குப் பிறகு கட்டிய பிரீமியத் தொகையைத் திரும்பப் பெற்றுவிடலாம். அதற்கு வட்டி, போனஸ் தொகையையும் காப்பீட்டு நிறுவனங்கள் கொடுக்கின்றன.

கூடுதல் சமை

இதில் உள்ள ஒரு பிரச்சினை என்னவென்றால், இந்த வசதியில் செலுத்தப்படும் பிரீமியம் தொகை கொஞ்சம் அதிகம். இதற்காக மாதந்தோறும் கணிசமான பணத்தை ஒதுக்க வேண்டியிருக்கும். அதிக வருவாய் ஈட்டுபவர்களுக்கு எந்தப் பிரச்சினையும் இல்லை. குறைந்த வருவாயில் வீட்டுக் கடன் வாங்கியவர்களுக்கு அதிகத் தொகை ஒதுக்குவது கூடுதல் சமையாக இருக்கும். வீட்டுக்கும் கடனுக்கும் பாதுகாப்பு இருந்தால் மட்டும் போதும் என்று நினைப்பவர்களுக்கு இரண்டாவது வகைதான் நல்ல தேர்வாக இருக்கும்.

இப்போதெல்லாம் பெரும்பாலான வங்கிகள் மற்றும் வீட்டு வசதி நிறுவனங்கள், கடன் கொடுக்கும்போது வீட்டுக்கும் கடனுக்கும் சேர்த்துக் காப்பீடு எடுத்துவிடுகிறார்கள். சில வங்கிகள், நிறுவனங்கள் அந்தத் தொகையைக் கடனோடு சேர்த்துவிடுவதும் உண்டு. இன்னும் சில வங்கிகள் அதற்கான பிரீமியத்தைத் தனியாக வசூலிக்கவும் செய்கின்றன. காப்பீடு எடுக்கும்போது அதைப் பற்றி ஒரு முறை தீர் விசாரித்துக் கொள்ளுங்கள்.

எது எப்படி இருந்தாலும், வீட்டுக்கும், வாங்கிய கடனுக்கும் காப்பீடு மிகவும் அவசியம். அதை முறையாக எடுத்துக்கொண்டால் சொந்த வீட்டுக்குப் பங்கம் வந்தாலும் பயமில்லாமல் இருக்கலாம்.

Courtesy: தி இந்தி, 16.05.2015

HUMOUR

It may sound like a joke but it is serious!!!
Sarcasm at its best.

Checking out at the store, the young cashier suggested to the older woman that she should bring her own shopping bags because plastic bags weren't good for the environment. The woman apologized and explained, "**We didn't have this green thing back in my earlier days**".

The cashier responded, "That's our problem today. Your generation did not care enough to save our environment for future generations".

She was right — our generation didn't have the green thing in its day.

Back then, we returned milk bottles, pop bottles and beer bottles to the store. The store sent them back to the plant to be washed and sterilized and refilled, so they could use the same bottles over and over. Yes, they really were recycling.

We refilled writing pens with ink instead of buying a new pen; and we replaced the razor blades in a razor instead of throwing away the whole razor just because the blade got dull.

But, **we didn't have the green thing back in our day.**

We walked up the stairs, because we didn't have an escalator in every shop and office building. We walked to the grocery store and didn't climb into a 300-horsepower machine every time we had to go two blocks.

But, she was right. **We didn't have the green thing in our day.**

Back then, we washed the baby's nappies because we didn't have the throw-away kind. We dried clothes on a line, not in an 'energy gobbling machine burning up 220 volts;' wind and solar power really did dry our clothes back in our early days. Kids got hand-me-down clothes from their brothers or sisters, not always brand-new clothing.

But, that young lady is right. **We didn't have the green thing back in our day.**

Back then, we had one TV, or radio, in the house — not a TV in every room. And, the TV had a small screen the size of a handkerchief (remember them?).

In the kitchen, we blended and stirred by hand because we didn't have electric machines to do everything for us.

When we packaged a fragile item to send in the post, we used wadded up old newspapers to cushion it, not Styrofoam or plastic bubble wrap.

Back then, we didn't fire up an engine and burn petrol just to cut the lawn. We used a push mower that ran on human power.

We exercised by working so we didn't need to go to a health club to run on treadmills that operate on electricity.

But, she's right. **We didn't have the green thing back then.**

We drank water from a fountain or a tap when we were thirsty instead of demanding a plastic bottle.

We actually cooked food that didn't come out of a packet, tin or plastic wrap and we could even wash our own vegetables and chop our own salad.

But, **we didn't have the green thing back then.**

Back then, people took the tram or a bus, and kids rode their bikes to school or walked instead of turning their mothers into a 24-hour taxi service.

We had one electrical outlet in a room, not an entire bank of sockets to power a dozen appliances.

And we didn't need a computerized gadget to receive a signal beamed from satellites 2,000 miles out in space in order to find the nearest pizza joint.

But, isn't it sad the current generation laments how wasteful we old folks were just because **we didn't have the green thing back then.**



சீனாவில் நடந்ததாகக் கூறப்படும் பழங்கதை இது. **லாவோட்சுவின்** சீடரான 90 வயது முதியவர் ஒருவர் தன் வீட்டுக்கிணற்றில் தனது இளம் வயது மகனுடன் சேர்ந்து கஷ்டப்பட்டு நீர் இறைத்துக்கொண்டிருந்தார்.

அந்த வழியே **ஞானி கன்பூசியஸ்** வந்தார். **கன்பூசியசும் லாவோட்சுவும்** சமகாலத்தவர்கள். ஆனால் இருவரது சிந்தனைகளும் வேறுபட்டவை. மேற்குலகம் கன்பூசியசின் சிந்தனைகளை முன்னதாகவே அடையாளம் கண்டது. ஆனால் லாவோட்சுவின் சிந்தனைகள் சமீப காலமாகவே அங்கீகரிக்கப்பட்டத் தொடங்கியுள்ளன.

ஒரு முதியவரும் அவருடைய மகனும் சிரமப்பட்டு தண்ணீரைக் கிணற்றில் இறைத்துக் கொண்டிருப்பதைப் பார்த்தார் கன்பூசியஸ். அந்தத் தந்தை, மகனின் மீது இரக்கம் கொண்டார் கன்பூசியஸ். அவர்களிடம் சென்று, “நீங்கள் என்ன முட்டாள்களா? உலகம் நவீனமாகிவிட்டது. குதிரைகளும், காளைகளும், இந்த வேலையைச் செய்வதற்கு வந்துவிட்டது உங்களுக்குத் தெரியாதா? ஏன் நீயும் சிரமப்பட்டு இந்த இளைஞனின் ஆற்றலையும் வீணாக்குகிறாய்” என்று கேட்டார்.

அந்த முதியவர், கன்பூசியஸிடம், “எனது மகன் இருக்கும்போது இதைக் பேசவேண்டாம். அவன் மதிய உணவுக்குப் போன பின்னர் கேளுங்கள். நான் உங்கள் கேள்விக்கான பதிலைச் சொல்கிறேன்” என்றார்.

அந்த இளைஞன் மதிய உணவுக்காக வீட்டுக்குள் சென்றான். அப்போது கன்பூசியசின் கேள்விக்கு அந்த 90 வயது முதியவர் விடையளித்தார்.

“எனக்கு இப்போது 90 வயது கடந்துவிட்டது. 30 வயதுள்ள இளைஞன் ஒருவனுடன் என்னால் சரிக்குச் சமமாக வேலை செய்ய முடிகிறது. நான் தண்ணீர் இறைப்பதற்காகக் குதிரைகளைப் பயன்படுத்தினால் என் மகன், எனது ஆரோக்கியத்துடன் 90 வயது வரை எப்படி இருக்க முடியும்? அதனால்தான் உங்களிடம் என் மகன் முன்னால் இக்கேள்வியைக் கேட்க வேண்டாம் என்று மன்றாடிக் கேட்டுக் கொண்டேன்.

இது ஆரோக்கியத்துடன் தொடர்புடைய விஷயம். நகரங்களில் தண்ணீரை இறைக்க குதிரைகள் வந்துவிட்டதாகக் கேள்விப்பட்டோம். இந்த வேலைகளுக்காக இயந்திரங்களும் கிடைக்கும் செய்தி எனக்குத் தெரியும். ஆனால் அந்த இயந்திரங்கள் வந்துவிட்டால் என் மகனுக்குச் செய்வதற்கு என்ன வேலை இருக்கும்? அவனது உடல் நலம் என்ன ஆரோக்கியத்துடன் இருக்கும்?” என்று கேட்டார்.

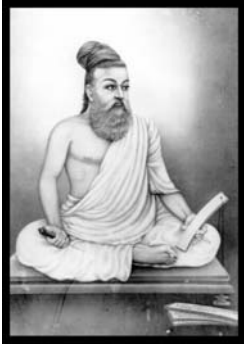
ஒரு செயலின் தாக்கம் இன்னொன்றின் மீது உடனடியாக இருக்கும்.

இதைத்தான் லாவோட்சு சொல்கிறார். **“வேலையும் ஓய்வும் ஒன்றிலிருந்து ஒன்று பிரிக்க இயலாதது. நீங்கள் நன்றாக இளைப்பாற ஆசைப்பட்டால் நன்கு வேலை செய்யுங்கள்”** என்கிறார்.

Courtesy: தி இந்து, தேதி: 11.06.2015

Naturally, to follow dharma, we have to find out what it is. You have to struggle with it. The answer will not come easily. You will be swayed by your desires, conditioning, and those around you who have ideas about what you should do, what is proper, what is improper. – DHARMA

TIRUKKURAL AND MANAGEMENT IN A 'NUTSHELL' – 27



A Sound Body and a Sound Mind can do Good for all and the recent observance of International Yoga Day is a step towards this purpose and also a proclamation of a Concept and Practice of Indian origin accepted World over. Tiruvalluvar deals with the Concept of “Thavam” or “Notral” meaning Penance or Observance respectively. In the modern concept this can really go to mean Focus to Meditation and Yoga helping to provide

sound body and a clear mind. In one of the Kurals quoted below, Tiruvalluvar says that **the person who has realized the Power of Meditation and Yoga, can even challenge death due to achievement of Health both of Body and Mind.**

“Kootram Kuthithalum Kaikoodum Notralin
Aatral Thalaipat tavarkku Kural 269

கூற்றம் குதித்தலும் கைகூடும் நோற்றலின்
ஆற்றல் தலைப்பட் டவர்க்கு குறள் 269

“Behold men that have acquired Power by Penance; they can succeed even in conquering death”

HOME FESTIVALS – 8

ஆவணி - AAVANI (August/September)



This is a busy month, with two major festivals celebrated both at home and at the temple. Krishna Jayanthi, the birth of Lord Krishna, comes first. In the painting at right is the rescue of the baby Krishna, who was born in a prison. His father carries him across a swollen stream while the seven-headed serpent, AdiSeshan, protects the incarnation of Lord Vishnu from the storm. In the Home, offerings of butter and yoghurt are made to Krishna’s image, and footprints made with red powder reveal his path from the home’s front door to the shrine room, suggesting that Krishna has come to participate. Ganesha Chaturthi is a mammoth festival across all of India, ten days in celebration of His manifestation. Shown in the

center of the painting is a statue of Lord Ganesha and a devotee offering obeisance by pulling his ears and bobbing up and down, a practice called *thopukarnam* in Tamil, done only for Ganesha – one explanation being that it is to make the Baby Ganesha laugh. The icon of Ganesha is made by the devotees from river clay and painted and decorated. At festival’s end is the Visarjana or departure, when the clay icon is placed into the river the Deity is bid farewell. In North India Visarjana is celebrated by millions of people. At far right in the art is depicted the story of Ganesha consuming so many sweet offerings that He had to tie a snake around his belly to keep it from bursting. Ganesha chastised the Moon for laughing at His predicament, and as penance the Moon has ever since waxed and waned through the month instead of remaining constantly bright.

(To be continued)

The state of perfection achieved by a person is known as Yoga. Though the common meaning of Yoga is the bringing together of a number of materials or influences, the philosophic meaning is Viyogam or cutting away from attachment... That state of perfection which is cutting away from the attachment of sorrows, is known by the term yoga. This yoga has to be practised with determination of purpose and a steady mind.

– H.H. SHRI PARAMACHARYA

GE LIGHTING ILLUMINATES LONDON'S TOWER BRIDGE

After a major refurbishment involving GE Lighting, the stunning architectural details of London's iconic Tower Bridge will be clearly visible at night for the first time in its 118-year history.

The new lighting scheme was specifically developed to enhance the aesthetics of the bridge and ensure an energy efficient lighting scheme was in place. More than 2 km of GE Lighting's Tetra Contour architectural LED lighting has been installed on the stone and metal work on the bridge, illuminating the structure at night. Supplied in 2.44 m lengths, it takes the form of a flexible LED light engine that can be moulded on site to fit the shape of architectural features. Controls have also been installed enabling the mood of the lighting to be changed to suit different occasion.

Interesting facts about the Tower Bridge relamping

Tower Bridge was last relamped with spotlights 25 years ago. The once-in-a-generation lighting makeover of Tower Bridge will reduce energy consumption by 40%. The City of London Corporation owns Tower Bridge and commissioned global lighting experts Citelum to design the scheme, whose other work includes Notre Dame and the Eiffel Tower. The project comes at no cost to the taxpayer. GLA and Mayor Boris Johnson helped to coordinate ensuring it contributes to the London 2012 Olympics as well as the Queens Jubilee celebrations. The cost of the upgrade is being supported by EDF and GE, both sustainability partners of London 2012. Bridge owner, the City of London Corporation contributed £400,000, towards the works from its ancient Bridge House Estate fund that pays for the five City bridges. Features such as the gothic turrets, windows, the central aerial walkway and the suspension chains have been picked out in colours, whose shades and intensity are for the first time, variable. As Tower Bridge is a listed bridge, the modern LED equipment is less intrusive and can be installed more sympathetically. 8,270 meters of new electrical cable has been installed, along with 1,750 metres of control cabling for the LED projectors.

Tetra Contour has been installed on the bridge and is comprised of a flexible LED light engine and a rigid, optically diffused light guide that can be heat formed to fit a variety of architectural needs.

GE lights up London's must-see monument
TOWER BRIDGE

GE logo, Citelum logo, City of London logo, EDF Energy logo

Opened **30 June 1894** by the future **King Edward VII**
When it was built, Tower Bridge was the largest and most sophisticated bascule bridge ever completed.

The framework was clad in Cornish granite and Portland stone to protect the underlying steelwork and to give the Bridge a more pleasing appearance.

40% energy saving over current artistic lighting

3,500 walk under it.

40,000 pedestrians and motorists pass over Tower Bridge every day.

45% energy saving over current street lighting

GE LEDs and Floodlighting will offset the artistic lighting and showcase the beauty of the bridge and the two towers.

GE logo, imagination at work

● - the position of the lighting

The bascules take about a minute to raise to their max angle of 86 degrees. Raised over 18,000 times a year when first built, raised 100 times a year now.

Tetra Contour cable – GE's more efficient and more durable alternative to neon lighting – will follow the metal curves on either side of the towers and across the walkway. LED Projectors will enhance the architecture of the two towers, the system's three color options will allow the bridge to take on different looks for special events, such as the 2012 Olympic Games.

GE LIGHTING ILLUMINATES LONDON'S TOWER BRIDGE

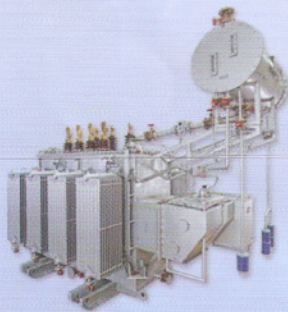


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