

ELECTRICAL INSTALLATION ENGINEER

NEWS LETTER

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

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ISSUE NO. 136

VOL : No. 12/2017

MONTHLY ISSUE NO. 6

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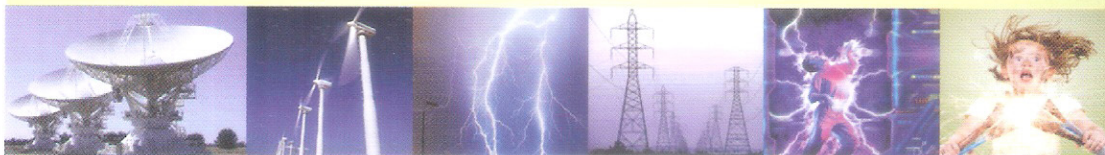
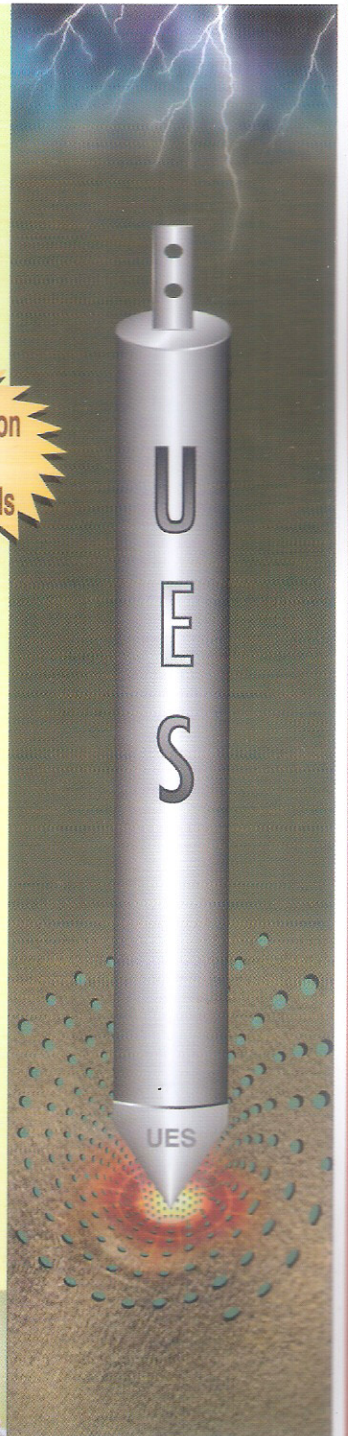
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EVENTS

L&T Training Programme

Best Maintenance Practices in LV Switchgear	3 rd – 7 th July 2017
Introduction to Industrial Electrical Systems	10 th – 12 th July 2017
Power Quality Solution (RPHM)	17 th – 18 th July 2017
Industrial Electrician Training Programme	19 th – 20 th July 2017
Electrician Training Programme for Residential Buildings	21 st July 2017
Introduction to Industrial Electrical Systems	24 th – 26 th July 2017
Design of Control Circuits – DCC	27 th – 28 th July 2017

Venue: L&T Ltd., Switchgear Training Centre, Nilgiris

Contact Tel.: 0423-2517107

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AFE-Security and Fire Expo South India is a 3 day event being held from 29th June to the 1st July 2017 at the Chennai Trade Centre in Chennai, India. This event showcases products like Alarm Centres/Intruder Alarms, Access Control, Biometrics, Building Management Systems, CCTV, Computer Security, Integrated Systems & Networked

Security, IT Security, Manned Guarding, Physical Security, Retail Security, Screening / Anti – Terrorism, Secure Communications, Surveillance, Traffic Monitoring & Valuables in Transit etc. in safety and security industry.

Security And Fire Expo 2017 is a biggest event in South India on Fire and Safety. The event is going to be held on 29 June to 01 July 2017 at Chennai Trade Centre, Chennai, Tamil Nadu, India. The show acquire every opportunity for your business of Security & Fire Safety. The exhibitor showcase your most powerful and solutions to more and more trade visitors, buyers and decision makers at South India's largest Security & Fire Event.

Date: 29th June – 1st July 2017

Venue: Chennai Trade Centre, Chennai

Website: <https://www.tradeindia.com>

Energy And Environment Foundation

GLOBAL
Sustainability
AWARD 2017

Events Profile: Global Environment Awards organised by the Energy And Environment Foundation shall recognize outstanding contribution by the individuals, team, unit, region / project organization and honour them for their excellent contributions, commitment and actions that have made a positive impact on the environment. Whether by helping to improve the management of natural resources, demonstrating new ways to tackle climate change or raising awareness of emerging environmental challenges, Global Sustainability Award serve as an inspiration for the transformative action, business excellence and environment management across the world.

8th edition of the World Renewable Energy Technology Congress & Expo event will be held on August 21-23, 2017 at Expo & Convention Centre, Manekshaw Centre, Dhaulakuan, Delhi Cantt., Delhi, India with the theme "Renewable Energy: What Works".

Date: 21st – 23rd August 2017

Venue: Expo & Convention Centre, Manekshaw Centre, Near Dhaulakuan, Delhi Cantt, Delhi, India

Website: www.ee-foundation.org/sustainability.html



Events Profile: Organised by UBM India, Renewable Energy India Expo intends to accelerate the growth of India's Renewable Energy sector and contribute to the country's sustainable economic development. The show aims to upscale and mainstream the applications of renewable energy resources, showcase innovations, and enrich deliberations by providing the industry with an international exhibition and conference platform.

Date: 20th – 22nd September 2017

Venue: India Expo Centre, Greater Noida, India

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

EDITORIAL

Dear Members, Fellow Professionals and Friends,
SEASONS GREETINGS TO ONE AND ALL!

The month of **June** is marked by observance of “**World Environment Day**” on the 5th by all people of the World to remind ourselves of the Dangers if we do not ensure a Safe and Healthy Environment. Engineers from all over India and from all over the World observe this day as they certainly have a greater responsibility than all the other Professionals who all have lot of responsibility in addressing and the uses of Resources, Technology and Engineering. **The important Environmental concerns revolve around** a) *Sustainable Consumption and avoiding over exploitation of Natural Resources*, b) *Pollution of Air and Water*, c) *Climate Change and Global Warming*, and d) *Connecting with Nature more and more as a Solution*.

Sustainable consumption has to be addressed primarily to Water and Energy. Be it Agriculture or Domestic or Industrial and other uses, we are able to see abnormal quantities of water being used clubbed with lot of wastages, which has to be fully addressed by Engineering and Technology in minimizing the usages as well as reuses by Treatment and Recycling and so on. Reducing the use of Water in Agriculture can be addressed by Technologies like Sprinklers, Drip and Micro Irrigation and so on. Waste Water Treatments and reuses are all feasible with Technologies and it should be made compulsory, be it communities or industries or Municipalities or any other establishments or Institutions. It is certainly the duty of the Engineering fraternity to work on it and towards it. Sustainable Energy Consumption is a Great Challenge which has to be addressed by reducing consumption through Energy Efficiency and by more and more uses of Renewable Energy Sources in place of fossils. Over exploitation of resources like coal and oil has reached alarming proportions today which has to be just stopped through determined efforts of both the Government and the public at large. We see determined efforts today about Solar Energy, which is only a beginning and much greater advancement, can be seen by addressing “**Waste to Energy**” possibilities of all kinds in all areas.

Pollution of Air and Water are primarily through uses of improper and inefficient Technologies and irresponsible acts by the Industries and the communities at large and the Institutions. Tough rules in place with punishments and rewards and strict implementation without any exception can only help solve the situation.

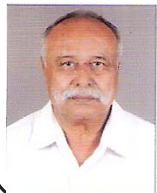
Climate change and Global warming threats, which are real and which are already being seen and experienced through many happenings and calamities all over the World, are mainly due to the abnormal levels of usages of Energy and the Energy being sourced at present, primarily and largely from Coal and Oil. The solution only lies in cutting down or at least stabilizing at the present levels of usages of Energy and sourcing the Energy completely or mostly from Renewable Sources. Many Technologies and Solutions are developed today to provide Heat and Fuel and Electricity from Renewable Sources and the examples can be Solar Heating, Solar Electricity, Solar Automobiles, Bio Gas, Bio Carbon, Bio Oil, Bio Fuel, and Bio Electricity and so on.

Connecting more and more with Nature in all activities of Life is a Best Solution to address all the concerns dealt above and to ensure Safe and Healthy Environment. Growing more trees, Greening the surroundings and less and less use of Energy and Efficient use of Energy are all largely accepted measures to protect the Environment, which have to be followed vigorously.

We thank all those members who have helped us by participating in the advertisement appearing for the issue May 2017 – Fomra & Fomra, Dehn India Pvt. Ltd., Safvolt Switchgears Pvt Ltd., Power Cable Corporation, Alfa Switchgear (I) Pvt. Ltd., Galaxy Earthing Electrodes (P) Ltd., Elmetlerr, Wilson Power and Distribution Technologies Pvt. Ltd., Universal Earthing Systems Pvt. Ltd., Supreme Power Equipment Pvt. Ltd., Consul Neowatt Power Solutions Pvt. Ltd., Pentagon Switchgear Pvt. Ltd., Pentagon Power Solutions, Ashlok Safe Earthing Electrode Ltd.

EDITOR

OBITUARY



C.N. GOPAL
Date of Death
31.05.2017

On behalf of The Tamilnadu Electrical Installation Engineers Association ‘A’ Grade extends **Heartfelt Condolences** for the demise of Our Member **Thiru. C.N. GOPAL, Proprietor, Best Electricals, Coimbatore - 641 009.**

We pray the almighty to rest his Soul in Peace.

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MEMBERS DETAILS

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256.	Electro-Tech Engineers	Pondicherry	0413-2641299, 98431 39062	EA 2246
257.	Tamilnadu Newsprint & Papers Ltd	Pugulur	04324-277001, 94425 62111	EA 1384
258.	Gopi Electricals	Rajapalayam	04563-230587, 94431 32026	ESA 181
259.	S&S Engineers	Rajapalayam	98423 50254	ESA 346
260.	Yesar Electrics	Rajapalayam	04563-220728, 98429 40426	EA 2321
261.	Blue Sea Power Solutions P Ltd.	Salem	94432 01577, 94432 63309	ESA 399
262.	Delta Roto Tech Private Limited	Salem	0427-2270424, 98427 99939	ESA 344
263.	Lakshmi Elektricals	Salem	94433 80038, 94422 80038	EA 1773
264.	Mani Engineering	Salem	94433 89677, 94431 36040	EA 1601
265.	S.S. Pathy & Co.	Salem	94433 57720, 94433 45252	EA 1013
266.	Sabari Electricals Enterprises	Salem	0427-2263826, 94437 48825	ESA 275
267.	Shree Sakthie Electrical & Engg.	Salem	0427-2336441, 94426 36995	ESA 382
268.	S.R. and Co.	Salem	0427-2443330, 95855 66602	EA 2203
269.	Madhu Electricals & Engineering	Sriperumbudur	73052 43313, 99437 67400	EA 2658
270.	Jayam Bros.	Thanjavur	04362-234974, 94431 35996	EA 1352

KNOW THY POWER NETWORK - 117

Let us move further

The beauty of Micro grid technology is that it is open to innovations which its original developers may not have thought of. It is flexible and can be adopted in many ways that suit the requirement of the end users. *It need not be treated as a "Customer side of the meter phenomenon".*

Many opportunities for innovations and their applications exist they are listed as follows

1. Formations of Hybrid micro grids – It is nothing but a combination of one fuel based generator and one renewable energy generator.
2. Formation of a micro grid with multiple fuelled generators and energy storage facilities with photo voltaic cells.
3. Integrated operation of several micro grids. In this case several micro grids are paralleled so as to function as "**Clustered micro grids**". Under normal conditions they operate in parallel to the centralised electricity grid. During the presence of storms or nature related events, they can come to the rescue of the affected consumers.

Types of Micro grids

Owing to the availability of electricity generation from various sources, micro grids are formed in several sizes – ranging from a few hundred kilowatts to multi mega watts. Residential sized micro grid that normally supply a few families or a community have its generation in the range of 50KW- 1MW / 2MW. Small industrial micro grids are commonly rated more than 20KW but less than 5MW. The sizes of feeder micro grids formed by the utilities fall in the range of 5MW – 20MW. And finally the substation micro grids are larger than 20MW. In the case of rural micro grids their sizes are defined by the needs of the end users.

To get a feel of these micro grids, the constituents of a small micro grids employed in remote areas in Australia and Canada are given as an illustration.

1. **Australia** – PV powered plants + Diesel generators + Fly wheel grid stabilizers + Micro grid and network controllers are its main components. In this arrangement, nearly 85% of the energy needs are met from the renewable energy sources.

2. **Canada** – A hybrid micro grid project employed in Canada contains 1.8 KW wind turbine + 17KW of PV solar panels + 35 KW natural gas fuelled generator with storage facilities. The storage includes 23KW lead acid battery, 12KW lithium ion battery and 6 KW sodium chloride battery. The much needed micro grid control system normally monitors, tracks and forecasts loads and generation and controls, and storage devices. Lighting, Air conditioning and electric vehicle charging are some of its common loads. Several challenges have to be met while going for micro grid solutions. Among them significant are,

1. Intermittence and variability in wind generation
2. Matching of loads with the most economical configuration of generator set.
3. Need for the smoothening of current surges and the optimization of the flow control

As a solution, the first problem area can be addressed by employing grid stabilizing fly wheel system. The second problem is solved by employing suitable controllers that would monitor and control wind turbines, Diesel generators, Loads and fly wheel energy storage devices. These controllers can also be used to resolve the last issue Viz. smoothening of surges in isolated power network.

More to the micro grid

Unlike earlier days when electricity was tapped only from fossil fuels, today we have many different power sources like Wind power, Solar power, Hydel power, Diesel power and Batteries. This provides wide options to the consumers. They need not rely upon Tangedco or any other Government Agency for meeting their electricity needs. They can simply erect micro grids and integrate the electrical power from all these power sources - local renewable and non-renewable electricity sources and run as a much smaller version and replica of the integrated grid with control systems and loads. This grid can be run in parallel with the existing centralised grid of the utility. In this way both micro grid and centralised grid can complement each other. Thus micro grid can play many roles - a power-outage protection source, a back-up source during emergencies a black start power, a reinforcement source, to the centralised grid in times of heavy demand or peak load hours a source of energy for the remote & isolated areas, and a reliable source of power during weather related outages like cyclones, hurricanes, torrential rains and water deluge. In the prevalent difficult power situation, in our state it will be the ideal solution, i.e. micro grid can play a major support to our utility system.

As outlined earlier, a small micro grid which consists of several Heat and power generators, Solar photo voltaics, Wind electric generators, a few hydro electric generators, Diesel generators and Energy storage facilities can be an ideal solution for source of our Industries, Hospitals and Big residential colonies. The only drawback with the deployment of micro grid is its “cost” but its wider application has now brought down the prices to the affordable level. Its attractive features and flexibility have balanced out all its demerits. The micro grid has the ability to island itself from the centralised grid and supply power to the consumers. This allows electrical power to remote areas; in these areas the micro grid will work as self sufficient energy islands. Micro grid thus can make itself as one of the candidates for the cost effective alternatives for long line extension or electrical delivery system to the remote areas which have limited access to main supply lines. These grids provide closer proximity between the generation and the load. Thus micro grids can be the best option for remote locations or isolated network. In addition, they can be a best choice for the buildings where the existing grid is underdimensioned or cannot keep in step with the fast development of additional power demands. In such cases the consumers are forced to install their own generating plants to ensure uninterrupted power supply. In these places micro grids with a PV energy source integrated with diesel generator and storage batteries will be the best option.

Storage is the next important area that draws attention. We know that a variety of generating sources are available for micro grid operation. Likewise, there are a number of energy storage possibilities. Important amongst them are, usage of Storage batteries, Fly wheel storage, Hydrogen storage and Ultra capacitors. Advanced lead acid, Nickel cadmium and Lithium batteries are among the off shoots of the battery system. The modularity the micro grid provide is important.

Let me sign off here.

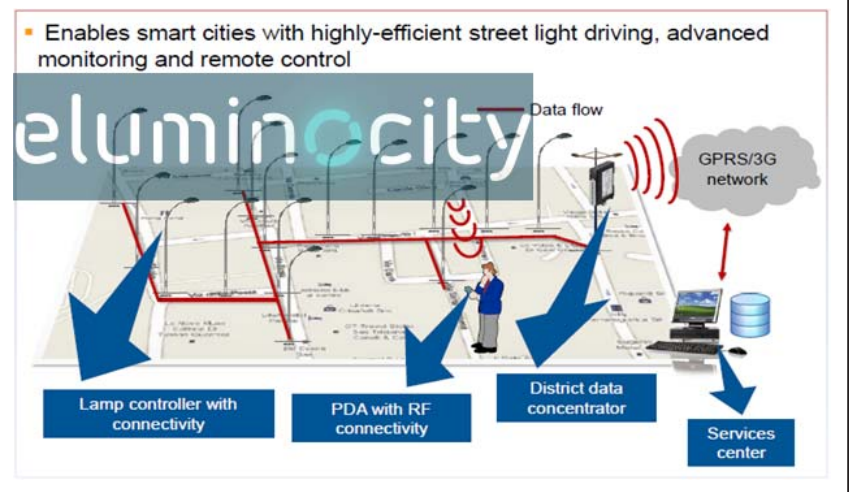


(To be continued...)
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AN INTELLIGENT STREETLIGHT FOR THE CITY OF THE FUTURE: INFINEON TEAMS UP WITH ELUMINOCITY

Munich, Germany – February 27, 2017

– The trend towards urbanization is continuing and it is projected that by 2050 nearly 70 percent of mankind will reside in urban areas. Such demographic changes will impact on a city's infrastructure, driving requirements for smarter, more secure and energy-efficient solutions. Infineon Technologies AG (FSE: IFX / OTCQX: IFNNY) and eluminocity GmbH have jointly developed an intelligent streetlight to tackle these requirements. In promoting e-mobility, helping to save energy and enabling a connected infrastructure, the streetlight can serve as the backbone for the city of the future.



“Semiconductors are the key to making the urban infrastructure intelligent. Together with our partners we can offer a secured platform with scalable sensor hub, data processing and connectivity,” said Andreas Urschitz, President of Power Management & Multimarket Division at Infineon. “Our solution leverages existing cellular infrastructure and can support the evolution towards 5G deployment.”

“The behaviour and needs of city dwellers will rapidly advance due to digitization. For this reason our hard and software updates make the streetlight future-proof,” added Sebastian Jagsch, CEO and founder of eluminocity. “The intelligent streetlight can accommodate new sensors as well as new components for mobile communications. This enables us to constantly develop new applications to tackle upcoming demands. We enhance comfort, safety, security, and efficiency in public spaces, thus making whole cities future-proof.”

Securely connected for energy saving

Each of the companies contributes specific know-how to the partnership for the connected city. Infineon provides decades of expertise in the field of sensors, power management chips, and security solutions. Eluminocity adds its know-how in system integration, data analysis and application solutions. Other partners deliver connectivity, computing performance and cloud solutions. The intelligent streetlight can be protected against unauthorized access from the cloud down to the device level and can be enabled for updating by means of hardware and software.

Through the use of LEDs, the intelligent streetlight saves energy directly. Around 19 percent of the world's electricity consumption is generated by lighting, of which about 80 percent is used in professional applications such as street lighting. Approximately nine million of the so-called light points installed in Germany consume about 4,000 GWh of electricity per year. Replacing streetlights with LEDs could save more than half of that electricity – enough to supply about 630,000 two-person households for a whole year.

Improved air quality is at hand thanks to an integrated charging station for electric vehicles, which ensures that a charging infrastructure can be easily built in residential areas. The result would be to boost electromobility, a key benefit given that it is estimated that 37 percent of Germans would be more enthusiastic about electromobility if there were more charging stations. Furthermore, the streetlight could be equipped with parking spot detection sensors. Feeding information about the availability of vacant parking spaces to the cloud will create the basis for an intelligent traffic management system. This could simplify the search for parking lots – a task that experts believe is responsible for every third moving vehicle in cities.

Thanks to integrated radar sensors, the intelligent streetlight can also be configured to adapt to environmental conditions. For instance, if the weather is bad or when cars or pedestrians are approaching then brightness can

increase. This not only improves comfort levels for road users but also enhances their safety. Data from the radar system is collected anonymously and forwarded to the cloud, with secure processing using end-to-end encryption. This facilitates various services that can be offered in the form of apps.

Designed to meet future requirements: environmental sensors and 5G base station

The streetlight also provides an option to be equipped with additional sensors that analyze the environment. Gas sensors can be integrated to measure air quality and report when defined limits are exceeded via a cloud connection to a municipal control center. This capability would, for example, allow joggers to know when to expect the best air quality in the city. The addition of microphones supports detection of certain audio patterns, enabling the automatic reporting of incidents such as car accidents to the nearest police station.

Equipped with high-frequency components, the streetlight may also serve as a base station for communications based on the 5G mobile radio standard. Compared to the previous standard, this requires more transmitting and receiving units, but offers a hundred times higher transmission speed, a thousand times higher data capacity, real-time capability – and a lower energy consumption.

More information is available at www.infineon.com/smart-streetlighting.

ABU DHABI TO BUILD WORLD'S LARGEST SOLAR POWER PLANT

Abu Dhabi's government-owned power utility aims to close a financing package for a 3.2 billion dirham (\$872 million) solar power plant, which will be the world's largest, in April, a senior official at the utility said on Sunday.

Last week, Abu Dhabi Water & Electricity Authority (ADWEA) said it had selected a consortium of Japan's



Marubeni Corp and China's JinkoSolar Holding to build and operate the 1,177 megawatt plant. The two companies were selected from six bids received by ADWEA in September, Reuters reported.

The project is ADWEA'S first foray into renewable energy. Abu Dhabi aims to generate 7% of its energy from renewables by 2020; the government's green energy firm Masdar has launched renewable energy projects including solar plants.

The plant, to become operational in 2019, will be funded 25% by equity and 75% by debt, Adel al-Saeedi, acting director of privatization at ADWEA, told Reuters. ADWEA would contribute the equity while local and international banks would fund the debt.

The winning bidders offered to provide electricity for 2.42 cents per kilowatt hour, one of the most competitive prices seen to date in the solar industry, Saeedi said.

A special-purpose company would be formed to operate the project; ADWEA would own 60% of the company while Marubeni and Jinko would hold 40%. Power generated would be sold to Abu Dhabi for 25 years.

Initially the plant at Sweihan, east of the city of Abu Dhabi, was to have a capacity of 350 MW, but ADWEA increased the capacity because additional land became available, said Saeedi.

WORLD ENVIRONMENT DAY 05-06-2017

Theme: Connecting People to Nature

Since its beginning in 1974, World Environment Day has developed into a global platform for raising awareness and taking action on urgent issues from marine pollution and global warming to sustainable consumption and wild life crime. Millions of people have taken part over the years, helping drive change in our consumption habits as well as in national and international environmental policy.

‘Connecting People to Nature’, the theme for World Environment Day 2017, implores us

to get outdoors and into nature, to appreciate its beauty and its importance, and to take forward the call to protect the Earth that we share.

This year’s theme invites people to think about how they are part of nature and how intimately they depend on it. It challenges people to find fun and exciting ways to experience and cherish this vital relationship.

In recent decades, scientific advances as well as growing environmental problems such as global warming are helping us to understand the countless ways in which natural systems support our own prosperity and well being. For example, the world’s oceans, forests and soils act as vast stores for greenhouse gases such as carbon-di-oxide and methane; farmers and fisher-folk harness nature on land and under water to provide us with food; scientists develop medicines using genetic material drawn from the millions of species that make up Earth’s astounding biological diversity.



Billions of rural people around the world spend every working day **‘connected to nature’** and appreciate full well their dependence on natural water supplies and how nature provides their livelihoods in the form of fertile soil. They are among the first to suffer when ecosystems are threatened, whether by pollution, climate change or over-exploitation.

Nature’s gifts are often hard to value in monetary terms. Like clean air, they are often taken for granted, at least until they become scarce. However, economists are developing ways to measure the multi-trillion-dollar worth of many so-called **‘ecosystem services’**, from insects pollinating fruit trees in the orchards of California to the leisure, health and spiritual benefits of a hike up a Himalayan valley.

In the age of asphalt and smartphones and among the distractions of modern life, connections with nature can be fleeting. **But with everyone’s help, World Environment Day can make clearer than ever that human being need harmony between humanity and nature so that both are able to thrive.**

“We Won’t have a society if we destroy the environment.”

PRODUCT OF THE MONTH - OPPLÉ

OPPLÉ, a global integrated lighting solutions company and one of **World's Leading LED Lighting** brand today launched their new '**Pipe**' Table Lamps. This is a new addition to their range of LED table Lamps. This product has been designed to offer smartness and portability to everyday life. This light comes with a flexible angle that can be twisted as per one's own convenience. Along with this, it offers a clip that can be attached to any kind of base, like a table, laptop, etc. This handy light provides flicker free and uniform light output that is healthy for the human eyes and does not harm it in anyway. It also has another feature of adjusting the brightness as per requirement. A user can adjust its illumination to 10%, 40% or 100% by use of a simple touch button. This way, it protects the eyesight and brings in additional visual relaxation.

Available for **Rs. 1455/-**, '**Pipe**' is also easily chargeable. It comes equipped with a 2.0 USB jack and can be connected to any power source. It hardly takes any time and charges itself till the battery capacity reaches up to 500mAh.

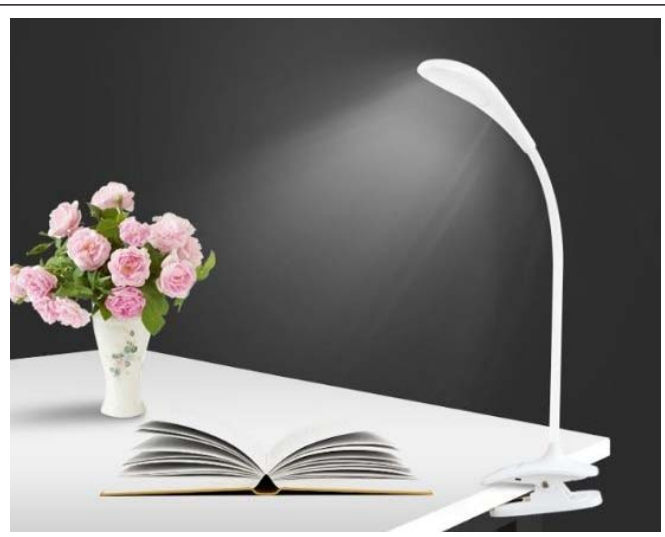
According to **Mr. Rambo Zhang, India Head, OPPLÉ Lighting**, "*Pipe is a new and innovatively styled table lamp launched by the brand. Priced at such a low rate, it can be easily used by anyone and anywhere. Apart from this, it provides adjustable flicker free light that protects human sight in the best possible manner.*"

"Keeping in mind our motto of 'Healthy Lighting', we only bring in those products that are sensitive to the human eyes and provides maximum visual comfort to them", he added.

This product is enabled with a power capacity of 3W and only in White colour.

About OPPLÉ

OPPLÉ Lighting is an Innovative, fast growing, Integrated Lighting Solutions Company. With sales & service operations in more than 50 countries around the world, OPPLÉ is known for its strong commitment to R&D and Innovation. OPPLÉ Lighting was founded in 1996 as home lighting company specializing in the manufacture of CFL and ceiling lights. Since then the company's portfolio has diversified to include electrical appliances, commercial lighting and LED lighting and is the largest home lighting company in the Chinese market. The company is headquartered in Shanghai, China and the global operations are driven by a team of committed 7000 employees, inclusive of 400 engineers in R&D.



HOW TO DECODE POWER REQUIREMENT VERDIGRIS WAY

Mark Chung was a chip guy. Not a software developer, certainly not a power systems engineer. He spent nearly 15 years in the semiconductor industry since getting his master's and bachelor's degrees in electrical engineering at Stanford in 1999. He'd been an engineer at AMD for nearly six years designing chips like the Athlon and Opteron, then at startup PA Semi working on microprocessors that, he anticipated, would go into Apple computers (Apple later purchased the company and the designs would end up in iPhones).

In 2008 Chung was a principal engineer at RMI, a company that later merged with Netlogic and was acquired by Broadcom. One month that year—a month he and his family had mostly spent out of town, he received a surprisingly large electrical bill: \$560, when his typical bill was around \$100. He called the local electric company, and a representative assured him that his smart meter was working just fine, and the bill was correct. At work that week, he got into what he called “**an engineer debate**” with colleague Jonathan Chu over what could have caused the large bill and how to trace the source of the problem. That weekend he and Chu purchased two **Kill-A-Watt meters**—inexpensive plug-in devices designed to monitor the electricity use of appliances—and the two went from room to room around Chung's house, spot-checking various appliances and gadgets.

“We didn't see anything wrong,” he says.

Perhaps, the two reasoned, the problem was intermittent, and could only be identified with longer-term monitoring. So they hacked the meters to add WiFi chipsets and send data onto the home's wireless network, writing software on an old Dell Inspiron to gather and display the data.

No anomalies emerged. And the next month the electric bill was just as high.

“That's when we had an epiphany,” Chung says. “We realized we were doing this a stupid way; the smart way would be to just look at one point at all the electricity and unpack it to figure out where it is going.”

He did a quick search of the literature, and, he says, stumbled on a paper by Zico Kolter explaining an experimental theory involving tracking the electricity use of multiple appliances in a home by monitoring the energy data from a smart meter. Chung and Chu posited that a similar approach could be applied to tracking multiple systems on a single circuit at higher fidelity by applying packet inspection techniques to the signals coming from that circuit.

So Chung and Chu bought an old HP oscilloscope from Craigslist and mounted it on the main electrical panel feeding Chung's house. They then set about rewriting an algorithm they'd been researching at work, one designed to accelerate packet separation in chips, to apply it to this problem.

Then, he says, something amazing happened. It worked... sort of. They realized they could see each individual device drawing power in Chung's house at the moment it turned on.

“At first, we didn't know what the devices were, but we see what they are doing. The hairdryer comes on for 5 minutes at 8 a.m. The Xbox in my brother-in-law's room is on for 4 hours from 10 p.m. to 3 a.m. We thought we could teach the system to label these things.”

And, it turned out, the pool pump, programmed to come on every day and run for 12 hours, was using a ridiculous amount of power—some 4 kW, which turned out to be about 10 times as much as it was supposed to. They had found the cause of the high electric bills.

He bought and installed a new pump. Problem solved, and Chung didn't think much more about electricity use, he says, until 2010, when his first child was born.

“I had a sudden change in the time frame in which I was thinking about problems,” he said, “to thinking about another generation and a more distant future. It was transformational.”

And it brought him back to his hunt for his home electricity waster in 2008. “Someone who didn't have the ability to figure out the problem,” he said, “would not just be paying for wasted electricity, they would be polluting the environment and wasting my child's resources.”

He took a look at the market—and saw that, since 2008, a few companies had come out with electricity analyzers that installed in the circuit breaker box. However, they all had to be wired into the circuits by an electrician, and, he says, were “pretty crummy in terms of capability.”

“I thought if I pulled Jon [Chu] and a couple of other friends together, we could start a company and make something better.”

“I couldn’t convince them at that point to leave what were fairly cushy jobs at NetLogic,” he says. (At that point Broadcom had just bought the entire company for nearly \$4 billion.) He decided to go it alone, and at the end of 2011, he quit his job. “I had to convince my wife to give me a year (it took nearly 2) to get the business off the ground and to let me invest some of money I’d made in the PA Semi and NetLogic acquisitions,” he says.

He started talking to potential customers, generally the people who managed hotels, airports, and other large businesses. “You have to go for people who can afford it first, when you are going for a new market,” Chung said.

It turned out these folks used expensive building management systems that generally just tracked cooling and heating, and that they did little with the data because it didn’t tell them much; they could indeed use a tool that told them more.

Armed with this kind of market research data, and some early pilots he conducted at the end of 2012, Chung convinced Chu, along with his brother Thomas Chung, to jump in. They named the company Verdigris, after the name of the green pigment that forms when copper is exposed to the environment. Then they spent three intensive months working on both the technology and the business development under the umbrella of the Stanford StartX accelerator, then moved to accelerator Founder.org as part of its inaugural class.

Along the way they connected with NASA, where researchers are interested in energy management systems to help develop technology for future extraterrestrial buildings, and NASA offered the company inexpensive office space along with an opportunity to use its Sustainability Base, a building designed to be as smart and green as possible using today’s technology, as a testbed.

“That,” Mark Chung said, “was perfect—we needed a way to collect detailed label sets on equipment, and NASA had redundant energy management systems along with smart plugs on every outlet, all data we could use to train our AI system.”

Fast forward to today. Verdigris has developed a magnetic sensor that clips on the outside of the wires leading into the circuit breaker box. It works by sampling changes in the magnetic field around the wires at a rate of 8 kilohertz. These types of sensors already existed, but most operated at lower frequencies and are larger—too large to fit on every wire in the tight space inside a typical circuit breaker box.

“We shrunk the sensors and got high fidelity signals,” Chung says, “by figuring out novel ways to fit more powerful sensors into tight spaces.” Some of that had to do with the arrangement of the magnetic material, he says, but can’t say more until patents are filed.

Verdigris also had to develop algorithms to decode the signals. It did so by training a deep learning system, essentially, turning things on and off while the system observed the changes in magnetic fingerprints. The system ships today with some basic labels in place, like refrigeration, lights, pumps, motors. If the user wants more specific information (GE microwave here, Samsung refrigerator there) they need to teach the AI themselves by labeling those devices when they are detected through the app.

“We can go down to five-watt devices,” Chung said, though he admits the system has a hard time telling the difference between an iPhone and iPad. “We could theoretically tell you if a computer is idle or being used if it’s on the charger.”

Beta systems rolled out to customers in 2014. Its production system started shipping late last year at US \$3300 for a 42-sensor system; the company also charges customers \$49 or \$69 a month, depending on the level of data provided, for the cloud subscription. At this point, it is still targeting the business market, but the company does already have a handful of private residential customers in Silicon Valley.



Photo: Verdigris Verdigris’ non-invasive sensor detects changes in the magnetic fields around electrical wiring.

One of its early customers used the product to solve a mystery much like the one that inspired its creation: Somewhere in the company somebody was doing something, likely bringing in a space heater, that was tripping a circuit breaker regularly. But nobody could find the culprit. “We said ‘we think we can,’ and we did,” says Chung.

Generally, he thought users would be using the data to improve energy efficiency. It turns out that, for now, says Chung, “our customers don’t seem to have time to care about that—they care more about whether a hotel room is going to be too hot or cold or whether machinery is about to fail. “We can detect when motors are faulty, for example, that a bearing has failed in a motor, or a rotor bar in a condenser pump has broken—we can pick up changes in the physical nature of devices from changes in their signatures.”

Verdigris has more than \$16 million in funding, including about \$1.5 million in startup funds from its founders and significant investments from manufacturing firm Jabil and Verizon. It has 28 employees, virtually all engineers, and is still hiring. Right now, it is focusing on getting this first product out to business customers.

But a consumer product is coming—”in a few short years,” Chung promises.

“Our goal is to eventually get down our hardware kit to \$100 or less,” says Chung. “Then we can connect every residence, parking lot, pool house, connecting the dots between demand and loads on the grid, and help optimize the use of energy resources and save the planet.”

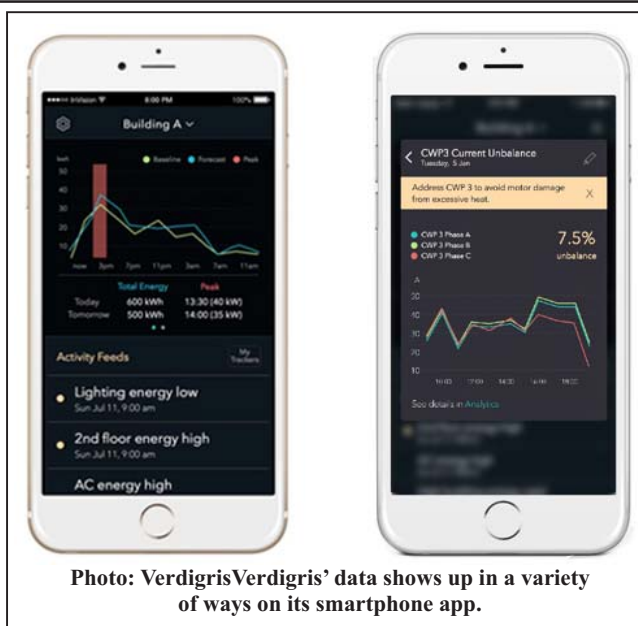


Photo: VerdigrisVerdigris’ data shows up in a variety of ways on its smartphone app.

HYUNDAI’S FIRST ELECTRIC BUS CAN GO THE DISTANCE

Hyundai says its Elec City electric bus can go 290 miles on a single charge (Credit: Hyundai)

Hyundai has been making some sizable moves in the electric vehicle space, last year unveiling a full lineup of electric IONIQs and even an electrified scooter to go with it. It is now setting its sights on zero-emission public transit with its first electric bus, and its claimed range is nothing to sneeze at.

The diesel-powered buses that roam many of the world’s cities are a bit of a problem. One of the reasons for this is the nitrogen oxides that are released through the burning of the fuel, which are strong oxidizing agents that mix with volatile organic compounds in the atmosphere to create the type of smog that famously clouds city skylines in Los Angeles and Beijing.

Respiratory problems, headaches, heart disease and cancer are all problems that can arise from this type of pollution, and there may be a lot more of it about than we even realize. A comprehensive study last month found that real-world emissions from diesel vehicles have been underestimated by as much as 50 percent, linking the pollution that had gone unaccounted for with 38,000 premature deaths in 2015.

Converting city buses to electricity could help us cut down on these harmful emissions, and they mightn’t be bad for a city’s bottom line either. While the initial costs will be much higher, research has shown that these can be paid back over time by savings in fuel and maintenance. And that’s to say nothing of the savings on health care. So it is good news that more and more companies are looking for cleaner alternatives. Hyundai’s so-called Elec City is its first mass-produced electric bus, and runs on a 256-kWh battery with range listed as 290 mi (466 km). If the bus does make its way to the US, its competitors will include the Proterra Catalyst E2 which despite having a claimed nominal range of 194 to 350 mi (312 to 563 km), has logged more than 600 mi (966 km) on a single charge under test conditions. The Lion Bus and the EZ10 in Switzerland are a couple of other examples of electric buses currently undergoing trials around the world.

Details beyond that are scarce, but Hyundai does say an official launch for the Elec City is coming in 2018.

Source: Hyundai



ECO-VILLA PROTOTYPE OPENS ITS DOORS AT MASDAR CITY

Abu Dhabi, United Arab Emirates, January 19, 2017 – Masdar City’s Eco-Villa, a pilot project incorporating water and energy-saving technologies, has been completed and a UAE national family will soon live in the prototype sustainable dwelling, it was announced today at Abu Dhabi Sustainability Week 2017.

The Eco-Villa was launched in the presence of His Highness Sheikh Dhiyab bin Mohamed bin Zayed Al Nahyan; His Excellency Suhail Mohammed Al Mazrouei, UAE Minister of Energy; His Excellency Dr Sultan Ahmed Al Jaber, Minister of State and Chairman of Masdar; His Excellency Sheikh Abdullah bin Mohammed Al Hamed, Head of the Energy Council and Member of Abu Dhabi’s Executive Council; and Mohamed Jameel Al Ramahi, Chief Executive Officer of Masdar, Abu Dhabi’s renewable energy company.



The 405 square-metre Eco-Villa is the first villa to achieve a 4 Pearl rating according to the Abu Dhabi Urban Planning Council’s Estidama Pearl Building Rating System. It will use around 72 per cent less energy and 35 per cent less water than a typical comparably sized villa in Abu Dhabi, displacing an estimated 63 tonnes of carbon dioxide annually.

The cost of construction is similar to that of a conventional home of the same size; its energy and water efficiency will also reduce running costs substantially. The four-bedroom property is expected to consume just 97 kilowatt hours (kWh) of electricity per square metre.

Fully equipped with 87 rooftop solar panels, the prototype is capable of supplying as much as 40,000 kWh of electricity to the national grid. A suite of passive energy and water-saving design features further reduce its impact on the environment.

“People expect a sustainable design option to be more expensive, but our Eco-Villa concept challenges this misconception,” said Yousef Baselaib, Executive Director of Sustainable Real Estate at Masdar.

“The Eco-Villa stays true to Masdar City’s principles of sustainable urban development in that it is cost efficient, environmentally sensitive and culturally appropriate in both its design and function. Because of its energy and water-efficient design, residents of the Eco-Villa will receive significantly reduced power and water bills.”

Once a family moves into the property, Masdar’s sustainability team will monitor the villa’s energy, water and waste management performance. The data collected will enable the design of the Eco-Villa to be further refined, supporting the eventual commercialisation of the building concept.

“Our Eco-Villa prototype shows that sustainable design can be implemented according to the specific environmental, social and economic demands of the Gulf region,” added Masdar’s Baselaib.

The Eco-Villa is located in Masdar City, one of the world’s most sustainable urban developments.

Today, Masdar City is home to around 300 full-time students of the Masdar Institute of Science and Technology. Around 2,000 apartments are either under construction or in design through Masdar or third-party investors. This will bring the residential population at Masdar City to more than 3,500 people over the next three years.

About Abu Dhabi Sustainability Week

The annual Abu Dhabi Sustainability Week (ADSW), hosted by Masdar, is an Abu Dhabi government initiative that aims to address the interconnected challenges of clean energy, water and sustainable development. Anchored by the World Future Energy Summit, ADSW features a series of complementary conferences, exhibitions and events, including the general assembly of the International Renewable Energy Agency, the Award Ceremony of the Zayed Future Energy Prize, the International Water Summit, EcoWASTE and The Festival @ Masdar City.

ADSW is the largest gathering on sustainability in the Middle East, attracting global policy makers, industry thought-leaders and clean-tech innovators among 38,000 attendees representing around 175 countries in 2017.

About Masdar

Masdar is Abu Dhabi's renewable energy company which works to advance the development, commercialisation and deployment of clean energy technologies and solutions. The company serves as a link between today's fossil fuel economy and the energy economy of the future. Wholly owned by the Mubadala Development Company PJSC, the strategic investment company of the Government of Abu Dhabi, Masdar is dedicated to the United Arab Emirates' long-term vision for the future of energy and water.

About Masdar City

One of the world's most sustainable urban developments, Masdar City in Abu Dhabi is enabling innovation in sustainability and clean technologies by integrating education, research & development, investment and business opportunity. It is an innovation ecosystem: a thriving community, a business and investment free zone, and a hub for knowledge creation and R&D realising pilot projects in the commercialisation of clean technologies. The nucleus of Masdar City is the Masdar Institute of Science & Technology (MI), the region's first graduate-level university researching real-world technologies and solutions at the energy and water nexus. Through initiatives such as Masdar City, Masdar is helping to realise a template – or 'green-print' – for sustainable urban development in the UAE and potentially other countries.

CHINESE SCIENTISTS EXPLORE ALL-WEATHER SOLAR CELLS

A photovoltaic revolution is taking place with the emergence of all-weather solar cells, according to a Chinese scientist.

“Solar cell research is mainly focused on elevating photoelectric conversion efficiency upon direct sunlight until new light has been shed on persistent high-efficiency power generation in poor light conditions such as rain, fog, haze and night,” said Tang Qunwei, a professor with Ocean University of China. Researchers from the Ocean University of **China** (located in Qingdao) announced their findings (A Solar Cell That Is Triggered by Sun and Rain) in a journal published by the German Chemical Society and said they plan to use **graphene**, which utilizes a thin layer of carbon atoms arranged in a honeycomb, to produce electricity derived from exposing the material to salty rainwater.

“Raindrops would form a layer of positive ions, which are found in the salt of rainwater,” according to an article published this week by news outlet Quartz. “Meanwhile, graphene is rich with delocalized electrons — which are free to move around. This forms a double layer — where positive and negative charges are separated — creating an electric potential between them. The separation in the double layer creates a voltage, just like a battery.”

Tang's team and one led by Yang Peizhi, a professor with Yunnan Normal University, developed a solar cell using a crucial material called long persistent phosphor (LPP), which can store sunlight energy in the day and harvest it in darkness. “Only partially visible light can be absorbed by light absorbers and then converted into electricity. But solar energy from unabsorbed visible and near-infrared light can be stored in LPP, releasing monochromatic visible light at night,” Tang said. “The released light is re-absorbed by light absorbers to convert it into electricity, realizing persistent power generation in the day and in the dark.”

The work of Tang and Yang was recently published in an academic journal published by the American Chemistry Society, ACS Nano, and the publication Nano Energy. Tang has published in Chemistry - A European Journal, where he wrote that the physical proof of all-weather solar cells would open the door for an upcoming photovoltaic revolution.

“All-weather solar cells could indicate that the global solar industry will bring down the cost of energy harvesting,” Tang said. (Xinhua)

***“The earth will not continue to offer its harvest, except with faithful stewardship.
We cannot say we love the land and then take steps to destroy it
for use by future generations.” - POPE JOHN PAUL II***

WÄRTSILÄ INTRODUCES NEW HYBRID AND ENERGY STORAGE SOLUTIONS

The technology group Wärtsilä today announced new hybrid power plants, engines+storage and energy storage solutions to power markets globally. These new and innovative solutions provide Wärtsilä's existing and future customers added value by utilizing energy storage technology together with traditional engine based power generation. Wärtsilä also announced it would be offering stand-alone energy storage solutions.



In April 2016, Wärtsilä announced its entry into the solar PV business by introducing solar PV power plants and engines+solar PV hybrid power plants. Today, Wärtsilä hybrid solutions are further extended with energy storage technology. The energy storage market is being created as we speak and gaining momentum. Today, large markets exist for stand-alone energy storage, for example in the USA, United Kingdom and central Europe. Hybrid solutions including energy storage are increasingly becoming financially attractive, for example in areas where fuel prices are high and the penetration of renewable power sources is significant.

By providing hybrid power plants, engines+storage Wärtsilä also introduces energy management system (EMS) to optimize the usage of hybrid power plants. In July 2016, Wärtsilä announced its co-operation with Greensmith, a leading provider of EMS software. Greensmith's GEMS platform is the most widely-deployed energy storage software solution enabling the most-advanced and proven energy storage systems in the world. With GEMS, hybrid power plants run in an optimal way at all times ensuring ideal utilization of both the engines and the energy storage solution.

“We are very excited to introduce these new solutions to our customers. Adding energy storage technology to our existing engine based power plants enables our customers to have instant power while saving fuel, maintenance costs and reducing emissions. With a world-class EMS software platform we solidify our systems integration capabilities” says Javier Cavada, President of Wärtsilä Energy Solutions.

These new solutions provide customer value in many ways, including

- Optimized spinning reserve - availability for spinning reserve markets even when the engine plant is off-line
- Fuel savings by utilizing energy storage and optimizing operation of engines in a hybrid power plant
- O&M optimization and savings
- Regulation compliance
- Reduced emissions

“With these new solutions, Wärtsilä does not only enter the energy storage market but also becomes a systems integrator as we are able to optimize the usage of our hybrid power plants with EMS software,” says RistoPaldanius, Director, Energy Storage at Wärtsilä Energy Solutions.

Company Brief:

Wärtsilä Energy Solutions is a leading global systems integrator offering a broad range of environmentally sound solutions. Its offering includes ultra-flexible internal combustion engine based power plants and utility-scale solar PV power plants, as well as LNG terminals and distribution systems. The flexible and efficient Wärtsilä solutions provide customers with superior value and enable a transition to a more sustainable and modern energy system. As of 2017, Wärtsilä has 63 GW of installed power plant capacity in 176 countries around the world.

“Earth provides enough to satisfy every man's needs, but not every man's greed.”

- MAHATMA GANDHI

INDIA HAS A BETTER OPTION THAN ELECTRIC CARS

A move to electric vehicles in India will be far from “green”, and ignores existing technologies which could be less disruptive and more useful

Since coming to power the Indian Prime Minister, Narendra Modi, has announced one green energy initiative after the other. One by one, however, these have turned out to be red herrings that have succeeded only in drawing attention away from technologies that can deliver the required non-fossil fuel energy.

His first commitment, to set up 100,000 MW of solar power generating capacity by 2022 has got off to a slow start. 2,133 MW of generating capacity was added in 2015, and a little under 4,000 MW in 2016. Around 10,000 MW is now under construction and will come on stream by **the end of next year**. That will still leave another 84,000 MW to be constructed in the next four years. The task is not impossible, so the government has raised its solar power target to **250,000 MW by 2030** but the impact these will have on carbon emissions is debatable.

The first two large plants have an ‘availability’ of only 19-20%, in other words they can only be run for about 1,700 hours a year, or less than five hours a day. Thus even 250,000 MW of power installed in photovoltaic plants will generate no more electricity than 60,000 MW generated by conventional power plants today. They will thus meet only 10% of the additional power the country will need by 2030. Solar photovoltaic power could therefore turn out to be a red herring when it comes to reducing GHG emissions and mitigating climate change. But it is being chased not only by India but by most countries of the world, because it is cheap, takes very little time to set up, and is therefore virtually risk free.

Leapfrogging to an electric vehicles future

But the Indian government is about to chase another, even larger, red herring. In a 90-page report prepared with the Rocky Mountain Institute (RMI) titled “**Transformative Mobility Solutions for India**”. The outcome of a multi stakeholder workshop in February, led by India’s Planning Commission (renamed **NitiAayog** in 2014) and RMI, which included key industry leaders, the report urges the government to make a radical transformation towards a transportation system geared completely around electric vehicles.

The report proposes a 15 year plan for making the shift which will begin by limiting the registration of conventional vehicles through public lotteries, and complement that with a preferential registration for electric vehicles, similar to **policies followed in China**. To kick-start the shift, the report suggests an initial bulk procurement of electric vehicles, building standardized, swappable batteries for two- and three-wheelers to bring down their cost and having favourable tariff structures for charging cars.

Where will the electricity come from?

The idea is futuristic and may get accepted because it will fit in with Modi’s flamboyant style of decision making. RMI and NitiAayog have sweetened the pill by claiming it will reduce annual GHG emissions by one billion tonnes. A few moments reflection, however, reveals its gaping flaws. The number of privately owned motorised vehicles rose from 29 million in 2002 to 160 million in 2013. This figure will almost certainly rise again, to over 500 million, by 2030. This immediately raises the question, “Where will the electricity they consume come from?”

A few hundred thousand electric cars spread all over the country can have their batteries charged from sockets in their garages, or at charging stations installed at petrol pumps, without unduly increasing the load on the existing power stations. So this will genuinely help to lower emissions. But when 350 million vehicles have to be charged every day, at any time of the day or night, anywhere in the country, not only will an entire nation-wide, and therefore expensive, recharging infrastructure have to be built, but the power these vehicles will consume will have to be generated first. Given the limited capacity of solar PV power to meet this demand and the miniscule contribution of nuclear power in India’s energy mix, nearly all of this will have to come from coal.

That is when the second law of thermodynamics will come into play. Even with supercritical temperatures and pressures of steam to drive the generators, the conversion efficiency of heat into electricity is no higher than 42%. There will be further losses in converting AC into DC current and in overcoming the inertia of moving parts as electrical energy is turned into mechanical energy to drive the vehicle. All in all, therefore, at least three times as much fossil fuel energy will have to be consumed as the energy saved by switching from oil and gas to electric cars. Most of it will come from coal, which generates far more greenhouse gases per unit of usable energy than petrol, diesel or CNG.

A giant shift in infrastructure

Then there is the giant shift that will have to be made in the country's energy infrastructure. In 13 short years, a nationwide network of charging stations will have to be built, that is capable of recharging car and lorry batteries within a few minutes. Simultaneously an intricate transport fuel distribution and storage system will become redundant, causing substantial losses to the distributors. Add to this the losses that India's highly developed auto components companies will have to endure, and the outcome is obvious. Since India is no longer a closed economy and no other country is contemplating such radical auto surgery many, if not most, of them will shift their factories to Thailand.

The number of charging stations that will have to be created is mind boggling. In 2014 there were 51,780 petrol pumps. Another 35,600 were projected to be added by **the end of this year**. At the current rate of growth this figure is likely to treble to 250,000 by 2030, and the majority will have to be in small towns and along highways, where there is no reliable power supply today. If these stations are also to meet the demand of charging electric vehicles, during power cuts and low voltage periods the owners will have to set up generators. These will run on diesel, contributing still more greenhouse gasses.

What price will consumers pay?

Finally there is the question of price. The Mahindra group is selling the e20, a design bought from ChetanMaini, the pioneer manufacturer of electric vehicles in India, for INR 700,000 (USD 10,850). Toyota is planning to sell its model 3 in the US for USD 35,000 (INR 2,200,000) just marginally less than the price of a Mercedes. This price could come down sharply if the bulk of the components are manufactured in India. But **Tesla has postponed its entry into India** because the infrastructure for even the stipulated 30% manufacture of its components does not exist in the country.

The report seems to be aware of these problems. That is why it has tried to sweeten the pill by pointing to the fact that in addition to lowering carbon emissions by one billion tonnes a year, the shift will also save USD 60 billion in foreign exchange due to less oil having to be imported. This inducement only works if electric vehicles are a real alternative to conventional vehicles in India. As Tesla's decision to bypass India shows, this is not currently the case. There is, though, an alternative fuel which could make this a reality: methanol.

The advantages of methanol

Methanol has all the qualities of ethanol, but without the limitation of supply that ethanol faces because of having to be produced from food crops. It is a clean burning, very high flame speed fuel that was the prescribed fuel in all major automobile races in the world from 1965 till 2008, when it was joined by ethanol. Best of all, while ethanol has so far only been produced in large quantities from food crops, methanol can be produced from any biomass, from municipal solid waste to every manner of crop residue.

The technology that can convert biomass waste into transport fuels is gasification, also called destructive distillation. This is the burning of biomass in a limited supply of oxygen to produce mainly carbon monoxide and hydrogen, instead of carbon dioxide. The two gases can be combined using a 92-year old industrial process called the Fischer-Tropsch synthesis, into any transport fuel one desires. It has been in use in South Africa to produce synthetic transport fuels from coal for more than half a century, and has now been adapted by several research institutions to do the same with any kind of biomass.

Since transport fuels made from biomass emit the same amount of carbon dioxide when consumed as the biomass absorbed from the air, it is completely carbon-neutral. It too will save pretty nearly all of the foreign exchange that India spends on imported crude oil. Finally, since the crop residues – leaves, stalks and roots – will be as valuable as the crop itself, it will double farm incomes across the entire country – **one of the aims of the Prime Minister**. Not only are the synthetic fuels produced by this route less costly than those obtained by refining crude oil, so long as the price of crude oil remains around, or above USD 60 a barrel, switching to them requires no change either in the design of automobile engines or the energy infrastructure of a country. The social cost of switching to biomass-based fuels is zero.

Unfortunately in chasing the gleaming chimera of the electric car transformation the global market economy is chasing yet another red herring while the technologies that could actually help avert catastrophic climate change are being ignored.

Article from Prem Shankar Jha, May 31, 2017



GREEN ARCHITECTURE

Eco-construction, also referred to as sustainable construction or green building, proposes various possibilities of reducing the environmental impact of buildings. Green building is not a specific construction method, but it brings together a set of techniques, materials and technologies which when suitably integrated in a construction project, contribute to enhancing its environmental performance. In an ideal world, eco-construction optimises energy efficiency, limits water consumption, makes maximum use of recycled, recyclable and non-toxic materials. It also generates as little waste as possible during the construction process and subsequent occupation.

In a green building, the structural creation processes respect the **environment** and make efficient use of resources. This **practice** is growing and complements the conventional concerns of designing buildings that are economical in energy, sustainable and comfortable. A green building is a clean, sustainable building, designed with natural materials, uses little energy and renewable ones at that, is easy to maintain and available at a reasonable cost.

A green building is designed to reduce the overall impact of the built-up environment on human health and the natural environment, through:

- The efficient use of energy, water and other resources
- Protecting occupant health and improving employee productivity
- Reducing waste, pollution and harm to the environment.

Effectively, a green building can incorporate sustainable materials (reused, recycled, recyclable, or from renewable resources) in its construction, create a healthy interior environment with a minimum of pollutants and functional landscape planning that requires less water (using indigenous greenery that thrives without additional watering).

Zen ZNE Office - A Case Study from Davis, California

Multiple Modes of Energy Capture Create ZNE Office Building

We wanted the design to reflect our mission statement: Integrating art, architecture and ecology in order to put people in touch with the environment, each other and their spiritual and cultural aspirations.

Art and architecture: the building reflects the personal sculptural vision of the architects, using sensuous curving strawbale walls clothed in luminous white lime plaster with those mid-century gull wing glulam roof beams juxtaposed with austere corrugated metal boxes as well as sculpted columns, guardian cats and furniture from the hands of the architects...

Ecology: the building is adapted to the climate to capture 90% of its heating and cooling energy from its environment. In the summer, no direct sunlight enters the windows. A natural ventilation system brings cool breezes into the building to cool heat sinks. Natural light provides all necessary lighting during daylight hours (more on this below)...

In touch with the environment and each other: occupants have direct access to inviting, usable outdoor spaces designed for working, eating, and socializing. The spaces are shady in the summer while sunny and protected in the winter...

Green Architecture

- **Green architecture or green design, is an approach to building planning that minimizes harmful effects on human health and the environment.**
- **The "green" architect or designer attempts to safeguard air, water, and earth by choosing *eco-friendly* building materials and construction practices.**



Spiritual and cultural aspirations: in the world today there is a convergence of religious and secular aspirations to care for the environment and climate. This building reflects our aspirations by having a low carbon footprint and further celebrates them by focusing on creating a beautiful merging of art and architecture.

Our design philosophy is based on a bio-regional understanding that each building needs to be adapted to the specifics of the local climate and site; that is, we “design with climate.” We design so that the building extracts energy from the environment in a benign way. Our goal was to create a “Zero Net Energy” building. Thus, while we designed to reduce the need for off-site energy, we were passionate about creating a beautiful studio environment where we would be inspired to do creative work. Therefore, we worked to integrate architectural and sculptural beauty with the sustainability/energy harvesting features into a harmonious whole where beauty and sustainability mutually reinforce each other.

Our natural and solar energy capture systems include natural light, replacing electrical light; natural ventilation, replacing forced air; passive solar heat gain in winter, reducing heating needs; and cool air night flushing, thermal mass storage for heating and cooling, and solar heat gain avoidance in summer by orienting the windows to the south and the north and making sure they do not act as solar heat collectors.

Another strategy to reduce unwanted summer heat gain and winter heat loss was the utilization of thick, highly insulating strawbale walls. The baled rice straw is a local agricultural waste product that I have been using for almost 35 years to create super-insulated buildings. The walls are encased in a lime/cement plaster that protects the bales from the elements and permanently sequesters the straw. Not only can the strawbale wall system be curved and sculpted, but the thick straw walls also provide excellent (R-40) insulation that reduces the heat flow through the walls to a trickle.

Our natural light strategy is designed to eliminate the need for artificial light on all but the darkest days. We employ small distributed skylights with clear prismatic diffusers; since skylights are thermal weak points, we designed them to provide the optimum amount of light without overheating the space in the summer. We supplemented the natural lighting with the north- and south-facing windows. In addition, when we looked for interior paint and materials, we carefully considered light reflectance, especially for places such as the skylight light wells. We found a highly reflective and diffusing white paint with 98% reflectivity. The backup lighting system employs all LED light fixtures; however, we seldom need them. Thus, natural light represents a major capture of energy and a very powerful way that we have minimized our electrical energy use.

Natural ventilation is provided by operable windows and automatic louvers on the north and south sides of the building. The louvers are programmed to open automatically on summer nights, as soon as the outside temperature becomes cooler than the inside temperature. Since the “**sea breeze**” is from the south, the air flows through the building exiting on the north side, purging heat from the building at night. The same south windows that capture (cooling) energy in summer also capture energy in winter by allowing solar heat gain.

We moderate the passive heating and cooling of our building by thermal mass in the form of 26 vertical 18" diameter water columns, which together hold 22,000 pounds of water. During a cool summer evening the



water is cooled from 75° F to 70° F. This is the equivalent of 110,000 BTU or nine tons of ice melting. Since our design has minimized summer heat gain, the water mass and the cooling potential of the slab floor are plenty to keep the building cool on most summer days. This same mass is available to store solar heat on sunny winter days when the low sun comes into the south-facing windows. Water is particularly good at storing passive heat gain since it is a fluid. When the temperature changes at the surface of the tank, the cooler water thermosiphons out of the way, allowing heat transfer throughout the water by both conduction and convection.

Finally, an air-to-water heat pump provides both backup heating and cooling. The heat pump is linked to a heavily insulated 1,250-gallon water tank, which provides an additional 100,000 lbs. of thermal storage. Because of this thermal mass and other thermal mass in the building, we have a sufficient buffer so that the heat pump needs to come on only during the most favourable time of day. For example, in the summer the heat pump cycles on in the early morning hours when the air temperature in Davis is 60° F or less, allowing it to work extremely effectively. The stored precooled water is then pumped throughout the building's radiant heating/cooling system, cooling the building's slab and the water collectors.

The average California office building has an energy utilization intensity (EUI) of 15-20 kWh per square foot per year. Since our natural energy capture systems provide light and space heating and cooling, our building, which is all electric, has an EUI of 3.7 kWh per square foot per year. This means that our recently installed 11 kW photovoltaic (PV) system will have plenty of capacity to make our building Zero Net Energy (ZNE) and charge one or two electric cars to boot. Optimizing the building's capacity to tap naturally occurring energy sources, combined with a very efficient radiant back-up heating/cooling system and a small PV array, demonstrates the feasibility of creating very low-cost ZNE commercial office buildings.

By Jonathan Hammond for Solar Today

<http://solartoday.org/2017/04/zen-zne-office/>

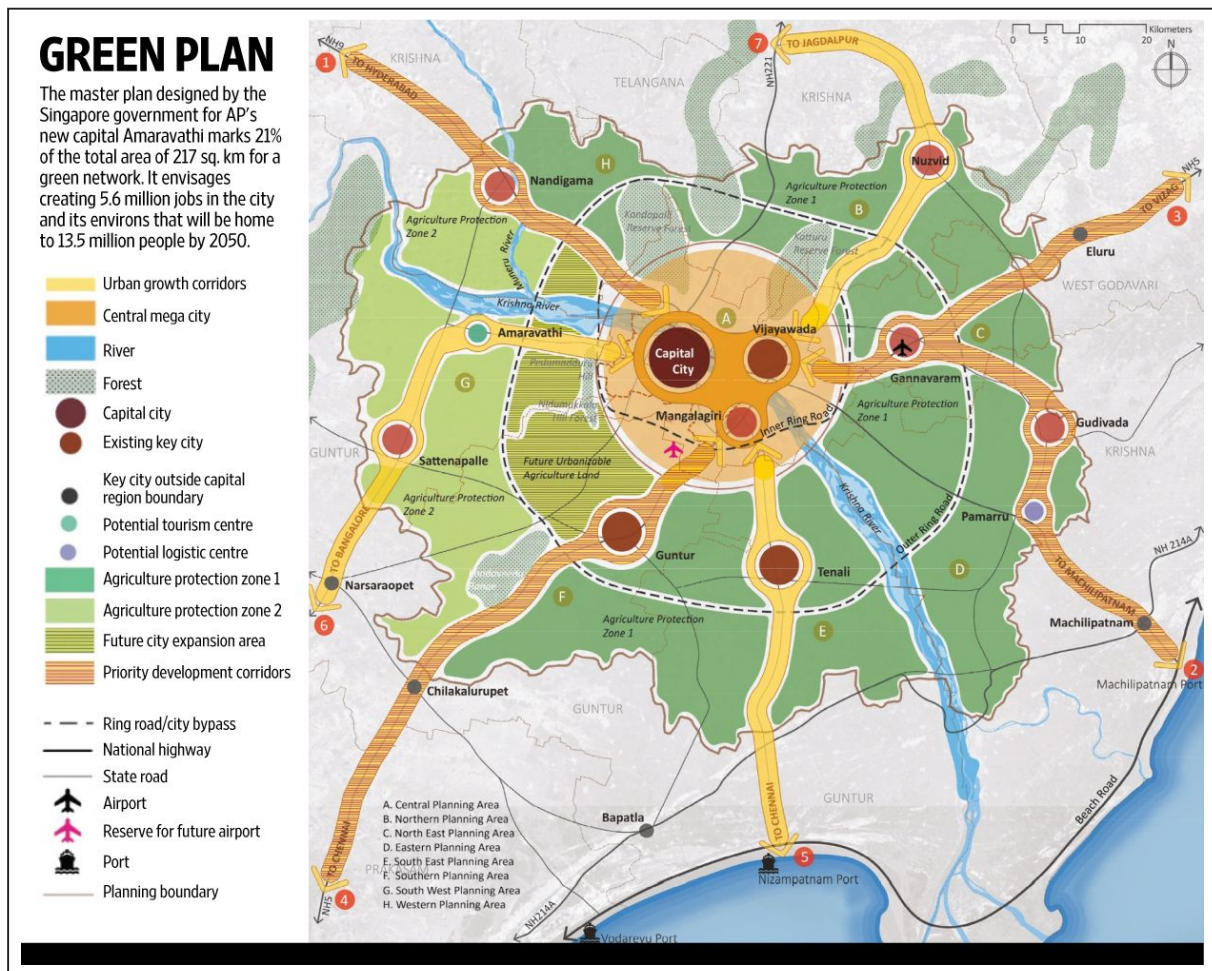
BEEP TO HELP AMARAVATI HAVE ENERGY-EFFICIENT BUILDINGS

Under the Indo-Swiss Building Energy Efficiency Project (BEEP), a bilateral project between the Ministry of Power, Government of India, and the Government of Switzerland, the Project Management and Technical Units (PMTU) of India and Swiss will help the AP Capital Region Development Authority raise energy-efficient and thermally comfortable buildings in Amaravati.



In this regard, BEEP on Tuesday organised a day-long seminar for the officials of the CRDA, builders, and others concerned.

“Switzerland has developed stringent codes for buildings in the last 40 years. It also has the most stringent code in the world for solar protection buildings. Swiss has been No. 1 in innovation in the last five years and the expertise in buildings, practical application, and innovation that we bring can help cities like Amaravati, where there is a chance to introduce new designs and technologies,” said Pierre Jaboyedoff, Senior Engineer and Energy Consultant of the Swiss PMTU, BEEP.



“This project would definitely influence energy efficiency of a city like Amaravati positively and the kind of technology that we advocate will comfort people here,” he said.

CRDA Director (Planning) V. Ramudu said that Amaravati needed development of 120 crore square feet of building area in which 60 crore square feet would be in the core city. “It will have 20-30 crore square feet of residential area, which will come up in the next 20 years,” he said. Mr. Ramudu said that all the structures would be made energy-efficient as part of the project.

Core team members and representatives of BEEP PMTU Dr. Sameer Maithel and VernicaPrakashKapoor presented various designs of energy- efficient buildings and their case studies and the technical support available under BEEP for designing new buildings in Amaravati.

AP Energy Conservation Mission CEO A. Chandra Sekhara Reddy said that the project would be totally incorporated into the master design of Amaravati, which would be finalised soon.

The SECM had on April 1 started the Energy Conservation Building Code (ECBC) Cell that exclusively trains officials of the municipal administration, town planning, architects, and engineers.

The Bureau of Energy Efficiency (BEE) and the Swiss Agency for Development of Cooperation (SDC) of the Federal Department of Foreign Affairs of the Swiss Confederation are the implementing agencies of the project.

ENERGY CONSERVATION THROUGH ENERGY EFFICIENCY – 27

EMDS: The details from International studies and analysis are continued in the components, controls and major driven equipments efficiencies and energy consumption.

Energy Savings Technologies and Savings Potentials Applicable to Electric Motor Driven Systems

The efficiency of an electric motor driven system (EMDS) (such as a pump, fan, compressor or industrial handling and processing) is determined by the total motor system, *i.e.* the multiplication of efficiencies for each component. Within the various electric motor technologies described, energy savings options are available for both components and integrated systems.

Improving component efficiency

The following analysis examines key electrical and mechanical components and how they interact, and identify state of the art efficiency, beginning with the electric motor itself.

a) Standard AC squirrel cage induction motor

The energy efficiency of the AC motor is classified by IEC 60034 30 (October 2008) into three Commercially available energy efficiency classes:

- IE3 Premium Efficiency (equivalent to 60 Hz operation with NEMA Premium)
- IE2 High Efficiency (equivalent to 60 Hz operation with Epact, similar to 50 Hz operation with Eff1)
- IE1 Standard Efficiency (similar in 50 Hz operation with Eff2)

To initiate a competition for even higher motor efficiency in future, the IEC standard indicated a Super Premium class with 15% lower losses than the IE3. General understanding is that this will be not a standard AC induction squirrel cage motor, but either an electrically commutated or copper rotor motor. These efficiency classes cover motors from 0.75 kW to 375 kW, 2 pole, 4 pole and 6 pole and in 60 Hz or 50 Hz operation with a supply voltage of 200 V to 700 V. This efficiency classification asks for IE2 and IE3 motors to be tested with a method of “low uncertainty” among the various testing methods provided by IEC 60034-2-1.

The three phase asynchronous AC induction motor is the global standard for general purpose medium size industrial motors. It consists of two major elements:

- A fixed **stator**, with feet to the ground or with flanges to the machine, with copper coils inside that produce a rotating magnetic field.
- An inside **rotor**, separated by a slot and attached to the output machine, that receives a torque via the rotating magnetic field.

There is only a very limited potential for further efficiency improvement in the state of the art electric motors on the market today as per Table.

b) Gears and Transmissions

Motor systems experience losses in other mechanical components. Gears and transmissions are two mechanical elements which offer significant potential for improved efficiency. In motor efficiency of around 100 kW output, just two percentage points separate one motor efficiency class from the next. This means it can be easier or more cost effective to change transmissions and gears to achieve the same overall performance improvement. In efficient motor systems, artificial flow reducers (such as dampers, throttles, bypasses, etc.) should be avoided; they are not treated here.

Gears are used in some applications to convert motor speed to the required speed. Some types of gears (worm gears with very high gear ratios) can be very inefficient: the larger the gear ratio (relationship of the two revolutions per minute [rpm]) and the more gear stages used, the lower the efficiency. Gear losses come from tooth friction and lubrication churning. Losses tend to be between 2% and 12% higher

Table: Nominal load efficiencies in IE3 Premium Efficiency AC induction motors

IE3	50 Hz (4-pole)	60 Hz (4-pole)
0.75 kW	82.5%	85.5%
200 kW	96.0%	96.2%

Abbreviation: AC = alternating - current.

Source: IEC 60034-30.

in new gears until the teeth are smoothed. High gear losses can be avoided by using a motor with a pole number and respective speed closer to the desired rpm of the driven equipment. If the gear is not used to provide maximum torque at low speed, a VFD can be used instead. In many newer applications, gears are avoided by an integrated direct drive, direct coupling of a motor to a machine (pump, fan, compressor, etc.), thereby eliminating any intermediary mechanical element.

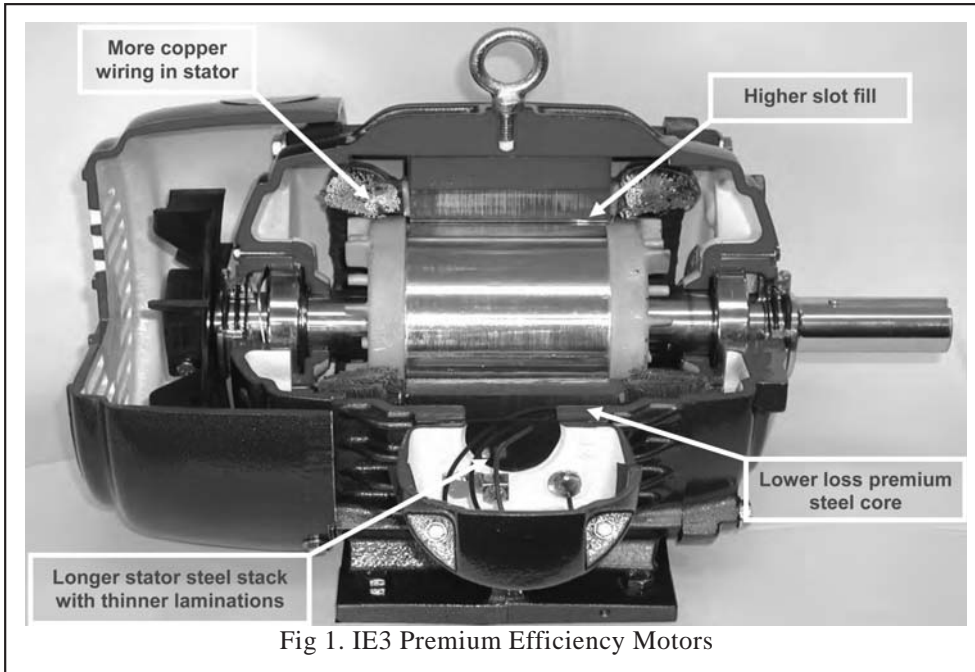


Fig 1. IE3 Premium Efficiency Motors

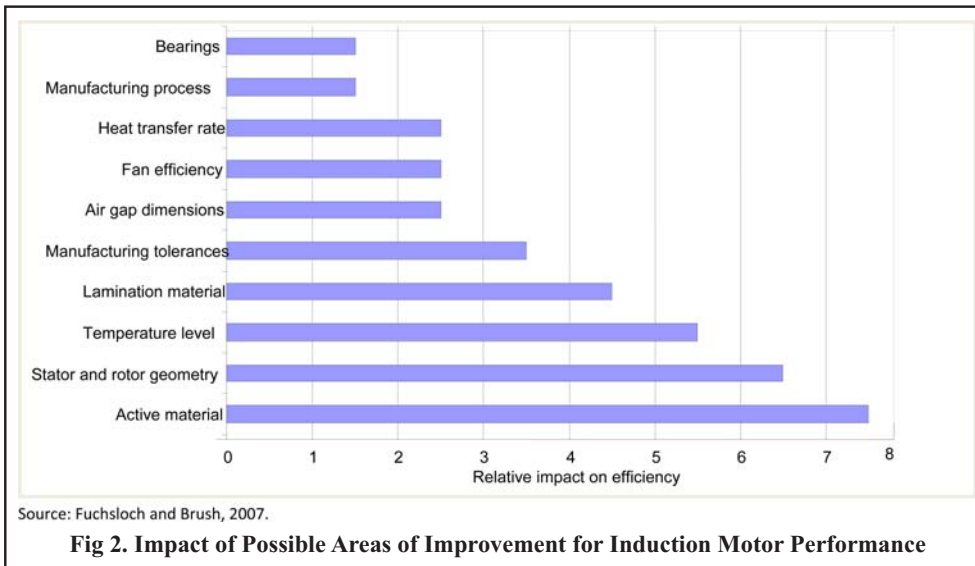


Fig 2. Impact of Possible Areas of Improvement for Induction Motor Performance

Gear Efficiencies

Gear Type	Normal Ratio Range	Pitch Line Velocity (m/s)	Efficiency Range
Spur	1:1 - 6:1	25	98% - 99%
Helical	1:1 - 10:1	50	98% - 99%
Double Helical	1:1 - 15:1	150	98% - 99%
Bevel	1:1 - 4:1	20	98% - 99%
Worm	5:1 - 75:1	30	20% - 98%
Crossed Helical	1:1 - 6:1	30	70% - 98%

Source : Roymech, 2009.

Transmissions are used in some applications to adjust the motor speed to the machine and to allow some soft connection between the two to allow for vibration etc. The traditional V belt has maximum friction but also high losses. It stretches in use and increases its slip. Its efficiency is around 95% to 98% when new and then drops to 93%. So called synchronous belts are toothed and require a toothed drive sprocket. They reach and maintain 98% efficiency. Flat belts can do the job with far lower friction losses and reach 98% to 99% efficiency. Recent developments in flat belt technology have overcome the drawbacks of high tension and mistracking. New designs and advances in materials have made both low and high power transmission practical and cost-efficient, at speeds that usually exceed other belt designs. Roller chains made from steel can make transmissions at around 98% efficiency. As for gears, in many newer applications, transmissions are avoided by an integrated direct drive, direct coupling of a motor to a machine (pump, fan, compressor, etc.), eliminating any intermediary element.



Fig 3. Two Transmission Systems: Roller Chains and Synchronous belts

c) Motor Control Technologies

Variable Loads and VFDs or ASDs

Many motor applications have high operating hours but variable loads. Even with the relatively flat efficiency curve of larger IE3 motors (between 50% and 125% load), there are still large gains to be made by adapting motor speed and torque to the required load. The largest benefit comes with pumps and fans in closed loops for which power consumption varies as a cubic power of their rotational speed. In traditional equipment, the load adjustment is made by introducing artificial brakes (control valves, dampers, throttles, bypasses, etc.). In air conditioning systems, the temperature and flow control of pumps and fans can be achieved with VSDs, reducing on/off cycles and providing a more stable indoor climate. In constant torque loads such as air compressors and horizontal conveyors, an adjustable speed control also has efficiency benefits by running the system with modulation more stable than with on/off cycles. Traditional speed and torque control uses either two speed or multi speed motors, with several motors working in parallel or with changing gears (step or continuous). Electrical switching (star/triangle) or other methods are also used. Early on, DC motors were used to alter speed continuously, but they are used less nowadays because of increased wear (brushes).

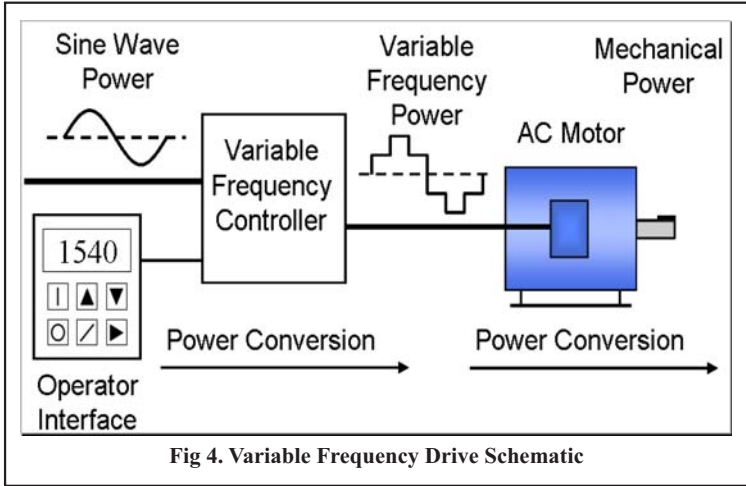


Fig 4. Variable Frequency Drive Schematic

Many mechanical systems in industry, infrastructure and buildings operate with variable load. A key element in improving energy efficiency and system integration is dealing efficiently with variable load, typical of many applications. This means that the motor speed (rpm) and/or torque (Newton meter [Nm]) should be adjustable to the immediate condition as determined by temperature or pressure differences, required flow of volume and mass, process and traction speed, etc. Depending on the

application, the adaptation of the motor load to the necessary speed and torque can be made using several traditional or more advanced electronic controller technologies such as VFDs. The addition of a VFD adds considerable potential for improved energy efficiency in many electric motor systems. The VFD has additional costs - typically equal to or larger than the higher efficiency motor. It also has some additional losses, depending on size and quality, typically 2% to 5% at nominal torque and speed, and 10% to 30% at 25% torque and speed. The application therefore requires careful analysis.

Applications for ASDs

Three basic types of application exist for ASDs (De Almeida *et al.*, 2009):

- **Pumps, fans and similar equipment with changing loads**, for which torque increases approximately with the square of the change in rotational speed of the motor. Many of these applications are controlled with mechanical dampers, throttles and bypasses. The mechanical load on the motor will change with approximately the cube of the change in rotational speed. The VFD (or an EC motor) can adjust the electric power input smoothly and continuously to the required flow volume, which reduces the losses in partial load accordingly. Traditional load control with multi-speed motors, parallel operated multi motor schemes (pump, fan, etc.) or mechanically adjustable fan propeller blades are to be considered – if they can do the job with lower costs and fewer losses.

The cost and energy efficiency benefits of a VFD in this group are high because the electric power increases with speed and a smooth adaptation to the real need is possible.

- **Escalators, hoists, cranes and similar types of equipment**, where torque is more or less independent from speed. The VFD (or an EC motor) can continuously adjust the speed from almost standstill to full speed without steps and can thus minimize required power at all times. Some of these applications can include regenerative braking phases in their operating cycles (*e.g.* hoists, elevators and cranes). In these cases, VFDs with active front ends may be beneficial and produce much less harmonic distortion. It must be noted, however, that active front ends produce additional losses and may require high frequency filters to avoid electromagnetic compatibility (EMC) problems in the grid.

The cost and energy efficiency benefits of this second group of applications are smaller than the first group because the change of input power is only linear to the speed.

- **Equipment that has minimal changes in load and speed** but can benefit from a VFD in other ways, *e.g.* soft starting and stopping, or the requirement of an especially high starting torque. The main benefit is not in energy-efficiency improvements but in less wear of the machinery involved, a higher power factor and a reduced voltage drop in the network close to a large starting motor. Some systems allow a change to a direct drive once the nominal constant operating load is reached, which will then eliminate the VFD losses. Some more traditional technical solutions for soft starting are less costly, but such methods do not save energy, although they may reduce peak loads and thus save on electricity tariffs.

The cost and energy efficiency benefits of this third group of applications are small compared to the first two groups. VFDs allow for voltage optimization to improve motor efficiency if the torque changes (even if the speed needs to remain constant). These savings may be offset by the losses due to the VFD.

In many applications, motors are oversized and run continuously in partial load (*e.g.* 50% or less).

Even though a VFD can improve energy efficiency by reducing input voltage to the motor, a better sizing of the motor for the necessary load is much more cost effective and can save even more energy. Through the use of VSDs, it is possible to avoid over sizing of motors for rarely needed, very high starting torque, which leaves motors running most of the time with low efficiency and very low power factor. The power factor can then be kept at a reasonable level.

Losses in VFDs

VFDs consume energy within their control circuits (motor control, network connection, input/output [I/O] logic controllers, etc.) and lose energy, particularly in the output switches.

Today, most VFDs for low voltage (less than 1 000 V) use integrated gate bipolar transistor (IGBT) switches with pulse width modulated signals and switching frequencies between 1 kHz and 20 kHz. The losses of these inverters are relatively low and their efficiency in partial load is typically better than cage induction motors. VFDs also induce further losses in the motor due to harmonic distortion and non

synosoidal output voltage waveform. The main influencing factors on total losses are the switching frequency and the output current (which is basically associated with output power and load).

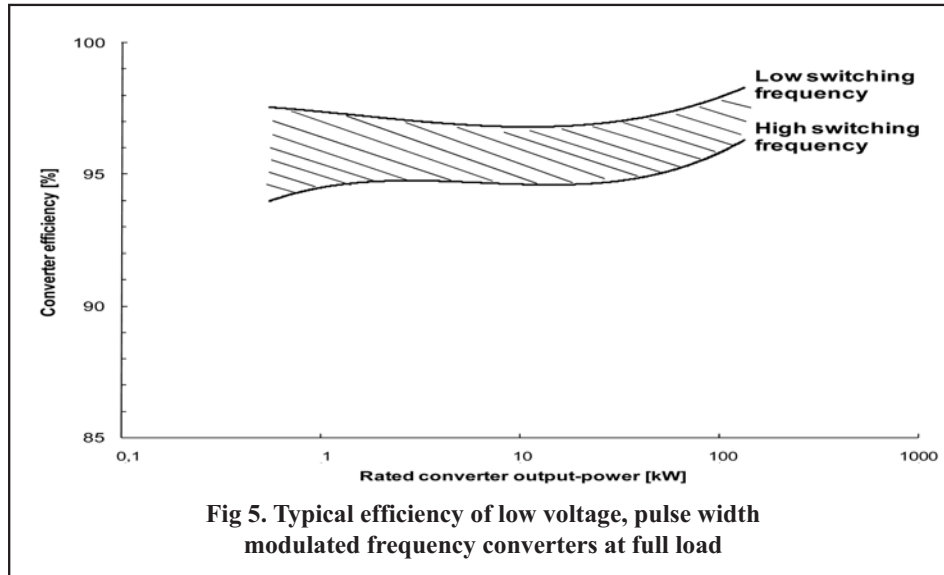


Fig 5. Typical efficiency of low voltage, pulse width modulated frequency converters at full load

It is important to have a proper understanding of testing and optimizing VFD use in variable load applications with asymmetrical variation of torque and speed. In general though, a VFD used for a considerable amount of time during the year either below 50% speed or below 50% torque has severe additional losses (Figure below). In a typical application for pumps and fans (indicated with the blue square torque line), a reduction of speed (*e.g.* down to 25%) will invariably reach very low torques (only 6.3%) and thus result in a very low load (1.6%) with severe losses in efficiency: down to <50%. Thus, the correct sizing of square torque machines is still critical in order to avoid many operation hours with speeds <50%.

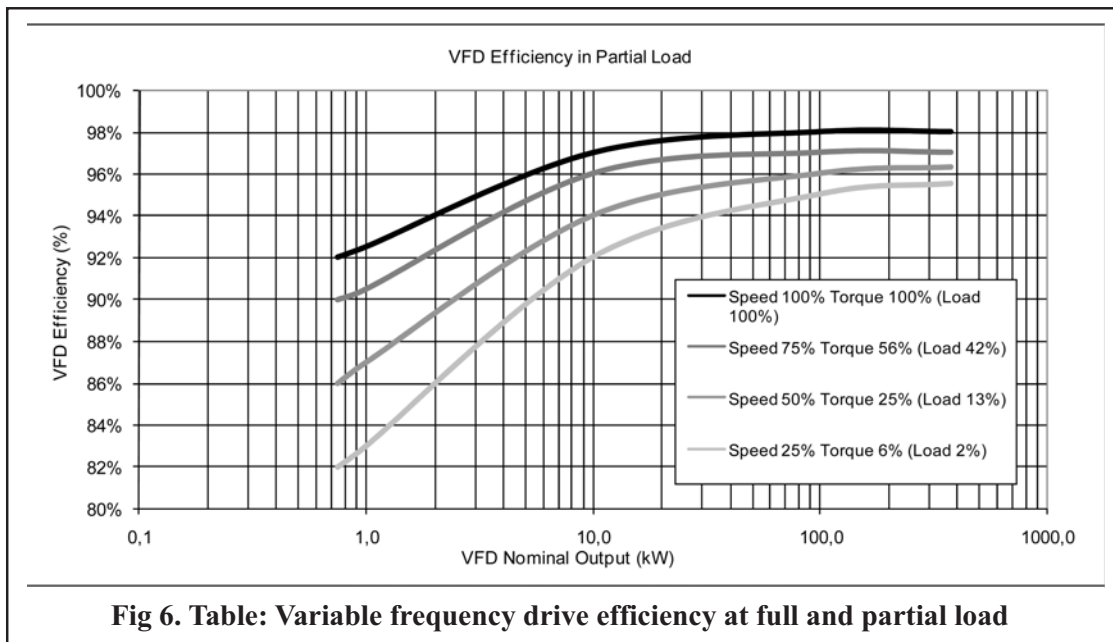


Fig 6. Table: Variable frequency drive efficiency at full and partial load

Source: A+B International, 2009.



(To be continued)
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WALK WITH PURPOSE – NISHA VARMA

Transform your daily walking routine into a fat-busting, weight-loss workout

The higher the intensity the more agile you will be basically, get more step out of every minute.

Walking is so easily accessible to all of us, that we never stop to imagine it can have so many benefits.

Usually done without the help or support of an expert, this form of exercise can actually help you lose those extra kilos or keep you at your optimum weight. Avoid turning it into a social exercise though, rather than one that is concentrated on the cardiovascular activity you set out for it to be!

A study by the London School of Economics reported that people who walked briskly for over 30 minutes a day had lower BMIs and smaller waists than even those who did other forms of exercise. This was especially true for women and people over 50 years old.

But you do need to take up the intensity. The higher the intensity, the more agile you will be: basically, get more step out of every minute. With increased intensity, the joints, muscles, heart and lungs work more efficiently too. However, chances of injury rise as you step it up. Follow these guidelines for a healthy walking experience.

Also, do remember never to over-exercise a tired or injured muscle or joint. Rest and recovery is the best way to deal with extreme fatigue and injury. For most people, 10 minutes to a kilometre is a good speed guideline, though depending on age and health, there's nothing to stop you from bettering performance, as you get stronger. Just don't rush things—try and up intensity gradually. Walk on a surface that is smooth—like a designated walking path—so you lower the risk of falling.

Take short steps

To avoid musculoskeletal stress, don't increase intensity by over-striding and taking long steps. Instead, pick up the pace, by keeping the stride short and quick.

Be conscious of the arms

The arms should bend at the elbow and swing forward and back to enable an increase in intensity. Right arm, left leg forward and vice versa. For this reason, avoid carrying purses and mobile phones that may create an imbalance.

Start and end slow

Space out your walking session. If you're walking for 60 minutes, then use the first 10 as a warm-up and the last 10 as a cool-down.

Build pace

Gradually increase speed and feel the body break into a sweat. You must be slightly out of breath, but not so much that you can't speak. Feel your heart rate rise. Stay in this state for 20-40 minutes (depending on your age and medical status). You can increase this every 10 days or so by 5 minutes.

If you're walking with a partner, make sure you are both at the same fitness level, so one of you isn't trying to keep up with the other.

Finish with stretches

Finish the session with stretching the lower body muscles, like the thighs, calves, and lower back.

Flexibility reduces with advancing years, but regular stretching will help you maintain the range of movement around a joint and the length of the muscles.

Nisha Varma is an American College of Sports Medicine exercise physiologist and a Reebok Master Trainer based out of Pune.



Courtesy: The Hindu, Dt. 22.05.2017



Motilal Oswal CMD
Motilal Oswal Securities Ltd



“Every person has unlimited potential and Entrepreneurship is nothing but tapping this potential to reach higher and higher levels” - Motilal Oswal

After completing his CA, Motilal Oswal decided to plunge into broking business along with his friend Raamdeo Agarwal.

Emphasis on research based advice has been the hallmark of Motilal Oswal Financial Services Ltd. (MOFSL) which today spans the wide gamut of financial services like Broking & Distribution, Wealth Management, Institutional Equities, Investment Banking, Private Equity and Asset Management. While the company started in 1987 as a small sub-broking unit, Oswal’s passion for promoting and nurturing entrepreneurship in the country has enabled the company to have a network spread over 586 cities and towns comprising 1581 Business Locations. He has served on the Governing Board of the BSE, Indian Merchant’s Chamber (IMC) and has also served on various committees of BSE, NSE, SEBI and CDSI. He is the President of the Jain International Trade Organisation (JITO). He has been awarded the **Rashtriya Samman Patra** by the Government of India for being amongst the highest income tax payers in the country for a period of 5 years. He has won several awards for his professional contributions – the **“Knight of the Millennium”** awarded by ICME, **“Excellent Business Achiever in Financial Services”** award by the Indian Institute of Chartered Accountants - India, **“Udyog Rattan Award”** by the institute of Economic Studies, New Delhi, **‘Samaj Ratna’** award at the hands of her Excellency President Smt. Pratibha Patil, **“Hall of Fame for Excellence in Franchising”** by franchising World Magazine and **“Special contribution to Indian capital Market”** Award by Zee Business. Motilal Oswal Securities has won many Awards and Recognitions like **“Best Equity Broker”** at Bloomberg UTV Financial Leadership Awards in April 2012, **Quality Excellence Awards** for the best customer service result award at the National Quality Excellence Awards 2013. Mr. Oswal has also authored two books of quotation on **‘The Essence of Business & Management’** and **‘The Essence of Life’**. He has published hundreds of articles in Financial Magazines and Newspapers.

HUMOUR

“Ticket Please”

Three lawyers and three engineers were travelling by train to a conference. At the station, each lawyer bought a ticket whereas the engineers bought only one ticket between them. ‘How are you going to travel on a single ticket?’ asked a lawyer.

‘Wait and watch’, answered one of the engineers.

When they boarded the train, the lawyers took their seats, but the three engineers crammed into a toilet and closed the door behind them. Shortly after the train started, the ticket collector arrived. He knocked on the toilet door and asked, “Ticket, please.” The door opened just a crack and a single arm emerged with a ticket in hand. The ticket collector took it and moved on.

Seeing this, the lawyers decided to the same thing on the return trip so when they arrived at the station they bought only one ticket. To their astonishment, the engineers didn’t buy any. ‘How are you going to travel without a ticket?’ asked one of the perplexed lawyers.

“Wait and watch”, answered an engineer.

In the train, the three engineers crammed into a toilet and the three lawyers into another nearby. Soon after the train started, one of the engineers got out of the toilet and walked to one where the lawyers were hiding.

He knocked on the door and said, “Ticket, please...”

“Engineer at Work”

An engineer died and reported to the pearly gates. An intern angel, filling in for St Peter, checked his dossier and grimly said, “Ah, you’re an engineer. You’re in the wrong place.”

So the engineer was cast down to the gates of hell and was let in. Pretty soon, the engineer became gravely dissatisfied with the level of comfort in hell, and began designing and building improvements. After a while, the underworld had air conditioning, flush toilets, and escalators, and the engineer was becoming a pretty popular guy among the demons.

One day, God called Satan up on the telephone and asked with a sneer, “So, how’s it going down there in hell?”

Satan laughed and replied, “Hey, things are going great. We’ve got air conditioning and flush toilets and escalators, and there’s no telling what this engineer is going to come up with next.”

God’s face clouded over and he exploded, “What? You’ve got an engineer? That’s a mistake. He should never have been sent down there. Send him up here.”

Satan shook his head, “No way. I like having an engineer on the staff, and I’m keeping him.”

God was as mad as he had ever been, “This is not the way things are supposed to work and you know it. Send him back up here or I’ll sue.”

Satan laughed uproariously, “Yeah, right. And just where are YOU going to get a lawyer?”

JADAV PAYENG

Padma Shri. **Jadav “Molai” Payeng** (born 1963) is a **Mishing tribe environmental** activist and forestry worker from **Jorhat**, India. Over the course of several decades, he planted and tended trees on a **sandbar** of the river **Brahmaputra** turning it into a forest reserve. The forest, called **Molai forest** after him, is located near Kokilamukh of **Jorhat**, Assam, **India** and encompasses an area of about 1,360 acres / 550 **hectares**. In 2015, he was honoured with **Padma Shri** the fourth highest civilian award in India.



Career

In 1979, Payeng, then 16, encountered a large number of snakes that had died due to excessive heat after floods washed them onto the tree-less sandbar. That is when he planted around 20 bamboo seedlings on the sandbar. He started working on the forest in 1979 when the social forestry division of **Golaghat district** launched a scheme of tree plantation on 200 hectares at Aruna Chapori situated at a distance of 5 km from Kokilamukh in **Jorhat district**. Molai was one of the labourers who worked in that project which was completed after five years. He chose to stay back after the completion of the project even after other workers left. He not only looked after the plants, but continued to plant more trees on his own, in an effort to transform the area into a forest.

The forest, which came to be known as Molai forest, now houses **Bengal tigers**, **Indian rhinoceros**, and over 100 deer and rabbits. Molai forest is also home to apes and several varieties of birds, including a large number of vultures. There are several thousand trees, including valcol, arjun (*Terminalia arjuna*), ejar (*Lagerstroemia speciosa*), goldmohur (*Delonix regia*), koroï (*Albizia procera*), moj (*Archidendron bigeminum*) and himolu (*Bombax ceiba*). Bamboo covers an area of over 300 hectares.



A herd of around 100 elephants regularly visits the forest every year and generally stay for around six months. They have given birth to 10 calves in the forest in recent years.

His efforts became known to the authorities in 2008, when forest department officials went to the area in search of a herd of 115 elephants that had retreated into the forest after damaging property in the village of Aruna Chapori, which is about 1.5 km from the forest. The officials were surprised to see such a large and dense forest and since then the department has regularly visited the site.

A few years back, poachers tried to kill the rhinos staying in the forest but failed in their attempt due to Molai who alerted department officials. Officials promptly seized various articles used by the poachers to trap the animals.

Molai is ready to manage the forest in a better way and to go to other places of the state to start a similar venture. Now his aim is to spread his forest to another sand bar inside of Brahmaputra.

Personal life

Jadav Payeng belongs to a tribe called “**Mishing**” in Assam, India. He lives in a small hut in the forest. Binita, his wife, and his 3 children (two sons and a daughter) accompany him. He has cattle and buffalo on his farm and sells the milk for his livelihood, which is his only source of income. In a recent interview he revealed that he lost around 100 of his cows and buffaloes to the tigers in the forest, but blames the people who carry out large scale encroachment and destruction of forests as the root cause of the plight of wild animals.

Honours

Jadav Payeng was honoured at a public function arranged by the School of Environmental Sciences, **Jawaharlal Nehru University** on **22 April 2012** for his remarkable achievement. He shared his experience of creating a forest in an interactive session, where **Magsaysay Award** winner **Rajendra Singh** and JNU vice-chancellor Sudhir Kumar Sopory were present. Sopory named Jadav Payeng as “**Forest Man of India**”. In the month of October 2013, he was honoured at **Indian Institute of Forest Management** during their annual event Coalescence. In 2015, he was honoured with **Padma Shri**, the fourth highest civilian award in India.

In popular culture

Payeng has been the subject of a number of documentaries in the recent years. A locally made film documentary, produced by Jitu Kalita in 2012 *The Molai Forest*, was screened at the **Jawaharlal Nehru University**. Jitu Kalita, who lives near Payeng’s house, has also been featured and given recognition for good reporting by projecting the life of Payeng through his documentary.

The 2013 film documentary *Foresting life*, directed by the Indian documentary filmmaker **Aarti Shrivastava**, celebrates the life and work of Jadav Payeng in the Molai forest. These are also the focus of **William Douglas McMaster’s** 2013 film documentary *Forest Man*. With 8,327 USD pledged on its **Kickstarter** campaign, the film was brought to completion and taken to a number of film festivals. It was awarded the **Best Documentary prize** at the Emerging Filmmaker Showcase in the American Pavilion at the **2014 Cannes Film Festival**.

Payeng is also the subject of the children’s book *Jadav and the Tree-Place*, written and illustrated by Vinayak Varma. The book was published by the **open-source** children’s publishing platform **StoryWeaver**, and its production was funded by a grant from the **Oracle** Giving Initiative.

NICE MESSAGES FROM RATAN TATA’S LECTURE IN LONDON



- Don’t educate your children to be **rich**. Educate them to be **happy**. So when they grow up they will know the **value** of things not the **price**.
- “Eat your food as your medicines. Otherwise you have to eat medicines as your food”.
- The one who loves you will never leave you because even if there are 100 reasons to give up he/she will find one reason to hold on.
- There is a lot of difference between human being and being human. A few understand it.
- You are loved when you are born. You will be loved when you die, in between you have to manage...!
- If U want to Walk Fast, Walk Alone...! But if U want to Walk Far, Walk Together...!!

➤ Six Best Doctors in the World

1. Sunlight
2. Rest
3. Exercise
4. Diet
5. Self Confidence &
6. Friends

Maintain them in all stages of Life and enjoy healthy life.

- If you see the moon... You see the beauty of God... If you see the Sun ... You see the power of God...
And... If you see the Mirror... You see the best Creation of God... So Believe in YOURSELF...

We all are tourists & God is our travel agent who already fixed all our Routes Reservations & Destinations.

So Trust him & Enjoy the “Trip” called LIFE...

இனிமே கறிவேப்பிலையை தூக்கி போடாதீங்க!! எப்படி புற்று நோயை தடுக்கிறது என தெரியுமா?

கறிவேப்பிலையை உணவிலிருந்து நாம் ஒதுக்கி விடுவதையே வழக்கமாக வைத்துக் கொள்கிறோம். ஆனால் அதுதான் மாணிக்கமாய் ஒளிரும் பண்புகளை கொண்டது. அது புற்று நோயை தடுக்கிறது. கறிவேப்பிலையில் கோயினிஜாக், குளுகோசைட், ஒலியோரெசின், ஆஸ்பர்ஜான் சொரின், ஆஸ்பார்டிக் அமிலம், அயாமைன், புரோலைன் போன்ற அமினோ அமிலங்கள் உள்ளது. இவைகள் தான் கறிவேப்பிலைக்கு இனிய மணத்தை தருகிறது. பல மருத்துவ குணங்களையும் வெளிப்படுத்துகிறது.



கறிவேப்பிலை மிகச் சாதாரணமாகவே வளரும் தன்மை கொண்டது. அதன் மணம் போல் அதன் மருத்துவ குணங்களும் வியக்கத்தக்கது என பல அறிவியல் ஆராய்ச்சியாளர்கள் கூறுகின்றனர். அதனைப் பற்றி காண்போம்.

ஆராய்ச்சி: கறிவேப்பிலை புற்றுநோயை ஆரம்பித்திலேயே கொல்லும் ஆற்றல் உடையது என்பதை அண்மையில் ஆஸ்திரேலிய உணவியல் அறிஞர்கள் கண்டறிந்துள்ளனர். இந்நிறுவன தலைமை ஆராய்ச்சியாளர் லனேகோபியாகக் கறிவேப்பிலை சிறந்த ஆண்டி ஆக்ஸிடென்டாக இயங்குகிறது என்கிறார். இது புற்றுநோய், இதய நோய்களை குறைக்கும் ஆற்றல் கொண்டது. மேலும் கறிவேப்பிலையால் ஞாபக சக்தி எளிதில் கிடைக்கிறது என்கிறார் இவர். கறிவேப்பிலையிலிருந்து எண்ணை எடுத்து அதை நுரையீரல், இருதயம், கண்நோய்களுக்கு தலைக்கு தேய்க்கும் எண்ணையாக பயன்படுத்தலாம் என இங்கிலாந்தில் உள்ள வேளாண் மருத்துவ ஆராய்ச்சி நிலையம் தெரிவித்துள்ளது.

கண்பார்வை அதிகரிக்கும்: சாதாரணமாக 100 கிராம் கறிவேப்பிலையை அரைத்து சாற்றை எடுத்து 100 கிராம் தேங்காய் எண்ணையில் கலந்து இதமான சூட்டில் ஈரப்பதம் நீங்கும் வரை காய்ச்சி தினசரி தலைக்கு தேய்த்து வந்தால் உடல் உஷ்ணம் மங்கும். பரம்பரை நரை வராது. கண்பார்வை குறைவு ஏற்படாது.

கருவேப்பிலையும் கடுகும்: திருவனந்தபுரத்திலுள்ள கேரளா யூனிவர்சிட்டியில் கறிவேப்பிலையையும், கடுகையும் தாளிக்க பயன்படுத்தினால் அதனால் நன்மை உண்டா என ஆராய்ந்தார்கள் மருத்துவ குழுவினர். அதில் கறிவேப்பிலையும், கடுகும் சேர்ந்து நமது திசுக்களை அழிவிலிருந்து பாதுகாக்கிறது என்பது தெரிய வந்தது. மேலும் ஃபீரேடிகல்ஸ் உருவாவதையும் தடுக்கிறது.

சர்க்கரை வியாதி: இது தவிர நீரிழிவு நோயாளிகள் காலையில் 10 கறிவேப்பிலை இலையையும், மாலையில் 10 இலையையும் பறித்த உடனேயே வாயில் போட்டு மென்று சாற்றை விழுங்கி வந்தால் மாத்திரைகளை குறைத்திட முடியும். தினசரி வெறும் வயிற்றில் கறிவேப்பிலை இலையை 3 மாதங்கள் சாப்பிட்டு வந்தால் நீரிழிவால் உடல் கனமாவது குறைக்கப்படும். சிறுநீரில் சர்க்கரை வெளியேறுவதும் முற்றிலும் தடை செய்யப்படும்.

கொழுப்பு கரைய: கறிவேப்பிலை ரத்தத்தில் இருக்கும் கொழுப்பை குறைக்கவும். அறிவை பெருக்கவும் உதவுகிறது. கறிவேப்பிலையை பச்சையாகவே மென்று தின்றால் குரல் இனிமையாகும். சளியும் குறையும் என்கிறார்கள் மருத்துவர்கள்.

Courtesy: PESOT, February 2017

தினமும் பேரிச்சம் பழம் சாப்பிடுவதால் உண்டாகும் நன்மைகள் !!!

பேரிச்சம் பழத்தில் வளமான அளவில் ஊட்டச்சத்துக்கள் நிறைந்துள்ளதால், தினமும் பேரிச்சம் பழத்தை உட்கொண்டு வந்தால், ஒரு நாளைக்கு ஒருவருக்கு வேண்டிய ஊட்டச்சத்துக்கள் கிடைக்கும். குறிப்பாக காப்பர், பொட்டாசியம், நார்ச்சத்து, மாங்கனீசு, வைட்டமின் பி6, மக்னீசியம் போன்றவற்றைப் பெறலாம். வைட்டமின் 'ஏ' குறைவினால்தான் கணத்திற்கு நல்லது. ஒரு வேளை உங்களுக்கு சீரற்ற குடலியக்கம், மலச்சிக்கல் அல்லது வேறு ஏதேனும் செரிமான பிரச்சனைகள் இருப்பின், பேரிச்சம் பழத்தை தினமும் உட்கொண்டு வர, அதில் உள்ள நார்ச்சத்து இப்பிரச்சனைகளுக்கு தீர்வளித்து, குடல் புற்றுநோய் வரும் அபாயத்தைக் குறைக்கும்.



- பேரிச்சம் பழத்துடன் பாதாம் பருப்பு சேர்த்து பாலில் கலந்து கொதிக்க வைத்து சாப்பிட்டால் நரம்புத் தளர்ச்சி நீங்கி, ஞாபக சக்தி கூடும். கைகால் தளர்ச்சி குணமாகும்.
- பேரிச்சம் பழத்தில் உள்ள மக்னீசியம், தமனிகளில் ஏற்படும் வீக்கத்தைக் குறைத்து, இதய நோய்கள் வரும் அபாயத்தைக் குறைப்பதாக கூறுகின்றனர்.
- பேரிச்சம் பழத்தை கர்ப்ப காலத்தில் உட்கொண்டு வந்தால், பிரசவம் முடிந்த பின் உடல் எடையை குறைக்க உதவியாக இருக்கும்.
- பேரிச்சம் பழத்தில் உள்ள பொட்டாசியம், இதய செயல்பாட்டை மென்மையாக்கி, இரத்த அழுத்தத்தை சீராக வைத்துக் கொள்ளும். எனவே பேரிச்சம் பழம் சாப்பிட்டு வந்தால், இரத்த அழுத்தத்தைக் கட்டுப்பாட்டில் வைத்துக் கொள்ளலாம்.
- தினமும் பேரிச்சம் பழத்தை உட்கொண்டு வந்தால் மூளையின் செயல்பாடு மேம்படும். அதாவது ஞாபக சக்தி, ஒரு முகப்படுத்தும் தன்மை, கூர்மையான புத்தி, எதையும் எளிதில் கற்றுக் கொள்ளும் திறன் போன்றவை அதிகரிக்கும்.
- பேரிச்சம் பழத்தில் உள்ள அதிகப்படியான இரும்புச்சத்து உடலில் இரத்தணுக்களின் அளவை அதிகரித்து, இரத்த சோகை வரும் அபாயத்தைக் குறைக்கும். எனவே உங்கள் உடலில் இரத்தத்தின் அளவு சீராக இருக்க, தினமும் 3 பேரிச்சம் பழத்தை உட்கொண்டு வாருங்கள்.
- சளி இருமலுக்கு பேரிச்சம் பழத்தின் கொட்டைகளை நீக்கி பாலில் போட்டு காய்ச்சி பருகி வந்தால் சளி, இருமல் குணமாகும்.
- நீர்ழிவு நோயால் பாதிக்கப்பட்டவர்களின் எலும்புகள் பலம் இழந்து காணப்படும். இவர்களுக்கு கால்சியம் இரும்புச்சத்து தேவைப்படுவதால் தினமும் இரண்டு பழம் வீதம் சாப்பிட்டு வந்தால் உடலுக்குத் தேவையான சத்துக்கள் கிடைக்கும்.

Courtesy: PESOT, March 2017

இதயத்தின் ஆரோக்கியத்தை அதிகரிக்க வேர்கடலை எப்படி சாப்பிடலாம்?

நம்ம ஊரிலேயே மிக விலை குறைவாக கிடைப்பதால் தான் என்னவோ, ஆரோக்கியமான உணவுகளை நாம் அதிகம் தவிர்த்துவிட்டு, இப்போது நோய்களை கட்டிக் கொண்டு அழுகிறோம். நம்மை பொறுத்த வரை நடஸ்-ல் சிறந்தவை முந்திரி, பாதாம், பிஸ்தா போன்ற உசத்தியான விலை உயர்ந்த நடஸ் தான். நாம் அன்றாடம் பயன்படுத்தும் பொருட்களில் காஸ்ட்லியானவை தரமானது என்ற கண்ணோட்டம், எண்ண ஓட்டம் அதிகரித்து போனதால் தான். விலை குறைந்த உணவுகள் மீதான நமது கவனத்தை நாம் செலுத்துவதே இல்லை. இதோ, வேர்கடலை எப்படி இதயத்தின் ஆரோக்கியத்தை மேம்படுத்துகிறது என இங்கு காணலாம்.



ஆய்வுகள்! ஏறத்தாழ இருபது ஆண்டுகளுக்கு முன்னரே பல ஆய்வாளர்கள் வேர்கடலை இதய நலனை அதிகரிக்கவும், மாரடைப்பு போன்ற இதய கோளாறுகள் ஏற்படாமல் இருக்கவும் உதவுகிறது என கண்டறிந்து கூறிவிட்டனர். ஆண், பெண், வயது என எந்த பாகுபாடும் இல்லாமல், அனைவரின் இதயத்திற்கும் வலுவை சேர்க்கும் திறன் கொண்டது வேர்கடலை.

கையளவு போதும்! வாரத்தில் ஐந்து நாட்கள் ஒரு கைப்பிடி அளவு வேர்கடலை நீங்கள் சாப்பிட்டு வந்தால், உங்கள் இதயம் ஆரோக்கியம் அடைவது மட்டுமின்றி, இதய நோய்கள் ஏற்படும் சதவீதம் 50% குறையும் மேலும், இதய கோளாறால் ஏற்படும் இறப்பையும் வேர்கடலை 24% குறைக்கிறது என ஆராய்ச்சியாளர்கள் கூறுகின்றனர்.

கொலஸ்ட்ரால்! வேர்கடலையில் எல்.டி.எல் எனப்படும் தீய கொலஸ்ட்ரால் குறைவாகவும், எச்.டி.எல். எனப்படும் இதய ஆரோக்கியத்தை மேம்படுத்தும் நல்ல கொலஸ்ட்ரால் அதிகமாகவும் இருக்கிறது. இதனால் தான் இதய கோளாறு உள்ளவர்கள் வேர்கடலை மற்றும் ஆலிவ் ஆயில் டயட்டில் சேர்த்துக் கொள்ள வேண்டும் என அறிவுரைக்கப்படுகிறது.

எச்.டி.எல்! உங்கள் உடலில் நல்ல கொலஸ்ட்ரால் சமநிலையில் வைத்துக் கொண்டாலே இதயத்தின் செயற்திறன் மற்றும் ஆரோக்கியம் எப்போதும் மேம்பட்டு இருக்கும். ஆகவே, நீங்கள் உண்ணும் உணவில் இருக்கும் கொலஸ்ட்ரால் எச்.டி.எல் ஆ அல்லது எல்.டி.எல். ஆ என்பதை முதலில் அறிந்து உட்கொள்ளுங்கள்.

எச்.டி.எல் உணவுகள்! ஆலிவ் எண்ணெய், பீன்ஸ், பருப்பு வகைகள், நார்ச்சத்து உணவுகள், தானியங்கள், ஆளிவிதைகள், நடஸ் உணவுகள் போன்றவற்றில் எச்.டி.எல் எனும் நல்ல கொலஸ்ட்ரால் அதிகம் இருக்கின்றன.

Courtesy: PESOT, April 2017



Recently, at a Conference of Business Leaders there were deliberations about what are the Qualities that make a Leader. One of the Top Business Leader in the meet presented a "5 - C" Model of Leadership, which are as follows:

- Competency
- Courage and Confidence** (Paired into one)
- Communication
- Consistency
- Compass or Integrity

Tiruvalluvar, no doubt, deals with all these in a very comprehensive manner and in this part, let us review what he has to advise us about "Courage and Confidence".

Courage and Confidence can only help you to face the learned and also help you learn what you have not from them.

"Katrarmun Katra Selachchollith Thamkatra Mikkaarul Mikka kolal" *Kural 724*

கற்றார்முன் கற்ற செலச்சொல்லித் தாம்கற்ற
மிக்காருள் மிக்க கொளல். குறள் 724

"Speak with assurance before the learned that which thou hast mastered; and that which thou knowest not, learn from them that excel there in."

"Valoduyen Vankannar Allarkku Nooloduyen Nunnavai Anju Bavarkku?" *Kural 726*

வாளோடுஎன் வன்கண்ணர் அல்லார்க்கு நூலோடுஎன்
நுண்ணவை அஞ்சு பவர்க்கு? குறள் 726

"What have vthey to do with swords, those who have no mettle in them? And what have they to do with books, those who are afraid to face the assembly of wise?"

HOME FESTIVALS - 7

ஆடி - Aadi (July/August)



There are two major home festivals this month. The first is Adi-Perukku, in honour of the Kaveri River. Women and girls go to the nearest river where they place offerings on a bamboo tray (upper left) into the water, then have a feast upon the riverbank.

Varalakshmi Vratam ("Vow to bring Lakshmi") is also a ladies' festival, in which paintings of the Goddess of Wealth are made upon the walls (upper right), kumbha pots intended for worship are decorated with Her image. Beside the pot are placed various cosmetics, comb, beads, etc and worship is done. Then the ladies sing songs inviting the Goddess to their home. Kozhukkatai, rice and jaggery cakes are a favourite of the day. In the evening, friends are invited to the home and given clothing, coconuts and sweets.

(To be continued)



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