



ELECTRICAL

INSTALLATION ENGINEER

NEWS LETTER

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

Old No.82 / New No. 123, Lloyds Enclave, Avvai Shanmugam Road, Royapettah, Chennai - 600 014.

Phone : 2811 1300 Email : tngrade@gmail.com Website : www.teiea.com

ISSUE NO. 117

VOL : No. 10/2015

MONTHLY ISSUE NO. 11

PRIVATE CIRCULATION ONLY

NOVEMBER 2015

EXTECH
INSTRUMENTS
A FLIR COMPANY

True RMS Multimeter @ Unbelievable Price

EX205T



₹ 3500/-

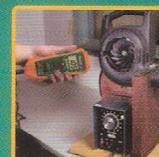
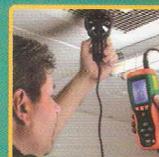
* Local Sales Taxes Extra

TOUGH TOOLS
FOR TOUGH BUDGETS

Key Features

- Auto-ranging
- True RMS for accurate AC readings even with non-sine wave signals
- Measure current, voltage, resistance
- Max Hold to capture maximum readings
- Low current resolution down to 0.1µA
- Easy to read, 4-digit backlit display (2000 count)

MultiMeters | Clamp Meters | Thermometers | Airflow Meters | Light Meters | Sound Meters
Water Quality Testers | Tachometers | Humidity & Moisture Meters | Video Inspection Cameras



For more information, please contact us at:

FLIR Systems India Pvt. Ltd.

1111, D Mall, Netaji Subhash Place, Pitampura, New Delhi 110034

Tel: +91-11-4560 3555 Fax: +91-11-4721 2006 E mail: flirindia@flir.com.hk Website: www.extech.com

EVENTS

South Asia Power

Sri Lanka
neventure

South Asia Power Congress & Expo 2015

Events Profile: South Asia, inclusive of India, Pakistan, Nepal, Bhutan and Sri Lanka, is now undergoing an especially promising period of its regional integration and

economic cooperation. Proposed and led by India, power transmission grids at intrastate, interstate and cross-border levels are being deployed and commissioned all over the region, linking the countries within, as well as the energy sector.

Date: 1st - 3rd December 2015

Venue: The Kingsbury, Colombo, Sri Lanka

Website:

<http://www.neventurecorp.com/events/southasiahydro/>

3rd MYANMAR

ELECTRIC POWER

CONVENTION 2016

Events Profile: Myanmar focusing on the power generation and T&D sector. The 4th Annual event is the perfect occasion for participants to grasp the pulse of Myanmar's new power development plans in the coming years under the leadership of the new government. The event also serves as a deal-making platform for participants to identify new partners and to conclude new deal.

Date: 13th - 15th January 2016

Venue: Sule Shangri-La, Yangon, Myanmar

Website:

<http://www.neventurecorp.com/events/mepc/>

Biomass & BioEnergy ASIA

26-28 Jan 2016 / Bangkok, Thailand

Biomass
Supply Chain

Biofuels
World

Events Profile: Biomass Supply Chain, themed *"Organized the Feedstock Market"* - Push for Green & BioEnergy in South East Asia - Incentive for Localized Energy Generation; Biomass Trade & Demand Markets Dynamics (Wood Pellets, Palm Agri Biomass, PKS, etc); Upgrading Palm Agri Biomass to Energy Products; Structural Development of Forestry to Pellet Projects; Importance for Organised Logistics Chain; Pelletizing & Torrefaction and **Biofuels World Asia** themed *"Driving & Flying with Sustainable Biofuel... Making it Possible!"* Opportunities in Asia's Biofuels Mandate in Land Transport & Aviation; Sustainable Aviation Fuels for 2020 in Japan; Impact of Crude oil & Feedstock Market on Biofuels' Production & Prices; Logistics & Blending Infrastructure for Sustainable Usage; Next Generation Biofuel Solutions

Date: 26th - 28th January 2016

Venue: Sofitel Bangkok Sukhumvit, Bangkok, Thailand

Website:

<http://www.cmtevents.com/aboutevent.aspx?ev=160102>

L&T Training Programme

| | |
|--|---------------|
| Breaker Maintenance Workshop - C Power ACB | 30 Nov-2 Dec |
| Introduction to Industrial Electrical Systems | 2-4, 9-11 Dec |
| Breaker Maintenance Workshop - U Power Omega ACB | 3-4 Dec |
| Selection of LV Switchgear and Applications | 14-18 Dec |
| Introduction to Medium Voltage Switchgear | 21-22 Dec |
| Fire Detection & Security Solutions | 23 Dec |
| Building Management & Energy Management Systems | 24 Dec |
| Selection & Application of Drives | 28-30 Dec |
| Venue: L&T Ltd., Switchgear Training Centre, The Nilgiris | |
| Email: stc_coonor@lntebg.com | |

EDITORIAL

Dear Members, Fellow Professionals and Friends,

Happy Deepavali Greetings to One and All!

Best Wishes for Better Business, Growth and Prosperity !!

We are celebrating Deepavali, the Festival of Lights and Gaiety this month. When we think of **LIGHT**, we cannot but remember the great contribution of Electrical Technology in providing Light for comfortable Living, Safety and Productivity from almost the end of 19th century. With ever increasing needs for Lighting and more and more of it and in larger and larger measure, the consumption of Electrical Energy and the conservation of it became a concern. The Technologies of Florescent Lights, Gas filled Lamps, CFL and now LEDs and Induction Lighting are all helping to increase Efficiencies of Lighting resulting in Energy Conservation.

“Cha Cha Nehru” is remembered this month and Children’s’ Day is celebrated all over the country. But as Engineers, we should remember him gratefully for the solid foundation laid in his period for the Industrial growth of the Country with establishment of Steel Plants, Fertilizer Plants, Heavy Electricals and Engineering and Machinery Units, Plants to produce Defense Equipments and many more such resulting in large scale growth of Small and Medium Industries as well. The activities that followed of Nuclear & Space, Automobiles, IT & Telecommunication and so on helped Industrial and Service Sectors growth in the Country. With a sound base, the Country could later on go with Liberalization, Privatization and Globalization resulting in GDP and Economic growth of the Country. The Government at present is endeavouring to take it forward with “**Make in India**” and so on. All these help the growth of our Country and it is widely believed that soon India will become an Economic Super Power.

November is also a month when both World Legal Services Day and National Law Day are observed on the 9th and the 26th respectively and as Law abiding citizens we are all concerned about some of the recent happenings in the Country concerning Law, Legal Services and the Judiciary. We are aware that Judiciary and the Legal System in the Country is one of the important pillars of Democracy which increases the confidence and faith of the people in Democracy. The controversies between the Government and the Judiciary with regard to the appointments of Judges and the ‘Body’ to do that as well as the open protest of Lawyers against Law and the efforts to portray that they are above Law are all concerns. Serious efforts to establish the Fairness of Law and Legal Functioning and the strict implementation of Law and Legal Provisions to demonstrate that ‘Nobody is above Law’ is very important to create confidence in people about Law and Order in the Country. This will help people to focus on working towards betterment of their own lives and the Country through Fair Ways.

National Flag Day is observed on 30th November and it is important to to reaffirm our faith in our National Flag and the National Anthem which are like our 2 eyes and ensure our actions with Patriotism.

We thank all those members who have helped us by participating in the advertisements appearing for the issue October 2015 – Galaxy Earthing Electrodes Pvt. Ltd., Wilson Power and Distribution Technologies Pvt. Ltd., JL Seagull Power Products, OBO Bettermann India Pvt. Ltd., Power Links, Sun Sine Solution Pvt. Ltd., Universal Earthing Systems Pvt. Ltd., FLIR Systems India Pvt. Ltd., Faith Power Solutions, I.P.L. Products, Ashlok Safe Earthing Electrode Ltd., Cape Electric Pvt. Ltd., Energy Mission Machinerics (India) Pvt. Ltd., Supreme Power Equipment Pvt. Ltd., P2 Power Solutions Pvt. Ltd., Abirami Electricals.

EDITOR

OBITUARY



P. SURENDRAN
D.O.D.: 17.10.2015

On behalf of The Tamilnadu Electrical Installation Engineers Association ‘A’ Grade extends **Heartfelt Condolences** for the demise of Our Member **Thiru P. SURENDRAN, M/s. Johnsons Electrical Tradings, Chennai.**

We pray the almighty to rest his Soul in Peace.

| | PARTICULARS | PAGE NO. |
|---|---|-----------------|
| President : U. BASKARAN Secretary : K. KANNAN Treasurer: P. SUYAMBU | Events | 4 |
| | Editorial | 5 |
| | Contents | 6 |
| Editor : G. VENKATESH Advisor: S. MAHADEVAN Printer : M. VENKATARAMAN | Members Details | 7 |
| | Optical Rectenna could double Solar Cell Efficiency | 8 |
| | Know Thy Power Network – 98 | 11-12 |
| | Scientists Push Boundaries to find New Energy | 13-14 |
| | GE's Digital Power Plant: The Natural-Gas contender to grid Batteries | 14 |
| | Chinese Tycoons Liang Wengen and Nan Cunhui plan to pour | 17 |
| | OSLO Recognized as the EV Capital of the World | 18-19 |
| | Ways to save Energy at home – Cooling | 19 |
| | Abengoa selected to build the World's largest biomass combined heat and power plant in the UK | 20 |
| | 5 must-haves for a successful Solar project | 21-23 |
| | What does "Responsible Innovation" mean? | 23 |
| | How long do Solar Panels last? | 24 |
| No part of the material protected by this copyright notice may be reproduced or utilised in any form or by any means, the electronic or mechanical including photocopying, recording, or by any information storage and retrieval systems, without prior written permission from the copyright owner. | CCM: China's New EV charging Infrastructure plans | 29-30 |
| | Quantum Physics meets genetic Engineering | 31 |
| | Gujarat Energy Training & Research Institute | 32-33 |
| | How will growing EV Demand affect Oil Demand? | 34 |
| | Energy Conservation through Energy Efficiency - 8 | 35-36 |
| | Book Price List | 38 |
| | பசுமைக் கூரைகளே எதிர்காலம் | 39 |
| | Entrepreneur – Dr. Ashok K. Chauhan – Amity University | 40 |
| | 20 Most Peaceful Countries in the World – 12 | 40 |
| | Dr. Raja Ramanna (1928 – 2004) | 41-42 |
| | Husain Ahmad Madani | 45 |
| | Humour | 46 |
| | உலர் அன்னாசி பழமும் இரத்த உற்பத்தியும்! | 46 |
| | பச்சைக் காய்கறிகள் | 46 |
| | இருமலை குணப்படுத்தும் தேன் | 46 |
| | Tirukkural and Management in a 'Nutshell' – 30 | 47 |
| | Home Festivals – 12 | 47 |
| | Power Your Mind | 47 |
| Milan Cathedral | 48-49 | |
| YOUR CONTRIBUTION TOWARDS NEWS LETTER (A) FOR BLACK & WHITE ONLY 1. Full Page (Per Issue) Rs. 2500 (B) FOR FOUR COLOUR PRINTING 1. Full Page (Per Issue) Rs. 5000 Same Size Positives CD/Zip to be supplied by the Advertiser | ADVERTISEMENTS | PAGE NO. |
| | Abirami Electricals | 16 |
| | Ashlok Safe Earthing Electrode Ltd. | 50 |
| | Cape Electric Pvt. Ltd. | 27 |
| | DEHN India Pvt. Ltd. | 51 |
| | Electrotherm India Ltd. | 52 |
| | Elektrotec 2016 | 9 |
| | Faith Power Solutions | 2 |
| | Faith Power Solutions – I.P.L. Products | 3 |
| | Flir Systems India Pvt. Ltd. | 1 |
| | Galaxy Earthing Electrodes Pvt. Ltd. | 43 |
| | JL Seagull Power Products | 44 |
| | OBO Bettermann India Pvt. Ltd. | 15 |
| | P2 Power Solutions Pvt. Ltd. | 28 |
| | Power Links | 7 |
| | Supreme Power Equipment Pvt. Ltd. | 37 |
| | Sun Sine Solution Pvt. Ltd. | 26 |
| | Universal Earthing Systems Pvt. Ltd. | 25 |
| Wilson Power and Distribution Tech Pvt. Ltd. | 10 | |

DISCLAIMER: Readers are requested to verify & make appropriate enquiries to satisfy themselves about the veracity of an advertisement before responding to any published in this **NEWSLETTER**. The printer & Tamilnadu Electrical Installation Engineers Association does not vouch for the authenticity of any advertisement or advertiser or for an advertiser's products and or Services. In no Event can The Printer & Tamilnadu Electrical Installation Engineers Association be held responsible / liable in any manner whatsoever for any claims and / or damages for advertisements / articles in this **NEWSLETTER**. **In any Manner we don't vouch for any reach and response.**

MEMBERS DETAILS

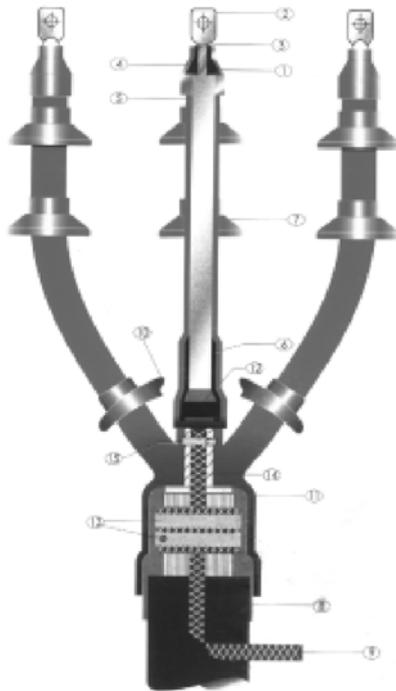
| S.No. | Company Name | License No. | District | Contact No. |
|-------|--------------------------------------|-------------|----------|----------------------------|
| 121. | Sri Iyyappa Electricals | EA 1990 | Chennai | 044-26821022, 95511 11033 |
| 122. | Sri Ram Electricals | ESA 242 | Chennai | 044-24725463, 98840 41259 |
| 123. | Sri Renukadevi Enterprises | EA 2495 | Chennai | 044-24845868, 94440 09914 |
| 124. | Sri Rukmani Electricals | EA 2748 | Chennai | 94443 09210 |
| 125. | Sri Sivasakthi Electricals | EA 2557 | Chennai | 044-22231135, 94442 30412 |
| 126. | Sri Vignesh Electricals | EA 1753 | Chennai | 044-24570591, 98410 39377 |
| 127. | Sruthi Engineering | EA 2098 | Chennai | 080-26602828, 098869 08445 |
| 128. | SS Engineering | EA 2426 | Chennai | 044-22520298, 92836 92677 |
| 129. | SSE Enterprises | EA 2223 | Chennai | 044-22385465, 98844 22365 |
| 130. | Sterling & Wilson Pvt. Ltd. | ESA 306 | Chennai | 044-42956600, 97899 76503 |
| 131. | Sudha Sudhan Engineers | ESA 359 | Chennai | 044-22445892, 98410 74032 |
| 132. | Sudhan Power Tech | ESA 218 | Chennai | 044-22321925, 98423 52095 |
| 133. | SVE Energy Pvt. Ltd. | ESA 249 | Chennai | 044-24570591, 91767 89209 |
| 134. | Swan Electric Consortium | ESA 224 | Chennai | 044-28250268, 98410 01590 |
| 135. | Swan Electric Contracts Co Pvt. Ltd. | ESA 282 | Chennai | 044-28330151, 98840 25888 |



POWER LINKS

94/95, Triplicane High Road,
Chennai - 600 005.

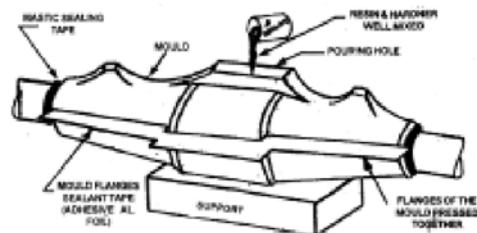
Ph : 28420695, Mobile : 9282143549



- **HEAT SHRINKABLE &**
 - **EPOXY COMPOUND TYPE**
- ### CABLE JOINTING KITS

From

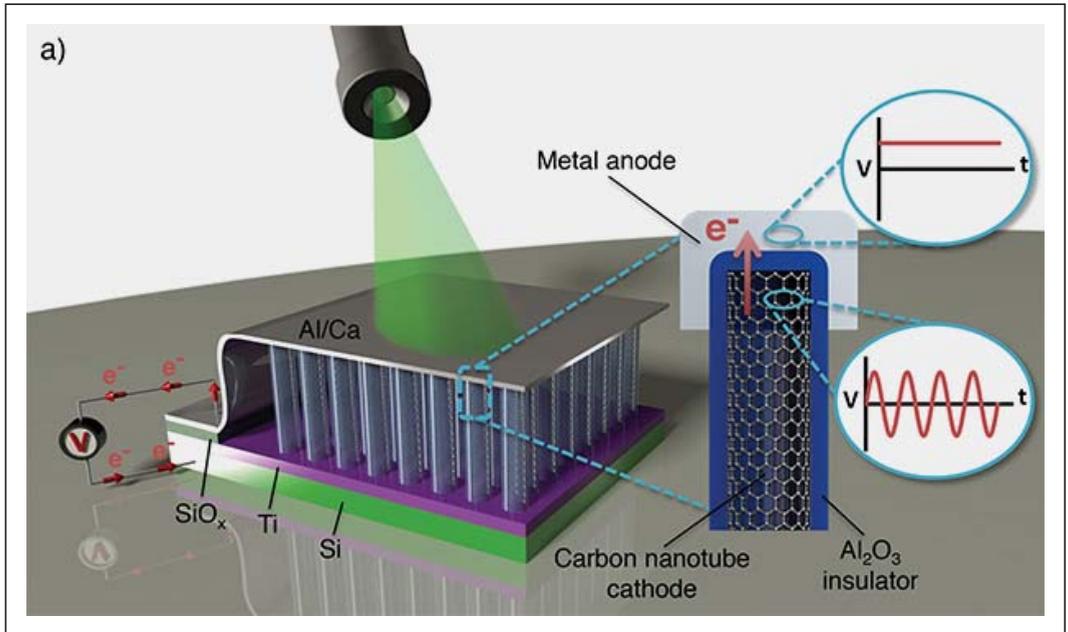
1. 1 KV (LT) to 33 KV (HT)
FREE INSTALLATION SERVICE



OPTICAL RECTENNA COULD DOUBLE SOLAR CELL EFFICIENCY

Researchers at the Georgia Institute of Technology have developed a first of its kind: an optical rectenna, which combines the qualities of an antenna with a rectifier diode. If further refined, the researchers believe the device could lead to a new generation of highly efficient solar cells.

While rectennas have been around since the 1960s, they have not been able to operate at optical wavelengths. The challenge in achieving this goal was to make the antenna portion of the devices small enough as well as fabricating some kind of rectifier into them.



In research published in the journal *Nature Nanotechnology*, the Georgia Tech researchers were able to overcome this challenge by growing multi-walled carbon nanotubes that serve as antennas for capturing light. In addition, each of the nanotubes has tiny rectifiers built into it that can convert the oscillating charge produced by the waves of light hitting the antennas into a direct current.

“Based on what others have done and what the theory is showing us, I believe that these devices could get to greater than 40 percent efficiency [in solar cells],” said Baratunde Cola, an associate professor at Georgia Tech in a press release. That would be about double today’s best solar cell efficiency.

With an enormous number of carbon nanotubes serving as the antennas, one of these devices can produce a fair amount of current. However, the energy conversion efficiency of these devices is still low at around one percent, which is fine for high-temperature detectors but not so great for a solar cell. Nonetheless, the researchers believe that with some optimization techniques they have up their sleeves, they could produce a device within a year that is commercially viable.

“We could ultimately make solar cells that are twice as efficient at a cost that is ten times lower, and that is to me an opportunity to change the world in a very big way,” said Cola. “As a robust, high-temperature detector, these rectennas could be a completely disruptive technology if we can get to one percent efficiency. If we can get to higher efficiencies, we could apply it to energy conversion technologies and solar energy capture.”

The combination of materials used make the optical rectennas is key to how they function. The researchers first grow metallic multi-walled carbon nanotubes onto a conductive substrate. They then coated the nanotubes with an aluminum oxide material to serve as an insulator using an atomic layer deposition (ALD) process. More than two years ago we saw how ALD fabrication techniques had opened the door for the production nano-antenna arrays for highly efficient solar power devices.

On top of this layer of nanotubes another layer of optically transparent thin films of calcium and aluminum is deposited. The difference in work function between the calcium layer and the carbon nanotubes produces a potential of two electron volts, which is enough to push the electrons out of the nanotube antennas when they are excited by light.

Courtesy: IEEE Spectrum

**“I’d put my money on the Sun and Solar Energy, what a source of Power!
I hope we don’t have to wait until oil and coal run out, before we tackle that.”**

– THOMAS EDISON

In this article, let us get a clear picture of some more concepts relating to the basic characteristics of Electrical Equipment Insulation.

I Understand the concepts

(i) **Insulation resistance:-** Just like the banks of a river, equipment insulation resists the flow of current and keeps the current in its path along the conductor. But it does not mean, that all insulations are perfect. No insulation that exhibits infinite resistance to the current flow exists; some current always flows along the insulation or through it to ground. For an insulation engineer, this current plays an important role. It forms the basis of his insulation testing equipment (MEGGER OR MEGA OHM METER). Then you may ask what is the significance of the results registered by this testing equipment. This megger test is a quick field test at site and helps the engineer concerned to decide to go for further tests on the equipment or declare it as “defective or suspect”. It is not a confirmatory test; it is only a preliminary, “Go or no go test”. When the test readings show that the insulation material is good, it simply shows that the equipment insulation offers a relatively high resistance to the current flow and hence the equipment is safe for further operation and tests as well. The megger test will tell you “how good the equipment insulation is”.

Before going deep into this topic, let us note the five basic causes of insulation degradation which will enhance the significance of this test. All these causative factors interact with each other and cause a gradual spiral of decline in insulation quality. The five basic causes of insulation deterioration are,

- **Electrical Stress** – This is brought by the voltages that exceed the designed voltage rating of the equipment insulation. Exposure to such abnormal electrical (voltage) stresses bring cracking or de-lamination or puncture of the insulation concerned. These voltage stresses actually crush the insulation and try to alter its shape leading to its slow or sudden death.
- **Mechanical Stresses** – These stresses occur when a running machine goes out of balance or subjected to frequent stops or starts or exposed to mechanical damages. Bearing failure or other mechanical vibrations also produce this kind of stresses. As regards UG cable, the injuries inflicted on it by the external mechanical devices, especially during the digging of a trench, cause these stresses.
- **Chemical Attacks** – This kind of attacks occur when the insulation is exposed to corrosive vapours / gases chemical fumes, sparks and arcs produced by oil vapours, dirt and oil. These undesirable factors simply reduce the effectiveness of the insulation and impedes its function.
- **Thermal Stresses** – This kind of stresses are produced while running the machine in excessively hot or cold conditions and this is known to all. These conditions produce excess expansion or contraction of the insulation which may result in cracks and failures. Frequent stops and starts of a machine also cause this kind of stresses. It is one of the main factors that control the thermal ageing of the insulation.
- **Environmental Pollution** – The contaminants or pollutants surrounding a machine consists of a multitude of agents ranging from moisture, humidity to conducting pollutants like salt sprays, coal dust, chemical powders, cement dust and fly ash. Rodent attacks also fall under this category.

In this context, it may kindly be noted that due to various reasons when an insulation fails to adequately stop / limit the flow of electrical current in undesirable paths, it will be declared as failed / weak. This flow of current consists of (i) the flow across the outer or inner surfaces of the insulation and (ii) through the body of the insulation (conduction current). To cite an example; the pinholes or cracks in the insulation or moisture and foreign matters like chemical pollutants and salt can go inside the insulation surface and get ionized when an voltage is applied across it and provides a low resistance path for surface leakage currents. On cleaning and drying out the insulation surfaces containing moisture and other contamination, this leakage current can be reduced or stopped. But the degradation caused by other causative factors like mechanical damages, over voltage and thermal stresses cannot be easily rectified and so the deterioration process of insulation once started cannot be stopped. In other words, once the insulation degradation process gets initiated / triggered, the various initiators tend to help / assist each other and enhance the rate of deterioration only and the degradation can never be eliminated or rolled back. Insulation degradation process is an one way process or irreversible process. This is the role played by insulation tester (megger) in the life of any electrical equipment.

The megger insulation tester is essentially a high range resistance meter with a built in de-generator, which can be hand cranked, battery or electrical mains operated. The high DC voltage generated by this testing device,

when applied across the equipment insulation, produces several currents through and over the surfaces of the insulation being tested. The total current thus obtained in the test is directly indicated on an analog scale or on digital read out or both.

When a test voltage is applied across the insulation, more than one current flows in the circuit. The resultant current gives the resistance value of the insulation (i.e $R=E/I$). This current consists of three or four components depending upon the operating environment. Among them, the effect of surface leakage current can be eliminated by adequate cleaning and drying of the insulation.

The other three component are,

- (i) **Capacitive Charging Current** – It is required to charge the capacitance of the insulation. This current is initially large but relatively short lived i.e. it lies down quickly. It exponentially drops down to a value close to zero quickly. Hence its effect is not considered.
- (ii) **Absorption or Polarization** – This current also decays but it takes a longer time than the capacitive charging current. It depends on the type and condition of the bonding material used in the insulation. It takes several minutes for this current to lie down.
- (iii) **Conduction Current** – This current is steady and passes through the insulation continuously. Normally it will be treated as very high value resistor connected in parallel with the capacitance of the insulation. This is the main component of the insulation that exists finally i.e. when the insulation is fully charged and full absorption takes place.

The main precautions that should be taken prior to the insulation resistance test is to ensure that the test specimen is completely discharged and the final value of IR is taken after making adequate “wait time”. This point is to be essentially noted since the absorption current decreases at a relatively slow rate depending upon the exact nature of the insulation i.e. this stored energy in the capacitive medium of the insulation requires a longer time to die down than the time taken for the capacitance of the insulation to get fully charged.

Further it will be of interest to note that the interpretation and reading of the test results. The results on a direct reading analog scale require adequate experience. In addition, the temperature of the insulation under test also needs attention. This has to be taken note of before declaring the test results as temperature corrections are to be made.

When the test is started, three / four different currents (capacitive charging, dielectric absorption and conduction / leakage) are flowing in the circuit. Sum of these currents will drive the display of the instrument. As described earlier, as time goes on (in minutes), the charging current and the dielectric absorption current will cease to flow and finally the resultant of conduction / leakage current alone will exist. Thus the display of the instrument also varies. The reading increases speedily in the beginning, then gets slows down and finally becomes steady. In the case of an analog meter, the operator should be careful / watchful and see the pointer of the meter moves / travels “Smoothly” or “Stuttering”? And also whether it is rising steadily or intermittently dropping back? Useful information is given by these observations. The “Stuttering or filter” of the pointer indicates that the test piece approaches its breakdown or the test voltage is nearing its maximum withstand voltage level. This warning needs to be heeded immediately and the test has to be stopped; otherwise the test piece will fail.

The speed of the pointer movement gives information on the capacitance of the item under test. If the pointer alternately rises and drops back, it shows the “arcing” occurs in the test piece but it is too small to cause the automatic shut down of the tester.

When the needle sways and oscillates, it indicates that the test piece has not yet reached the steady state and still under the influence of absorption and charging current. It shows that the item should be tested longer or that there is a problem.

It is time for me to stop. Let us reconnect in next month. Till than kindly stay tuned.

(To be continued...)



V. Sankaranarayanan, B.E., FIE,
Former Addl. Chief Engineer/TNEB
E-mail : vsn_4617@rediffmail.com
Mobile: 98402 07703

The secret of getting ahead is getting started – Mark Twain

SCIENTISTS PUSH BOUNDARIES TO FIND NEW ENERGY

Wind and solar energy remain the only obvious replacements for fossil fuels, but recent research shows that scientists are clearly thinking outside the box to come up with future alternatives.

They have recently been able to report at least theoretical progress with nuclear energy, algae, and a novel alloy.

From algae to alloys, ingenuity in the world's laboratories is fuelling experiments to find new ways of providing viable sources of clean energy.

In just a few days, they proved that thermo nuclear fusion – once somebody works out how to make it happen – will be economically viable. They have worked out how to cultivate green algae for biofuel in huge quantities at US\$50 a barrel, which is about the cost of crude oil. They have even found a way to get electrical energy directly from cyanobacteria, or blue-green algae. And they have exploited an alloy that can deliver a colossal pulse of electric power when you kick it.

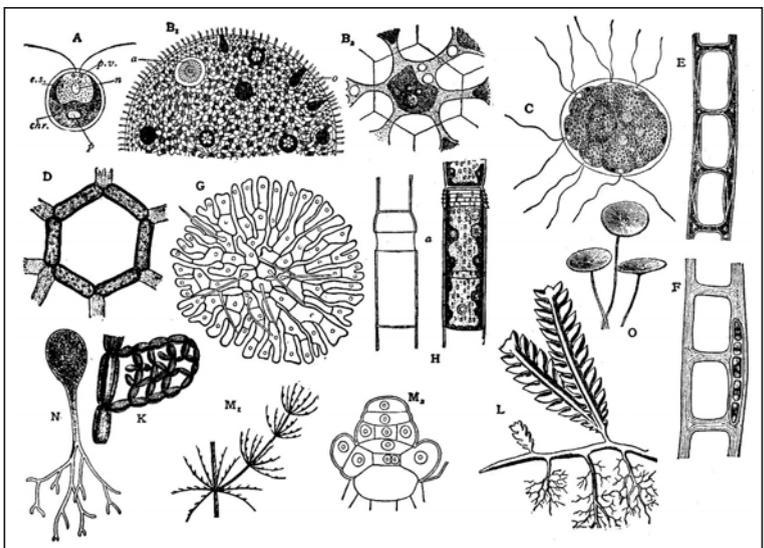
Experimental stage

None of these technologies has advanced beyond the experimental stage, but all are testament to the ingenuity now being deployed in the world's laboratories and experimental start-ups. Fusion power – not to be confused with nuclear fission – exploits the thermonuclear conversion of hydrogen to helium with little or no noxious discharge and the generous release of energy. This is what powers the sun and fuels the planet's life. It is also the basis of the thermonuclear bomb. For the last 60 years, humans have been trying to make fusion work peacefully on Earth, with only tantalising flickers of success. But if it does work, British scientists report in the journal *Fusion Engineering and Design*, it will not be too expensive. They analysed the cost of building, running and ultimately decommissioning a fusion power station, and found it comparable to fission or nuclear energy. The challenge of nuclear fusion is to heat stripped-down heavy hydrogen atoms to 100 million °C so that they fuse into helium, while finding a way to tap the released energy, and at the same time keep the reaction going.

The International Thermonuclear Experimental Reactor (ITER), now being built in the South of France, might in a decade show that it could happen. Assuming it works, the process should be affordable. There would be no high-level radioactive waste, no problems with finding fuel, and no by-product that could be turned into nuclear weaponry. "Obviously we have had to make assumptions, but what we can say is that our predictions suggest fusion won't be vastly more expensive than fission," said Damian Hampshire, of the Centre for Materials Physics at Durham University, UK. "Calculating the cost of a fusion reactor is complex, given the variations in the cost of the raw materials and exchange rates. However, this work is a big step in the right direction." Biofuel is currently based mostly on the conversion of agricultural crops – sugar cane or corn – to feedstock for ethanol, which can be converted into gasoline or other fuels. But, in a hungry world, this is not an ideal solution. So researchers have been looking at the microbial plant life in waste water and ponds as a possible answer, with promising experimental results on the small scale. But now an Israeli company called Univerve has pioneered a cultivation system that

What is algae?

- Algae are a large and successful group of organisms, which flourish in the sea, in fresh-water and in damp places on land.
- Most algae contain green chlorophyll, and can produce foods, such as sugars, from the sun.
- They have been classified in a separate kingdom called Protista.
- They are the base of the aquatic food chain.
- Algae growth is a natural occurrence in all water bodies.
- Algae thrives on hot weather when it reproduces more rapidly. It is stimulated by nutrients.



Algae Biofuel Beginning

Algae was responsible for creating the Earth's oxygen atmosphere three billion years ago and it took around two billion years to form the modern atmosphere with 20 percent oxygen. Without algae some argue that we would not be here.

gets ever more sunlight to speed up photosynthesis and get the algae working ever harder They report in Technology journal that they bubbled air through a suspended, modular triangular structure with transparent walls so the algae get their solar energy from all sides and their oxygen at all times. They promise green reactors up to 100 metres, holding 100 cubic metres of “production medium” or algae. There is a bonus: algae make omega-3 oils, so it could also serve the food industry and deliver cattle feed, as well as feedstock for the biofuel business. In Montreal, Canada, researchers report in the same journal that they can tap into the photosynthesis in the tank full of algae and directly retrieve clean energy in the form of electricity. The process involves tapping into the electron transfer chains in the plant life that turn sunlight into carbon-based tissue. In essence, the tank of cyanobacteria serves as the anode in a biological battery.

Commercially-useful

Having demonstrated the principle, the next step is to work out how to get commercially-useful power from what becomes, quite literally, the power plant. In the US, civilian and military scientists have been looking again at an alloy of iron doped with gallium that has been around for decades, but which has just shown that it can produce electricity. It has been named Galfenol, and is described in the Journal of Applied Physics as magnetoelastic. Squeeze or deform it, and its magnetisation changes. Stick it in a magnetic field, and it changes shape. The scientists found that when boxed in a clamp so that it could not deform, wrapped with copper wire and subjected to a powerful impact, Galfenol generated as much as 80 megawatts of instantaneous power per cubic metre. That is, it converted mechanical energy into electromagnetic discharge. Right now, like the other advances, it remains a discovery awaiting an application. But energy researchers are certainly applying great ingenuity to the search for clean energy sources.

GE’S DIGITAL POWER PLANT: THE NATURAL-GAS CONTENDER TO GRID BATTERIES

General Electric is sinking billions of dollars into natural gas turbines and power plants as the answer to the world’s need for cleaner and more flexible power. It’s also investing heavily in software to manage every aspect of electricity generation, distribution and consumption, in the form of its internet of things (IOT) offering, which it calls the “industrial internet.”

On Tuesday, GE put those two businesses together in the form of its Digital Power Plant offering. The IOT-equipped, cloud-supported software suite aims to squeeze increased flexibility and efficiency out of existing and new gas-fired power plants, to the tune of \$50 million to \$230 million in added value per plant.

GE also announced its first Digital Power Plant customers: New Jersey’s Public Service Enterprise Group (PSEG) for its gas-fired generators, and multi-state generator Exelon for nuclear, gas and wind power. The white paper accompanying Tuesday’s announcement mentions a “digital wind farm” with \$100 million in potential savings, alongside the emphasis on natural gas.

GE has made a big push into next-generation gas turbines that can ramp up and down more efficiently, helping to lower the costs of bringing additional flexibility to the grid. That’s something that utilities and grid operators are looking for to help manage the intermittency of wind and solar power, whether from minute to minute or over the course of an entire day.

GE claims its software can make these generators “behave like a virtual battery,” Ganesh Bell, GE’s chief digital officer, said in a Tuesday briefing. That could open up new opportunities in providing flexible capacity and quick-responding ancillary services for grid markets, depending on what type of power plant you’re starting with.

GE adds asset performance, power plant operations, and linkages to energy market and financial management software to allow this flexibility to be built into a company’s entire decision-making process. All of this, in turn, is supported by its data analytics platform, built to analyze and optimize every piece of its equipment over the internet someday. The company is holding its Minds + Machines conference this week, and is inviting partners to check out its white paper later Tuesday and come up with applications to build on the platform, he said.

All told, this improved asset performance, reduced fuel consumption, decreased unplanned downtime and maximized operational efficiency should yield up to \$230 million over 20 years for one of GE’s next-generation power plants, according to Steve Bolze, president and CEO of GE Power & Water. Existing baseload plants could get about \$50 million in value over a 20-year period, Bell said. GE equipment generates about one-fifth of the world’s electricity today, and the company sees a \$75 billion opportunity in its existing natural-gas power plant customer base, Bolze said.

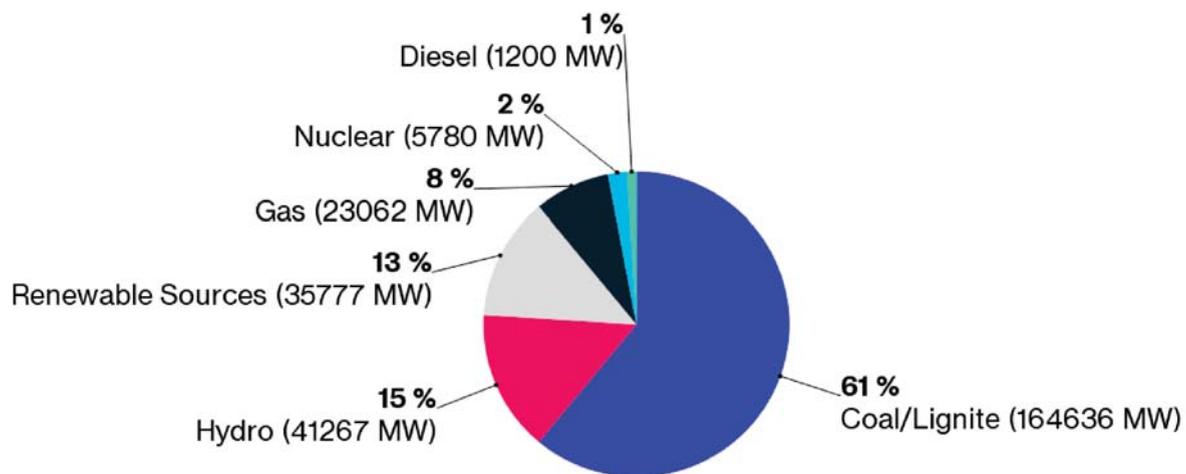
GE competes with Siemens, Mitsubishi Hitachi Power and acquisition target Alstom for the world’s natural-gas turbine business, and it’s not the only one that’s been working on this kind of flexibility and efficiency in its newest models. Nor is it the only company promising a wraparound software-and-device-connectivity platform to better manage them.

CHINESE TYCOONS LIANG WENGEN AND NAN CUNHUI PLAN TO POUR

Chinese tycoons Liang Wengen and Nan Cunhui plan to pour \$5 billion into India's renewable power sector as Prime Minister Narendra Modi seeks a major expansion of clean energy in one of the world's biggest polluters. Liang's Sany Group will install 2,000 megawatts of capacity and generate 1,000 jobs from 2016 to 2020 at a cost of \$3 billion, a statement released at a briefing in New Delhi on Thursday showed. Chint Group Chairman Nan said at the same event that his company will invest \$2 billion in solar power and equipment.

Modi's goal is 175 gigawatts of green energy capacity by 2022, up from about 37 giga watts, at an estimated cost of \$200 billion — more than the size of Vietnam's economy. Other billionaires such as Soft Bank Group Corp.'s Masayoshi Son and Foxconn Technology Group's Terry Gou have also outlined plans for substantial investment in clean power in India.

India's Installed Power Generating Capacity (as on March 31, 2015)



Source: Central Electricity Authority

Bloomberg

The nation remains reliant on coal, which fires about 60 percent of its power generation capacity. Asia's third-largest economy also needs to find the funds to pay for its green ambitions.

Dollar Contracts

While Modi is trying initiatives such as dollar-linked solar contracts to cut costs and woo investment, India has yet to allow higher distribution charges so electricity utilities can afford more renewable supplies.

"There have been billions in commitments made to invest in the Indian renewable sector over the last few years, which the government uses to tout as interest from the private sector," Raj Prabhu, chief executive officer of Mercom Capital Group, a cleantech communications and research company, said in an e-mailed statement. "However, very little of these commitments turn into a real investment."

Sany is China's biggest maker of construction machinery. Liang has a net worth of \$3.4 billion, according to the Bloomberg Billionaires Index. Chint has total assets of more than \$5 billion and 29,000 employees, according to its website.

Courtesy: Bloomberg

"The growth in India and China will be very healthy, so, all things being equal, the importance of India will continue to grow."

— RONALD DE JONG

Executive Vice President and Chief Market leader, Royal Philips Electronics

OSLO RECOGNIZED AS THE EV CAPITAL OF THE WORLD

Thanks to supportive government policies, Norway has become the friendliest place in the world for electric cars. Actually, the country is the most successful market for electric car producers, with more electric cars per capita than anywhere else in the world. One of the biggest sensation of the year, Tesla Model S even managed to be the best-selling car in September, while the Nissan Leaf climbed to top over all car models in October.

Many ask now what makes these cars so popular in the country and seek whether the same trend can be imported to other countries, considering environmental factors.

There are several incentives that promote electric cars choice in Norway. Availability of free public charging stations as well as toll-free roads, ferries and the ability of electric-car drivers to use bus lanes are important factors for Norwegian drivers to choose electric cars over conventional alternatives. Also conventional vehicles can be relatively expensive in Norway due to high tax regime, while plug-in cars are exempt from paying any tax until 2018.

While these new players of Norwegian roads are expensive relative to their size and luxury, but the free tax regime bring down their price to around the same as petrol and diesel vehicles, making them a viable alternative for many Norwegian households.

A Culture in Norway

Professor Marianne Ryghaug at Norwegian University of Science and Technology also points out there is a cultural dimension to the enthusiasm for electric cars in the country beyond their time and money saving features. According to Ryghaug, they are widely seen as comfortable and efficient due to their small size, and also provide the satisfaction of driving a less polluting car.

- Demonstrating environmental concerns by driving an electric car is important to some people. As more and more people choose them, it appears to be a more reasonable choice for others – particularly those with environmental leanings. This is at least true for countries like Norway where electricity is mainly produced from renewable sources, notes Ryghaug.

Yet it is Not Problem-Free

However, these encouraging promotions have potential to make the country's road overcrowded. The country is already starting to have more electric cars than it can handle, according to Quartz (via Charged EVs). Despite the growth of the charging-station network, Norwegians are having trouble finding places to plug in. Estimated 15,000 electric cars are served by 5,000 public charging stations. Roughly 500 of those stations are in the capital city of Oslo, where the majority of the population is concentrated.

Also, using bus lane started to become a problem. During rush hour on December 3, electric cars made up 75 percent of the 829 vehicles in Oslo's bus lanes, while actual buses made up just 7.5 percent. Taking all these factors into consideration, Marianne Ryghaug says it's not easy to replicate the situation in Norway in other countries.



Other countries have much less tax on conventional cars, and might deem it too expensive to implement the other favours Norway bestows upon electric vehicle drivers. But there may be other lessons to learn from the Norwegian case, adds she.

FACTS ABOUT ELECTRIC CARS IN NORWAY

- In 2013, 7,882 new passenger electric cars registered in Norway, which is twice as many as in 2012 when only 3,950 were registered.
- Last year, the market doubled and EVs now hold 5.5% market share on average in 2013.
- According to the November and December results, with over 11% of market share, it is expected that 2014 has a big chance to double the share.
- The fleet of plug-in electric vehicles in Norway is the largest per capita in the world, with Oslo recognized as the EV capital of the world.
- As of 30 September 2013, a total of 14,902 all-electric vehicles have been registered in Norway, including 13,462 all-electric cars and 1,440 quadricycles.
- Norway's fleet of electric cars is one of the cleanest in the world because almost 100% of the electricity generated in the country comes from hydropower.
- Norway was the first country in the world where electric cars have been listed among its top 10 best selling cars, and the first one to have electric cars topping the new car sales monthly ranking.
- Among the existing government incentives, all-electric cars are exempt in Norway from all non-recurring vehicle fees, including purchase taxes, which are extremely high for ordinary cars, and 25% VAT on purchase, together making electric car purchase price competitive with conventional cars.
- Electric vehicles are also exempt from the annual road tax, all public parking fees, and toll payments, as well as being able to use bus lanes.
- These incentives are in effect until 2018 or until the 50,000 EV target is achieved.

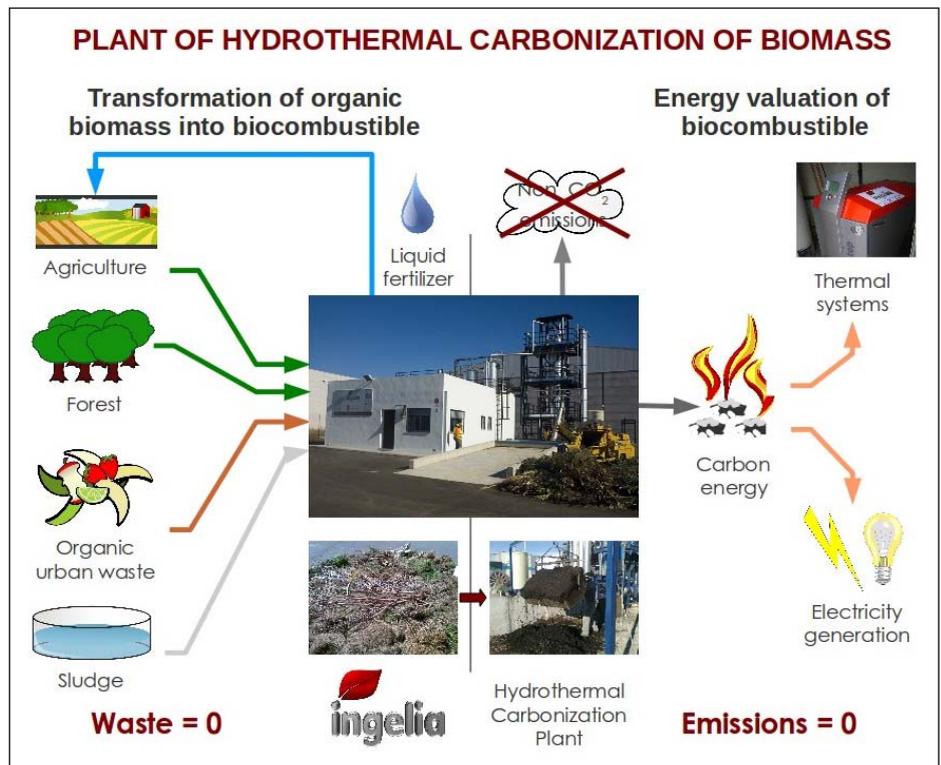
WAYS TO SAVE ENERGY AT HOME – COOLING

- **Switch your ceiling fan** to turn in a counter-clockwise direction in the summer; in the winter, run it at low speed, but clockwise.
- **Close your exterior doors and windows** tightly when the AC is on. Save even more by turning off kitchen and bath exhaust fans.
- **Change or clean your AC's air filters** at least once a month to keep your system running at peak performance.
- **Make sure your AC has a STAR rating**
- **Make saving automatic:** Set your thermostat fan switch to "auto" to save energy. Leaving it in the "on" position keeps air running constantly.
- **Block the sun** from overheating your home! Inside, use shades, blinds and drapes. Outside, use awnings, trees and shrubs.
- **Insulate your walls** with injected foam insulation to help you save energy by keeping hot outside air from seeping through porous block walls – check with your local building supply company for details.
- **Give your AC tune-up.** Running an inefficient AC system can result in high monthly bills.
- **Open interior doors** so that cooled air flows freely throughout your home.
- **Repair leaky ducts** to reduce heating and cooling costs.
- **Install attic insulation** rated R-30 and sealing any attic leaks to reduce high home cooling costs. You'll save money each month.
- **Check for household leaks** to make sure air isn't escaping through openings such as fireplace dampers, doors and windows.
- **Decorate for a cooler home** by hanging light-coloured curtains that allow light to enter a room while blocking some of the sun's rays, and light-coloured paint to reflect heat.
- **Close unused air vents.** If you have central AC you can close air vent in rooms you're not using so you're not paying to cool them.
- **Plant trees** to provide shade on the sunny side of your home.
- **Use ceiling fans** to cool off for less. Ceiling fans use no more electricity than a standard light bulb. However, be sure to turn fans off when you leave — they only cool people, not rooms.
- **Install more ceiling fans.** Because the breeze of a fan can make you feel three to four degrees cooler, you can raise that thermostat and still stay comfortable.
- **Raise the temperature** on your thermostat by a few degrees to save on your cooling costs.
- **Install a programmable thermostat** to adjust your temperature during the day.

ABENGOA SELECTED TO BUILD THE WORLD'S LARGEST BIOMASS COMBINED HEAT AND POWER PLANT IN THE UK

- The plant will have 299 MW and produce renewable electricity and heat at high efficiency.
- The engineering and construction contract will exceed 600 M€.

Abengoa, an international company that applies innovative technology solutions for sustainable development in the energy and environment sectors, and Toshiba Corporation, have been selected as preferred bidders to build the Tees Renewable Energy Plant. The project is owned by MGT Teesside, a subsidiary of MGT Power, a British company committed to developing utility scale biomass CHP projects. This will be the world's newly built largest power and steam from biomass plant, and will be located in the Port of Teesside, Middlesbrough, United Kingdom. It will have a capacity of 299 MW of electricity and steam, both for self-sufficiency and to be exported to nearby industry and users. The engineering and construction contract will exceed 600 M€.



Abengoa will be responsible for carrying out the engineering, design and construction of the plant for the client MGT Teesside. This project will use wood pellets and chips from certified sustainable forestry resources from the United States and Europe as fuel, and will be audited to ensure compliance with the strict criteria established by the UK's incentives for renewable energy. The project will supply renewable energy for the equivalent of at least 600,000 households in the UK. During the construction phase, up to 1,100 jobs are expected to be created.

With this plant, Abengoa will contribute to reduce the UK's carbon footprint and promote the country's energy transition to renewable and efficient energy sources. In addition, this base-load generation reliable thermal plant will help to ensure the supply of electricity to U.K. consumers, while reducing greenhouse gas emissions.

Abengoa has now been awarded the construction of two power and steam biomass plants in less than a year, the other being a 215 MW plant in Ghent, Belgium. The Ghent project was previously the largest power and steam from biomass plant in the world to have awarded a construction contract. These two awards strengthen Abengoa's capacity to develop complex projects, as well as its commitment to sustainable development.

About Abengoa

Abengoa (MCE: ABG.B/P SM /NASDAQ: ABGB) applies innovative technology solutions for sustainability in the energy and environment sectors, generating electricity from renewable resources, converting biomass into biofuels and producing drinking water from sea water.

About Toshiba

Toshiba Corporation, a Fortune Global 500 company, channels world-class capabilities in advanced electronic and electrical product and systems into five strategic business domains: Energy & Infrastructure, Community Solutions, Healthcare Systems & Services, Electronic Devices & Components and Lifestyles Products & Services.

Founded in Tokyo in 1875, today's Toshiba is at the heart of a global network of over 590 consolidated companies employing over 200,000 people worldwide, with annual sales surpassing 6.5 trillion yen (US\$63 billion).

Most people spend more time and energy going around problems than in trying to solve them – HENRY FORD

5 MUST-HAVES FOR A SUCCESSFUL SOLAR PROJECT

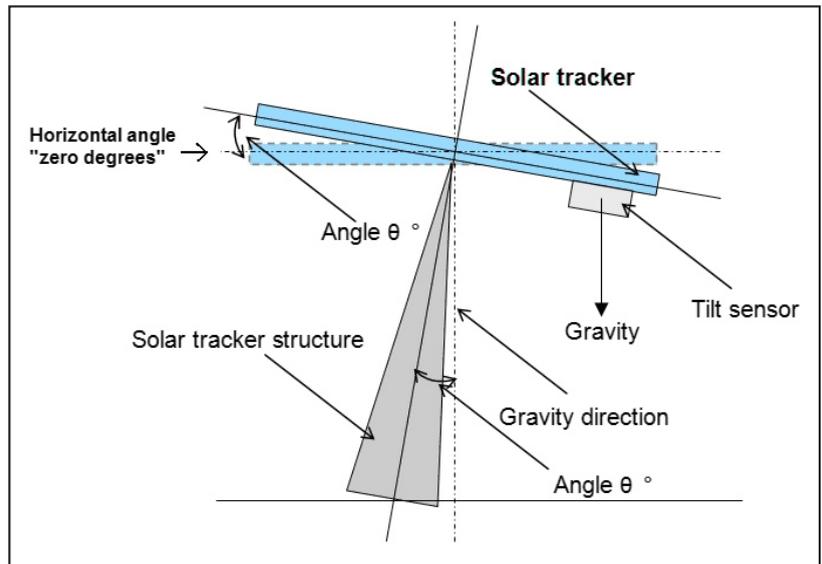
(This article pertains to Singapore region. Since Indian climate conditions are very similar to Singapore, this article suits India also.)

The solar industry is enjoying unprecedented growth, thanks to falling installation costs and the attractiveness of cheap, renewable, and sustainable energy. But making a solar project work hard for you is not as easy as it looks. Experts share five tips for ensuring the perfect solar project.

The global solar industry has in the past decade enjoyed rapid growth, with total installed capacity growing more than 200 times from 806 megawatts in 2000 to about 175 gigawatts last year, according to the International Renewable Energy Agency (IRENA). Sunny Singapore has seen a similar trend. The city-state's Energy Market Authority says that the total capacity of solar PV systems doubled from 2013 to 2014, from about 14 megawatts peak (MWp) at the end of 2013 to 30.8MWp at the end of last year. This figure is set to multiply thanks to a government target to install 350MWp of solar energy on public sector rooftops by 2020. Solar energy is becoming increasingly attractive, especially as it is now at grid parity in Singapore - that is, the cost of generating solar energy is competitive with the cost of fossil fuel derived electricity provided by the national utility, even without subsidies. But despite solar's growing popularity, commercial and residential clients may not always have all the right information to ensure that their solar systems are long-lasting and high-performing.

Andre Nobre, head of PV systems technology group at the Solar Energy Research Institute of Singapore (SERIS), adds that if a solar PV installation is not done right, problems such as low energy yields, frequent system failure, and faulty components can create a negative perception of solar, which could affect growth numbers for PV in Singapore. From the experience and expertise of the installer to the location and exact angle at which the panels sit, the variables that affect how a solar system will perform for a client are numerous and complex.

Here are five pointers from solar experts on how clients can achieve the perfect solar installation.



1. Choose a reliable integrator

PV systems integrators deliver many services to clients, including designing, building, and connecting a system to the grid. Setting up an installation in the ideal location, sourcing the best quality components, making sure it is safe, and that it delivers a good energy yield are all part of an integrator's job. Tai Xiang, senior vice president for Singapore's largest PV installer Phoenix Solar, says that given the huge difference in quality that exists among installers, "it is our job to educate the client" on the difference and what responsible installers do to deliver the best possible system.

For example, before purchasing components from a new supplier, Phoenix Solar visits their factories and assesses their compliance with international certification standards and financial performance to ensure that the manufacturer does not compromise on quality to cut costs and that good working conditions are available for its workers, says Tai. Clients should expect potential integrators to do the same, and should always ask for references and testimonials for the same type of installation they plan to purchase, says SERIS's Nobre.

"Although I might be shown only "cherry-picked" excellent systems, at least I would have the peace of mind that such an integrator has successfully demonstrated having installed these systems before," he explains.

In Singapore, the National Solar Repository is a valuable resource for solar buyers, adds Tai. The website tracks the efficiency and output of systems across the island, and has comprehensive explanations about the technical components of a system. While it is not mandatory for companies to publicise performance data, Phoenix Solar does so, says Tai. "Most integrators with high-performing systems would do the same", she says.

2. The perfect installation starts with the perfect building

Getting the design right from the start can also reduce the upfront cost of a solar project, says Kong Wei Jie, sales manager of Phoenix Solar.

For example, metal roofs are better suited to solar installations than tiled roofs because they are easier to drill or attach clamps on. Therefore, if a building or home owner has already decided to install solar panels before construction begins, they should opt for a metal roof, he recommends. He adds that it is important to take note of areas of the roof which are obstructed by surrounding buildings or trees. This is where 3D modelling can help: It can chart how the sun will shine on the roof over the course of the day and predicts energy output from a solar system, "Selling a bigger system to clients means higher profits, but there is no point in installing panels on an area of the roof that is in shade most of the time," he shares. Clients should ask to see 3D models and simulations before deciding on a system size, Kong suggests.

3. Get the angle right

Another often-overlooked aspect of a solar installation is the angle at which solar panels rest on the roof, says Nobre. Commercial and residential clients alike must make sure that PV modules are tilted to approximately 10 degrees, so that the panels can effectively 'self-clean' when it rains. If the angle is not steep enough, rainwater collects on the panels and will lead to system degradation over time. "Although you hear integrators saying they follow this rule, the average tilt angle of systems is still six to seven degrees across the island," he notes. The National Solar Repository also lists the tilt angles of each installation, and clients can check to ensure that the company they choose sticks to the recommended tilt angle.

4. Compare your system with others

It is common for a company to promise a certain yield to potential new clients, but they may not always explain how this yield may be affected by factors such as the availability of sunlight or the quality of modules, says Nobre. This may lead to lower-than-expected energy yields. Kong adds that customers should familiarise themselves with the solar system performance benchmark published on the National Solar Repository. This is a figure which indicates the minimum levels an installation should perform at. This currently stands at 1.08 megawatt hours per kilowatts peak per year. This figure will be updated regularly.

A good system should deliver energy equivalent to or more than the benchmark figure, says Kong. If it does not meet this target, "there is something it is not doing properly". To guide clients and companies towards more effective installations, the Energy Market Authority has collaborated with the Building and Construction Authority to publish a comprehensive handbook on best practices. Such information empowers clients and "encourages installers adhere to guidelines," says Kong.

5. Know your business models

Signing up for a solar system is also no longer just a matter of purchasing an entire system from a systems integrator, says Kong. There is now a variety of purchasing models available, ranging from an outright purchase to a solar power purchase agreement (PPA), where the installer pays for the construction and maintenance of a rooftop solar system, and the client only pays for the electricity used. Familiarity with the various purchasing models and potential cost savings will help clients get the most out of their solar installation, Kong adds. The most

suitable purchasing model depends on the buyer's financial requirements. Outright purchase gives the highest returns to the owner of the system while PPAs will appeal to clients who, while keen on having a supply of clean solar electricity, prefer not to commit up-front capital. However for PPAs, the bulk of the financial rewards goes to the PPA company and the buyer is required to enter into a long term (20 to 25-year) contract.

The solar industry is still relatively new, but is sure to grow as pressure to mitigate climate change makes energy from fossil fuels less attractive, he adds. "As the industry grows, clients will be more educated, hold installers accountable for a quality product, and create a positive cycle that will drive the industry forward."

Courtesy : Eco Business

WHAT DOES "RESPONSIBLE INNOVATION" MEAN?

We might say that in doing their work, and through the innovation processes that they are part of, engineers are writing history. In so doing, they take on a huge responsibility. As more and more voices lend their weight to the call for "responsible innovation," and a community of scholars and practitioners adopt the "RI" cause, what role should engineers and their professional organizations play in this debate?

Last month's National Society of Professional Engineers *PE* magazine featured an article by Eva Kaplan-Leiserson that raised a host of interesting questions related to engineers' role in ethical decision-making processes, and their responsibility to future generations for the effects brought about through their work. The article suggests that engineers should move away from looking at their work from a purely technical point of view and ask how their developments may affect humanity's future and whether they are working towards idealized goals of societal improvement and the common good.

Such a suggestion raises another set of questions. How much control can a design engineer have over his or her product once it has reached the market? Can engineers provide (and implement or enforce) appropriate guidelines for the use of novel devices?

"Who is better equipped to understand the possible far reaching effects of these innovation processes than the engineers themselves?" Kaplan-Leiserson asks, quoting Sujata Bhatia, author of a recent article in *The Chronicle of Higher Education's Chronicle Review*, "Fools for Tools." Bhatia believes that "If engineers fail to carefully weigh the long-term impact of their innovations and neglect to provide appropriate guidance for novel devices, then engineers share the culpability if their machines are used in ways that harm the public good."

The Responsible Innovation (RI) community shares an interest in the debate, although from a slightly different perspective. The goal of RI is to make the entire innovation process responsible, and not merely individual engineers, scientists or entrepreneurs.

A decade ago RI was practically unheard of, with scattered individuals in universities across the globe connecting through a loose network of interests, or working with non-academic partners on the fringes of policy-making and politics. Today the community boasts RI university chairs, dedicated blogs, book series, and a growing global network.

The concept is still in its infancy, and as a result definitions abound within a rapidly expanding body of literature both from academic and non-academic sources. One of the most commonly cited definitions of Responsible Innovation comes from Rene von Schomberg, team leader of science policy at the European Commission: "Responsible Research and Innovation is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society)."

These definitions address the concept of RI in terms of science, technology, and industrial production and include the distribution and supply processes, end products and their use. But unlike Kaplan-Leiserson, who emphasizes individual actions, these RI advocates stress process.

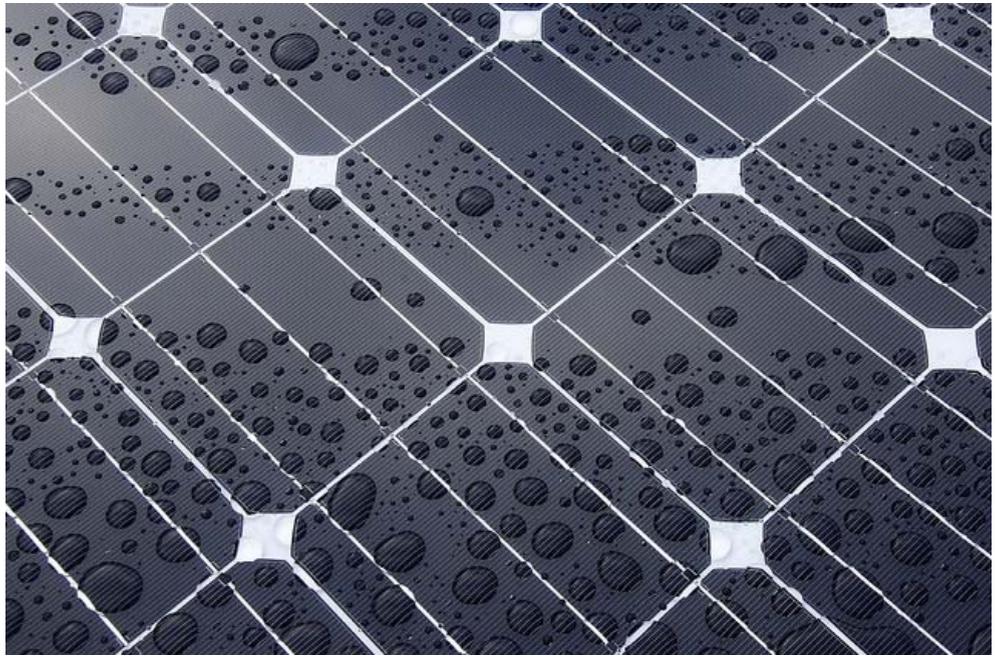
As with any other young concept, RI draws from a broad base of methodologies, interests and experiences. Current research includes placing social scientists in laboratories to enhance scientists' own understanding of the complex consequences and ripple-effects of their innovations; the construction of ethical frameworks to bring RI considerations to bear onto both funding and research practice areas; and the investigation of grass-roots models of production that seem to fit the various RI models.

The RI debate has also evolved to incorporate those interested in entrepreneurship and small business, banking, science and scientific research and a host of other fields. The European Commission has included the concept in many of its research calls, as have various engineering and academic funding bodies. The Netherlands government also has a large funded RI project, and it seems that the concept is quickly becoming institutionalized.

HOW LONG DO SOLAR PANELS LAST?

When considering going solar, we know that one of the top questions tends to be something along the lines of “How much do solar panels cost?” or “What is the cost of solar?” because for many of us, adding a home solar array isn’t just about reducing pollution and greenhouse gas emissions, but it’s also about the bottom line, which inevitably comes down to discussions of dollars and cents.

Once it’s established that the cost of going solar isn’t nearly as high as people might think, and that a home solar system is well



within reach of many homeowners, a popular follow-up question is usually about longevity and reliability, or to phrase it explicitly, “**How long do solar panels last?**”

Most solar panels used in home solar arrays come with a warranty for some 25 or 30 years, which means that the solar panels are guaranteed for decades, unlike many of the other goods we buy. And again unlike many other consumer goods, they don’t ‘give up the ghost’ at the end of their warranty period and need to be replaced, but continue to still produce clean electricity, although at a slightly less efficiency each year. In fact, some decidedly old-school solar cells have been producing electricity daily for about 40 years or so, and are expected to continue to power homes and businesses for decades more.

According to a study undertaken by the National Renewable Energy Laboratory (NREL) a few years ago, which looked at the ‘photovoltaic degradation’ rates of some 2000 solar installations, the average solar panel loses about half of a percentage point (0.5%) of efficiency per year, which means that a panel at the end of its 25-year warranty period should still be operating at about 88% of its original capacity. However, not every panel will see degradation rates as high as 0.5%, as shown by this 30+ year old solar panel, which outperforms its original specs, even after decades in the sun.

*This decades-long life of solar panels makes the economics of going solar even better, as most systems will pay for themselves within the first ten years, and yet still produce many many more years of clean electricity for their owners, so asking “**How long do solar panels last?**” might be the wrong question.*

Perhaps a far better question might be “What are the estimated maintenance or replacement costs for a solar energy system?”, because while the solar panels themselves probably won’t need replacing anytime soon, the inverter (which converts the DC from the panels into AC for feeding into the home’s outlets and the grid) may need to be. The average inverter warranty ranges from 10 to 15 years, and unlike solar panels, will not just slowly get more inefficient, but will instead just quit working. However, while that’s usually the case with a central inverter (which handles the output of all the panels), a newer type, the so-called ‘micro-inverters’, are installed or included with each solar panel, and are said to have a much longer lifespan (up to 25 years), and could last for decades as well.

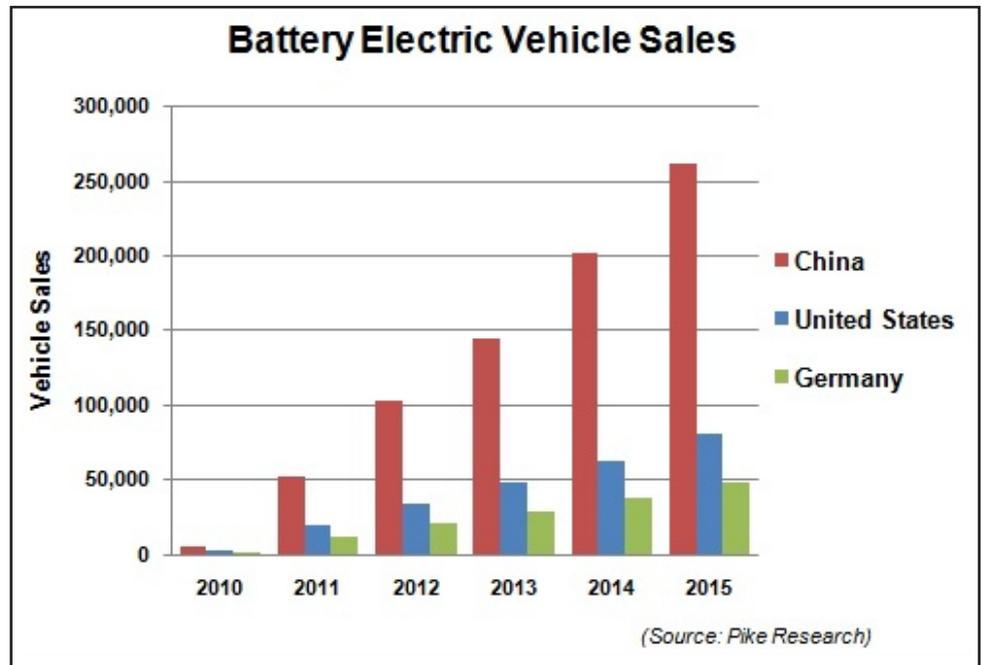
Even adding in the cost of a replacement inverter (or several, if micro-inverters are used instead) over the life of a solar energy system, the return on investment for solar is still better than many places you can put your money, and has the added benefit of essentially locking in your electricity prices for years to come.

“Have you also learned that secret from the river; that there is no such thing as time?” That the river is everywhere at the same time, at the source and at the mouth, at the waterfall, at the ferry, at the current, in the ocean and in the mountains, everywhere and that the present only exists for it, not the shadow of the past nor the shadow of the future”. – HERMANN HESSE, Siddhartha

CCM: CHINA'S NEW EV CHARGING INFRASTRUCTURE PLANS

China's commitment to building 12,000 EV charging stations and 4.5 million charging points by 2020 could be a "game-changer" for the country's EV market, according to analysts CCM.

The target was originally announced on September 25 by the press office of the State Council, China's government cabinet chaired by Premier Li Keqiang, and then reinforced last Friday (October 9) by the publication of a set of Guiding Opinions on Propelling the Construction of Electric Vehicle Charging Infrastructure calling for the construction of a charging infrastructure capable of coping with up to 5 million EVs by 2020.



CCM calculates that meeting this target will require an investment of up to RMB120 billion (USD19 billion) based on current costs, which Beijing plans to fund through a combination of public and private capital.

If the goal is achieved, it is certain to have a dramatic effect on China's charging infrastructure. As of 2014, there were only approximately 30,000 charging points in the entire country, according to think tank China EV100, and a lack of charging infrastructure has long been perceived as a major road block to faster growth in EV sales.

Though China's EV market is growing very fast in percentage terms, with production of EVs up over 300% year on year during January-August 2015 at 123,500 units, this is a drop in the ocean compared to the 15.5 million vehicles produced in China overall during the same period, and is far lower than the government's target of 500,000 EV sales during 2015.

However, last announcement could mark a turning point, not only due to the scale of the planned investment, but also because it indicates a clear evolution in Chinese government policy, according to Stanley Wang, editor of China Li-ion Battery E-News:-

"China's willingness to pour money into the EV market has never been in doubt - what is new is that the government is approaching things more systematically and making sure that the money is being spent more efficiently".

"Until recently, support was provided mainly through subsidies to make EVs more price competitive, but not enough attention was paid to other barriers such as the chronic lack of charging infrastructure, and policies were often uncoordinated, meaning that the infrastructure that was installed was incompatible with many vehicles".

"But we have seen real progress in recent weeks, and the government now appears to be on the right track. We think that, together with the other recently announced policies, this latest commitment to building 4.5 million new charging posts could be a real game-changer for EVs in China, particularly BEVs."

A plan taking shape

The target for constructing charging points is just the latest in a series of policy measures to boost charging infrastructure announced by Beijing in the last six weeks.

New legislation aimed at standardizing charging stations and battery-swap stations came into effect on September 1 and October 1 respectively, while new universal standards for charging points are currently being developed and are expected to be published in early 2016.

We are what our thoughts have made us; so take care about what you think. Words are secondary. Thoughts live; they travel far. – SWAMI VIVEKANANDA

Also in the pipeline is a new policy to regulate the number of charging points provided in municipal car parks, with requirements expected to include the provision of one charging point for every ten parking spaces outside major public buildings and in public car parks.

When asked for details about the new car parks policy, Lu Kehua, deputy minister of China's Ministry of Housing and Urban-Rural Development stated: "It is a great wish that every EV should be equipped with one charging point."

Meanwhile, the September 23 State Council meeting gave an indication of the shape of future supporting policies. According to a press briefing on September 25, during the meeting Premier Li called for entry barriers to the charging infrastructure market to be lowered and for measures to encourage private capital to invest through public-private partnerships or even as sole proprietors. Individuals and communities will also be allowed to set up their own charging points in their homes and residential areas.

Central and local governments will also be encouraged to help private investors finance the construction of charging points by creating special investment funds and bonds, and by allowing private companies to charge fees for the usage of their charging points and developing payment methods to allow them to do this.

Charging fever

The flurry of government announcements has sent the stock prices of charging providers soaring in recent weeks. On September 22, the shares of Qingdao Tgood Electric Co., Ltd., Hangzhou Zhongheng Electric Co., Ltd., Shanghai Potevio Co., Ltd., Zhejiang Wanma Co., Ltd. and Shenzhen Auto Electric Power Plant Co., Ltd. all hit the 10% daily limit for price rises, and have continued rising since then, with all these companies hitting the daily limit again on October 8.

And industry experts expect that this could be just the beginning. One Chinese security analyst commented to CCM:

"Market demand for charging infrastructure is increasing following the explosion in sales of alternative energy vehicles. The stock prices of relevant companies will continually rising for some time to come," said the analyst.

About CCM:

CCM is the leading market intelligence provider for China's agriculture, chemicals, food & ingredients and new energy markets. Founded in 2001, CCM offers a range of data and content solutions, from price and trade data to industry newsletters and customized market research reports. Our clients include Monsanto, DuPont, Shell, Bayer, and Syngenta. CCM is a brand of Kcomber Inc.



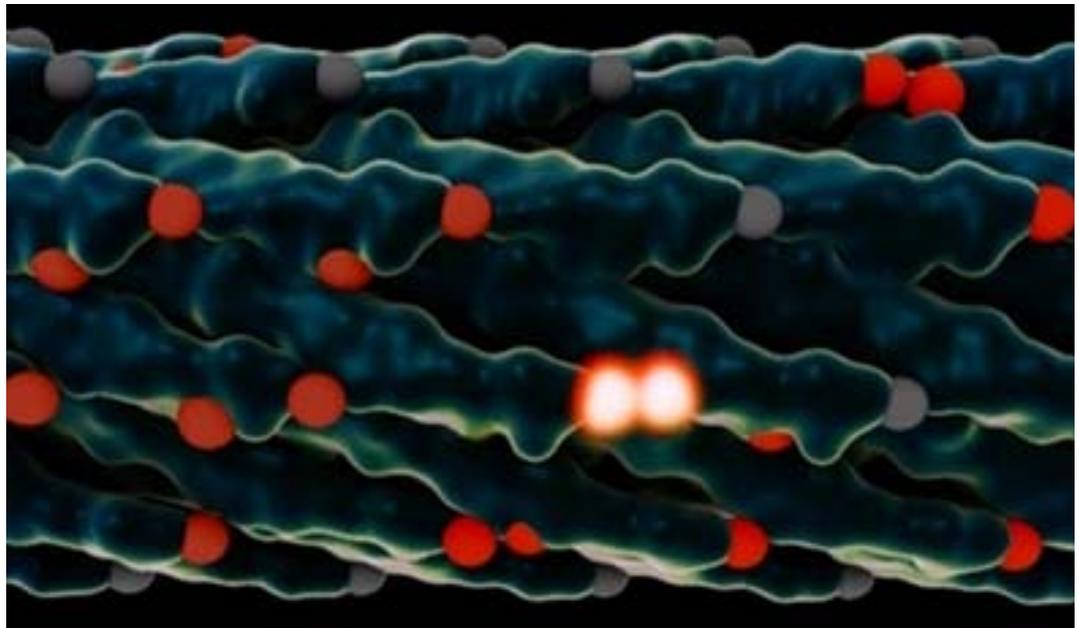
An individual who breaks a law that conscience tells him is unjust, and who willingly accepts the penalty of imprisonment in order to arouse the conscience of the community over its injustice, is in reality expressing the highest respect for the law. – MARTIN LUTHER KING, JR.

QUANTUM PHYSICS MEETS GENETIC ENGINEERING

MIT researchers achieved this new approach to solar energy not with high-tech materials or microchips — but by using genetically engineered viruses.

Nature has had billions of years to perfect photosynthesis, which directly or indirectly supports virtually all life on Earth. In that time, the process has achieved almost 100 percent efficiency in transporting the energy of sunlight from receptors to reaction centers where it can be harnessed — a performance vastly better than even the best solar cells.

One way plants achieve this efficiency is by making use of the exotic effects of quantum mechanics — effects



Rendering of a virus used in the MIT experiments. The light-collecting centers, called chromophores, are in black, and chromophores that just absorbed a photon of light are glowing white. After the virus is modified to adjust the spacing between the chromophores, energy can jump from one set of chromophores to the next faster and more efficiently. Courtesy of the researchers and Lauren Alexa Kaye.

sometimes known as “quantum weirdness.” These effects, which include the ability of a particle to exist in more than one place at a time, have now been used by engineers at MIT to achieve a significant efficiency boost in a light-harvesting system.

This achievement in coupling quantum research and genetic manipulation, described this week in the journal *Nature Materials*, was the work of MIT professors Angela Belcher, an expert on engineering viruses to carry out energy-related tasks, and Seth Lloyd, an expert on quantum theory and its potential applications; research associate Heechul Park; and 14 collaborators at MIT and in Italy.

Lloyd, a professor of mechanical engineering, explains that in photosynthesis, a photon hits a receptor called a chromophore, which in turn produces an exciton — a quantum particle of energy. This exciton jumps from one chromophore to another until it reaches a reaction center, where that energy is harnessed to build the molecules that support life.

But the hopping pathway is random and inefficient unless it takes advantage of quantum effects that allow it, in effect, to take multiple pathways at once and select the best ones, behaving more like a wave than a particle.

This efficient movement of excitons has one key requirement: The chromophores have to be arranged just right, with exactly the right amount of space between them. This, Lloyd explains, is known as the “Quantum Goldilocks Effect.”

That’s where the virus comes in. By engineering a virus that Belcher has worked with for years, the team was able to get it to bond with multiple synthetic chromophores — or, in this case, organic dyes. The researchers were then able to produce many varieties of the virus, with slightly different spacings between those synthetic chromophores, and select the ones that performed best. In the end, they were able to more than double excitons’ speed, increasing the distance they traveled before dissipating — a significant improvement in the efficiency of the process.

Every great advance in science has issued from a new audacity of imagination.

– JOHN DEWEY, *The Quest for Certainty*, 1929

GUJARAT ENERGY TRAINING & RESEARCH INSTITUTE

Gujarat Energy Training & Research Institute (GETRI) is an autonomous training and research facility promoted by Gujarat Urja Vikas Nigam Limited. It was established with a view to offer a platform for providing state-of-the-art facilities for training, skills upgradation, research and documentation of best practices in the power industry. GETRI is equipped with full-time faculty members with expertise in power sector - Generation, Transmission, Distribution, Regulatory, IT, Finance, Commerce and HRD. The Institute also calls upon eminent external faculty with rich and vast experience in their respective fields both in India and abroad.

Objectives

The purpose of the institute is catering to the need for training the employees of GUVNL and its subsidiary companies. The following activities are carried out continuously :

- To prepare a training need analysis periodically in accordance with our mission & vision.
- Comprehensive annual training plan preparation (for generation, transmission and distribution).
- To foster growth, team spirit and creativity amongst employees.
- Identifying planned training intervention for each level of transition in an employee's career.
- To extend support, advise and impart skills to trainers.
- To nurture professional values for protecting the environment.
- To set up research chairs for funding patentable works.

RESEARCH PROJECTS

- **P-01** Variation In Transmission Losses.
- **P-02** To reduce Auxiliary consumption in GETCO substation.
- **P-03** High rate of CT failure.
- **P-04** Corridor constraints for transmission lines.
- **P-05** Premature failure of transmission equipments.

RESEARCH CHAIRS

- Design patentable energy efficient motors.
- Design patentable renewable energy homes.
- Design patentable wireless transmission of power.
- Design patentable carbon footprint reduction projects.

The GETRI campus is spread over 75,000 square feet with constructed floor area of 33,000 square feet. GETRI has a well designed air-conditioned auditorium with seating for 100+. The latest audio and visual aids are available. The air conditioned library has a rich collection of more than four thousand books, reports, journals, periodicals, CD's and cassettes. Models for key aspects of the Electricity business assist the trainers. There are 39 double rooms of which 7 on the ground floor are with 3-star facilities. Broadband internet connectivity is wirelessly available in all the rooms and gardens.

Technical Training and skill Upgradation:

Power Station (Thermal, Hydro and non-conventional) Technologies and operations & maintenance.

Transmission systems technologies and operations & maintenance,

Distribution system technologies and operations & maintenance,

Energy Efficiency

Energy Environment Interface

Rural Electrification

Proposed Training Programmes:

Power Trading

The Electricity Act, 2003

V-Governance (Karmayogi)

Leadership excellence through Team & work excellence.



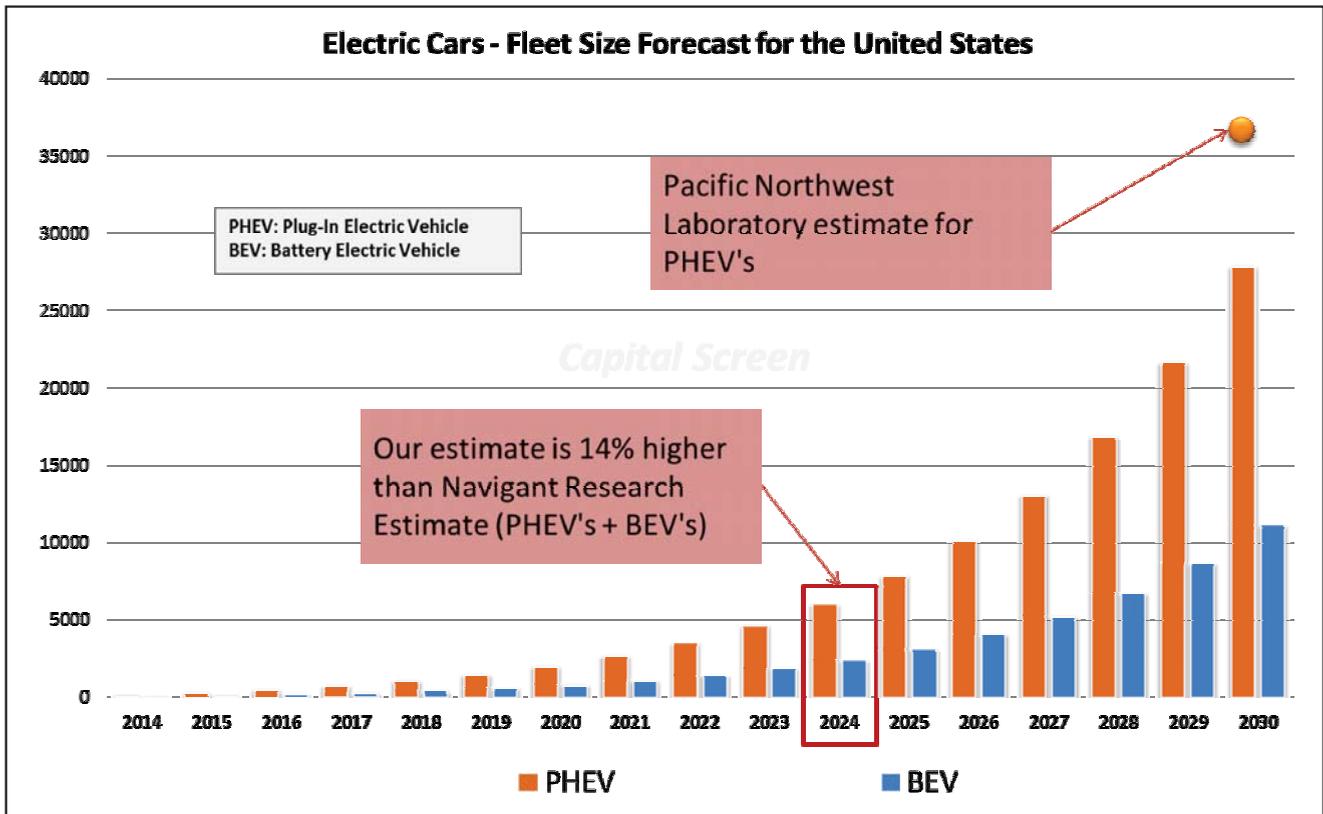
Disaster Management.
 tariff Structure and Analysis
 Advance Financial Management.
 Effective Performance Management.
 Disaster Management
 Safety Audit
 Generation
 Power Station Management
 P.C. BASED Simulator Training
 Boiler Combustion Optimisation
 Efficiency Management
 Condition Monitoring of Predictive Maintenance in Thermal Power Plant
 Workshop on Boiler Pressure Parts Failure
 Steam Turbine Performance. - Optimization and Diagnostic & Operational aspects
 O&M of Hydro Power Station
 Best Practices of Operation of Coal Based Power Plant
 Boiler Competency Examination
 Boiler Proficiency Examination
 Data Acquisition & Distributed Digital Control System.
 Turbine Operation and maintenance
 Boiler operation & maintenance
 Switchyard & electrical equipment Maintenance
 Medical Assistant Course in Occupational Health
 Water Management of Power Plant including Water Audit & Recycle
 Utilization of Fly-Ash in Building Construction.
 Transmission
 Grid Management
 Workshop on Availability Based Tariff - Experiences of Power Utilities
 Power System Operation & Computerised Load Despatch System SCADA
 Advance course on Power System Protection
 O&M of Transmission Lines and S/S
 Failure of Transformers - Cases & Remedies
 Skill Building Training programme for Line Staff of Transmission wing.
 RLA and life extension of sub-station equipments One day prog. on safety
 Induction training programme for VijSahayak
 Distribution
 Energy management
 Attitudinal Change
 G.I.S./G.P.S. for power utilities
 Pilferage of Electricity issues & challenges.
 Skill Building
 Best Practices in Distribution System O&M
 Distribution Loss Reduction
 Electrical Safety Procedure, Accident Prevention & Disaster Management
 Performance Benchmarking & Quality of Supply & service
 Customer Satisfaction, Communication & Outreach Change Management
 GIS-Supported Network Planning, Analysis and Asset Management
 Communications skills, employee motivation and morale development

HOW WILL GROWING EV DEMAND AFFECT OIL DEMAND?

According to the analysts over there, roughly 39 million electric vehicles (EVs) and plug-in hybrids (PHEVs) will be on the roads in the US by 2030. A fleet of this size would lower gasoline consumption by around 17.2 billion gallons a year (the electrics would use about 180 terawatt-hours of electricity a year instead).

The analysts note that this would have a very bearish impact on gasoline demand, and therefore crude oil prices — and that most current market players “have difficulties understanding how sizable the impact electric cars could make on crude oil demand and price in the long term is.”

Owing to this prediction, the analysts note that investing in other commodities, rather than crude oil, might be a better choice over the long-term.



In the United States 71% of the petroleum products consumed are used in transportation. Only 1% is used to produce electricity and 28% goes to the industrial, residential and commercial uses. Let's discuss how big impact electric cars could make on the gasoline consumption.

How much would such a sizable electric fleet impact the gasoline and electricity demand? Electric fleet would save annually some 17.2 billion gallons of gasoline (~\$39.5 billion at the pumps by current prices) by 2030. That corresponds to 0.4 billion barrels and it would be ~13% against the current level of gasoline consumption. Electric fleet would increase the electricity consumption by ~180 TWh. That is equivalent to ~3% of the current annual electricity consumption in the US.

...We believe that other asset classes and commodities might be better investments than oil in light of the fundamentals discussed in this article for the next 10-15 years. We recently wrote a bullish article on the agricultural commodities where the fundamentals look much better in our opinion.

E-GOVERNANCE

A transparent, smart governance with seamless access, secure and authentic flow of information crossing the inter-departmental barrier and providing a fair and unbiased service to citizens."

— Dr. A.P.J. ABDUL KALAM, Former president of India

ENERGY CONSERVATION THROUGH ENERGY EFFICIENCY – 8

Electrical Losses: We have been discussing the I^2R losses which can be considered as ‘omnipresent’ as it is there when ever and where ever Current I flows, whether in Domestic situation or Industrial or Agricultural usages or Transmission Lines of all Voltages like LV, MV, HV or EHV. Efficiency and Power Factor improvements result in reduction of “I” and higher and higher Voltages of Transmission also help reduction of “I” to minimize I^2R losses. In AP, for example, where there is a very large usage of Agricultural Pumping Sets, they have adopted in most of the parts of the State, HV Transmission up to the point very near to the Pumping Sets and reduce the Voltage to usable level through small rating Transformers of 15 and 25 KVA Ratings, thus achieving a sizable reduction in I^2R losses. In some of the parts of the State, they have also experimented with “*Single Phase Pumping Sets – 260V and 440V*”, which are of High Power Factor (0.95), helping to reduce distribution I^2R losses substantially.

Table below will show the steady reduction of losses steadily over the years in AP. Tamilnadu also has a very large number (more than 20 Lakhs) of Agricultural Pumping sets in use and High Voltage Distribution System could help reduce the distribution losses.

| OVERALL T&D LOSSES (%) | | | | | |
|------------------------|---------|---------|---------|---------|---------|
| State | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 |
| Andhra Pradesh | 20.3 | 19.2 | 18.1 | 16.1 | 15.3 |
| Tamil Nadu | 18.0 | 18.0 | 18.0 | 18.0 | 17.0 |



Power distribution is the weakest link in India's power chain

In the I^2R losses, ‘R’ or the Resistance of the Conductor is another factor that contributes to the increase or decrease of the I^2R losses. ‘R’ is decided by the Conductor Metal and its purity.

Copper is considered as one of the best conductor metal for Electricity (next only to Silver, which is unaffordable) with its low resistance and uniform cross section. The Conductor Metals for Electricity (remembered as SCAIL in short) are graded in the order of priority as Silver, Copper, Aluminum, Iron and Lead by its ‘R’ or Resistance Values.

We are seeing a TV Advertisements these days for a brand of Cables and Wires, which is relevant in this context. The head of the household says in that Ad. that though he is unable to control the way the appliances are used in the house, he has at the least done his portion for saving Electricity by changing the wiring in the entire house, with a Good Quality (Purity and Resistivity with appropriate gauge of wire) House Wiring Cable. The simple message is that with reduced ‘R’ value the I^2R losses reduce. The performance of the appliances could also become better as the Voltage Drop ($I \times R$) will also reduce providing better Voltage at the terminals of the Appliances.

Table: The resistivity of some metals

| | Resistivity | | |
|---------------------|---------------------|----------------------|----------------------|
| | $\mu\Omega\text{m}$ | $\mu\Omega\text{cm}$ | $\mu\Omega\text{mm}$ |
| Copper (annealed) | 0.0172 | 1.72 | 17.2 |
| Copper (hard drawn) | 0.0178 | 1.78 | 17.8 |
| Aluminum | 0.0285 | 2.85 | 28.5 |
| Tin | 0.114 | 11.4 | 11.4 |
| Silver | 0.0163 | 1.63 | 16.3 |

Temperature is an important factor that affects the Resistance Value. The Higher the Temperature, the Higher is the Resistance Value, which can be understood from the following Equations

R_1 = the conductor resistance at temperature T_1

R_2 = the conductor resistance at temperature T_2

$$R_1 = R_0(1 + \alpha T_1) \quad \text{and} \quad R_2 = R_0(1 + \alpha T_2)$$

In the Wires and Cables and Bus Bars etc, **I^2R losses** generate Heat resulting in increase of Temperatures. Selection of Cables, Laying of Cables and ‘Bunching’ of them where necessary, should be done in such a way that there is enough ventilation so that the Temperature Rise will be restricted.

In equipments like Transformers and Motors, there are additional losses, like Magnetization Losses etc, that contribute to more Heating and ventilation becomes very necessary and critical.

As we have broadly seen from the details discussed so far, **I^2R losses** form the major chunk of losses in the Electrical System. Apart from T & D Losses, in which **I^2R losses** can be assumed to constitute about 95% of it, the major equipments in the Electrical system like Transformers and Motors also contribute sizably to **I^2R losses**.

Approximate Break Up of Losses (out of the total losses) in Motors:

#55% to 60%-Stator and Rotor Copper Loss

***ROTORS of SQ. CAGE Motors- Copper Fabricated -TO- Al. Die cast – TO – Now COPPER DIE CAST.**



My message, especially to young people is to have courage to think differently, courage to invent, to travel the unexplored path, courage to discover the impossible and to conquer the problems and succeed. These are great qualities that they must work towards. This is my message to the young people.

– Dr. ABDUL KALAM

DIECAST COPPER ROTORS: Technology already Developed by ICA, NY. Indian Manufacture for Motors upto 20HP is with Very Positive SUCCESS – CE, CSA Certifications obtained

#20% to 25%- Core Losses

#2% to 12% - Friction and Windage

#4% to 5% - Stray Losses

Approximate Transformer Losses:

| KVA Rating | No-load Loss (Watts) | Full Load Loss at 75 Deg C (Watts) | Impedance % |
|------------|----------------------|------------------------------------|-------------|
| 160 | 425 | 3000 | 5 |
| 200 | 570 | 3300 | 5 |
| 250 | 620 | 3700 | 5 |
| 315 | 800 | 4600 | 5 |
| 500 | 1100 | 6500 | 5 |
| 630 | 1200 | 7500 | 5 |
| 1000 | 1800 | 11000 | 5 |
| 1600 | 2400 | 15500 | 5 |
| 2000 | 3000 | 20000 | 6 |

From the Table above giving Estimated Losses of different ratings of Transformers, it can be seen that Load or Copper or I^2R losses account for around 55% to 85%, depending on Loading of the Transformers.

A broad estimate will show that in our country at present, out of about 1000 Billion Units of Electricity generated based on present installed capacities and load factors, almost around 300 Billion Units are lost just through **I^2R losses**, which include all the kinds and areas in which the **I^2R losses** occur, discussed in this and earlier parts of the article. All attempts and continuous efforts must be made to reduce the **I^2R losses** in Cables and Wires and Conductors and Bus Bars and Terminations and Joints and Electrical Equipments and operating Power Factor and so on which can contribute sizably to increase the Efficiencies and Conservation of Energy.

(To be continued)



*S. Mahadevan, B.E., F.I.E., M.B.A.,
Consultant,
Energy and Energy Efficiency,
Mobile: 98401 55209*

TAMILNADU ELECTRICAL INSTALLATION ENGINEERS ASSOCIATION 'A' GRADE

OUR PUBLICATIONS

| Sl. No. | Title-Description of the Books | Your Contribution (Rs.) |
|---------|---|-------------------------|
| 1 | Electrical Design of Medium Voltage Bus Bars / Connections / Duct. | 300 |
| 2 | Guidelines On Electrical Installations For Practicing Contractors (Revised Edition) | 300 |
| 3 | CEIG - Extra High-High Voltage Electrical Installations-Indian Electricity Rules Pre-commissioning Tests of Electrical Apparatus And Equipments | 200 |
| 4 | (1) Installation of Captive generator (2) Electricity H.V. & M.V. Installation Proposals (3) Precautionary Measures to be taken in Design & Installation of building services including Electrical Services (4) The Indian Standard Specification | 110 |
| 5 | Self Certification Procedure | 70 |
| 6 | 1.Allowable Current Density in Bus Bar Installations 2. Electricity-Details on Implementation of renewable Energy Devices 3. Electricity-Electrical Inspectorate service rendered by Inspectorate scale of fees 4. Electricity-Captive Power Plant of Industries and other consent | 70 |
| 7 | 1. Electricity Guidance Notes for New, Extension to Existing or Modification of Electrical Work 2. Indian Electricity Act 1910 & Rules 1956 Statutory Appeal | 100 |
| 8 | Abstract - I Electricity-Policy on Captive Power Generation Plant | 60 |
| 9 | Abstract-II Electricity-Electrical Inspectorate Services rendered by Inspectors-Scale of fees- Revised-Orders-Issued. Energy (BI) Dept. | 70 |
| 10 | Electricity - Code of Practice of Earthing (IS-3043-1987) | 80 |
| 11 | T.N.Tax on Consumption or sale of Electricity Act 2003 and Rules made there under. | 100 |
| 12 | Guidelines for Installation of Transformer sub-station oil filled equipment etc. in the Buildings | 100 |
| 13 | Technical Hand Book on Electrical Information | 40 |
| 14 | Indian Electricity Act 2003, Indian Electricity Rules 1956 | 90 |
| 15 | Over Voltage Phenomena in a Power Network – an Overview | 110 |
| 16 | A Treatise on Power Quality with a Focus on Harmonics | 300 |

N.B. Packing & Forwarding charges Extra

PLEASE NOTE: Outstation members are requested to send the payment by D.D. only in favour of "TAMILNADU ELECTRICAL INSTALLATION ENGINEERS ASSOCIATION 'A' GRADE"



பல்லுயிர்ச் சூழலுக்குக் கூரைகளில் போடப்படும் தோட்டங்கள் உதவிபுரிகின்றன. அத்துடன் மழைநீர் சேகரிப்புக்கும் கட்டிடத்தின் வெப்பத்தைக் குறைப்பதிலும் உதவுகின்றன. கடந்த 30 ஆண்டுகளாக, வளம் குன்றாத நகர்ப்புற வளர்ச்சிக்கு அவசியமான அங்கமாகப் பசுமைக் கூரைகள் என்று சொல்லப்படும் கூரைத் தோட்டங்கள் கருதப்படுகின்றன. சுற்றுப்புறச்சூழல் தொடர்பான விழிப்புணர்வு அதிகரித்துவரும் நிலையில் பொருளாதார ரீதியாகவும், சூழலியல் ரீதியாகவும் பசுமைக் கூரைகள் பிரபலமாகவும் ஆகிவருகின்றன. சமீபகாலமாக, உலகமெங்குமுள்ள பெருநகரங்களில் பெரும்பாலான கட்டிடங்களில் அமைக்கப்படும் பசுமைக் கூரைகளும், கூரைத் தோட்டங்களும் நகர்ப்புற சுற்றுச்சூழலுக்கும் குடியிருப்போருக்கும் பயனளிக்கும் வகையில் அமைக்கப்பட்டு வருகின்றன.

நிலத்தடி நீரை அதிகரிக்கும் தோட்டம்

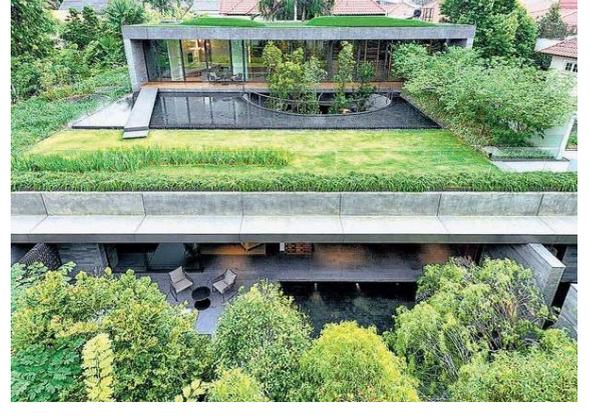
சென்னை, பெங்களூரு, மும்பை, ஐதராபாத் போன்ற நகரங்களில் பசுமைக் கட்டிடங்களுக்கு வரவேற்பு அதிகரித்துள்ளது. பசுமைக் கட்டிடங்களுக்கான விதிமுறைகளையும் மாநில அரசுகள் வகுத்துள்ளன. மழைநீர் சேமிப்பு அமைப்பு, தாவரங்கள் வளர்த்தல் போன்றவற்றை இந்த விதிமுறைகளின்படி கட்டாயமாக்கியுள்ளன. ஆற்றலைத் திறனுடன் கையாள்வது தொடர்பான கவனம் அனைவரிடமும் அதிகரித்துள்ளதுதால் பசுமைக் கட்டிடங்கள் கட்டப்படுவதும் அதிகரித்துள்ளது.

அவை கட்டிடங்களின் கூரைகளைக் கட்டுவதிலும் பிரதிபலிக்கிறது. ஒரு கட்டிடம் கட்டுவதில் கூரைக்கு ஆகும் செலவு அதிகமென்பதால், ஆற்றலையும் வளங்களையும் திறனுடன் பயன்படுத்துவதற்கு ஏற்ப வளம் குன்றா தொழில்நுட்பங்களைக் கூரைக்கட்டுமான நிறுவனங்கள் அறிமுகப்படுத்தியுள்ளன.

பசுமைக் கூரைகள் அல்லது கூரைத் தோட்டங்கள், பார்வைக்கும் அழகாய் இருப்பதோடு, திறன்வாய்ந்த மழைநீர் சேமிப்புக்கும் வழிவகுப்பதாக உள்ளது. நிலத்தடி நீரின் அளவையும் அதிகரிக்கிறது.

தவிர்க்க முடியாத மாடித் தோட்டங்கள்

அடுக்குமாடிக் குடியிருப்புகளில் வீடு வாங்குபவர்களும் கூரைகளில் தோட்டங்கள் உள்ள குடியிருப்புகளின் மீது ஆர்வம்காட்டத் தொடங்கியுள்ளனர். பெரிய பரப்பளவுள்ள மொட்டைமாடிக் கூரைகளைத் தோட்டமாக்கினால், அதில் ஒரு பகுதியில் கூரை அமைத்துக் குடியிருப்பவர்கள் அமர்ந்து இளைப்பாறலாம். மாலைகளில் விருந்துகள் மற்றும் நண்பர்கள் கூடுகைகளுக்குக் கூரைத்தோட்டங்கள் கூடுதல்



கவர்ச்சியைத் தருபவை. தொங்கும் தோட்டம் போல கொடித் தாவரங்கள், சொட்டுநீர்த் தோட்டங்கள் மற்றும் சற்றே சரிந்த கூரை மேற்பரப்புகள் இருந்தால் அலாதியான பசுமை அனுபவத்தைக் கொடுக்கும்.

தற்போது அடுக்குமாடிக் குடியிருப்புகளில் வீடுகளை வாங்க விரும்புவவர்கள் வசதியான வீட்டோடு அருமையான கூரைத் தோட்டமும் இருக்கவேண்டுமென்று விரும்புகிறார்கள். விருந்தினர்களை உபசரித்து இளைப்பாறவும், நல்ல காற்றை சுவாசிக்கவும், உடற்பயிற்சி செய்யவும் இத்தோட்டங்கள் மனதுக்கு உற்சாகம் அளிப்பவையாக உள்ளன. பெருநகரங்களில் 75 லட்சம் முதல் 2 கோடி ரூபாய் விலையில் கிடைக்கும் அனைத்து அடுக்குமாடிக் குடியிருப்புகளிலும் தவிர்க்க முடியாத அம்சமாக கூரைத்தோட்டங்கள் மாறியுள்ளன.

மேம்படவிருக்கும் தொழில்நுட்பம்

கூரைத்தோட்டங்களிலான கூரைகளுக்கு எந்தப் பாதிப்பும் இருப்பதில்லை என்று கட்டுமான நிபுணர்கள் உறுதி கூறுகிறார்கள். 50 வருடங்களுக்கு மேல் கூரை உறுதியாக இருக்கும் தோட்டங்கள் உண்டு. இந்தியா போன்ற உஷ்ணநாடுகளில், சரியாக நீர் ஊற்றிப் பராமரிக்கப்படும் பசுமைக் கூரைகளால் மின்சாரச் செலவு குறைகிறது.

செடிகள் மற்றும் புற்களை வளர்க்கும் கூரைத்தோட்டத்துக்கு, கூரை மேல்தளத்தில் இரண்டு அங்குலம் அளவுக்கு மணலைப் பரத்த வேண்டும். அதன் மேல் நீரை உறிஞ்சக்கூடிய தரை ஓடுகள் இருக்க வேண்டும். அதன்மேல் புல் பற்றை அமைத்தல் வேண்டும்.

பசுமைக் கூரைகள் எல்லாவற்றையும் தொடர்ந்து பராமரித்து வருதல் அவசியம். முறையாக நீர் ஊற்றுவதும், களையெடுப்பதும், வெட்டிவிடுதலும், உரமிடுதலும், கரையான்களைக் கண்காணிப்பதும் அவசியம். தொடர்ந்து நீர் ஊற்றிப் பராமரித்து கட்டிடத்தைக் குளிர்்பதத்தில் வைத்திருப்பதற்கும் உதவும். நீர் வளம் குன்றாமல் இருக்க கழிவுநீரைச் சுத்திகரித்தோ, மழைநீரைச் சேமித்தோ பயன்படுத்துவது அவசியம். இதன் மூலம் நன்னீர் தட்டுப்பாடின்றி குடியிருப்பவாசிகளுக்குக் கிடைக்கும்.

தற்போதைக்குப் பசுமைக் கூரைகளை அமைப்பதும் பராமரிப்பதும் சற்று செலவுபிடிப்பதாகவே இருப்பினும். எதிர்காலத்தில் குறைவான செலவிலேயே பசுமைக் கூரைகளை அமைக்கும் தொழில்நுட்பங்கள் மேம்படும் என்பதில் சந்தேகமே இல்லை.

Courtesy: தி இந்து, 26.09.2015



Dr. Ashok K. Chauhan
Founder, President Amity University

“Success Does Not Mean The Absence Of Failures. It Is The Attainment Of Ultimate Objectives. It’s My Dream And Mission To See That India Becomes A Knowledge Superpower By 2030,” Ashok Chauhan.

Dr. Ashok K. Chauhan was born in 1942 in the state of Uttar Pradesh. After completing his M.Sc. in Chemistry in 1963, Dr. Chauhan worked at one of the largest industrial groups in India. In 1966, he won a scholarship to research chemical engineering and plastic technology in West Germany and then became Head of Research and Development at Daetwyler Europe.

As an immensely successful entrepreneur in Europe for over three decades, Dr. Chauhan realised that if one could motivate tens of thousands of talented youngsters

and give them global level professional education while instilling in them a sense of values, then there could be no reason why they could not cross over the world to become global leaders. With this vision, Dr. Chauhan went on to establish the not-for-profit Ritnand Balved Education Foundation in 1986, bringing together some of the brightest minds from the scientific, academic and corporate community to take the first step towards his dream. His innovative leadership strategies have transformed the Ritnand Balved Education Foundation into a sustainable and value driven conglomerate. Today, Dr. Chauhan’s vision has translated into the internationally benchmarked campuses that have come to epitomise the Amity Education Group. Currently the Group comprising of 5 universities, 17 schools and pre-schools and 150+ institutions, home to over 95000 students pursuing 240 Programmes from Nursery to PhD, across 15 campuses spread over 1000 acres. This unmatched growth of Amity is a culmination of globally benchmarked hi-tech campuses, a dedicated faculty comprising thought leaders and practicing professionals, innovative teaching methodology and an unparalleled corporate interaction. He has always believed in the policy of keeping one eye on vision and the other on implementation. Ashok’s sons Asseem & Atul are well educated and qualified to look after Amity Universities in Rajasthan and U.P. respectively. Ashok’s wife, Dr. Amita, looks after K-12 initiatives. He was felicitated with **“Excellence in Education Award”** during National Congress on **“Building New India through Excellence in Education”** - by Ramakrishna-Vivekanand International Foundation.

20 MOST PEACEFUL COUNTRIES IN THE WORLD - 12

FINLAND



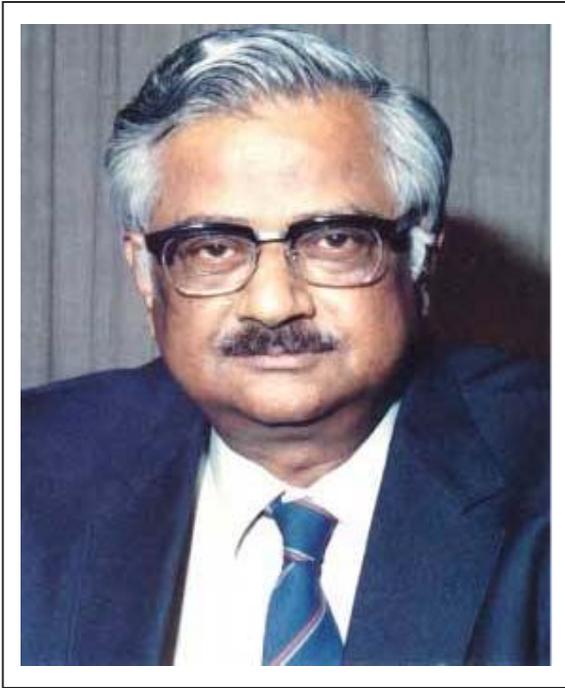
Finland is considered one of the most peaceful and livable countries, which is not renowned for its combative nature. Finland is still a country that embraces mandatory civil and military service for young people, and the country’s only participation in fighting has been as a part of joint United Nations peace keeping forces. When speaking about Finland, I want to say about its education. Finland places education at the heart of literally everything. Finland’s education system is ranked fifth best in the world.

(To be continued)

Courtesy: Amerikanki

Dr. RAJA RAMANNA (1928-2004)

Raja Ramanna (28 January 1928– 24 September 2004) was an Indian physicist who is best known for his role in India's nuclear program during its early stages.



Having joined the nuclear program in 1964, Ramanna worked under Homi Jehangir Bhabha, and later became the director of this program in 1967. Ramanna expanded and supervised scientific research on nuclear weapons and was the first directing officer of the small team of scientists that supervised and carried out the test of the nuclear device, under the codename *Smiling Buddha*, in 1974.

Ramanna was associated with and directed India's nuclear program for more than four decades, and also initiated industrial defense programmes for the Indian Armed Forces. Because of his directing role and leadership in developing the Indian nuclear programme over four decades, Ramanna is often considered the **"Father of the India's nuclear program"**, and was also a recipient of India's highest civil decoration in honour of his services to build India's nuclear programme. Ramanna died in Mumbai in 2004 at the age of 79.

Education

Raja Ramanna was born in beginning of 1925 to Rukmini and Ramanna in Tumkur, in the princely state of Mysore. The parents having recognised his talent for music early in life were instrumental in introducing him to classical Western music. Beginning his studies at Bishop Cotton Boys' School, Bangalore, where he mostly studied literature and classical music, he later attended Madras Christian College and resided at St. Thomas's Hall where he continued his interests in arts and literature but soon

shifted back to physics. At Madras Christian College, Ramanna obtained a B.Sc. in Physics and gained a B.A. degree in Classical music in 1947.

In 1947 Ramanna went on to attend Bombay University where he gained his M.Sc. in Physics, followed by M. Mus. in Music theory. Ramanna was awarded a Commonwealth Scholarship, and travelled to Great Britain in 1952 to complete his doctorate. Ramanna attended London University's King's College and enrolled in a doctoral programme there. In 1954, Raja Ramanna obtained a Ph.D. in Nuclear Physics and also a L.R.S.M. from King's College London. In the United Kingdom, Ramanna was invited to do his research at the Atomic Energy Research Establishment (AERE) where he gained expertise in nuclear fuel cycles and reactor designing. While in the U.K., Ramanna continued his interest in European music and Western philosophy, attending Opera and Orchestra performances every week.

Western music and philosophy remained a lifelong passion for Ramanna, and after returning to India, Ramanna accomplished himself by performing classical European music at many public concerts in India and abroad. Ramanna also had a keen ear for Indian classical music. His musical talents also received wide appreciation in neighbouring Pakistan. In 1956, Ramanna was invited by the National College of Arts and National Academy of Performing Arts to perform and lecture on the classical piano with a live ensemble and received jubilant praise and honour for his performance.

Indian nuclear programme

Ramanna was one of the secretive personalities surrounding the Indian nuclear programme, a programme started and envisioned by Jawaharlal Nehru in 1947, and being directed by Homi J. Bhabha. After his doctorate in physics, Ramanna returned in 1954 to India, where he joined the senior technical staff of Bhabha Atomic Research Centre (BARC), where he worked under Homi J. Bhabha in classified nuclear weapons projects. In 1958, Ramanna was made its Chief Directing Officer (CDO), where he was tasked to develop the ingenious nuclear fuel cycle critical for the development of nuclear devices.

While Bhabha dedicated to develop this programme, Ramanna inducted by to choose the preferable nuclear test site to carry out the weapon-testing experiments. The exact dates are unknown, but Ramanna chose and began the underground construction of nuclear test site at an Indian Army base, the Pokhran Test Range (PTR). After the disastrous death of Homi Bhabha, Ramanna was immediately elevated to become the directing officer of this programme. Ramanna, serving as the CDO of BARC, began to take initiate to develop

the first nuclear weapon. At BARC, the initial designing of nuclear weapon was completed under his guidance and the necessary nuclear weapons' explosive material for this weapon was completed under Ramanna by 1970. As the first nuclear device was completed and developed under his guidance, Ramanna went to Indian Prime Minister's Office, where he had notified Indian premier Indira Gandhi about the successful development of the nuclear device.

In 1974, Ramanna and other officials of the BARC verbally notified Indira Gandhi that India was ready to conduct the test of its small miniature nuclear device. Indira Gandhi verbally gave permission to Ramanna to carry out the test, and preparation was taken under Ramanna. Ramanna immediately travelled to Pokhran to pay a visit to the nuclear site that was constructed under his guidance. Preparations were completed under extreme secrecy and the first nuclear device was flown from Trombay to Pokhran Test Range with Ramanna. Ramanna and his team installed the nuclear device in the nuclear test site and necessary preparations were done before Indira Gandhi's visit to his site. In the morning in May 1974, Ramanna conducted the first test of a small nuclear device under codename *Smiling Buddha*. Pictures of Indira Gandhi inspecting the aftermath of the explosion site were flashed on front pages of newspapers in India and the world over with Ramanna and Dr. Homi Sethna, India's top nuclear scientist duo, by her side. Following this achievement, Ramanna gained international fame and was also honoured with India's highest civilian awards the same year by the Indira Gandhi's administration.

In 1978, Saddam Hussein approached Ramanna for help to build an Iraqi nuclear bomb. The offer came while Ramanna was in Baghdad for a week as Saddam's personal guest. He was given a tour of the capital and Iraq's main nuclear facility at Tuwaitha. At the end of the trip, Saddam invited the scientist to his office and told him: "You have done enough for your country; don't go back. Stay here and take over our nuclear programme. I will pay you whatever you want." Ramanna was shocked and scared by the Iraqi proposal. He reportedly could not sleep that night, worried that he might never see his homeland again. He took the next flight out.

Later in his career, Ramanna advocated for the strict policies to prevent nuclear proliferation. Ramanna also travelled to Pakistan, where he attended the annual International Physics Conference to deliver a lecture on nuclear physics, notably lectures on nuclear force. Ramanna began lobbying for peace process between India and Pakistan, and was a leading force to prevent nuclear escalation in the region. Later in the 1980s and 1990s, Ramanna served as Director of the Defence Research and Development Organisation (DRDO) and as scientific adviser to the Defence Minister of India in 2000. Ramanna also joined the International Atomic

Energy Agency in 1984 where he served as the President of the 30th General Conference of the IAEA.

Interests

A multi-faceted personality, Ramanna was a gifted musician, and could play the piano as dextrously as he could speak about atomic energy. Music was close to his heart, and one of the two books he wrote was **The Structure Of Music In Raga And Western Systems** (1993). The other was his autobiography, entitled **Years Of Pilgrimage** (1991).

Minister of State

In 1990, Ramanna was made Union minister of State for defence in 1990 by V.P. Singh administration. He was a nominated member of the Rajya Sabha from 1997 to 2003. Dr. Ramanna was closely associated with the I.I.T. Bombay, having been Chairman of the Board of Governors for three consecutive terms from 1975 to 1984. In 2000, Ramanna was also the first director of National Institute of Advanced Studies, Bangalore.

Institute Named After Ramanna

- Raja Ramanna Centre for Advanced Technology, Indore (M.P.)

Posts held

- Chairman, Governing Council, Indian Institute of Science, Bangalore
- Council of Management, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore
- Chairman, Board of Governors, Indian Institute of Technology, Bombay
- President, Indian National Science Academy
- Vice-President, Indian Academy of Sciences
- Scientific Adviser to the Minister of Defence
- Director-general of Defence Research and Development Organisation (DRDO)
- Secretary for Defence Research, Government of India
- Chairman, Atomic Energy Commission
- Secretary, Department of Atomic Energy
- Director, Bhabha Atomic Research Centre
- Director, National Institute of Advanced Studies, IISc campus, Bangalore

Awards

- Shanti Swarup Bhatnagar Prize for Science and Technology in 1963
- Padma Shri in 1968
- Padma Bhushan in 1973
- Padma Vibhushan in 1976

Books

- *The Structure of Music in Raga and Western Systems*
- *Years Of Pilgrimage (Autobiography)* (1991)

HUSAIN AHMAD MADANI

Syed Husain Ahmad Madani (6 October 1879 - 1957) was an Islamic scholar from the Indian subcontinent. His followers called him *Shaykh al-Islâm* to acknowledge his expertise in hadith and fiqh.



Early Life

He was born in Bangarmau Dist Unnao where his father was a teacher. He was originally from Tanda Dist Faizabad. His father was Sayyid Habibullah, descendant of Muhammed.

Education and spiritual training

In 1892, at the age of thirteen, he went to the Darul Uloom Deoband, where he studied under Mehmud Hasan. After completing the exoteric sciences, he became a disciple of Rasheed Ahmad Gangohi, who later authorised him to initiate others in the Sufi path. Rasheed Ahmad Gangohi was also the *pir* (or spiritual teacher) of Mehmud Hasan and it was Mehmud Hasan who told Husain Ahmed to become Rasheed Ahmad Gangohi's disciple too. He was held among the senior *khulafa* (or successors) of Rasheed Ahmed Gangohi. Through him his spiritual lineage goes back to Alauddin Sabir Kaliyari who was the originator of the Chisti-Sabiri branch of the Chisti order. This spiritual chain is however strongly linked with the Naqshbandi order of Sufism as well, because one of the ancestral *pirs* of Husain Ahmed had also accepted Syed Ahmad Shaheed as his master who belonged to the Naqshbandi order. Thus Husain Ahmed had the benefit of being linked to both the Naqshbandi and the Chisti order. While the former stressed on the exoteric, the latter was more focused on the esoteric aspects of Islam. His main school of thought, of whose litanies he practiced, was however Chisti-Sabiri.

Career

After graduating from the Darul Uloom Deoband, he migrated to Medina with his family. He began teaching Arabic grammar, *usul al-fiqh*, *usul al-hadith*, and Quranic exegesis. He spent 18 years teaching these various Islamic sciences in Medina. He was then appointed as head teacher and "**Shaikhul Hadith**" of Darul Uloom Deoband. He filled this position for approximately 28 years.

His efforts for independence

After his teacher Mehmud Hasan was sentenced by the British for his role in the Silk Letter Conspiracy to a prison in the Island of Malta, Madani volunteered to go with him so that he could look after him. He had personally not been convicted. He was imprisoned for three years. It so happened that holy Islamic month of Ramadan came and neither Mehmud Hasan nor Madani was Hafiz of the Qur'an. At this instance, Mehmud Hasan said to his student (Madani) that in all of his life, he didn't have a Ramadan without listening to the complete Qur'an in the special night prayers called as Tarawih. Husain Ahmed Madani, who respected his teachers very much, took this very sentence of his teacher seriously and started to memorize the Holy Quran in the prison itself. Daily, Madani used to memorize one Juz of the Holy Quran and recite it in the Tarawih. Continuing doing so, he memorized the whole Quran in the 30 days of Ramadan, thus saving his teacher Mehmud Hasan from being deprived of listening to the Holy Quran, like every Ramadan. Such an example of respect of teachers.

After his release, he returned to India and became actively involved in India's freedom struggle. He had considerable influence over a section of the Muslims, more prominently those belonging to Eastern Uttar Pradesh and Bihar. He was against the two-nation theory, and predominantly due to this a large number of Muslims from Eastern U.P. and Bihar declined to migrate to Pakistan at the time of partition. He became the President of the Jamiat Ulema-e-Hind, a post he held until his death in 1957. (He also held the post of *Shaikhul Hadith* at Darul Uloom Deoband till his death).

He was against the inception of Pakistan. He was of the view that in the present times, nations are formed on the basis of homeland and not on ethnicity and religion.



HUMOUR

19 Horses (It is Moral for Life)

One rich man owned 19 horses when he died. In his last will and testament he had written that upon his death, half the horses he owned should go to his only son; one fourth to the village temple and one fifth to the faithful servant. The village elders could not stop scratching their heads. How can they give half of the 19 horses to the son? You cannot cut up a horse. They puzzled over this dilemma for more than two weeks and then decided to send for a wise man who was living in a neighbouring village.

The wise man came riding on his horse and asked the villagers if he can be of any help to them. The village elders told him about the rich man's last will and testament which stated that half of the (19) horses must be given to his only son, one fourth must go to the temple and one fifth to the faithful servant.

The wise man said he will immediately solve their problem without any delay whatsoever. He had the 19 horses placed in a row standing next to one another. Then he added his own horse as the 20th horse. Now he went about giving half of the 20 horses that is ten horses to the son. One fourth of 20- that is 5 horses were given to the temple committee. One fifth of twenty- that is 4 horses were given to the faithful servant. Ten plus five plus four made 19 horses. The remaining 20th horse was his own which he promptly mounted, spoke a few inspiring words, and rode back home.

The wise man said: In our daily lives, in our daily affairs, simply add God's name and then go about facing the day's happenings. Ever come across problems in life that are seemingly insurmountable? (Like the villagers, do we feel that such problems cannot be solved?).

The villagers were simply dumfounded, full of disbelief and filled with admiration. And the parting words of the wise man were inscribed in their hearts and minds which they greatly cherished and passed on to their succeeding generations till today.

Didn't Fly

A helicopter carrying passengers suddenly loses engine power and the aircraft begins to decent. The pilot safely performs an emergency landing in water, and tells the passengers to remain seated and to keep the doors closed, stating that in emergency situations, the aircraft is designed to stay afloat for 30 minutes, giving rescuers time to get to them. Just then a man gets out of his seat and runs over to open the door. The pilot screams at him, "Didn't you hear what I said, the aircraft is designed to stay afloat as long as the doors remain closed?!".

"Of course I heard you", the man replied, "but it's also designed to fly, and look how good that one worked out!!"

உலர் அன்னாசி பழமும் இரத்த உற்பத்தியும்!

உடலில் போதுமான அளவு இரத்தம் இல்லாமல் இருப்பவர்களுக்கு அன்னாசிபழம் ஒரு சிறந்த சத்து பொருளாக அமைகிறது என்றால் அது மிகையாகாது.

முதலில் நன்கு பழுத்த அன்னாசி பழத்தை சுத்தமான தண்ணீரில் கழுவிய பிறகு அதன் மேல்புறம் உள்ள தடிமனான தோலினை செதுக்கி எடுத்துவிட்டு சின்ன சின்ன துண்டுகளாக வெட்டி தூசி படாமல் அதனை வெயிலில் நன்கு காயவைத்து உலர்ந்த நிலையில் உள்ள அன்னாசி பழ வற்றலை பாத்திரத்தில் வைத்து முடிவைத்து கொள்ள வேண்டும்.

தினம்தோறும் உறங்குவதற்கு ஒரு மணி நேரம் முன்பாக ஒரு டம்பளர் பாலில் பத்து துண்டு அன்னாசி வற்றலை

போட்டு ஊற வைக்க வேண்டும். பின்பு ஊறிய வற்றலை எடுத்து முதலில் சாப்பிட்டு விட்டு அதன்பிறகு பாலையும் குடித்து விட வேண்டும்.

இவ்வாறாக இரண்டு மாத காலத்திற்கு தினம்தோறும் சாப்பிட்டு வந்தால் உடலில் நல்ல முறையில் இரத்தம் உற்பத்தியாகும். மேலும் உடல் சக்தி பெறும். பித்த மயக்கம் சம்பந்தப்பட்ட அனைத்தும் முற்றிலுமாக நீங்கும்.

பொதுவாகவே அன்னாசிபழம் சாப்பிட்டு வருபவர்களுக்கு நாவறட்சி நீங்கி தாகம் தணியும், சுறுசுறுப்பு உண்டாகும். குறிப்பாக மனித உடலில் நோய் எதிர்ப்பு சக்தியினை அதிகரிக்க செய்யக்கூடிய தன்மை அனைத்தும் அன்னாசி பழத்திற்கு உள்ளது. *Courtesy: Pesot, March 2015*

பச்சைக் காய்கறிகள்

பச்சை மஞ்சள் காய்கறிகள், பழங்கள் சிறந்தது. இவைகளில் வைட்டமின் ஏ, வைட்டமின் சி அதிகம். வைட்டமின் ஏ யில் பீட்டா கரோட்டின் உள்ளது. இது ஒரு ஆண்டி ஆக்ஸிடெண்ட். புற்று நோய் வராமல் தடுக்கும் குணம் கொண்டது.

கேரட், தக்காளி, பீட்ரூட், மாம்பழம், கொய்யா, ஆரஞ்சு, ஆப்பிள், எலுமிச்சை, நெல்லி, திராட்சை, இவைகளில் இந்த சத்து அதிகம். அவைகளை அடிக்கடி சாப்பிட்டால் புற்று நோய் வரும் வாய்ப்பு குறைவு.

Courtesy: Pesot, August 2015

இருமலை குணப்படுத்தும் தேன்

இயற்கையில் நமக்கு கிடைக்கும் பல்வேறு பொருட்கள் மருத்துவ குணம் நிறைந்தவையாக உள்ளன. அந்த வகையில் தேன் சிறந்த மருந்தாக விளங்குகிறது.

தொடர் இருமலை நிறுத்தும் ஆற்றல் தேனுக்கு இருப்பதை சித்த மருத்துவர்கள் மட்டுமல்ல. மேற்கத்திய நாடுகளின் மருத்துவர்களே ஒப்புக் கொண்டுள்ளனர்.

நமது நாட்டில் பெரும்பாலான நாட்டு மருந்துகளும், சித்த மருந்துகளும் தேனுடன் கலந்து உண்ணும்படி மருத்துவர்கள் அறிவுறுத்துகின்றனர்.

Courtesy: Pesot, August 2015

TIRUKKURAL AND MANAGEMENT IN A 'NUTSHELL' – 30



Courteousness is an important characteristic for Managers for Good and Effective Management and this can be understood as a part of the Emotional Quotient requirement. Apart from love for Justice and Righteousness, Courteousness is also important and this is very clearly brought out and advocated in a number of Kurals of Tiruvalluvar.

*Nayanodu Nandri Purintha Payanudaiyar
Panbupa Rattum Ulagu Kural 994*

நயனொடு நன்றி புரிந்த பயன்உடையார்
பண்புபா ராட்டும் உலகு. குறள் 994

“Behold the men who love Justice and Righteousness, who are of a helpful disposition; the world setteth a high Value on their manners.”

*Nagaiyullum Innathu Igatchi; Pagaiyullum
Panbula Paduarivar Mattu Kural 995*

நகையுள்ளும் இன்னாது இகழ்ச்சி; பகையுள்ளும்
பண்புஉள பாடுஅறிவார் மாட்டு. குறள் 995

“Disparaging words pain a man even when uttered only in jest: the well bread therefore, are never discourteous even to their foes.”

*Panbuilan Petra Perunchchelvam Nanpal
Kalamtheemai Yalthirin Thatru Kural 1000*

பண்புஇலான் பெற்ற பெருஞ்செல்வம் நன்பால்
கலம்தீமை யால்திரிந் தற்று. குறள் 1000

“Behold the wealth in the hands of churlish men; it is even as the milk that is spoiled for being kept in an unclean vessel.” (Here the wealth can also be interpreted as the abundance of Knowledge and Skill possessed by the person)

HOME FESTIVALS – 12

மார்கழி - Markazhi (December/January)



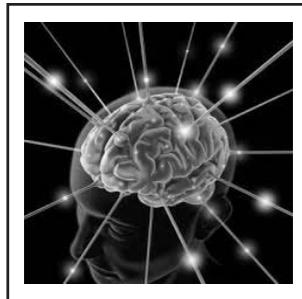
During Tirupuval (below, in upper left of painting), people bathe (lower left) and gather in the early morning to go

on procession singing devotional Vaishnava songs (upper left). Especially popular are those of the 9th century lady saint Andal, venerated as one of South India's greatest devotional poets. On Vaikunth Ekadasi, the 11th day of the lunar month, the doors of the huge temple of Srirangam are opened to devotees from morning to night for darshan of Rangam, an aspect of Lord Vishnu, sleeping on Adishani, the serpent king (upper right). Another famed festival is Ardra Darshana, when Siva Nataraja is decorated and taken from the temple in procession throughout the community (lower right). Especially the ill and those of old age seek to have a glimpse of Nataraj. A renowned sweet, aurdra kalli, is made with vegetables on this day.

“All of these festivals are earnestly conducted. People wait for the day with their mind on God. The purpose is to gather in the home and worship for the prosperity of the family and of all mankind.”

POWER YOUR MIND – ANCIENT VS MODERN

Those were the days
When the wise used to say
Love the whole world
For it is one family.
Love your nation and
Be a good patriot
If not the nation, love thy neighbour.
These are the days
Modern men say
Forget the world, do not bother



About the nation
Love your family and
Serve them all
See the whole world
In your dining hall.
Be selfish and dupe one and all.
Enjoy the world before you fall
Don't pay heed to Yama's call.

Courtesy: Swami Srikantananda

One of our duties as human beings is to avail ourselves of every opportunity to do good to others. The poor can serve others by their loyal work to the country and the rich by their wealth to help the poor.

– H.H. SHRI PARAMACHARYA

MILAN CATHEDRAL

The façade of the cathedral was eventually finished in 1805 on the initiative of Napoleon, who was crowned King of Italy here. And the “Veneranda Fabbrica del Duomo di Milano”, the venerable organisation concerned with all operational aspects of the Cathedral, continues to this day, as it did centuries ago, to seek out skilled builders and craftsmen who see to the completion and upkeep of the Cathedral – and so are responsible for the preservation and restoration of its original structure, but also for providing modern features such as access control system, air conditioning or lighting.

Using light to define spatial dimensions

These then were the experts that needed to be impressed when the interior of the Cathedral was to be fitted with new lighting for this year’s EXPO 2015 world fair in Milan. Fortunately, the lighting designers of Ferrara Palladino e Associati, Milan, were as familiar with the building as with the Veneranda Fabbrica, having previously worked on the façade lighting for the Cathedral back in 2000. Nonetheless – a gigantic task in light of the fact that the Cathedral is among the world’s largest sacred buildings. It is 157m long, the transept is 92m wide and the nave is 45m high. The primary concern of the lighting designers was to bring these majestic dimensions to life for the visitors. “Effectively – the first aspect to consider is the monumentality of the architecture as a whole. The impressive size, its enormous scale which accompanies us from the moment we enter through the main portal,” Pietro Palladino says explaining his design approach. “These are dimensions that confront us right away.”

In its concept, the light therefore needed to emphasize the lofty character of Gothic architecture as much as the vastness of its interior. In the words of Palladino, it was to “be a tool used to bring out the grandeur of this building and pay homage to the Cathedral as the most significant place of worship in the city”.

Worshippers and tourists will see the Cathedral in an entirely new light

In the light of the old system, the Cathedral’s interior had appeared mundane, indeed almost neglected. Floodlights with 400W high-intensity lamps had been mounted along the base of the vault, from where they illuminated the interior for the most part indiscriminately with a cool daylight character. A rather disappointing solution today, dictated by the lack of light sources back then that offered higher efficiency and a longer life. Maintenance and operating costs are invariably a critical aspect for the “Veneranda Fabbrica” in view of its formidable responsibilities and its difficult task of working with the typically limited budget of a cultural institution.

MILAN CATHEDRAL





ELECTROTHERM

Passion for Engineering Excellence at ELECTROTHERM (INDIA) LTD.
makes us Leader in what we attempt !

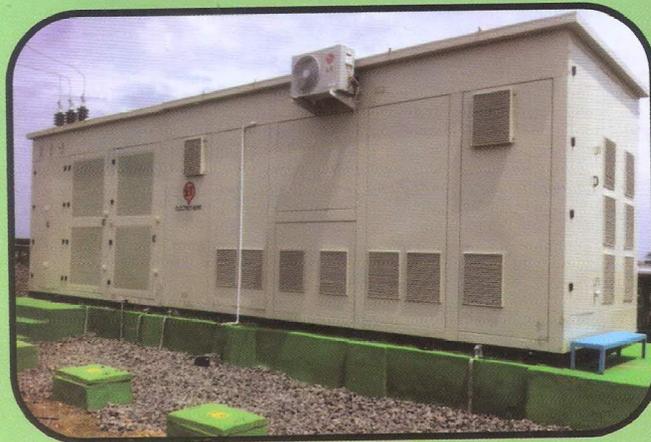
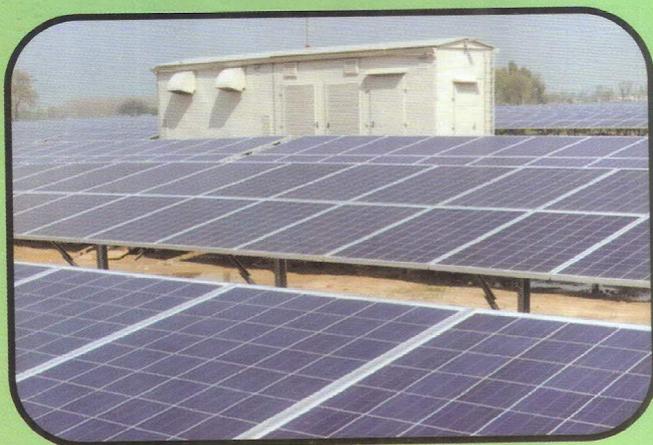
SOLAR POWER HOUSE

ADVANTAGES :

- Single window solution
- Almost no time investment for installation and commissioning even at farthest corner of remote sites
- Very easy to work at remote locations as no special tools and tackles required
- Everything is factory built, no skilled worker required at site
- Smart dimension and Portable Equipment
- Compact design and easy to handle at site
- Indoor, hence no exposure to sagging of connection wires etc and bird disturbance
- No outdoor structures hence safety from wear and tear
- Minimal Civil work involvement as everything is in house

TECHNICAL SPECIFICATION : (SPH → ALL IN 1 → SMART SOLUTION)

Single Containerized Solution Consisting Of,
VCB + Transformer + Inverter + UPS +
SCADA + Battery + ACDB & DCDB
11 KV Or 33 KV, Upto 3.2 MW
Single Container Solution



Head Office & Works : 72, Palodia, (Via Thaltej), Ahmedabad – 382 115, Gujarat (India)
Phone +91-2717-234544, 660550. Fax : +91-2717-234616,234866

E-mail : tinfo@electrotherm.com Website : www.electrotherm.com / www.ettransformers.com