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NEWS LETTER

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

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MARCH 2014



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EDITORIAL

Dear Members, Fellow Professionals and Friends,

Seasons Greetings and Best Wishes!!

Best Wishes for a Prosperous Business Period Ahead!!!

This month marks hectic activities by all businesses and programs for closing the Financial Year with satisfactory performance and results. There has been a general slowdown in all businesses due to various reasons. In Indian context, this can probably be attributed to increased supplies and increased competition, including competition from other countries. At this point, some thoughts on the broad concepts of LPG (Liberalization, Privatization and Globalization) Model followed would be important. Liberalization should not be at the cost of local industries and we should not make the local Industry suffer. This is ensured in many countries, including advanced countries, by levy of high duties on goods entering from outside. This should not be a protection for local industries to increase costs due to inefficiency and fleece the customer. Proper balancing can be achieved through increasing local competition and pressure to reduce costs, as it is happening in many industries. We should be careful about Models followed by many countries that they protect their local markets and subsidize the exports to keep high production levels. Our country should probably take care of our interests with this model, for ensuring high production levels in industries and increasing exports, as only high production levels can keep the economy growing. We have to keep our own customer interests and costs in mind all the time.

In the month of March, we have International Water Day on the 22nd and National Water Week from the 17th to 23rd. Water has always been a problem in our country, both due to floods and due to drought, though we seem to be blessed with enough water for all and for all cultivation and industries. Equitable distribution has been a problem and for over 50 years we have been talking about linking of rivers of the country etc which may never happen due to levels and costs and objections from different states. With modern technologies and developments, and with modern business practices like BOOT etc, the feasible way out seems to be only “National Water Grid” created with harvesting flood waters and surplus waters of the rivers of the country. The water grid can be an artificial canal(s), of storage and linking arrangement and can spread all over the country. It is claimed by the Engineers who have done work on this, that by harvesting only a small percentage, this grid can, not only take care of complete water requirements for homes and agriculture and industries, but also ensure Power Generation utilizing the levels of waters in north, middle and southern parts of our country.

Lok Sabha Elections are due very shortly and it is seen that the water is one of the subjects and promises by different parties. Let us hope for positive outcome from all these. The economic dimensions are also discussed widely, and with all our past experiences and awareness of people, we can certainly hope for all betterment and prosperity.

We thank all those members who have helped us by participating in the advertisements appearing for the issue February 2014 – Abirami Electricals, Max Electric Co., Wilson Power and Distribution Technologies Pvt. Ltd., Cape Electric Pvt. Ltd., Power Links, Ashlok Safe Earthing Electrode Ltd., Electrotherm (India) Ltd., Universal Power Equipment Pvt Ltd., C-Tech Engineering Services, Galaxy Earthing Electrodes Pvt. Ltd., Elmeasure India Pvt Ltd., Universal Earthing Systems Pvt. Ltd.

EDITOR

CONTRIBUTION TO NEWSLETTER (Rs.1,000/- per year)

374. K.G.S. Electricals, (2013-14)
375. Shri Sakthi Electricals, (2013-14)
376. Sruthi Engineering, (2013-14) **New Member**
377. Jayam Bros, (2013-14)
378. Del Star Engineering, (2013-14)
379. A.R.S. Electricals Pvt Ltd, (2013-14)

380. B.K. Control System, (2013-14) **New Member**
381. Shanti Enterprises Electricals Pvt Ltd, (2013-14)
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383. Saravanan Control System, (2014-15)
384. Mr. N. Ayyadorai, (2013-14) **Non Member**
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We request other members also to send their contribution for NEWSLETTER early.

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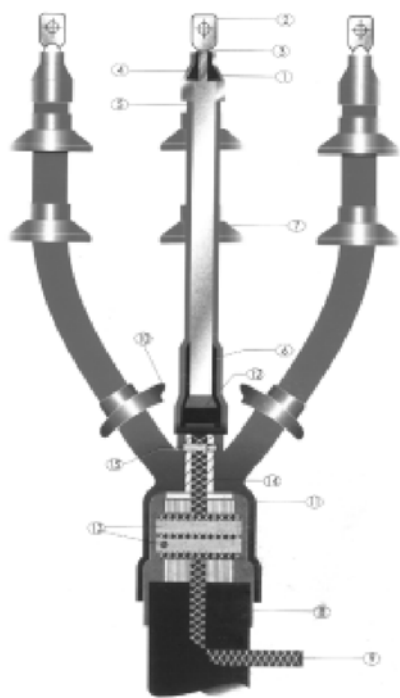
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MEMBERS DETAILS

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85	Sema Electrical & Enterprises	EA 2330	Chennai	044-26261981, 97911 88822
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87	Shakthi Electricals	ESA 397	Chennai	044-22434629, 98418 16376
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POWER LINKS

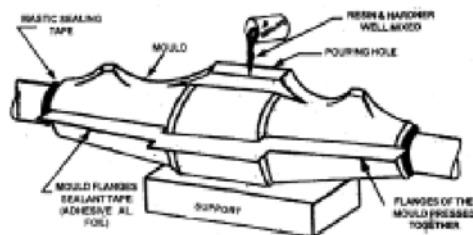
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EVENTS

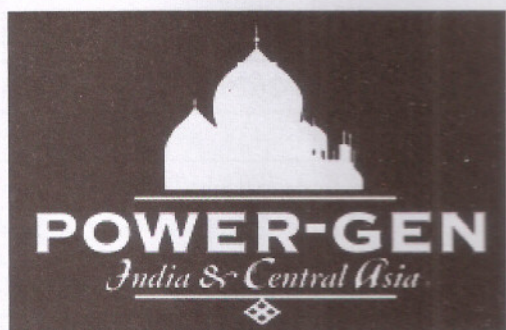
Energy Storage World Forum¹ LONDON 1-4 APRIL 2014 The 7th Forum

Event Profile: This year 7th Energy Storage World Forum features new value to its followers and newcomers! There are 3 new Master classes and a brand new day on Residential Energy Storage. In total there are over 24 Utilities / TSOs / DSOs / Solar / Wind Operators presenting in London.

Date: 1st - 4th April 2014

Venue: London

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



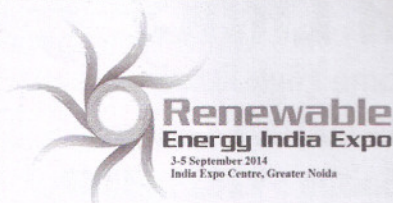
Event Profile: POWER-GEN India & Central Asia is the ideal platform to connect with key industry professionals and gain valuable new insights, ideas and solutions.

Year: 13th year in 2014

Date: 5th - 7th May 2014

Venue: Pragati Maidan, New Delhi, India

Website: <http://www.power-genindia.com>



Event Profile: Organised by UBM India, the Renewable Energy India Expo is an annual event that aims to accelerate growth of the Indian renewable energy sector by offering sustainable development opportunities to businesses in this industry.



UBM

A UBM Event

Date & Time: 3rd - 5th September 2014

Venue: India Expo Centre, Greater Noida, India

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

2nd India Smart Grid Summit 2014

April 24th - 25th | New Delhi, India

Exploring the Potentials of India Smart Grid, its Major Components and Smart Grid Projects
Top Event to Experience the Transformation of the Indian Power Sector



Event Profile: This event will gather the smart grid industry leaders to provide you with the latest, most up-to-date information driving the Smart Grid and ancillary services available today. This event will examine the global smart grid market trends, along with opportunities and challenges for smart grid development in India. Also, special sessions will be included on the exciting role play of Smart grid modernization in India

Date: April 24th - 25th 2014

Venue: New Delhi

Website: <http://www.cdmc.org.cn/2014/isgs/>

BRIEF REPORT ON TECHNICAL SEMINAR, TRICHY – 08.03.2014

The Seminar started with registration. Soon the Chief Guests **Er. S. Appavoo**, B.E., Chief Electrical Inspector to Government & Special Invitee **Er. R. Kumaresan**, B.E., Chief Engineer / Distribution, Tiruchirappalli, Tamil Nadu Generation & Distribution Corporation Ltd., graced the occasion.

The function started with Tamil Thai Vazhthu & lighting of Kuthuvilakhu. **Er. S. Appavoo**, B.E., Chief Electrical Inspector to Government, **Er. R. Kumaresan**, B.E., Chief Engineer / Distribution, Tiruchirappalli, Tamil Nadu Generation & Distribution Corporation Ltd., **Mr. U. Bhaskaran** President, TNEIEA 'A' Grade, **Mr. S.D. Poongundran**, Vice president, TNEIEA 'A' Grade & **Ms. Chandralekha**, Deputy Manager BHEL lighted the kuthuvilakhu. **Mr. U. Bhaskaran** President, TNEIEA 'A' Grade welcomed the gathering & followed by **Er. S. Appavoo**, B.E., Chief Electrical Inspector to Government's speech on Safe practices in Electrical installation.

After **Er. S. Appavoo**, B.E., Chief Electrical Inspector to Government excellent Speech, **Er. R. Kumaresan**, B.E., Chief Engineer / Distribution, Tiruchirappalli, Tamil Nadu Generation & Distribution, Spoke about "**ELECTRICAL SAFETY & PREVENTION MEASURES**"

After an inspiring speech by **Er. R. Kumaresan**, B.E., Chief Engineer / Distribution, Tiruchirappalli, Tamil Nadu Generation & Distribution, all the attendees were served with snacks & Tea during the Tea Break.

After the Tea Break, Technical Seminar Started.

Mr. A. Sekhar, CEO of **M/s. Spike Power Protection System & Technologies**, Chennai, spoke about "*Bondings and Earthing Solution*". He outlined about the latest trends in the maintenance Free Earthing.

Followed by **Mr. R. Sankaranarayanan**, Area Manager – Chennai / Puducherry, **M/s. Hager Electro Private Limited**, gave an inspiring speech on "*Importance of Over voltage Protection in electrical N/W & use of Hi RCCB's for Critical Application*".

Mr. Vyome Tripathi, General Manager **M/s. SVS Buildwel Pvt. Ltd**, New Delhi, spoke about "*Fire Suppression systems for Electrical Panel*". The Audience appreciated this presentation for taking pains to bring a washing model & a live demo.

This speech was followed by **Mr. Kiran Manjunath**, Sr. Engineer, Technical, **M/s. Klauke India** & **Mr. Srinivas Bondade**, Regional Sales Engineer, **M/s. Ideal Industries India Pvt Ltd.** on "*Measuring Instruments & Hand tools*".

On completion of Technical session **Mr. K. Kannan** our Secretary gave the vote of thanks. In his vote of thanks he thanked Chief Guests **Er. S. Appavoo** & **Er. R. Kumaresan** for their support to our Association. Secretary also mentioned **Mr. S.D. Poongundran**, Vice President TNEIEA 'A' Grade & **Mr. R. Kalaiselvan** of **M/s. L & K Electrical Enterprises**, for their contribution towards this seminar which has been a grand success.

The seminar ended with great success with an excellent lunch to all.

For Photos refer page nos. 28 & 29.

Same day evening by 6.00 pm, our Association had its Members Meeting & get-together, at T10 Hotels Pvt. Ltd. in Trichy.

Inspite of your busy work schedule, on behalf of our Association, we thank each and everyone who attended our Trichy Seminar on "**Electrical Safety & Prevention Measures**" - Secretary

KNOW THY POWER NETWORK – 78

Before we reconnect with the topic Smart Grid-Distribution system, let us have some general discussions and exchange of ideas on the present Smart world. This sort of interaction will help us to understand the roles played by various devices like Smart meters in the Smart Grid. Have you ever noticed / felt the vice like grip of Smart devices? Will it be possible for you to think or imagine a world without Internet, Colour TVs, Smart phones, Personal computers, Laptops, Tablets and other devices, which were not existing just a few decades before? Likewise can any one think of a modern industry without the wide use of digitization, internet, sensors and algorithms? All these show that we have a direct pathological relationship with the *Modern Smart devices*. *Today people are not addicted but “trapped” in the Smart world and they fail to use their wisdom*. All these do not happen on their own; they are all connected and made to happen by human beings only. We own it and hence we bear the responsibility to extract ourselves from this modern trend.

It will be very difficult to “free ourselves” from the “embraces” of Smart devices like Mobile phones, Laptops and Personal Computers. Now we cannot think of a world where the network communication, internets, online official works, ‘e’ commerce and computers are absent / not existing. We really feel that without these, both our official and personal lives will crash. Then we will become “lifeless and immobile”. Such is the influence of these modern electronic devices and networks on our day-to-day life. Today we are all surrounded by virtual detectives of Digital world. Every click, touch, swipe and search made on the Smart devices will create a unique identity of any individual or company and transfer the digital information thus collected to a Central Scanning Centre for further analysis. Thus our “privacy” / freedom / independence is totally lost. When these devices become further “smarter”, we get “dumber” and lose all our wisdom, common sense and other natural instincts. Today we voluntarily submit ourselves to these devices and get ruled / controlled by them. In this context, kindly recount how the present Smart devices drove away the earlier devices like MP3 players, pagers, calculators and point-and-shoot cameras and think what will happen in the future.

You may agree two or three things, as listed below, which decide the wide acceptance of the devices like Smart phones and Laptop Computers.

(i) Portability; (ii) Productivity (Profitability); (iii) High speed of operation which lead to Time Savings

Smart phones meet all these requirements and perfectly find a place in our pockets and move always with us except at places like bathrooms and toilets. Though laptops and Personal Desktop Computers do not always move with us, their productivity benefits are high and outweigh the drawbacks noted in this regard. In the Auto Manufacture world, today the Software literally drives the cars. It runs engines and guides the drivers to their destinations and permits the car passengers to connect with Mobile/GPS network. At the heart of all these is “Smart Auto Electronics” which accounts for nearly 30 percent of the total cost of the car [e.g. Expensive Audi or Mercedes Benz cars].

Now the question that stands before us is “how to shake or control the hegemony of this Smart world? And how to come out/move away from the “spell” or the influence cast by all these Smart devices, which block our Wisdom and restrict the understanding of our exact or real position. Today we are going from one task to another without actually realising “What we are doing”. We are totally brought under the strong influence of Smart Devices. Will it augur well for us? We don’t know.

Now we have to find way to get freedom from the slavery of this Smart World? It is a daunting task but by no means impossible. With this information, let us return to our regular topic “Smart grid” with its relation to Electricity Distribution network.

As stated earlier, the application of Information and Communication technology [ICT] in Smart Grid Distribution system improves its productivity and availability and also to manage the distribution network better during unscheduled or forced shutdowns/outages.

Consumption

Our next viewpoint is electricity consumption. In this context, the ability of the Smart Grid to support the Distributed generation is notable. This aspect helps the consumers to upload their surplus power into the Grid. Further, the open access and power trading facilitate the consumers to make profit by selling their surplus production of electricity and also deploy their appliances during off-peak tariff hours and make it possible to adopt the integrated appliance programming. Further the wide use of electric vehicles is also made possible. The other possibilities are increased use of renewable energy sources, lower emissions and advancement to energy security at a higher pace and finally we reach the goal post of energy independence. Among the relevant features that related to Distribution and Enduse segments of the Power network are,

- Advance Metering Infrastructure (AMI)
- Meter data management, Consumer Portal Service
- Demand response
- Smart pricing
- Billing and collection of receivables
- Integration of the distribution of renewable energy sources
- The adoption of Distribution Automation System and a restructured, accelerated power reforms development projects (APDRP) and wide application of SCADA
- Energy Audit
- Condition based maintenance
- Load research and Power Surveys
- Work force management and
- Network management.

Smart meters will help provide

- Automated real time meter reading and billing information
- Two way communication between the supplier and the consumer.
- Delivery of the voltage and power quality data at the consumer's ends to the utility control centre.
- Automated alarms to signal and alert the Supplier about the Operational problems and attempted power thefts or pilferage, and tampered meters
- Delivery of information to the Supplier about Overloading of system components, lack of reactive power support and low metering efficiency.
- Communication between the end devices like meters and home appliances and also between Utility enterprise collection and control systems.

One significant aspect of Smart Grid technology is that those who ask right questions of the technology and demand the right answers for them from the Technology providers will harvest the best knowledge and best equipment/devices like AMI used in the Smart grid.

Kindly stay tuned for my next article.

(To be continued...)

*V. Sankaranarayanan B.E., FIE, Former Addl. Chief Engineer/TNEB
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LARGEST MULTI-FEED STOCK BIODIESEL PLANT COMMISSIONED

UK - BDI – BioEnergy International AG has announced that it has been commissioned to build the biggest Multi-Feedstock BioDiesel plant in the world in the Netherlands with an estimated worth of €47 million. In future, the plant will be producing Biodiesel from waste materials and will have a total capacity of 250,000 tonnes/year.

The conclusion of the biggest contract to build a Multi-Feedstock Biodiesel plant in BDI's history marks the successful start into the fiscal year 2014. The commission for this exceptional Biodiesel project has an estimated worth of €47 million.

The Dutch customer Biodiesel Amsterdam (subsidiary of Simadan Holding) already brought an initial Multi-Feedstock Biodiesel plant supplied by BDI with a production capacity of 100,000 tonnes/year into operation in 2010 and is now increasing its production capacity at the location by a further 150,000 tonnes/year.

This Biodiesel plant in the port of Amsterdam is the largest in the world for the production of Biodiesel from waste materials using the patented Multi-Feedstock Technology.

Waste vegetable and animal oils from trade and industry are the only raw material used to manufacture Biodiesel in accordance with the relevant standards. As a result, this Biodiesel plant plays a major role in supplying Europe with sustainable fuel, the production of which does not involve competition of any kind with food production.

The safe processing of problematic waste materials into a biofuel is in addition a crucial contribution to the reliable disposal of these difficult materials. The project includes a Glycerin distillation factory with a production capacity of 50,000 tonnes/year.

Glycerin, which is a by-product of the Biodiesel production can be sold after appropriate processing to the industry as a raw material and thus generates further added value.

Courtesy: The Bioenergy Site News Desk

RESEARCHERS ENGINEER BREAKTHROUGH FOR BIOFUEL PRODUCTION

Researchers at Scripps Institution of Oceanography at UC San Diego have developed a method for greatly enhancing biofuel production in tiny marine algae.

As reported in this week's online edition of the Proceedings of the National Academy of Sciences, Scripps graduate student Emily Trentacoste led the development of a method to genetically engineer a key growth component in biofuel production.

In the quest to loosen humanity's dependence on traditional fossil fuel consumption, and with it rising concentrations of carbon dioxide and their damaging impacts on the environment, finding economically viable fuels from biological sources has been elusive.

A significant roadblock in algal biofuel research surrounds the production of lipid oils, the fat molecules that store energy that can be produced for fuel. A catch-22 has stymied economically efficient biofuel production because algae mainly produce the desired lipid oils when they are starved for nutrients. Yet if they are limited in nutrients, they don't grow well. With a robust diet algae grow well, but they produce carbohydrates instead of the desired lipids for fuel.

In a significant leap forward that clears the lipid production hurdle, Trentacoste and her colleagues used a data set of genetic expression (called "transcriptomics" in laboratories) to target a specific enzyme inside a group of microscopic algae known as diatoms (*Thalassiosira pseudonana*). By metabolically engineering a "knock-down" of fat-reducing enzymes called lipases, the researchers were able to increase lipids without compromising growth. The genetically altered strains they developed, the researchers say, could be produced broadly in other species.

"These results demonstrate that targeted metabolic manipulations can be used to increase accumulation of fuel-relevant molecules.... with no negative effects on growth," said Trentacoste. "We have shown that engineering this pathway is a unique and practical approach for increasing lipid yields."

"Scientifically this is a huge achievement," said Mark Hildebrand, a marine biology professor at Scripps and a coauthor of the study. "Five years ago people said you would never be able to get more lipids without affecting growth negatively. This paper shows that there isn't an intrinsic barrier and gives us hope of more new things that we can try—it opens the door to a lot more work to be done."

In addition to lowering the cost of biofuel production by increasing lipid content, the new method has led to advances in the speed of algal biofuel crop production due to the efficient screening process used in the new study.

"Maintaining high growth rates and high biomass accumulation is imperative for algal biofuel production on large economic scales," the authors note in the paper.

"It seems especially fitting that Scripps-UC San Diego is displaying so much leadership in the field of sustainable biofuels from algae, for instance with the California Center for Algae Biotechnology starting here, given the history of the institution playing such a pivotal role in climate change research," said paper coauthor William Gerwick, a distinguished professor of oceanography and pharmaceutical sciences at Scripps's Center for Marine Biotechnology and Biomedicine and UC San Diego's Skaggs School of Pharmacy and Pharmaceutical Sciences. "But these advances do not happen in isolation, and the current project is a great illustration of how different labs can collaborate to achieve greater advances than possible singly."

In addition to Trentacoste, Hildebrand, and Gerwick, coauthors include Roshan Shrestha, Sarah Smith, Corine Gle, and Aaron Hartmann. With a graduate student leading the research and two others contributing, the study underscores the value of a Scripps-UC San Diego education and the leadership role of students in cutting edge research.

The National Institutes of Health, California Energy Commission, Air Force Office of Scientific Research, Department of Energy, and National Science Foundation supported the research.

Courtesy: Bio Energy Site: <http://www.thebioenergysite.com>

You can't control everything. Sometimes you just need to relax and have faith that things will work out. Let go a little and just let life happen.

CONTROL OF HARMONICS GENERATED BY ALTERNATING CURRENT ELECTRIC ARC FURNACE AND LADDLE FURNACE - 1

An arc of an electric arc furnace as a virtual short circuit is purely resistive load but the reactor connected in series with primary of furnace transformer to smoothen the arc makes the total combination as an inductive load, with its fluctuating active and reactive power requirements, it leads to power quality issues such as poor power factor, harmonic generation, etc. This paper presents measurement and analysis of harmonics generated by alternate current electric arc furnace (AC EAF) and ladle furnace (LF) loads and also defines terms like harmonics, total harmonic distortion etc. Harmonic Filter Banks (HFB) of static Var compensator (SVC) are tuned to particular order of frequency to provide least resistance path to that order of harmonics for elimination. This paper also describes design criteria for harmonic filter banks of 100 Hz, 150 Hz and 200 Hz and presents the SVC as a solution for control of harmonics. The final results are compared with allowable limits set by international standards.

Keywords: Alternate current electric arc furnace (AC EAF), Ladle furnace (LF), Harmonics, Total harmonic distortion, Harmonic filter banks (HFB) and Static Var compensators (SVC).

1.0 INTRODUCTION

India produces about 70 million tonne of steel per annum from its installed capacity of 80 million tonne. India's per capita steel consumption of steel has gone up by around 25% in the last five years to 57 kg/person year in 2011 [1]. The specific energy consumption of an integrated steel plant is around 1000 kWh/tonne of finished steel. The electric arc furnace is heart of any integrated steel plant used for melting of steel [2]. The specific energy consumption of an alternate current electric arc furnace (AC EAF) is about 200 kWh/tonne and of a direct current electric arc furnace (DC EAF) is about 400 kWh/tonne for charged hot iron as raw material. Nonlinear, chaotic and short time varying loads like alternating current electric arc furnace (AC EAF) with their almost instantaneous fluctuations in both active and reactive power requirements leads to power quality issues like harmonic generation, poor power factor, current and voltage unbalances, voltage flickers, voltage dip and swells.

The direct smelting of iron containing materials, mainly scrap, is usually performed in electric arc furnaces. An electric arc furnace is a large refractory lined steel pot, fitted with a refractory roof through which three vertical graphite electrodes are inserted, as shown in Figure 1. The metal charge is melted with resistive heating generated by electrical current flowing among the electrodes and through the charge [3].

This study had considered CONARC alternating current electric arc furnace of 200 tonne capacity with transformer rating of 165 MVA, 33/1.45 kV and Ladle Furnace of 200 tonne capacity with transformer rating of 25 MVA, 33/1.45 kV. Figure 2 gives the single line diagram of furnace and the SVC. Reactor is connected in series with furnace transformer primary to smoothen the electric arc.

Shunt connected SVC for harmonic control consists of harmonic filter banks of 100 Hz, 150 Hz and 200 Hz.

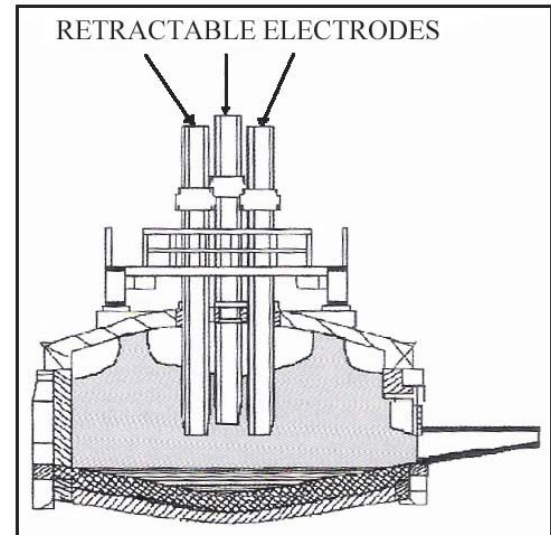


Fig.1: Schematic of Electric Arc Furnace

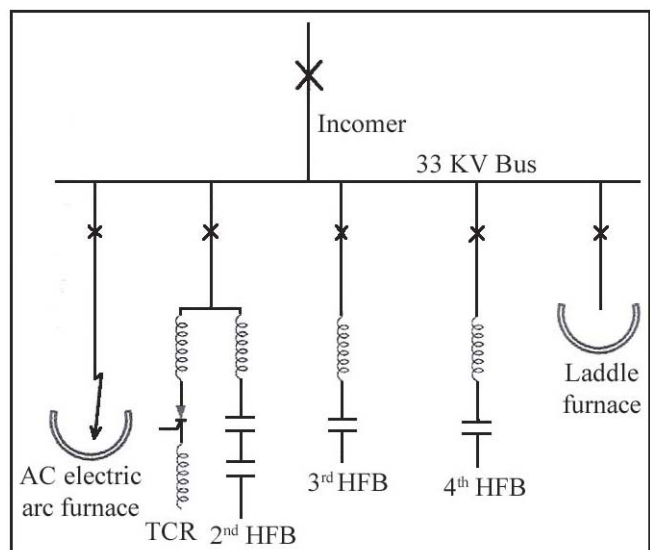


Fig.2: Single Line diagram of AC EAF and SVC

Harmonics can be defined as sinusoidal voltage and current having frequencies that are integer multiple of fundamental supply frequency [4]. Any signal component having a frequency which is not an integer multiple of the fundamental frequency can be designated as integer harmonic component or referred to more simply as an inter harmonic.

Harmonic disturbances are generally caused by loads like AC EAFs with nonlinear voltage/ current characteristic and are mainly the result in use of modern power electronic components. The harmonic current from different sources produces harmonics voltage drops across the impedance of network. The result of all the single harmonics coming from different sources is obtained by the vector addition of the single elements [5-6].

Total harmonic distortion (THD) of a signal is a measurement of the harmonic distortion present and is defined as the ratio of the sum of the powers of all harmonic components to the power of the fundamental frequency [7-8]. THD is used to characterize the linearity of audio systems and power quality of electric power systems. Generally the current values are described as demand factors and thereby the total current harmonics are described as Total demand distortion (TDD). The TDD is defined as the harmonic current distortion express as a percentage of maximum demand load current using 15 or 30 min demand period. The crest factor or peak-to-average ratio is a measurement of a waveform, calculated from the peak amplitude of the waveform divided by the root mean square value of the waveform [9].

$$\text{THD} = \sqrt{\frac{\text{Sum of squares of amplitudes of harmonics}}{\text{Square of amplitude of fundamental}}} \times 100\% \dots\dots (1)$$

$$\text{THD (voltage)} = \sqrt{\frac{(V_2)^2 + (V_3)^2 + (V_4)^2 + (V_5)^2 + \dots\dots + (V_n)^2}{(V_1)^2}} \times 100\% \dots\dots (2)$$

$$\text{TDD (current)} = \sqrt{\frac{(I_2)^2 + (I_3)^2 + (I_4)^2 + (I_5)^2 + \dots\dots + (I_n)^2}{(I_1)^2}} \times 100\% \dots\dots (3)$$

2.0 CONARC FURNACE PROCESS

In conventional DC electric arc furnace raw material (hot briquetted iron and direct reduced iron (DRI) is first charged in furnace shell and then electric arc is initiated for melting [10]. Sometimes due to topography of shells it is difficult to charge directly the hot iron metal into shell. The specific energy consumption (SEC) for CONARC EAF is about 200 kWh/tonne of steel and is much lower compared to similar capacity of conventional DC EAF of 400 kWh/tonne of steel [11].

The CONARC concept combines the conventional converter process with electric ARC steel making in a furnace having two identical shells. The furnace is equipped with common one set of electrodes which are connected to a transformer and can be lowered and raised alternatively over each of two shells. The oxygen is injected through a water cooled top lance.

The AC CONARC furnace is split into two stages. During converter process, the liquid iron is decarburised by injection of oxygen through the top lance and during the electric arc process, electrical energy is used for melting of cold charge (DRI or scrap) and for the super heating of the bath to tapping temperature.

The process starts with the charging of hot metal into a small part of the previous melt kept in the furnace. After top lance is brought into position, the oxygen blow is initiated. During the converter phase, the contents of carbon, silicon, manganese and phosphorus in the bath are reduced. These reactions are exothermic, i.e. they generate heat. Cold material like DRI or scrap is added to the furnace to utilise this energy and to avoid overheating of the bath.

After completion of the decarburisation process, the top lance is slewed away and electrodes are brought into operating position. In the arcing phase, the remaining solid charge material like scrap or sponge iron is fed into the bath until the desired tapping weight is reached. The temperature of the bath is then increased to the required value, where upon the heat is tapped into a Ladle.

Flexibility regarding the raw material input composition is another feature of the CONARC technology. This enables the operator to minimize the production costs by selecting a mix according to quality requirements as well as the availability and price of the raw materials and of the energy sources (primary: coal, oil and oxygen and secondary: electrical power).

The CONARC has proven that a production in the range of 100% direct reduced iron and also 100% scrap is possible. It is also demonstrated that the tap to tap time could be constantly adjusted in the range of less than 60 minutes with the same productivity.

3.0 MODELLING OF AC ELECTRIC ARC FURNACE

Kirchhoff's Current Law (KCL) can be used to equate voltages and currents for analysis of electrical circuit of EAF [12].

Figure 3 shows four nodes, one for each of the electrodes and the fourth representing the virtual ground at the matte (V_m).

Using these nodes, it is possible to determine the current in each electrode with respect to each voltage and the conductance coefficients, using its position as the input [13]. The following sets of equations can be obtained by applying KCL to each of the four nodes.

The Current Matrix Model can be represented as:

$$[I_i] = [G_{ij}][x_i] + [B_i]$$

Where

I_i is current matrix for electrode currents,

G_{ij} is conductance matrix and

B_i is a constant matrix.

The currents at nodes 1, 2 and 3 are modeled as:

$$I_1 = G_{12}(V_1 - V_2) + G_{11}(V_1 - V_m) + G_{13}(V_1 - V_3) \dots \dots \dots (4)$$

$$I_2 = -G_{12}(V_1 - V_2) + G_{22}(V_2 - V_m) + G_{23}(V_2 - V_3) \dots \dots \dots (5)$$

$$I_3 = G_{33}(V_3 - V_m) - G_{13}(V_1 - V_3) + G_{23}(V_2 - V_3) \dots \dots \dots (6)$$

$$G_{11}(V_1 - V_m) + G_{22}(V_2 - V_m) + G_{33}(V_3 - V_m) = 0 \dots \dots \dots (7)$$

The voltage (V_m) can be computed as:

$$V_m = \frac{G_1 V_1 + G_2 V_2 + G_3 V_3}{G_1 + G_2 + G_3} \dots \dots \dots (8)$$

These three currents represent three electrodes of AC EAF. The total current (I_1) flowing through electrode 1 is modelled as:

$$I_1 = \frac{1}{G_T} \begin{bmatrix} x_1 (2V_1 c_1 (G_s + G) - V_2 c_1 (G_s + G) - V_3 c_1 (G_s + G)) \\ + c_1 c_2 x_2 (V_1 - V_2) + c_1 c_3 x_3 (V_1 - V_3) \\ + x_2 (V_1 c_2 (G_s + 2G) - V_2 c_2 (G_s + G) - V_3 c_2 G) \\ + x_3 (V_1 c_3 (G_s + 2G) - V_2 c_3 G - V_3 c_3 (G_s + G)) \\ + (2V_1 - V_2 - V_3)(G_s^2 + 3GG_s) \end{bmatrix} \dots \dots \dots (9)$$

Similarly, the total currents I_2 and I_3 are computed as:

$$I_2 = \frac{1}{G_T} \begin{bmatrix} x_1 (-V_1 c_1 (G_s + G) - V_2 c_1 (G_s + 2G) - V_3 c_1 G) \\ + x_2 (-V_1 c_2 (G_s + G) + 2V_2 c_2 (G_s + G) - V_3 c_3 (G_s + G)) \\ + c_2 c_3 x_3 (V_2 - V_3) + c_1 c_2 x_1 (V_2 - V_1) \\ + x_3 (-V_1 c_3 G - V_2 c_3 (G_s + 2G) - V_3 c_3 (G_s + G)) \\ + (-V_1 + 2V_2 - V_3)(G_s^2 + 3GG_s) \end{bmatrix} \dots \dots \dots (10)$$

The electrode current of EAF are:

$$I_3 = \frac{1}{G_T} \begin{bmatrix} x_1 (-V_1 c_1 (G_s + G) - V_2 c_1 G - V_3 c_1 (G_s + 2G)) \\ + x_2 (-V_1 c_2 G - V_2 c_2 (G_s + G) + V_3 c_2 (G_s + 2G)) \\ + x_3 (-V_1 c_3 (G_s + G) - 2V_2 c_3 (G_s + G) + 2V_3 c_3 (G_s + G)) \\ + c_1 c_3 x_1 (V_3 - V_1) + c_2 c_3 x_2 (V_3 - V_2) \\ + (-V_1 - V_2 + 2V_3)(G_s^2 + 3GG_s) \end{bmatrix} \dots \dots \dots (11)$$

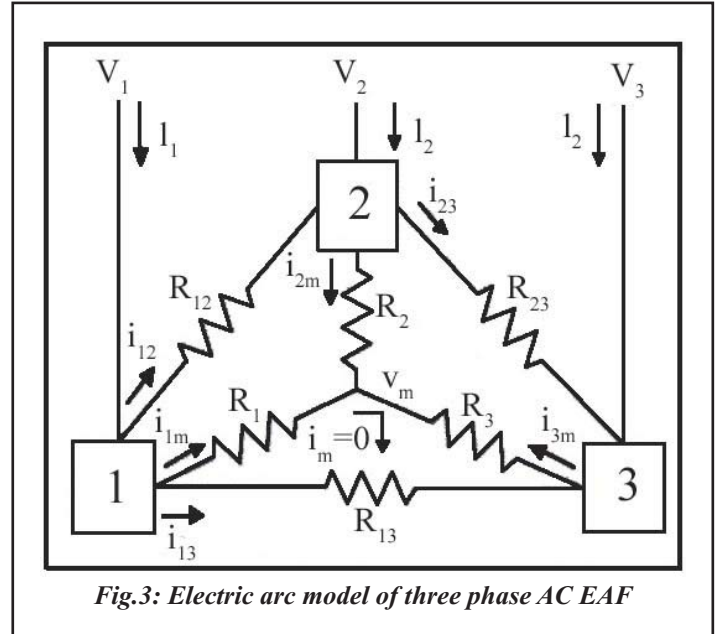


Fig.3: Electric arc model of three phase AC EAF

$$\begin{bmatrix} I_1 \\ I_2 \\ I_3 \end{bmatrix} = \frac{1}{G_T} \begin{bmatrix} \begin{pmatrix} 2V_1c_1(G_s+G) \\ -V_2c_1(G_s+G) \\ -V_3c_1(G_s+G) \\ +c_1c_2x_2(V_1-V_2) \\ +c_1c_3x_3(V_1-V_3) \end{pmatrix} & \begin{pmatrix} V_1c_2(G_s+2G) \\ -V_2c_2(G_s+G) \\ -V_3c_2G \end{pmatrix} & \begin{pmatrix} V_1c_3G \\ -V_2c_3(G_s+2G) \\ -V_3c_3(G_s+G) \end{pmatrix} \\ \begin{pmatrix} -V_1c_1(G_s+G) \\ +V_2c_1(G_s+2G) \\ -V_3c_1G \end{pmatrix} & \begin{pmatrix} -V_1c_2(G_s+G) \\ +2V_2c_2(G_s+G) \\ -V_3c_2(G_s+G) \\ +c_2c_3x_3(V_2-V_3) \\ +c_1c_2x_1(V_2-V_1) \end{pmatrix} & \begin{pmatrix} -V_1c_3G \\ -V_2c_3(G_s+2G) \\ -V_3c_3(G_s+G) \end{pmatrix} \\ \begin{pmatrix} -V_1c_1(G_s+G) \\ -V_2c_1G \\ -V_3c_1(G_s+2G) \end{pmatrix} & \begin{pmatrix} -V_1c_2G \\ -V_2c_2(G_s+G) \\ +V_3c_2(G_s+2G) \end{pmatrix} & \begin{pmatrix} -V_1c_3(G_s+G) \\ -V_2c_3(G_s+2G) \\ +2V_3c_3(G_s+G) \\ +c_1c_3x_1(V_3-V_1) \\ +c_2c_3x_2(V_3-V_2) \end{pmatrix} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \frac{(G_s^2 + 3GG_s)}{G_T} \begin{bmatrix} 2V_1 - V_2 - V_3 \\ -V_1 + 2V_2 - V_3 \\ -V_1 - V_2 + 2V_3 \end{bmatrix} \dots\dots (12)$$

The conductance matrix is nonlinear. Therefore this system cannot be controlled as a linear state space model. Therefore, linearization of the G_{ij} conductance matrix will be necessary to control this system with state feedback. Another observation is that when the electrodes are positioned flush on the slag (i.e. $X_1=X_2=X_3=0$), there is still a constant current passing through them. This constant value is represented by the second term in above Equation 12. It arises from the presence of G_s in the slagotomate conductance. *(To be continued...)*

*Courtesy: By Rajashekar P Mandi, Janak J Pate1,
Hitesh R Jariwala and Ankur Vashi, CPRI Journal March 2013*

EQUIPMENTS FOR SALE

1. 11KV - 2 Pole Structure: 1 set

2. MAIN PANEL:

- a. Double Bus Bar M.V. Panel
- b. E.B Side - Incoming
- c. 800 Amps - T.P Drawout Type ACB with Earth Fault Relay, Voltmeter, Ammeter with CTs. (L & T make)

i. E.B Bus:

- a. Phase - 50mm x 12mm Al. Flat
- b. Neutral - 25mm x 12mm Al. Flat

ii. Generator Bus Bar:

- a. Phase - 50mm x 12mm Al. Flat
- b. Neutral - 25mm x 12mm Al. Flat

iii. Generator:

Incoming

- a. 400amps - 4 Pole Fuse Switch (L & T make)

Outgoing

- a. 5 pairs - 250amps Fuse Switch
- b. 1 pair - 125amps 4 Pole Fuse Switch
- c. 1 pair - 200amps 4 Pole Fuse Switch (L & T make)

3. GENSET:

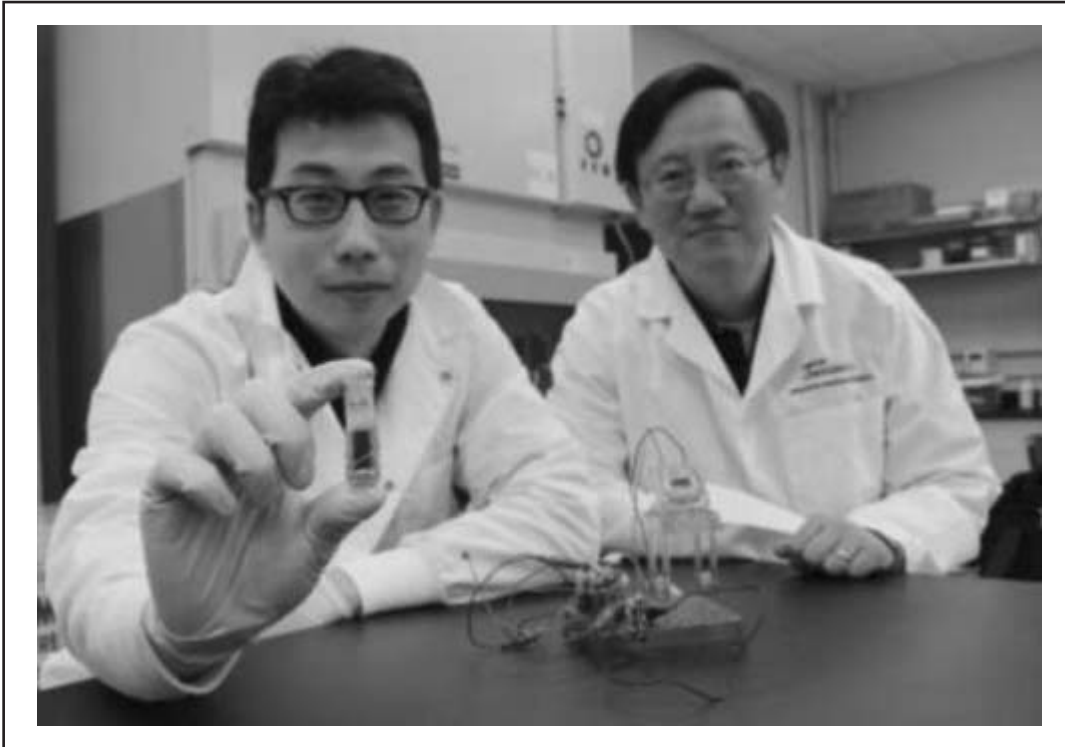
- 1. Capacity: 62.5KVA
Engine: Ashok Leyland
Alternator: Kirolskar
- 2. Capacity: 15KVA
Engine: Kirloskar
Alternator: Kirolskar

Contact: 99944 57569, 99944 71269

THE SUGAR BATTERY WITH UNMATCHED ENERGY DENSITY

A new “sugar battery” possessing an “unmatched” energy density has been created by a research team from Virginia Tech. The researchers think that their new battery — which, it bears repeating, runs on sugar — could potentially replace conventional forms of battery technology within only the next couple of years.

The researchers argue that their sugar batteries’ relative affordability, ability to be refilled, and biodegradability, are significant advantages as compared to current battery technologies, and should give it the edge in competition. They are currently aiming for the technology to hit the market sometime within the next few years.



“Sugar is a perfect energy storage compound in nature,” stated researcher YH Percival Zhang, an associate professor of biological systems engineering in the College of Agriculture and Life Sciences and the College of Engineering. “So it’s only logical that we try to harness this natural power in an environmentally friendly way to produce a battery.”

While sugar batteries aren’t an entirely new concept, they have never been all that viable either — the new technology, though, is different, possessing an “energy density an order of magnitude higher than others,” according to Zhang. Continuing: “Sugar is a perfect energy storage compound in nature. So it’s only logical that we try to harness this natural power in an environmentally friendly way to produce a battery.”

Virginia Tech provides more:

This is one of Zhang’s many successes in the last year that utilize a series of enzymes mixed together in combinations not found in nature. In this newest development, Zhang and his colleagues constructed a non-natural synthetic enzymatic pathway that strip all charge potentials from the sugar to generate electricity in an enzymatic fuel cell. Then, low-cost biocatalyst enzymes are used as catalyst instead of costly platinum, which is typically used in conventional batteries.

Like all fuel cells, the sugar battery combines fuel — in this case, maltodextrin, a polysaccharide made from partial hydrolysis of starch — with air to generate electricity and water as the main byproducts.

“We are releasing all electron charges stored in the sugar solution slowly step-by-step by using an enzyme cascade,” Zhang explained. “Different from hydrogen fuel cells and direct methanol fuel cells, the fuel sugar solution is neither explosive nor flammable and has a higher energy storage density. The enzymes and fuels used to build the device are biodegradable. The battery is also refillable and sugar can be added to it much like filling a printer cartridge with ink.”

Source and top image: Virginia Tech

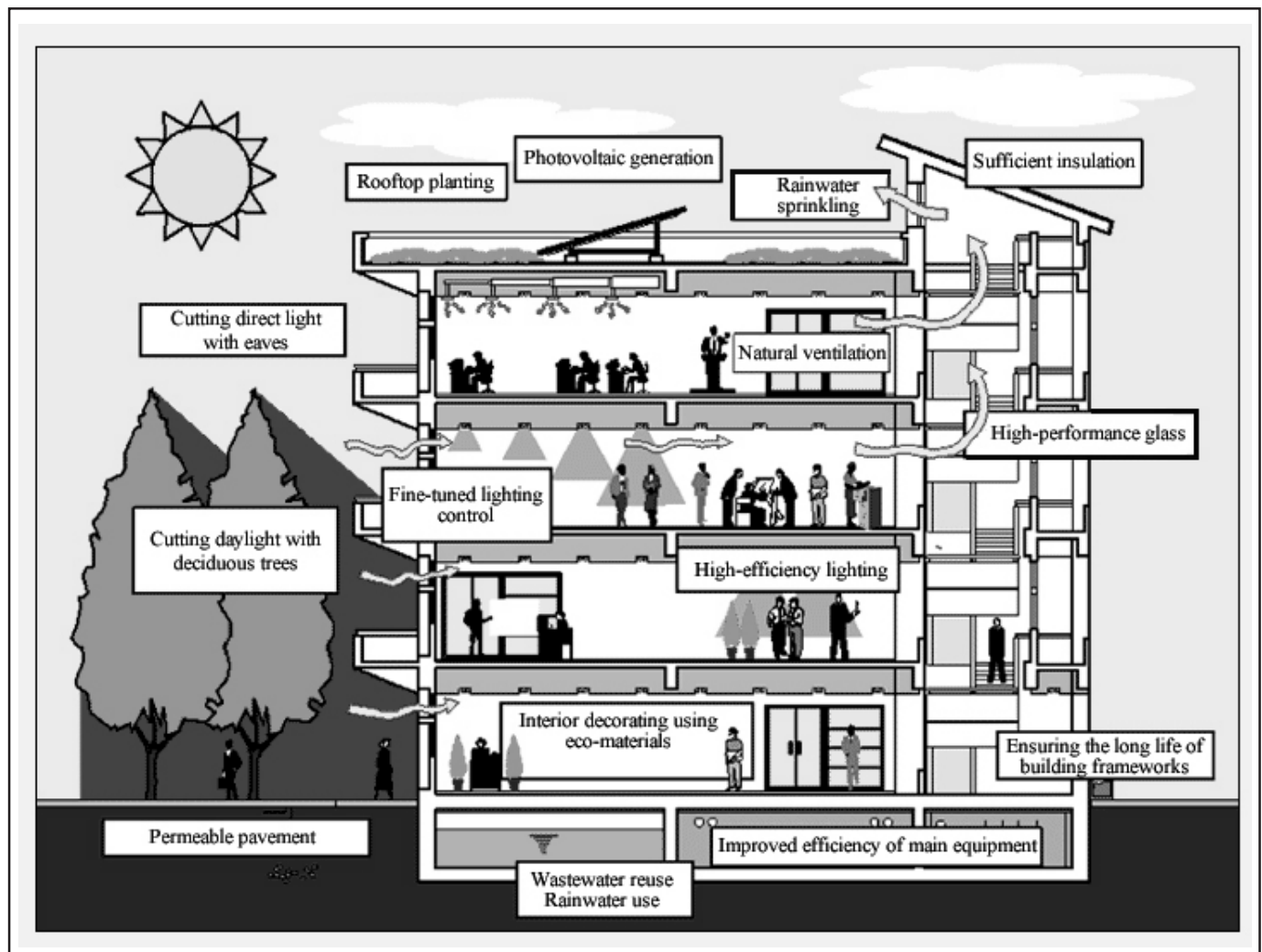
GREEN BUILDING REVOLUTION, LATEST TECHNOLOGIES AND AWARENESS KEY TO MAKE INDIA ENERGY SURPLUS: CII

Asserting that India can be an energy surplus state if Green Building Revolution is adopted, the Confederation of Indian Industry (CII) on Tuesday called for investment in renewable energy.

Addressing the Conference on Energy Management organized by the CII here today, Director General of Bureau of Energy Efficiency Ajay Mathur emphasized, "India can be energy surplus if we push in for a Green Building Revolution, adopt latest energy saving technologies, invest in Renewable energy and run mass awareness campaigns about Hi tech energy-savvy products."

"Further, there is a dire need to focus on Transmission and Distribution (T&D) and remove bottlenecks thereof, so as to reduce the T&D Losses and hence meet India's future energy demands", he further highlighted.

"In a metro like Delhi, where energy demand peaks up to 6000 MW in summers and average sales of ACs every year is three lakh, it is really important to monitor, control and conserve energy at each and every level of demand and supply chain. For this, both private and public sector power players need to collaborate and build up a strong cost effective management system for power generation, transmission and distribution," he added.



A CII-KPMG report on Energy Management for Competitive advantage was also released on the occasion.

Praveer Sinha, Chairman, CII NR Committee on Power Reforms & Renewable Energy & CEO and ED Tata Power Delhi Distribution Ltd said, "Energy Management is not a matter of choice but a necessity in the current scenario, where rate of energy consumption is rapidly increasing making India fourth largest user after US, China and Russia. Pro-active measures need to be adopted not only at industrial level but also at domestic level.

Development of green technologies, use of energy efficient electronic products (five star rating) and GPS based power energy meters can work wonders to ensure an energy surplus future.”

Discussing about important key technological trends needed to drive energy management in industry, he said, “For building a green and energy efficient future we need to increase focus on automation and control of processes, measurement and verification of energy consumption, integration of different systems in a facility (such as access & security, life safety, building management systems, etc.). Convergence of IT and energy management can help in shaping a better future.”

“It is evident that energy efficiency is the quickest, cheapest and the cleanest way to reduce energy consumption, so the Industry and Government need develop a cohesive, holistic and practical approach towards securing an energy efficient future,” he said.

Dr. Prem C Jain, Chairman IGBC and Chairman Aecom India said, “Green Architecture, Advanced energy GPS monitoring, development of green business ideas, analysis of latest global trends of clean energy can together help us in building a sustainable future.”

Highlighting the mission of IGBC (Indian Green Building Council), he added that the future belongs to energy efficient infrastructure, where buildings are not only consumers but also generators of energy.

“The vision of the council is to usher a green building movement in India and facilitate India to become one of the global leaders in green building technology.”

With eminent speakers from organizations like Siemens, Bharti Realty, Reliance Industries, GE energy management, various issues of energy management, innovative technologies and upcoming global trends in field of energy management were discussed in the conference.

OLKARIA III GEOTHERMAL COMPLEX IN KENYA REACHES 110 MW WITH COMMERCIAL OPERATION OF PLANT 3



Ormat Technologies, Inc. (NYSE: ORA) announced today it successfully completed construction and reached commercial operation of Plant 3 in the Olkaria III geothermal power plant complex almost three months ahead of schedule. With Plant 3 online, the complex’s total generation capacity has increased to 110 MW. The power generated by the Olkaria III complex, located in Naivasha, Kenya, is sold under a 20-year power purchase agreement (PPA) with Kenya Power and Lighting Company Limited.

Geothermal projects avoid the need to import fossil fuels and instead utilise a locally available resource which will improve Kenya’s power supply. Kenya’s power sector is highly dependent on hydrological conditions as the bulk of the generation capacity (677 of 1,198 MW) lies with hydro power.

The project contributes very positively to the targets of international climate change policies with the generation of renewable energy and is expected to qualify for the provision of carbon credits within the Clean Development Mechanism of the Kyoto-Protocol.

“This initiative means that the cost of power to the end user will be less than that generated from fuel oil or other alternative energy sources. This in effect will assist in holding down the cost of electricity to consumers as well as for the industry,” Tony Lea, Chairman of the EAIF comments.



NATIONAL SOLAR ENERGY FEDERATION OF INDIA (NSEFI)

National Solar Energy Federation of **India** (NSEFI) delegation led by Pranav Mehta, Chairman and Deepak Gupta, Director General met the Union Minister for New & **Renewable Energy** Dr Farooq Abdullah at New Delhi on Wednesday, 19th February, 2014.

Shri Pranav Mehta, Chairman, NSEFI complimented Dr. Abdullah and the Ministry for the impressive growth of solar energy in **India** in the last three years and achieving over 2200 MW capacity, thanks to the Jawaharlal Nehru National Solar Mission(JNNSM) and the policies of some State Governments. Shri Mehta also

appreciated Govt. of **India** backing domestic manufacturing and Concentrated Solar Power industry in the face of challenges and criticism from powerful quarters.

The delegation stressed the urgent need for immediate disbursal of the pending subsidy to MNRE Channel Partners for Off Grid SPV as also **Solar Thermal**, which if not done will undermine the cause of the Mission. The Minister agreed and assured the delegation that every possible effort will be made to provide the necessary funds so that more ambitious programmes can be undertaken. Further, NSEFI highlighted the fact that there is a need for upscaling the targets and achievements and maintaining the momentum of Solar growth especially in the context of the problem the country is facing in the conventional Power sector and the substantial outgo of foreign exchange and large subsidy burden in the consumption of fossil fuel. In this regard, NSEFI mentioned the **Following suggestions which require attention:**

- Development of Solar Park policy to assist the State Governments and start the development of such Solar Parks across the country for which land needs to be identified forthwith. This will allow a proper development of evacuation infrastructure and land availability.
- Solar Grid power development with bundling arrangement of tariff with thermal power.

The NSEFI delegation also emphasized that there should be a special mission to support large scale installation of solar agricultural pumps for irrigation purposes throughout the country. This will provide financial



relief to State Utilities by reducing huge subsidy burden and improve their rating. Similarly Solar mini grids in remote unelectrified and poorly electrified areas of the country needs to be promoted in a big way. NSEFI suggested that **Biomass** – CSP hybrid needs to be promoted and that the Ministry should consider a pilot plan on this model.

The Minister welcomed these suggestions and mentioned that Ministry and the Federation will work together to prepare the Policy and Programme in this regard. Shri Deepak Gupta, Director General, highlighted the fact that NSEFI is an umbrella organization of solar developers, manufacturers, MNRE Channel Partners, EPC Contractors, Component Manufacturers, NGOs, Service Providers and all stake holders of solar energy in **India** and not confined to some single segment of the Industry. The meeting ended with a group photograph and thanks to the Minister for his valuable time.

Courtesy: EQ international

National Solar Energy Federation of India [NSEFI] is a newly formed umbrella organization, consisting of Solar Manufacturers, Solar Developers both PV and Thermal, EPC Contractors, Financial Institutions, CDM and similar other similar instrument providers and other stake holders such as, Power Exchanges, Solar Appliances manufacturers, Service Providers and leading consultants, MNRE Channel Partners, NGOs and all the stakeholders of solar energy – which is holding out a large potential in the country.

The ultimate aim of the organization is to make solar energy affordable for all and to ensure widespread use and speedier growth as well as global competitiveness of solar industry in India and thereby serve the cause of global warming and climate change and nation building.

RAJASTHAN TO PRODUCE 25,000 MW OF SOLAR POWER

Rajasthan plans to produce 25,000 MW of solar power and get recognition as a “green State”. The desert State has also worked out a strategy for exporting power to other States.

Additional Chief Secretary (Infrastructure) C. S. Rajan said at a session on “Creating world class infrastructure” organised by the Confederation of Indian Industry (CII) here that the State Government had also set a target for installing 10,000 solar pumps for agriculture.

Power, water and road connectivity continued to be the priority sectors in the State, said Mr. Rajan at the session that marked the CII-Rajasthan’s annual day. In the road sector, Rajasthan was planning to construct three corridors from east to west of a total length of 1,100 km, said Mr. Rajan.

Jaipur Vidyut Vitaran Nigam chairman and managing director R. G. Gupta said the power discoms in the State were in a position of strength in terms of distribution and transmission of electricity. He said the discoms would work under the financial restructuring plan.

CII northern region chairman Jayant Davar said the State government must make land available for industries and arrange for adequate supply of water. Infrastructure expert R.S. Rama Subramaniam said a policy of investment, institutional arrangement and infrastructure vision and initiative was essential for creating world class infrastructure.

A reference was made to the Japanese zone in Neemrana industrial area, which has become a model for others to emulate, as well as a special zone attracting the Korean investment.

Mr. Rajan released a report on “Manufacturing in Rajasthan: Agenda for development” on the occasion.



Solar lighting – No time to wait for grid or government

By: Jonas Hamberg

In Phalodi, Rajasthan shopkeeper Nandkishor Sharma’s Chinese make solar lighting systems are selling like ice-cream on a sunny day. Sharma’s systems consist of a 15W, 5W, or 3W panels and a 12 volt or smaller battery. The 15 W panel goes for Rs.1650 and a car battery with a 1 year warranty comes in at Rs.3000. All these without any government subsidies or bureaucracy!



Courtesy: The Hindu

***Best awarded words in London... “Eat your food as your medicines.
Otherwise you have to eat medicines as your food.”***

SOON, CHEAP SECOND-GEN BIOFUEL FOR CARS

Press Trust of India

In a breakthrough, scientists have developed a new technique to produce cheap and environmentally friendly second-generation biofuel from dead plant tissue.

The process as used today needs expensive enzymes, and large companies dominate this market, researchers said.



Now Danish and Iraqi researchers have developed a new technique that avoids the expensive enzymes.

Researchers said the production of second generation biofuels thus becomes cheaper, probably attracting many more producers and competition, and this may finally bring the price down.

Bioethanol, which is made from the remains of plants after other parts have been used as food or other agricultural products, and therefore termed “second generation,” is seen as a strong potential substitute candidate.

Corn cobs and sugar canes are in fact plant parts that can also be used directly as food, so there is a great public resistance to accept producing this kind of bioethanol.

A big challenge is therefore to become able to produce bioethanol from plant parts, which cannot be used for food.

The goal is to produce bioethanol from cellulose. Cellulose is very difficult to break down, and therefore cannot directly be used as a food source, researchers said.

“But the patented enzymes are expensive to buy. We are proud to now introduce a completely enzyme-free technique that is not patented and not expensive. The technique can be used by everybody,” said Per Morgen from University of Southern Denmark.

Together with colleagues from the University of Baghdad and Al-Muthanna University in Iraq, he said that it is not an enzyme, but an acid that plays the main role in the new technique.

The acid is called RHSO_3H , and it is made on the basis of rice husks.

The ashes from burnt rice husks have a high content of silicate, and this is the important compound in the production of the new acid.

The scientists paired silicate particles with chlorosulfonic acid and this made the acid molecules attach themselves to the silicate compounds.

“The result was an entirely new molecule - the acid RHSO_3H - which can replace the enzymes in the work of breaking down cellulose to sugar,” said Morgen.

PRODUCT OF THE MONTH

FLIR EX-SERIES

A new thermal imaging experience

FLIR Ex-Series thermal imaging cameras are ideal for electrical and mechanical inspections where their ability to detect potential problem areas mean that installations can be quickly and easily inspected and breakdowns avoided. Building inspectors will also rapidly discover the benefits of the FLIR Ex-Series as they are ideal for detecting insulation losses, inspecting under floor heating and many other building related anomalies.

FLIR Ex-Series cameras are easy-to-use thermal imaging cameras that give the user access to a new dimension in inspection capability. An affordable replacement for a spot pyrometer, they provide a thermal image with temperature information on every pixel. A FLIR thermal imaging camera can scan an entire area, never missing a potential problem area, no matter how small it might be.

Outstanding ease-of-use

With a fixed focus-free lens FLIR Ex-Series are extremely simple to operate. Designed for entry-level users, and measuring temperatures up to +250°C., they produce instant, 'point-and-shoot' JPEG thermal imagery with all required temperature data included.

Visual camera and FLIR patented MSX

A built-in visual camera makes observing and inspecting faster and easier; the visual image can also be used as a reference against the thermal image. FLIR's patented MSX-technology provides thermal images of exceptional quality in real time. This results in sharper-looking thermal images, quicker target orientation and clutter-free reports.

Different models: lightweight and easy to carry

All FLIR Ex-Series weigh only 575 grams, and are easy to carry in a belt pouch.



	FLIR E4	FLIR E5	FLIR E6	FLIR E8
Built-in visual camera	Yes	Yes	Yes	Yes
FLIR patented MSX technology	Included	Included	Included	Included
Thermal image quality	80 x 60 pixels	120 x 90 pixels	160 x 120 pixels	320 x 240 pixels
Sees temperature differences as small as	0.15°C	0.10°C	0.06°C	0.06°C
Analysis	Spotmeter	SpotmeterArea with max./min.	SpotmeterArea with max./min. Color alarm; blue below / red above set temperature	SpotmeterArea with max./min. Color alarm; blue below / red above set temperature

Reporting and analysis software included

FLIR Tools software is available for free download by all Ex-Series users. FLIR Tools allows the user to import thermal images to a PC for basic reporting and analysis of findings.

Key features of FLIR Tools mean that the user can:

- Layout, move and resize measurement tools on any thermal image
- Create PDF image sheets

- Add headers, footers and logos to reports
- Apply filters when searching for specific thermal images

Those who need more analyzing capability can select FLIR Tools+ as an option.

About thermal imaging

Thermal imaging is the use of cameras constructed with special sensors that “see” thermal energy emitted from an object. Thermal or infrared energy is light that is not visible to the human eye because its wavelength is too long to be detected. It is the part of the electromagnetic spectrum that we perceive as heat. Infrared allows us to see what our eyes cannot. Thermal imaging cameras produce images of invisible infrared or “heat” radiation. Based on temperature differences between objects, thermal imaging produces a clear image. It is an excellent tool for predictive maintenance, building inspections, research & development and automation applications. It can see in total darkness, in the darkest of nights, through fog, in the far distance and through smoke. It is also used for security and surveillance, maritime, automotive, firefighting and many other applications.

About FLIR Systems

FLIR Systems is the world leader in the design and manufacturing of thermal imaging cameras for a wide variety of applications. It has over 50 years of experience and thousands of thermal imaging cameras currently in use worldwide for industrial applications, building inspections, research & development, security and surveillance, maritime, automotive and other night-vision applications. FLIR Systems has eight manufacturing plants located in the USA (Portland, Boston, Santa Barbara and Bozeman), Stockholm, Sweden, Tallinn, Estonia and near Paris, France. It operates offices in Australia, Belgium, Brazil, China, Dubai, France, Germany, Hong Kong, India, Italy, Japan, Korea, the Netherlands, Russia, Spain, UK and the USA. The company has over 3,200 dedicated infrared specialists, and serves international markets through an international distributor network providing local sales and support functions. *More about FLIR Systems and our products can be found at www.flir.com*

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GREENKO TO BUY LANCO'S HYDEL PROJECT FOR Rs 650 CRORE

Clean energy developer Greenko will acquire Lanco's 70 MW hydel plant in Himachal Pradesh for about 77 million euros (Rs 650 crore), which would take its overall generation capacity to 546 MW. London-listed Greenko would snap up the Budhil 70 MW hydro power plant in Himachal Pradesh and the project is also near the company's existing assets. With the buyout, the entity said its total generating portfolio would increase to 546 MW. "The total value of the acquired assets is approximately 77 million euros, funded in-line with the company's current portfolio from project finance debt and internal resources," Greenko said today in a filing to the London Stock Exchange.

At current exchange rate, the value would be about Rs 650 crore. On Monday, Lanco Infratech, which is facing challenging business conditions, announced it would sell three hydel projects in Himachal Pradesh including the Budhil plant, to Greenko for an undisclosed amount. Greenko today said the acquisition of two other projects - IKU-2 and Baner-3 - is expected to be completed later this year. Each has a generation capacity of 5 MW. According to Greenko, Budhil project is expected to “deliver an average of approximately 14 million euros of EBITDA over the long term, based on current exchange rates”.

Once final pro-forma approvals are received from the state and the banks, the company expects to recognise revenue from Budhil at the start of its 2014-15 financial year. Post acquisition, Greenko would have 12 run-of-river hydel projects operating in its Himachal Pradesh cluster, totalling 141 MW. Greenko CEO Anil Chalamalasetty said the deal is attractive for shareholders since it is immediately earnings accretive and offers strong returns. "This acquisition, combined with the **wind** farms we expect to commission in the coming months, will take us to over 700 MW by the start of the 2014 monsoon, compared to 244 MW a year before," he noted. The company said the transaction related to two other hydro projects is expected to be complete later this year.

Courtesy: Greenko

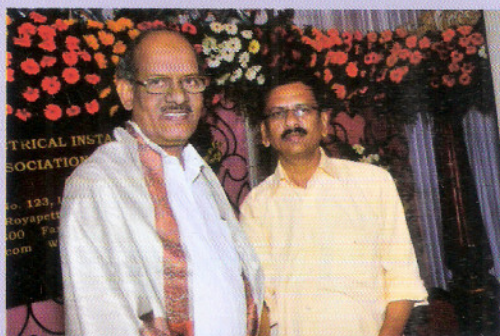
Modern technology Owes ecology An apology. - ALAN M. EDDISON

Technical Seminar in Trichy - 08.03.2014

Photos



Dignitaries



Mr. U. Baskaran, President
honouring **Er. S. Appavoo**



Mr. K. Kannan, Secretary honouring
Er. R. Kumaresan, Chief Engineer,
TANGEDCO, Trichy



Er. S. Appavoo, CEIG,
Lighting the kuthuvilakhu



Er. R. Kumaresan, Chief Engineer,
TANGEDCO, Trichy,
Lighting the kuthuvilakhu



Ms. Chandralekha, Deputy Manager, BHEL, *Lighting the kuthuvilakhu honouring the Women's Day*



Er. S. Appavoo, CEIG, *delivering the speech*



Er. R. Kumaresan, Chief Engineer, TANGEDCO, Trichy, *delivering the speech*



Mr. A. Sekhar, CEO, Spike Power Protection Systems & Technologies, *Presenting the Technical Papers*



Mr. R. Shankaranarayanan, Area Manager, Chennai, Hager Electro P. Ltd., *Presenting the Technical Papers*



Mr. Vyome Tripathi, SVS Buildvel Pvt. Ltd., *Presenting the Technical Papers*



Mr. Kiran Manjunath, Sr. Engineer, Klauke India, *Presenting the Technical Papers*



Mr. Srinivas Bondade, Regional Sales Engineer, Ideal Industries India Pvt. Ltd., *Presenting the Technical Papers*

ELECTRICAL INSTALLATIONS IN INDUSTRIAL BUILDINGS - 2

6 SUPPLY CHARACTERISTICS AND PARAMETERS

6.0 General

6.0.1 The arrangement of the electrical system in industrial plants and the selection of electrical equipment depends largely on the type of manufacturing process, the reliability of supply and adequate reserve of electrical capacity are the most important factors to avoid interruption of supply.

6.0.2 All electrical installation shall be suitable for the voltage and frequency of supply available.

6.0.3 For large loads, the relative advantage of high voltage three-phase supply should be considered. Though the use of high voltage supply entails the provision of space and the capital cost of providing a suitable transformer substation on the consumer's premises, the following advantages are gained:

- a) Advantage in tariff,
- b) More effective earth fault protection for heavy current circuits,
- c) Elimination of interference with supplies to other consumers permitting the use of large size motors, welding plant, etc., and
- d) Better control of voltage regulation and more constant supply voltage.

6.0.4 In very large industrial buildings where heavy electric demands occur at scattered locations, the economics of electrical distribution at high voltage from the main substation to other subsidiary transformer substations or to certain items of plant, such as large motors, furnaces, etc, should be evaluated. The relative economy attainable by use of medium or high voltage distribution and high voltage plant is a matter for expert judgement and individual assessment in the light of experience by a professionally qualified electrical engineer.

6.1 Industrial Substations

6.1.0 The general requirements for substation installations given in the Code shall apply in addition to those given below.

6.1.1 If the load demand is high, which requires supply at voltages above 650 V, a separate substation should be set up. For an outdoor substation general guidelines as given in the Code shall apply. For bringing the supply into the factory building, a separate indoor accommodation, as close as possible to the main load centre, should be provided to house the switchgear equipment.

6.1.2 The supply conductors should preferably be brought into the building underground to reduce the possibility of interruption of power supply. The accommodation for substation equipment as well as for main distribution panel shall be properly chosen so as to prevent access by any unauthorized person. It shall be provided with proper ventilation and lighting.

6.1.3 In cases where the load currents are very high, and the transformers are located just outside the building, a bus-trunking arrangement may be desirable. These trunkings should, however, be straight, as far as possible, and also as short as possible on economic grounds.

6.1.4 Location of Transformers and Switchgear

Oil filled transformers are preferably located outdoors while the associated switchgear is located in a room of the building next to the transformer. In certain cases, however, it may be considered desirable to locate the transformer inside the room.

For reasons of safety, however, it may be considered desirable to locate the transformer also inside the room. The transformer could be connected to the switchgear by cables for small loads, however it may often be found desirable to avoid cable joints and connect the transformer directly to the switchgear placed on either side of the transformer. For oil-filled transformer, special means should be available for remote operation of the main switches/circuit-breakers in an emergency created by explosion/fire in the transformers.

6.1.5 In order to ensure the reliability and safety of industrial sub-station, it is desirable to have circuit breakers as the main switching elements on both sides of the transformers. However, a high voltage sizes, switches and fuses may also be used for this purpose upto the limit specified under Rule 50, sub-rule 1 of *Indian Electricity Rules*, 1956.

Clearly, we need more incentives to quickly increase the use of wind and solar power; they will cut costs, increase our energy independence and our national security and reduce the consequences of global warming. - HILLARY RODHAM CLINTON

6.1.6 For small substations up to 1 600 kVA capacity, it is also possible to locate the substation at the load centre, without a separate room. This yields considerable economies in cost. In such cases, the transformer shall be of dry type.

6.1.7 Isolation of Switchgear

For installations where the system voltage exceeds 650 V, the typical circuits and the recommended location of isolating switches in such circuits are illustrated in IS 732. Reference should be made to the same for guidance regarding isolation depending on the type of supply system.

6.2 Distribution of Power

6.2.1 From the main receiving station, power is taken to the loads, either directly as in the case of small factories, or through further load centre substations as would be the case with bigger installations.

Distribution is done on HV through circuit breaker/ load break switches depending on quantum of load to be transferred, distance to be covered, and on similar factors. MV/LV distribution is possible through one of the following:

- a) Wall-mounted distribution boards,
- b) Floor mounted distribution boards,
- c) Local fuse distribution boards, and
- d) Overhead bus bar system with tap-off holes.

6.2.2 In every layout, however, specific care shall be taken for:

- a) Human safety,
- b) Fire/explosion hazards,
- c) Accessibility for repair/checking,
- d) Easy identification, and
- e) Fault localization.

6.2.3 Switchgear

6.2.3.0 All switchgear equipment used in industrial installations shall be metal enclosed. Woodwork shall not be used for mounting off switchboards.

6.2.3.1 MV switchgear isolation and protection of outgoing circuits forming main distribution system may be effected by means of circuit-breakers, or switchfuse units mounted on the main switchboards. The choice between alternative types of equipment may be influenced by the following considerations:

- a) In certain installations where supply is from remote transformer substations, it may be necessary to protect main circuits with circuit-breakers operated by earth leakage trips, in order to ensure effective earth fault protection.
- b) Where large electric motors, furnaces or other heavy electrical equipment is installed, the main circuits shall be protected by metal-clad circuit-breakers or contactors of air-break or oil-immersed type fitted with suitable instantaneous and time delay over current devices together with earth leakage and backup protection where necessary.
- c) In installations other than those referred to in (a) and (b) or where overloading of circuits may be considered unlikely to occur, HRC type fuses will normally afford adequate protection for main circuits. Where means for isolating main circuits is required, fuse switch or switch fuse units shall be used or fuses with switches forming part of the main switchboard shall be used.

6.2.3.2 It may be necessary to provide for connection of capacitors for power-factor correction; and when capacitors are to be installed advice of capacitor and switchgear manufacturers shall be sought.

6.2.3.3 Adequate passageways shall be allowed so that access to all switchboards for operation and maintenance is available. Sufficient additional space shall be provided for anticipated future extensions.

6.2.3.4 Switchboards should, preferably, be located in separate rooms to ensure:

- a) adequate protection against weather elements like heat, dust, corrosion, etc; and
- b) protection against entry of factory material like cotton, wood dust, water during cleaning, etc.

Where necessary the control rooms should be designed to avoid wide fluctuations in ambient temperature, and against entry of excessive dust or corrosive gases.

***I think we need to take positive steps toward space solar-power systems.
We need to move in a step-by-step manner. It's a real possibility to have
a great new energy source for mankind. - DANA ROHRBACHER***

6.2.3.5 Certain applications may necessitate location of the switchboards on the factory floor itself, without separate rooms. In such cases, the switchboards shall be specifically designed and protected against hazards mentioned above.

6.3 Main Distribution

6.3.1 For power distribution from a substation or main switchboard to a number of separate buildings, use shall preferably be made of;

- a) metal-sheathed, bedded and armoured cable, served, installed overhead/underground, or
- b) mineral-insulated metal-sheathed cable, served with PVC, laid overhead/direct in the ground, or
- c) PVC-insulated, armoured and PVC-sheathed cable installed overhead/underground, or
- d) XLPE insulated, armoured and PVC-sheathed cable installed overhead/underground.

6.3.1.1 Cables shall not be laid in the same trench or alongside a water main.

6.3.1.2 Cable trenches shall be made with sufficient additional space to provide for anticipated future extensions.

6.3.2 Cables at difference voltage levels should be laid with separation at least 250 mm and clearly identified. Cables at voltages above 1 000 V should be laid at the lowest level in trenches, and at the highest level on walls, keeping in view the requirements of human safety. The cable routes where buried should be properly identified by route markers, as a precaution against accidents. The marker should necessarily indicate the voltage level. Cables laid underground or at low working levels, should either be with armouring, or should be adequately protected against mechanical damage, for example, by the use of conduits.

6.4 Sub-circuits

6.4.0 The sub-circuit wiring shall conform in general to the requirements given in IS 732.

6.4.1 In 3-phase distribution systems, a neutral conductor may preferably be provided in all sub-main circuits even when there is no immediate requirement for the supply of single-phase circuits. Control devices are often designed for connection between one phase and neutral and considerable extra cost may be involved, if a four-wire sub-main has to be installed in place of a three-wire sub-main previously installed.

6.4.2 In workshops and factories where alterations and additions are frequent, it may be economical and convenient to install wiring in ducts or trunking. Alternatively, cables may be conveniently run on perforated metal cable trays. In this case earth continuity conductor shall be bonded to each section of ducts or trunking to provide permanency of the electrical continuity of the joints of the ducts.

6.4.3 In machine shops and factories where alterations in layout may repeatedly occur, consideration shall be given to the replacement of local distribution boards by overhead bus-bar or cable systems, to which sub-circuit are connected through fused plugs in tapping boxes wherever required.

6.4.4 In industrial installations, the branch distribution boards shall be totally segregated for single phase wiring.

6.4.5 Where more than one distribution system is necessary, the socket outlets shall be so selected as to obviate inadvertent wrong connections.

6.4.6 In industrial premises, 3-phase and neutral socket outlets shall be provided with earth terminal either of pin type or scrapping type in addition to the main pins required for the purpose.

In industrial installations, socket outlets of rating 30 A and above shall be provided with interlocked type switch. These shall be of metal clad type.

6.4.7 Where non-luminous heating appliance is to be used, pilot lamps shall be arranged to indicate when the circuit is live.

6.4.8 Final sub-circuits for lighting shall be so arranged that all the lighting points for a given area are fed from more than one final sub-circuit.

6.4.9 Individual sub-mains shall be installed to supply passenger and goods lifts from the main or sub-main switchgear, and the lift manufacturer shall be consulted as to the appropriate rating of cables to be employed.

The supply to small hoists and service lifts shall not be taken from a distribution board controlling final sub-circuits for lighting, unless the maximum current, including the starting and accelerating current, of the motor is less than 20 percent of the total rating of all the ways of the distribution boards. Where the supply is taken from such a distribution board, the motor circuit shall be clearly labelled.

6.5 Selection of Wiring Systems

The selection of a wiring system to be adopted in a factory depends upon the factors enumerated in the Code.

SAVE ENERGY: You Have the Power to Conserve

The wiring system available for general use are listed in Annex C. Selection from a group of alternative systems shall be made in accordance with Annex C, keeping in view the particular circumstances of each circuit having regard to,

- a) location, structural conditions, liability to mechanical damage and the possibility of corrosion;
- b) protection against corrosion, nature of the corrosive elements being taken into account in conjunction with the protective coverings available;
- c) occupancy of the building; and
- d) presence of dust, fluff, moisture and temperature conditions.

6.6 Earthing in Industrial Premises

6.6.0 In factories and workshops all metal conduits, trunking, cable sheaths, switchgear, distribution fuse boards, starters, motors and all other parts made of metal shall be bonded together and connected to an efficient earth system. The electricity regulations made under the *Factories Act* require that adequate precautions shall be taken to prevent non-current carrying metal work of the installation from becoming electrically charged.

In larger installations, having one or more substations, it is recommended to parallel all earth-continuity system.

6.6.1 Earth Electrodes

Any of the earth electrodes as mentioned in the Code except cable sheath, may be used in industrial premises.

6.6.2 Earth-continuity Conductor

6.6.2.1 Earth-continuity conductors and earth wires not contained in the cables

The size of the earth-continuity conductors should be correlated with the size of the current carrying conductors, that is, the sizes of earth-continuity conductors should not be less than half of the largest current-carrying conductor, provided the minimum size of earth-continuity conductors is not less than 1.5 mm² for copper and 2.5 mm² for aluminium and need not be greater than 70 mm² for copper and 120 mm² for aluminium. As regards the sizes of galvanized iron and steel earth-continuity conductors, they may be equal to the size of the current carrying conductors with which they are used. The size of earth-continuity conductors to be used along with aluminium current-carrying conductors should be calculated on the basis of equivalent size of the copper current-carrying conductors.

6.6.2.2 Earth-continuity conductors and earth wires contained in the cables

For flexible cables, the size of the earth-continuity conductors should be equal to the size of the current-carrying conductors and for metal sheathed, PVC and tough rubber sheathed cables the sizes of the earth-continuity conductors shall be in accordance with relevant Indian Standard.

6.6.2.3 Conduits may be used as earth-continuity conductors provided they are permanently and securely connected to the earth system. However, where by nature of the process, metal conduits cannot be used as earth-continuity conductor on account of corrosion, etc, the tough rubber or PVC sheathed cables may be used in which case they shall incorporate an earth-continuity conductor.

6.6.2.4 Flexible conduits shall not be used as earth-continuity conductors. A separate earth wire shall be provided either inside or outside the flexible conduits which shall be connected by means of earth clips to the earth system at one end and to the equipment at the other end.

6.6.2.5 Earth leakage protection

Use of earth leakage protection shall be made where greater sensitivity than provided by overcurrent protection is necessary. With a good earth electrode, overload protective devices may be used as earth leakage protective device.

In addition to the advantage of sensitivity gained by such methods, the circuits may be relieved of the thermal and mechanical shocks associated with the clearance of heavy faults.

Some degree of discrimination may, in certain cases, be introduced with advantage by providing the delay in the operation of an earth-leakage trip, so that earth faults on smaller subsidiary circuits protected by fuses have time to clear and prevent the opening of the circuit-breaker, controlling a larger part of the installation.

6.6.3 Earthing of Portable Appliances and Tools

6.6.3.1 Good electrical continuity between the body of a portable appliance and the earth-continuity conductor shall always be maintained.

***The fundamental concept in social science is Power, in the same sense
in which Energy is the fundamental concept in physics.***

6.6.3.2 It shall be ascertained that the fixed wiring at the appliance inlet terminals has been done correctly and in accordance with relevant Indian Standard.

6.6.3.3 A single pole switch shall not be connected in the earth conductor.

6.6.3.4 No twisted or taped joints shall be used in earth wires.

6.6.3.5 Additional security may be obtained by arranging the earth-continuity conductor in the flexible cable between the socket outlet and the portable appliance in the form of a loop through which a light circulating current provided by a small low-voltage transformer is passed when the appliance is in use. Any discontinuity in this loop will interrupt the circulating current and can thus be caused to operate a relay and disconnect the supply from the portable appliance.

6.6.4 *Earthing of Electrically Driven Machine Tools*

In all types of machine tools connected to medium voltage, the body of all motors and bed plate of the machine shall be earthed at two places by means of a strip or conductors of adequate cross-sectional area. The strip or conductor shall be securely fastened to the bed plate by means of bolts.

6.6.5 *Earthing of Electric Arc Welding Equipment*

6.6.5.1 All components of electric arc welding equipment shall be effectively bonded and connected to earth. The transformers and separate regulators forming multioperator sets and capacitors for power factor correction, if used, shall be included in the bonding.

6.6.5.2 All terminals on the output side of a motor generator set shall be insulated from the car case and control panel, as the generator is not connected electrically to a motor and therefore the welding circuit is electrically separate from the supply circuit including the earth.

6.6.5.3 In case of transformer sets, which for welding purpose are double wound, an 'earth and work' terminal shall be provided. In single phase sets this terminal shall be connected to one end of the secondary winding and in case of three-phase sets this shall be connected to the neutral point of the secondary winding.

6.6.6 *Earthing of Industrial Electronic Apparatus*

6.6.6.0 The earthing of these apparatus shall follow normal practice but attention shall be paid to the points discussed below.

6.6.6.1 Any industrial electronic apparatus which derives its supply from two-pin plugs incorporates small capacitors connected between the supply and the metal case of the instrument to cut down interference. This capacitor shall be securely earthed.

6.6.6.2 When an oscilloscope is being used to examine the wave-form of a high frequency source, the oscilloscope shall be earthed by a conductor entirely separate from that used by the source of high frequency power. However, when an oscilloscope is being used on a circuit where the negative is above earth potential and also connected to its metallic case, the earthing of the oscilloscope is not possible. Precautions shall be taken that in such a case the oscilloscope is suitably protected from other apparatus.

6.6.6.3 High frequency induction heating apparatus shall be earthed by means of separate earth wire by as direct a route as possible.

6.6.6.4 Dielectric loss heating equipment work at frequencies between 10 MHz to 60 MHz according to its use. These should not be directly earthed. At 30 MHz, for example, a quarter wavelength is nearly 250 cm and an earth wire of this length or odd multiples of it is capable of being at earth potential at one end but several hundred volts at the other end. This is due to the presence of standing waves on the earth conductors which besides being dangerous can result in energy being radiated to the detriment of communication services. In such a case it is recommended to mount the equipment on a large sheet of copper or copper gauze, the earth conductor being connected to it at several points.

6.6.6.5 In case where direct earthing may prove harmful rather than provide safety, for example, high frequency and mains frequency coreless induction furnaces, special precautions are necessary. The metal of the furnace charge is earthed by electrodes connected at the bottom of the charge, and the furnace coils are connected to the mains supply but are unearthed. A relay is connected by a detection circuit which itself is earthed to the coils. The object is to prevent dangerous breakthrough of hot metal through the furnace lining, the earth detection circuit giving a continuous review of the conditions for the furnace lining. When leakage current attains a certain set maximum it becomes necessary to take the furnace out of service and to re-line.

7 EMERGENCY/STANDBY POWER SUPPLIES

7.1 The provisions of the code shall apply.

(To be Continued...)

Courtesy: National Electrical Code 2011

NARROW GEOGRAPHICAL FOCUS STALLING INDIAN SOLAR INDUSTRY

With total installed solar capacity in India rising from 22 MW in January 2011 to over one GW in October 2012, and a reported pipeline worth over 1.1 GW, investors are casting covetous eyes on the market.

However, thanks to the narrow geographical focus of the two initial drivers of photovoltaics in the country – the Gujarat Solar Policy and the National Solar Mission – some 87% of India's total installed capacity is located in just two states: 68% (709 MW) in Gujarat; and 19% (195 MW) in Rajasthan.

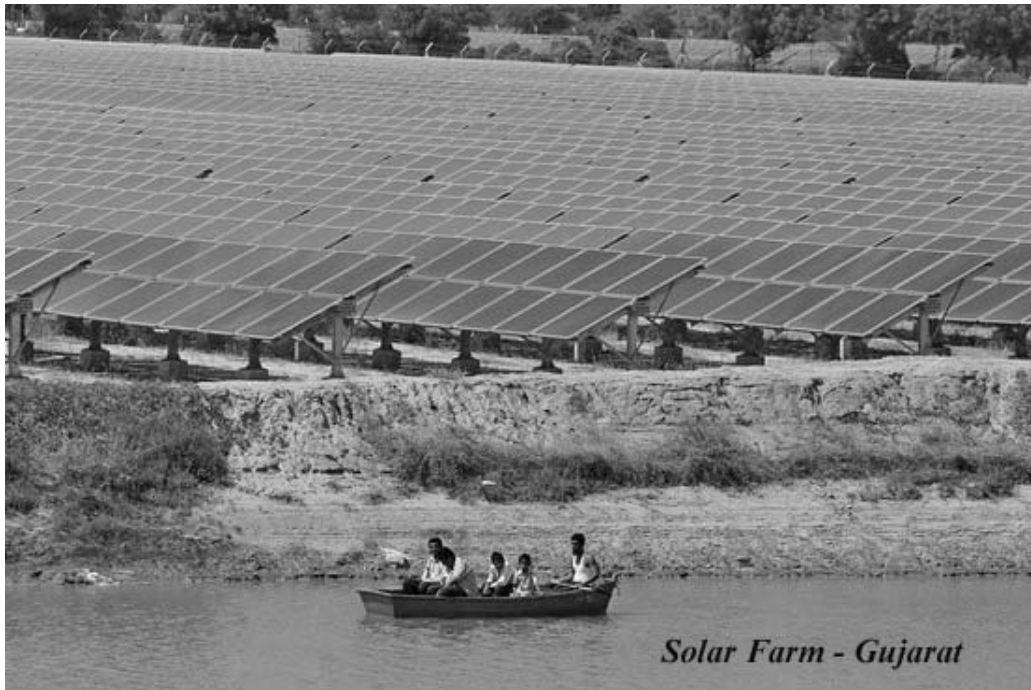
An overdependence on these twin drivers has also meant that when either stalls, the photovoltaic industry as a whole lurches to a halt. As a result, an initial surge of 1.1 GW of capacity at the end of 2010 was driven by the two schemes; with the National Solar Mission delivering only 350 MW more in December 2011 and a further 310 MW in the first half of this year, there has been a significant lull in development, as the Rooftop Photovoltaic and Small Solar Power Generation Programme (RPSSGP) has failed to take up the slack.

A shift in policy to the use of market forces-driven renewable energy certificates (RECs) has failed to maintain the earlier boom thanks to the combination of a lack of long-term price predictability for the RECs and a lack of enforcement of renewable purchase obligations (RPOs) in some states.

However, Bridge to India's report states that demand for RECs outstrips supply and the race to grid parity in several states will help further lift demand for solar.

The unbalanced nature of the solar market across the country is reflected by the report's league table of best and worst performing states. Predictably Gujarat and Rajasthan are rated top of the pile but Assam; Himachal Pradesh; Arunachal Pradesh; Nagaland; Meghalaya; Sikkim; Goa and the Union Territories are highlighted as having no state solar policy and no solar developments and a further five states are also lacking any targets or legislation.

The Solar Handbook pinpoints cause for optimism from the country's booming telecommunications infrastructure. With around 33% of India's telecoms towers in off-grid locations and 23% receiving less than 14 hours of electricity daily, there is a heavy dependence on diesel.



And, with the solar LCOE in India already markedly cheaper than diesel and a further 110,000 towers set to go up by 2016, photovoltaics are expected to make a significant contribution to the mobile communications revolution.

Read more: http://www.pv-magazine.com/news/details/beitrag/narrow-geographical-focus-stalling-indian-solar-industry_100009268/#ixzz2usGBkmLz

THE i-ROAD

An ultra-compact electric vehicle with only three wheels. A new breed of vehicle from Toyota built using the latest technologies, offering exhilarating, compact mobility for short-distance city driving. Its small footprint results in impressive maneuverability, navigating narrow streets quickly and smoothly. These features mean the i-ROAD will contribute to decreased congestion and need for parking, helping maintain clean communities that produce fewer greenhouse gases.

The feel of an i-ROAD. When you first grip the steering wheel, the feeling is like no other vehicle you've ever been in. Active Lean technology automatically raises and lowers the front wheels to balance the vehicle, even when turning sharply or on uneven or sloped roads. With no need for the driver to balance the vehicle, you can drive confidently. A new innovation, different from a car or a bike, the i-ROAD is designed to make you feel confident on the road.



At 850mm wide, the ultra-compact i-ROAD is perfect for getting out with your special someone. There's no need to take up the whole road, driving and parking in spaces a half to a quarter the size of other vehicles. The feel of the interior has also been carefully considered, fully enclosed from noise and the elements so you can enjoy music or a relaxed conversation.



Easy for anyone. In terms of ease of use, the i-ROAD is leagues ahead of any other vehicle. From making car sharing reservations to unlocking the vehicle, everything is controllable via smartphone*, reducing the distance between you and convenient mobility.

With a rechargeable lithium-ion battery and highly efficient electric powertrain, the i-ROAD can travel upto 50km* on one charge when driving at city speeds. Further, since you can charge at night or using solar, the i-ROAD helps reduce energy load on the community.



Estimated range of 50km at a speed of 30km/h per charge by 2016 - 42km by 2014

From the station to the store or from work to the doctor's office, the i-ROAD makes short trips easy. Planned to be available as part of a vehicle sharing service* that includes electric-assist bicycles, you can cruise through town then drop off your i-ROAD at the nearest sharing station to your destination. Toyota is developing an environmentally-friendly, readily-available form of transport like no other.

*To be included in the Ha:mo Urban Transport System proving test currently being carried out in Toyota City in 2014.

HYBRID SOLAR TECHNOLOGY TO POWER ALL ELECTRICAL DEVICES

The conventional rooftop solar plant is capable of powering lights and fans.

However, hybrid solar technology developed by Chennai-based **Basil Energetics Private Limited** is now capable of operating all electrical appliances.

The solar plant would power homes during day time and take power supply from the electricity grid at night.

R. Ramarathnam, chairman of the company, said the Smart Microgrid Solar System is a technology similar to the rooftop solar plant; the difference is in the installation of hybrid appliances including air-conditioners, refrigerators and ceiling fans along with a solar grid controller. He said the solar plant comes with a complete package having a solar panel and super efficient electrical appliances that could operate both on alternating current (AC) and direct current (DC).

The solar system package starts at a price rate of Rs. two lakh, Mr. Ramarathnam added.

Courtesy: The Hindu, dt: 06.03.2014

***"We welcome India's recent economic reforms as steps in the right direction...
I have no doubt that future reform will strengthen trade and investment
ties as well as benefit India's domestic industry."***

– Ms. NANCY J POWELL, US Ambassador to India

TRINA SOLAR AND ANU JOINTLY DEVELOP HIGH EFFICIENCY SOLAR CELL

Marks Highest Efficiency for a Back Contact Silicon Solar Cell

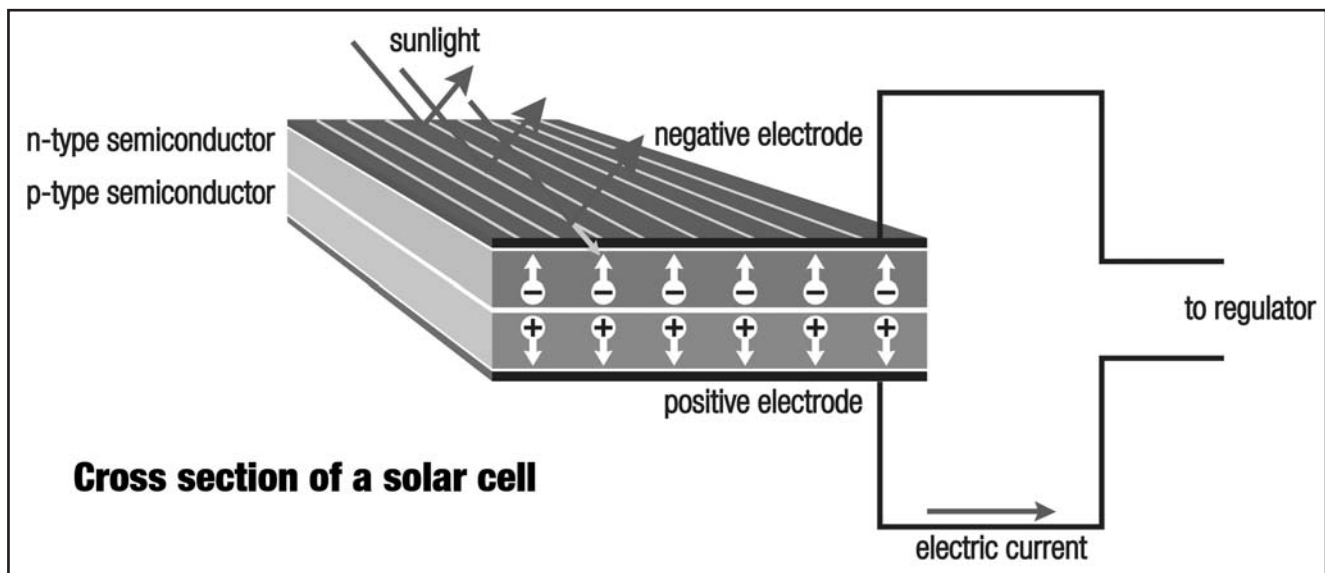
CHANGZHOU, China, Feb. 28, 2014 /PRNewswire/ — Trina Solar Limited (“TSL” or “Trina Solar”), a global leader in photovoltaic modules, solutions and services, announced today that researchers from Trina Solar and the Australian National University (“ANU”) have jointly developed a new high-efficiency solar cell.

The laboratory scale Interdigitated Back Contact (“IBC”) cell was developed at the Australian National University Centre for Sustainable Energy Systems under a research and development contract with Trina Solar through a collaboration contract with the Solar Energy Research Institute of Singapore (SERIS). After two years of research, funded by Trina Solar, the ANU has developed, with contribution from Australian consulting firm PV Lighthouse, an IBC silicon solar cell, which was independently tested by the Fraunhofer CalLab in Germany to be able to deliver an efficiency of 24.4%, putting it among the most efficient solar cells to date.

Trina Solar is now developing a commercial version of the IBC solar cell as well as an IBC PV module. The commercial cell has already reached an efficiency greater than 22% for a 125mm by 125mm IBC solar cell, and 238W for an IBC PV module (based on 72 cells), which was independently tested by the National Center of Supervision and Inspection on Solar Photovoltaic Products Quality of China. Though it is currently in laboratory scale, the new solar cell will soon be ready for industrialized mass production.

“We are delighted to collaborate with leading scientists at ANU on this exciting new development in our cell technologies,” said Dr. Pierre Verlinden, Vice-President and Chief Scientist of Trina Solar. “This marks a milestone in solar cell research with an improved IBC cell efficiency of 24.4%. This world-class efficiency demonstrates our commitment to leading innovation in PV technology. We remain committed to engaging in effective partnerships with the best PV research centers, which are fundamental to delivering R&D breakthroughs.”

“This is the highest efficiency independently confirmed for a conventional IBC solar cell to date,” said Professor Andrew Blakers, Director of the Centre for Sustainable Energy Systems at the ANU Research School of Engineering. “The results mean the laboratory cell technology can now be further developed for commercial solar cells. The work is expected to lead to commercial solar cells with improved efficiency, allowing more power to be generated from a given area of rooftop solar module.”



Professor Blakers added, “The ANU has been working to develop highly efficient back contact silicon solar cells, which have both positive and negative metallic contacts on the rear surface. That allows the surface facing the sun to be uniformly black, without the metal electrodes present on most solar cells. The back contact cell structure enables the end user to gain more electricity per unit area and a more favourable appearance.”

***“I am enough of an artist to draw freely upon my imagination.
Imagination is more important than knowledge. Knowledge is limited.
Imagination encircles the world.” - ALBERT EINSTEIN***

KOCHI SCHOOLS TO HAVE BIOGAS PLANTS SOON

All the city schools will begin a new chapter in decentralised waste management during the next academic year by installing biogas units on the campuses.

The Kochi Corporation and Suchitwa Mission have joined hands in imparting the practical lessons in waste processing in city schools.

Earlier, the local body had obtained the clearance from the State authorities for installing the plants in government schools within the city limits. It had also pushed the case of aided and unaided schools in the city as the second phase of the programme.

The other day, the State government issued administrative sanction for installing biogas plants in 54 schools in the city limits including government, aided and un-aided institutions, said T.K. Ashraf, Chairman of the Health Standing Committee of the Kochi Corporation.

The projects will be implemented with the financial support of the Suchitwa Mission.

The agenda of the Corporation Council permitting an agency to set up the units in government schools was passed during the last meeting. Though only one agency had responded to the bid for setting up the units, it was sanctioned at the meeting as the Mayor declared all the agenda passed. The Mayor resorted to passing all the agenda in one stroke as a section of the Congress councillors and LDF members staged a walk out.

The construction of the plants will begin in March when schools will close for the summer vacation. The units would be ready before June, when the educational institutions will reopen. Students will be trained in managing bio-degradable waste at their educational institutions. It would be mostly food waste that would be going into the units. The capacity of the biogas units that are to be provided to the institutions will be proportional to the student strength, he said.

The local body had earlier launched Bhoomika, an awareness programmes on waste management for school students. The students were encouraged to collect plastic refuse from their homes and store them at their schools, which would be picked up by the local body. The students were also provided incentives for the collection.



The local body had also decided to provide nine biogas units and 1,500 pipe compost units to residents of every division as part of the decentralised waste management system. The beneficiaries of these projects were selected by ward meetings. These units will be provided subsidies too, Mr. Ashraf said.

ENERGY STORY

ENERGY EFFICIENCY – THE FIFTH FUEL - PART 12

EFFICIENT ELECTRICAL ENERGY UTILIZATION

Electrical Energy Utilization and Motor Driven Systems:

Energy Efficiencies and Energy saving opportunities in Pumping Systems – Continued

As we analyzed, Electrical Motors Driven Pumping Systems contribute to high Energy Consumption in all sectors including Industries, Public Works, Commercial Applications and Agriculture and we should look for all possible solutions for Energy Saving.

We can basically understand that most of the Pumps used in all sectors are Centrifugal Pumps and like all centrifugal Loads, the “Affinity Law” applies for pumps based on Speed or RPM of rotation of pumps. One more interesting and important point to understand is that the “Affinity Law” applies to centrifugal pumps based on Diameter of Impellers also; meaning that in appropriate cases as discussed below, reduction of Diameters can also result in substantial reduction in energy consumption.

AFFINITY LAW (RPM Based)

$$\frac{N1}{N2} = \frac{Q1}{Q2} \quad \begin{array}{l} Q1 = \text{Capacity at } N1 \text{ speed} \\ Q2 = \text{Capacity at } N2 \text{ speed} \end{array}$$
$$\frac{N1 \text{ Sq}}{N2 \text{ Sq}} = \frac{H1}{H2} \quad \begin{array}{l} H1 = \text{Head at } N1 \text{ speed} \\ H2 = \text{Head at } N2 \text{ speed} \end{array}$$
$$\frac{N1 \text{ Cub}}{N2 \text{ Cub}} = \frac{P1}{P2} \quad \begin{array}{l} P1 = \text{Power at } N1 \text{ speed} \\ P2 = \text{Power at } N2 \text{ speed} \end{array}$$

- If pump speed is reduced from 2900 to 1450
- Head becomes 1/4th and Capacity is reduced to 1/2
- Power consumption to 1/8th of the rated parameters.

AFFINITY LAW (Dia of Impeller based)

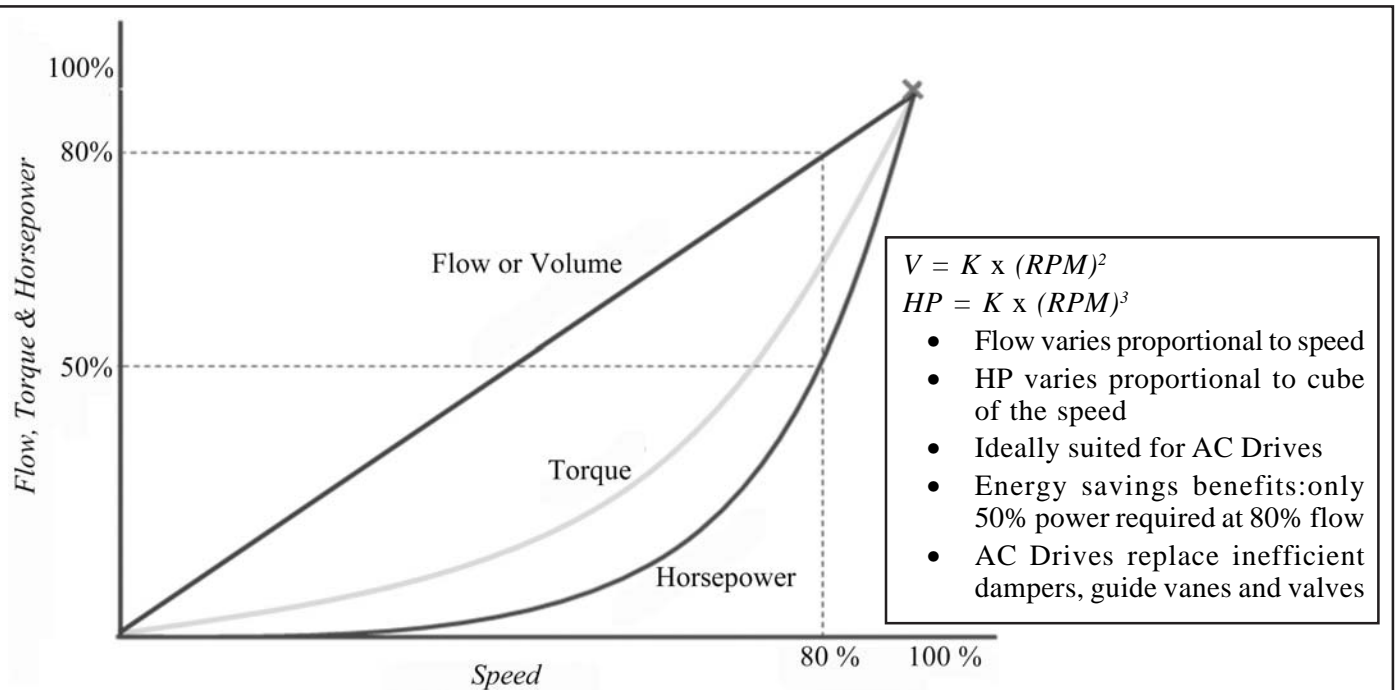
$$\frac{D1}{D2} = \frac{Q1}{Q2} \quad \begin{array}{l} Q1 = \text{Capacity at } D1 \text{ Dia} \\ Q2 = \text{Capacity at } D2 \text{ Dia} \end{array}$$
$$\frac{D1 \text{ Sq}}{D2 \text{ Sq}} = \frac{H1}{H2} \quad \begin{array}{l} H1 = \text{Head at } D1 \text{ Diameter} \\ H2 = \text{Head at } D2 \text{ Diameter} \end{array}$$
$$\frac{D1 \text{ Cub}}{D2 \text{ Cub}} = \frac{P1}{P2} \quad \begin{array}{l} P1 = \text{Power at } D1 \text{ Diameter} \\ P2 = \text{Power at } D2 \text{ Diameter} \end{array}$$

The Effects of Affinity Law in terms of Q, P and W i.e. Output, Head and Energy can be represented and explained through the following curves:

In case of Pumps the Energy Saving opportunities and areas can be summed up as under which include controlling of speeds of Motors as well as controlling the Dimensions of impeller diameters as well.

WHERE AND HOW TO SAVE ENERGY

- Any location where excess valve control or re-circulation is done in pumping systems.
- Where pumps operating with more than 15 – 20% valve throttling
- Where pump operates with more than the designed head.
- Where old pumps are running for years without proper maintenance.
- Where motors have been rewound frequently.
- Look for various alternatives to fine tune pump capacity to match process requirements such as
 - Impeller diameter reduction / increase
 - Installation of correct size pump
 - Install variable speed drive in medium sized pump

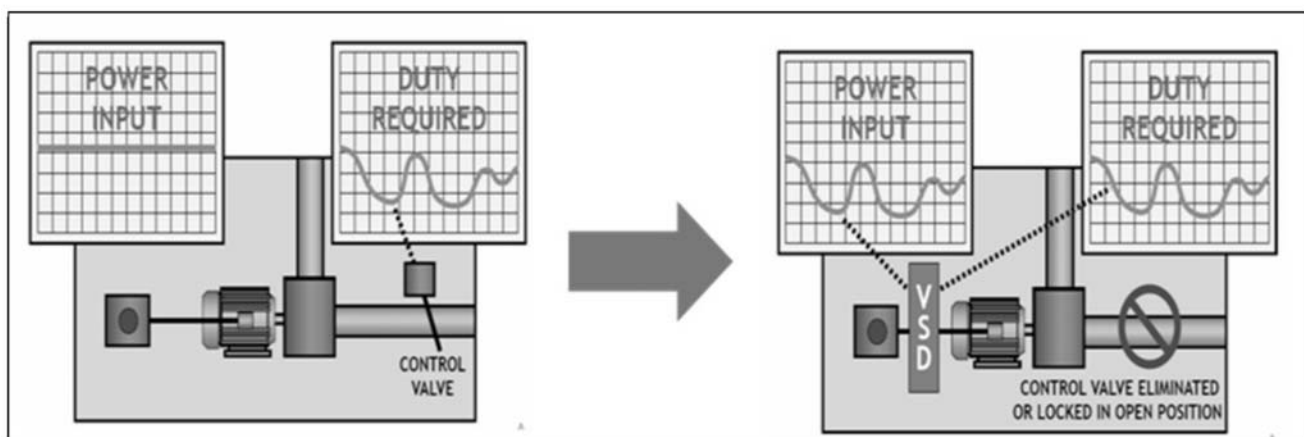


Summary of recommendations

- Install all measuring instruments like pressure gauge and flow meters Choose the correct size of pump and motor
- Do not oversize the pump or motor and waste power
- Do not throttle the valve for continuous operation instead change the impeller dia or change the pump
- Choose high efficiency motors to save on power
- Use VFD only when there is requirement for longer variable outputs.
- Last but not the least create routine maintenance schedule to avoid break down.

The Essence of recommendations above with regard to Energy Saving is to match the outputs with the Energy inputs. As illustrated in the figure below, the right side shows varying inputs with varying outputs.

In case of output requirements being consistently lower than the designed outputs of the pump, one possible solution is also reduction of Diameter of the Pump with all the due care and caution about other parameters and manufacturers and design clearances etc.

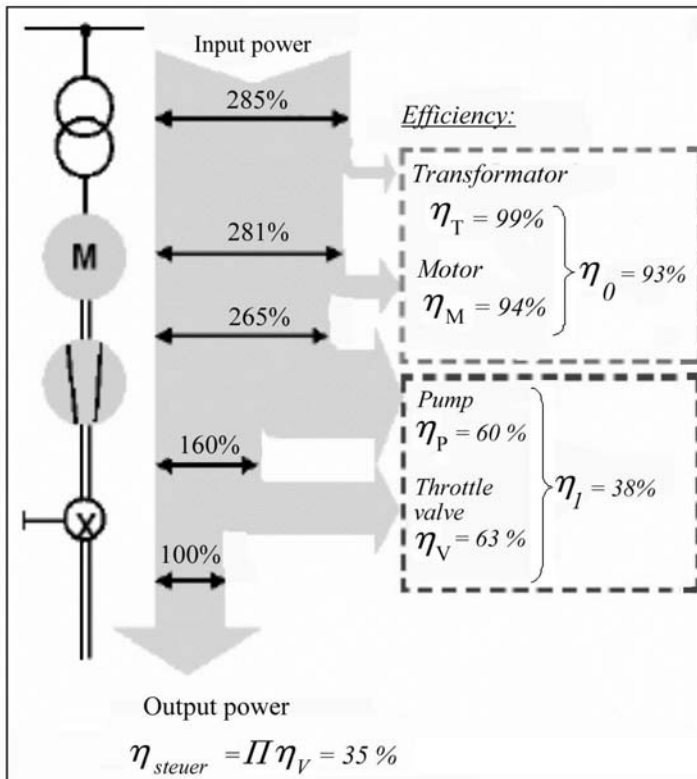


Shown below is the illustration of Energy Saving Potential using intelligent controls or matching outputs with the exact requirements and reducing input energy considerably. We can thus clearly see the high potentials of improving overall efficiency levels.

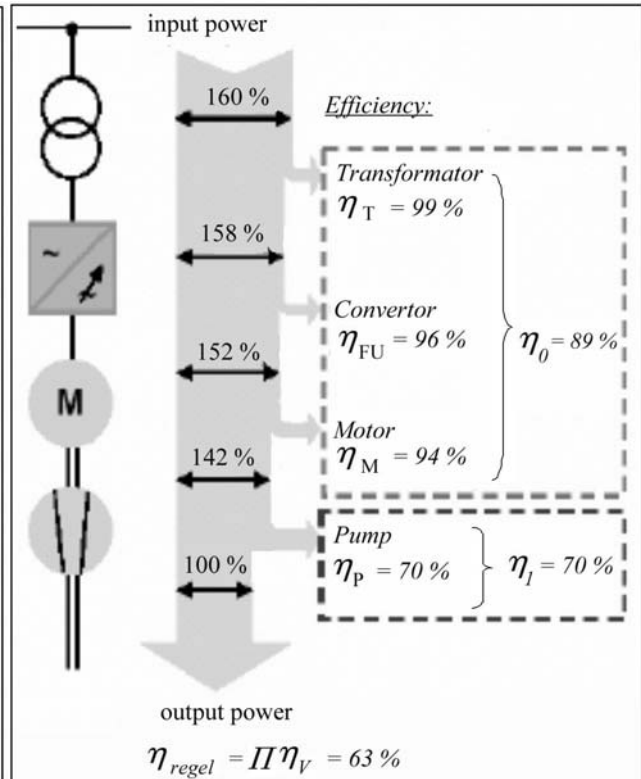
No one should approach the temple of science with the soul of a money changer.

- THOMAS BROWNE

Quantities Controlled by a Throttle



Quantities controlled by variable speed pump



In the case illustrated, the overall efficiency improvement is 35% to 63% and the overall energy saving is $125\% / 285\% = 43.85\%$. These kinds of substantial potentials and opportunities are available in case of Motors Driven Pumping Systems.

(To be continued)

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



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ANDERS CELSIUS (1701 - 1744)

Early life

Anders Celsius was born in Uppsala, Sweden on 27 November 1701. His family originated from Ovanåker in the province of Hälsingland. Their family estate was at *Doma*, also known as *Höjen* or *Högen* (locally as *Högen 2*). The name *Celsius* is a latinization of the estate's name (Latin *celsus* "mound"). As the son of an astronomy professor, Nils Celsius, and the grandson of the mathematician Magnus Celsius and the astronomer Anders Spole, Celsius chose a career in science. He was a talented mathematician from an early age. Anders Celsius studied at Uppsala University, where his father was a teacher, and in 1730 he too, became a professor of astronomy there.



Career

In 1730, he published the *Nova Methodus distantiam solis a terra determinandi* (*New Method for Determining the Distance from the Earth to the Sun*). His research also involved the study of auroral phenomena, which he conducted with his assistant Olof Hiorter, and he was the first to suggest a connection between the aurora borealis and changes in the magnetic field of the Earth. He observed the variations of a compass needle

and found that larger deflections correlated with stronger auroral activity. At Nuremberg in 1733, he published a collection of 316 observations of the aurora borealis made by himself and others over the period 1716–1732.

Celsius travelled frequently in the early 1730s, including to Germany, Italy and France, when he visited most of the major European observatories. In Paris he advocated the measurement of an arc of the meridian in Lapland. In 1736, he participated in the expedition organized for that purpose by the French Academy of Sciences, led by the French mathematician Pierre Louis Maupertuis (1698–1759) to measure a degree of latitude. The aim of the expedition was to measure the length of a degree along a meridian, close to the pole, and compare the result with a similar expedition to Peru, today in Ecuador, near the equator. The expeditions confirmed Isaac Newton's belief that

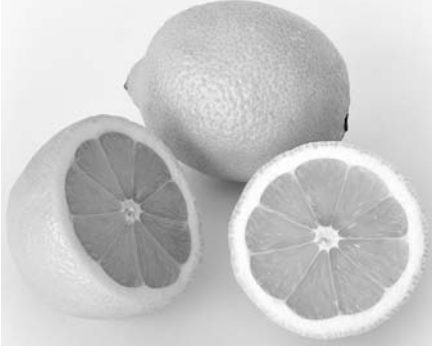
In 1738, he published the *De observationibus pro figura telluris determinanda* (*Observations on Determining the Shape of the Earth*). Celsius' participation in the Lapland expedition won him much respect in Sweden with the government and his peers, and played a key role in generating interest from the Swedish authorities in donating the resources required to construct a new modern observatory in Uppsala. He was successful in the request, and Celsius founded the Uppsala Astronomical Observatory in 1741. The observatory was equipped with instruments purchased during his long voyage abroad, comprising the most modern instrumental technology of the period.

In astronomy, Celsius began a series of observations using colored glass plates to record the magnitude (a measure of brightness) of certain stars. This was the first attempt to measure the intensity of starlight with a tool other than the human eye. He made observations of eclipses and various astronomical objects and published catalogues of carefully determined magnitudes for some 300 stars using his own photometric system (mean error=0.4 mag).

Celsius was the first to perform and publish careful experiments aiming at the definition of an international temperature scale on scientific grounds. In his Swedish paper "Observations of two persistent degrees on a thermometer" he reports on experiments to check that the freezing point is independent of latitude (and of atmospheric pressure). He determined the dependence of the boiling of water with atmospheric pressure which was accurate even by modern day standards. He further gave a rule for the determination of the boiling point if the barometric pressure deviates from a certain standard pressure. He proposed the Celsius temperature scale in a paper to the Royal Society of Sciences in Uppsala, the oldest Swedish scientific society, founded in 1710. His thermometer was calibrated with a value of 100° for the freezing point of water and 0° for the boiling point. In 1745, a year after his death, the scale was reversed by Carl Linnaeus to facilitate more practical measurement. Celsius originally called his scale centigrade derived from the Latin for "hundred steps". For years it was simply referred to as the Swedish thermometer.

Celsius conducted many geographical measurements for the Swedish General map, and was one of earliest to note that much of Scandinavia is slowly rising above sea level, a continuous process which has been occurring since the melting of the ice from the latest ice age. However, he wrongly posed the notion that the water was evaporating. In 1725 he became secretary of the Royal Society of Sciences in Uppsala, and served at this post until his death from tuberculosis in 1744. He supported the formation of the Royal Swedish Academy of Sciences in Stockholm in 1739 by Linnaeus and five others, and was elected a member at the first meeting of this academy. It was in fact Celsius who proposed the new academy's name.

எலுமிச்சை சர்வ ரோக நிவாரணி!



சுப காரியத்தில் முதல் இடம் வகிக்கும் பழம்தான் எலுமிச்சை, இது உலகெங்கும் நிறைந்து காணப்படும் பழமாகும். குறைந்த விலையில் எல்லா சத்துக்களும் நிறைந்த பழங்களில் எலுமிச்சையும் ஒன்று.

மனிதர்களுக்கு ஏற்படும் பலவித நோய்களை குணமாக்கும் சர்வ ரோக நிவாரணியாக எலுமிச்சை திகழ்கிறது. எலுமிச்சையின் தாயகம் பாரதம் தான். முதன்முதலாக 1984-ல் கார்ஸ்வில் ஹெம்மீலி என்பவர் எலுமிச்சையில் சிட்ரிக் அமிலம் இருப்பதைக் கண்டு பிடித்தார். மருத்துவர் ப்ளென்னின் (1875) ஆராய்ச்சியில் கெட்ட இரத்தத்தை தூய்மைப்படுத்தும் மருந்துகளில் எலுமிச்சையை விட சிறந்தது வேறு இல்லை என கண்டறிந்தார். உதாரணமாக இரண்டாவது உலகப் போரின் போது ஜெர்மனிய வீரர்களின் காயத்தில் இருந்து ஒழுகும் இரத்தத்தை உடனடியாக நிறுத்த எலுமிச்சையை உபயோகப் படுத்தியதாகக் கூறப்படுகிறது. இந்தியர்களை விட மேலை நாட்டினர் எலுமிச்சை பழத்தையும், அதன் விதை, தோல் அனைத்தையும் மருந்தாகப் பயன் படுத்துகின்றனர். இதிலிருந்து வாசனைப் பொருட்களும் தயாரிக்கின்றனர். இந்தியர்களின் வீடுகளில் எலுமிச்சை ஊறுகாய் இல்லாமல் இருக்காது. கண்களைப் பறிக்கும் மஞ்சள் நிறத்தில் மங்களகரமாய் காட்சிதரும் எலுமிச்சை பழத்தில் வைட்டமின் சி சத்து மற்றும் சுண்ணாம்பு சத்து அதிகம் நிறைந்துள்ளது.

100 கிராம் எலுமிச்சை பழத்தில்,

நீர்ச்சத்து-50 கிராம், கொழுப்பு-1.0 கிராம்,
புரதம்-1.4 கிராம், மாவுப்பொருள்-11.0 கிராம்,
தாதுப்பொருள்-0.8 கிராம், நார்ச்சத்து - 1.2 கிராம்,
சுண்ணாம்புச் சத்து-0.80 மி.கி, பாஸ்பரஸ்-0.20 மி.கி.,
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தையாமின்-0.2 மி.கி., நியாசின்-0.1 மி.கி.,
வைட்டமின் ஏ-1.8 மி.கி., வைட்டமின் பி-1.5 கிராம்,
வைட்டமின் சி - 63.0 மி.கி.

எலுமிச்சையின் பயன்கள்:

வயிறு பொருமலுக்கு

சிலருக்கு கொஞ்சம் சாப்பிட்டால் கூட வயிறு பெரிதாக பூரன்போல காணப்படும். வாயுவும் சேர்த்துத் தொல்லைக் கொடுக்க ஆரம்பிக்கும். இவர்கள் எலுமிச்சம் பழத்தின்

சாறு எடுத்து அதில் வெந்நீர் கலந்து அடிக்கடி பருகி வந்தால் மேற்கண்ட தொல்லைகள் நீங்கும்.

தாகத்தைத் தணிக்க

கோடைக்காலத்தில் கோடை வெயிலின் தாக்கத்தால் அடிக்கடி தாகம் ஏற்படும். சிலருக்கு எவ்வளவுதான் தண்ணீர் அருந்தினாலும் தாகம் குறையாமல் இருக்கும். இவர்கள் எலுமிச்சம் பழத்தின் சாறு எடுத்து இரண்டு கப் நீரில் சர்க்கரை சேர்த்து பருகினால் தாகம் தணியும். சர்க்கரை நோயால் பாதிக்கப்பட்டவர்கள் சர்க்கரைக்கு பதிலாக உப்பு சேர்த்து அருந்தலாம்.

கல்லீரல் பலப்பட

எலுமிச்சம் பழத்தை பிழிந்து சாறெடுத்து, அதில் தேன் கலந்து பருகி வந்தால் கல்லீரல் பலப்படும்.

தலைவலி நீங்க

ஒரு குவளை சூடான காபி அல்லது தேநீரில் ஒரு எலுமிச்சம் பழத்தை பாதியாக நறுக்கி, அரைமுகடியை பிழிந்து சாறு கலந்து அருந்தி வந்தால் தலைவலி குணமாகும். காலை, மாலை என இருவேளையும் அருந்த வேண்டும். தொடர்ந்து மூன்று நாட்கள் இவ்வாறு அருந்தி வந்தால் தலைவலி நீங்கும்.

நீர்க்கடுப்பு நீங்க

வெயில் காலத்தில் நீர்க்கடுப்பு பிரச்சனை சிலருக்கு அவதியை ஏற்படுத்தும். இந்நிலை நீங்க எலுமிச்சம் பழச்சாறுடன் சிறிது உப்பு கலந்து ஒரு வாரம் அருந்தி வந்தால் நீர்க்கடுப்பு, நீர் எரிச்சல் நீங்கும், இரத்தக் கட்டுக்கு உடம்பில் எங்காவது அடிபட்டாலோ, வீங்கினாலோ ரத்தம் கட்டி இருக்கும். இந்தப் பகுதியை தொட்டாலே சிலருக்கு வலியெடுக்கும். இந்த ரத்தக்கட்டு நீங்க சுத்தமான இரும்புக்கரண்டியில் ஒரு எலுமிச்சம் பழத்தைப் பிழிந்து சாறு எடுத்து அதில் சிறிதளவு கரிய போளத்தைப் (நாட்டு மருந்துக் கடைகளில் கிடைக்கும்) போட்டு காய்ச்ச குழம்பு போல வரும். அதனை எடுத்து பொறுக்கும் அளவு சூட்டுடன் இரத்தக்கட்டு உள்ள பகுதிகளில் பற்று போட வேண்டும். இவ்வாறு காலை, மாலை இரு வேளையும் சுத்தம் செய்து பற்று போட்டு வந்தால் ரத்தக்கட்டு குணமாகும்.

பித்தம் குறைய

எலுமிச்சம் பழத்தை பிழிந்த சாற்றில் ஒரு தேக்கரண்டி அளவு சீரகத்தையும், அதே அளவு மிளகையும் கொஞ்சம் கலந்து வெயிலில் காயவைத்து காய்ந்தபின் நன்றாக பொடித்து எடுத்து பாட்டிலில் பத்திரப்படுத்திக் கொள்ள வேண்டும். காலை, மாலை இரு வேளையும் இதில் அரை தேக்கரண்டி அளவு வாயிலிட்டு வெந்நீர் குடித்து வந்தால் பித்தம் குறையும்.

எலுமிச்சை தோல்

எலுமிச்சை பழத்தின் தோல், தோல் சம்பந்தப்பட்ட நோய்களைப் போக்கி சருமத்திற்கு பளபளப்பைத் தருவதாக ஆராய்ச்சியாளர்கள் கண்டறிந்துள்ளனர். எலுமிச்சம் பழத்தோலில் அதிக சக்தி கொண்ட எண்ணெய் இருப்பதை அறிந்தனர். இது பலவகையான நறுமணத் தைலங்கள் செய்வதற்கும் உபயோகமாகிறது.

மேலும் வாதம், எரிச்சல், தொண்டைபுண் போன்றவற்றிற்கு நல்லது. நகச் சுற்று கொண்டவர்கள் எலுமிச்சம் பழத்தை விரலில் சொருகி வைத்தால் நகச் சுற்று குணமாகும். கிராமப் புறங்களில் இன்றும் இம்மருத்துவ முறை கடைப்பிடிக்கப்பட்டு வருகிறது.

எலுமிச்சம் பழத்தோலை உரித்தவுடன் அதன் மேல் வெள்ளையாக இருக்கும் சிறு தோலில் வைட்டமின் பி அதிகமாக உள்ளது.

◆ எலுமிச்சம் பழம் உடலில் களைப்பைப் போக்கி உடலுக்கு புத்துணர்வை உண்டாக்கும்.

◆ தாதுவைக் கெட்டிப்படுத்தும்.

◆ எலுமிச்சம் பழச்சாற்றை உடலில் தேய்த்து குளித்தால் உடல் வறட்சி நீங்கும்.

◆ உடல் நமைச்சலைப் போக்கும்.

◆ மாதவிலக்கின் போது உண்டாகும் வலியைக் குறைக்கும்.

◆ மூலத்திற்கு சிறந்த மருந்தாகும்.

எலுமிச்சம் பழத்தின் பயன்களை ஒரு புத்தகமாகவே எழுதலாம். இதன் மருத்துவப் பயனை உணர்ந்து ஆரோக்கியம் பெறுங்கள்.

Courtesy: PESOT, November 2013

HUMOUR

Why do most Indian women request God for the same husband in the next life?

Because efforts taken to train him in this life should not go to waste!

GOD SAID, "I CANNOT BE EVERYWHERE, SO I CREATED MOTHER".

DEVIL REPLIED, "EVEN I CANNOT BE EVERYWHERE, SO I CREATED MOTHER-IN-LAW!!"

A lawyer defending a man accused of burglary tried this creative defense: "My client merely inserted his arm into the window and removed a few trifling articles. His arm is not himself, and I fail to see how you can punish the whole individual for an offense committed by his limb". "Well put," the judge replied. "Using your logic, I sentence the defendant's arm to one year's imprisonment. He can accompany it or not, as he chooses." The defendant smiled. With his lawyer's assistance he detached his artificial limb, laid it on the bench, and walked out".

After drinking —Men talk unnecessarily, become emotional, drive badly, stop thinking, fight for no reason. Hats off to women! They can do all this without drinking!

God created the donkey and said to him:

"You will be a donkey. You will work un tiringly from sunrise to sunset carrying burdens on your back. You will eat grass, you will have no intelligence and you will live 50 years".

The donkey answered:

"I will be a donkey, but to live 50 years is much. Give me only 20 years".

God granted his wish.

God created the dog and said to him:

"You will guard the house of man. You will be his best Friend. You will eat the scraps that he gives you and you will live 30 years. You will be a dog".

The dog answered:

"Sir, to live 30 years is too much, give me only 15 years".

"God granted his wish".

God created the monkey and said to him:

"You will be a monkey. You will swing from branch to branch doing tricks. You will be amusing and you will live 20 years".

The monkey answered:

"To live 20 years is too much, give me only 10 years".

God granted his wish.

Finally God created man... and said to him:

"You will be man, the only rational creature on the face of the earth. You will use your intelligence to become master over all the animals. You will dominate the world and you will live 20 years".

Man responded:

"Sir, I will be a man but to live only 20 years is very little, give me the 30 years that the donkey refused, the 15 years that the dog did not want and the 10 years the monkey refused".

"God granted man's wish".

And since then, man lives 20 years as a man, marries and spends 30 years like a donkey, working and carrying all the burdens on his back.

Then when his children are grown, he lives 15 years like a dog taking care of the house and eating whatever is given to him,

So that when he is old, he can retire and live 10 years like a monkey, going from house to house and from one son or daughter to another doing tricks to amuse his grandchildren.

That's Life.

WHAT IS THE DIFFERENCE?

Between CONTRACT and AGREEMENT

A Contract is enforceable by law while an Agreement may not be enforceable by law.

VEERAPANDIYA KATTABOMMAN



Veerapandiya Kattabomman; also known as Kattabomman was an 18th century Palayakarrar ('Polygar') chieftain from Panchalankurichi of Tamil Nadu, India. His ancestors migrated to Tamil Nadu from areas in present day Andhra Pradesh during the Vijayanagar period. Also known as Kattabomma Naicker he was among the earliest to oppose British rule in these

regions. He waged a war with the British six decades before the Indian War of Independence occurred in the Northern parts of India. He was captured and hanged in 1799 CE. His fort was destroyed and his wealth was looted by the British army. Today his native village Panchalankurichi in present day Thoothukudi district of Tamil Nadu and some polygars families migrated to vedal village in Kanchipuram District, India is a historically important site.

Fight against British

Kattabomman refused to accept the sovereignty of British East India Company and opted to fight against them. In 1799, he was captured by the British and hanged at Kayattar in Tirunelveli District, Tamil Nadu. His younger brother, Umaidurai (known as dumb boy, as he was deaf and mute) and other relatives were arrested and prisoned at Palayamkottai. In February 1801, Umaidurai escaped and mobilised local people to form an army and continued his fight till October 1801 when he and his companions in fight Chinna and Periya Marudu of Sivagangai were defeated and hanged by British. The Panjalankuricci fort "was razed to ground, the site was ploughed over and sown with castor seed..(cited in Dircks 1993,22).

Legend and folklore

In subsequent years, a good deal of legend and folklore developed around Kattabomman and the Marudu

Brothers. Kayatharu, where Kattabomman was executed has remained a place of political pilgrimage. In his Tinnevely Gazetteer of 1917, H. R. Pate notes the presence, in Kayatharu, of "a great pile of stones of all sizes, which represents the accumulated offerings by wayfarers of the past hundred years. Folk songs recalling the heroism of the Poligar leaders remain alive in Tamil Nadu to this day..."

The popular Tamil slang for a traitor or committing treason is *Ettapa* or *Ettapan*, courtesy the Ettayapuram Polygar whom the British later conferred the title of Raja. But it is disputed whether Ettapan ever committed a treason at all because Kattabomman was arrested by the king of Pudukottai. The Campa Cola ground in Chennai belongs/belonged to Ettappan family. Veerapandiya Kattabomman postage stamp released on 16.10.1999 by India postage Authority

Honour and Monuments

Kattabomman's story is celebrated in many legends and epic poetry in Tamil. Kattabomman is today recognised by the government as one of the earliest independence fighters opposing the British. In 1974, the Government of Tamil Nadu constructed a new Memorial fort.



The Memorial Hall

has beautiful paintings on the walls depicting the heroic deeds of the saga which gives a good idea about the history of the period. A cemetery of British soldiers are also seen near the fort. The remnants of the old fort are protected by the Archaeological Survey of India. At Kayathar, near Tirunelveli on the present day NH7, the place where he was hanged, there is another memorial for Kattabomman. To commemorate the bicentenary on 16 October 1799 of Kattabomman's hanging, the Government of India brought out a postal stamp in his honour. India's premier communication nerve centre of the Indian Navy, at Vijayanarayanam, about 40 km from here, is named as INS Kattabomman. Till 1997, the state transport buses of Tirunelveli District was named Kattabomman Transport Corporation.

Veerapandia Kattabomman Panpattu Kazhagam (Veerapandia Kattabomman Cultural association) is an organisation named in his honour.

The district administration celebrates 'Veerapandia Kattabomman festival' at Panchalankurichi on his anniversaries.

HOME FESTIVALS

Chitrai (April/May)

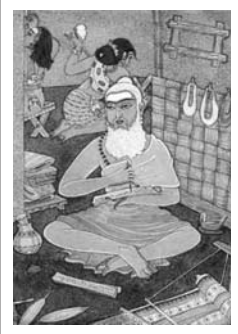


This month begins with the completion of Ram Navami, the nine days of celebration of Lord Rama's birth ages ago, which started in the previous month. At the upper left we see a decorated picture of Lord Rama's coronation. Next (Proceeding clock wise) comes a Vaisnava priest telling the stories of Lord Rama's birth and life; behind him are great parts of *paanagan*, a delicious drink of sugar and ginger, and a basket of *sundal*,

spiced chickpeas, served to the storyteller's guests, who also receive palm fans, as this is the hot season. Tamil New Year often falls on April 14 (as does the New Year of several other communities). The lady at upper right is shown with the new clothes and jewellery which are part of the celebration, as well as bananas, mangoes and the ingredients for *vepon pu pachadi*, a combination of bitter neem blossoms, sugar and mango – a reminder to face the unpleasant in life with a sweet smile. At lower left is the marriage of Siva and Parvati, Meenakshi Kalyanam, with brother Vishnu pouring the sacred ganga water on the joined hands. At lower right is the dark form of Yama, Lord of Death, who figures in three stories associated with this month; that of Savitri, who won her husband back from Yama in a battle of wits; Nachiketas, the boy who extracted three boons from Him and Markandeya, who won eternal youth from Lord Yama through the worship of the Sivalinga.

(To be continued)

TIRUKKURAL AND MANAGEMENT IN A 'NUTSHELL' - 11



Planning is considered as most essential and basic of Management. Plans are prepared taking into consideration all aspects like opportunities, risks, resources deployment and earnings and so on. Tiruvalluvar deals with Planning, its importance, methods and the dangers of acting without a proper and clear plan.

The following Kurals are examples dealing with the above concepts

*Azhivathoom Aavathoom Aagi Vazhipayakkum
Oothiyamum Soozhndu Seyal Kural 461*

அழிவதூஉம் ஆவதூஉம் ஆகி வழிபயக்கும்
ஊதியமும் சூழ்ந்து செயல். குறள் 461

Weigh well output the loss and gain
And proper action ascertain.

Thelivu Ilathanaith Thodangar Ilivuennum
Eethappadu Anju pavar Kural 464

தெளிவு இலதனைத் தொடங்கார் இளிவுஎன்னும்
ஏதப்பாடு அஞ்சு பவர். குறள் 464

They who scornful reproach fear
Commence no work not made clear.

Vakaiyarach Choozhathu Ezhuthal Pakaivaraip
Paththip paduppathor aaru Kural 465

வகையறச் சூழாது எழுதல் பகைவரைப்
பாத்திப் படுப்பதோர் ஆறு குறள் 465

Who marches without plans and ways
His field is sure to foster foes.

Aattrin Varuntha Varuththam Palarnindru
Potrinum Poththup padum Kural 468

ஆற்றின் வருந்தா வருத்தம் பலர்நின்று
போற்றினும் பொத்துப் படும்.

Toil without a plan ahead.
Is doomed to fall though supported.

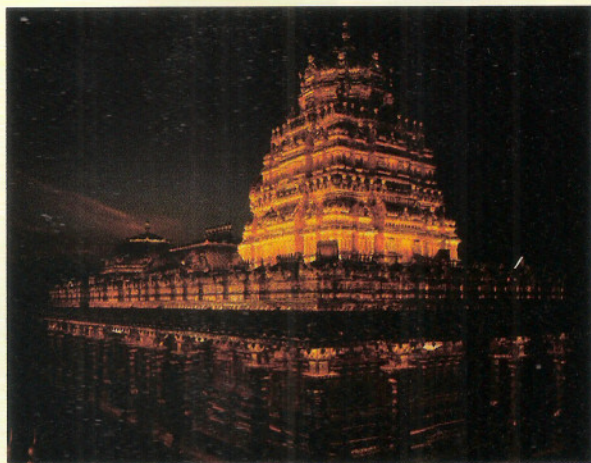
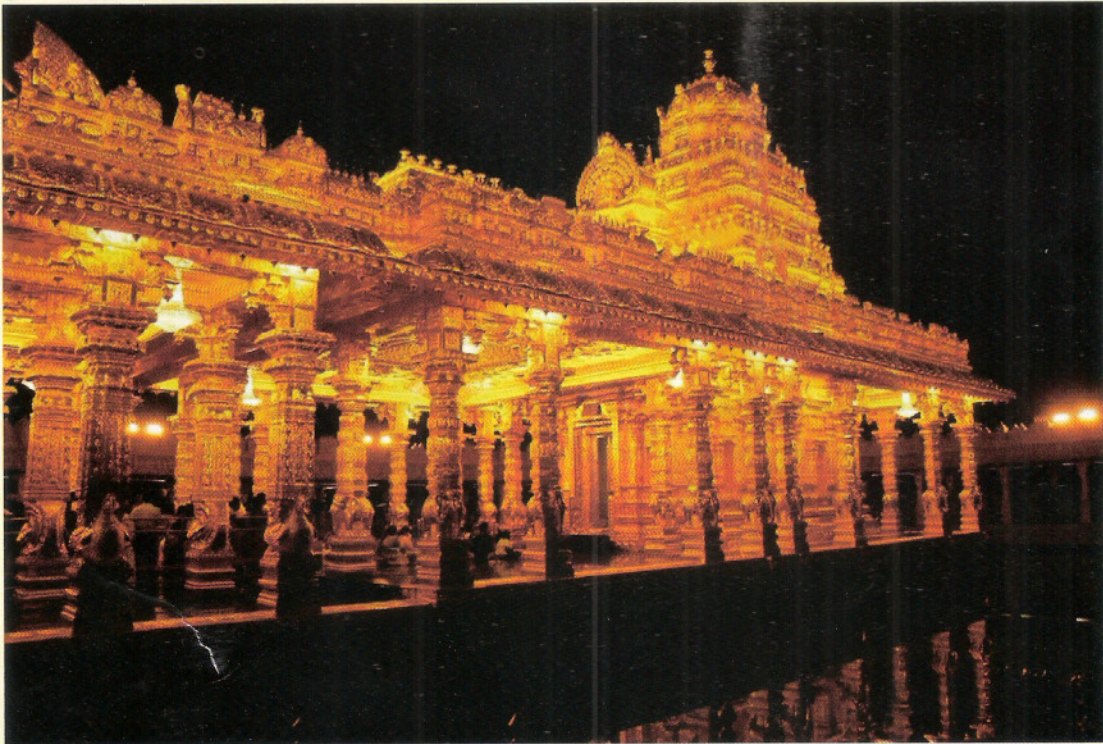
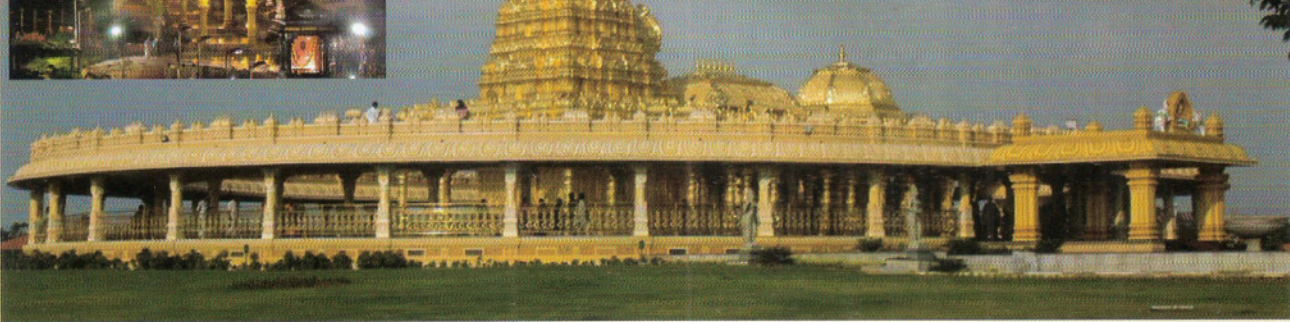
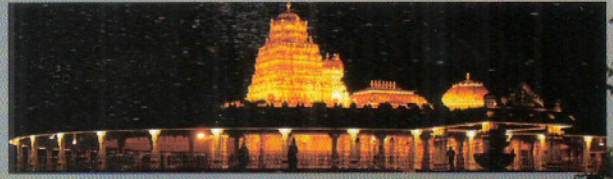
SRIPURAM

A Mahalakshmi temple called 'Sripuram' and made of more than a tonne of pure gold will glitter and gleam under the sun on August 24 when it is unveiled for consecration by the Sri Narayani Peetam headed by a 31-year-old godman who calls himself Narayani Amma. Devotees hail the temple as 'one of the wonders of the world' and say that it is the only temple covered fully with gold.

More than 400 gold and coppersmiths from the Tirumala Tirupathi Devasthanam are said to have worked for six years to craft the Rs 600-crore gold temple located on 55,000 sq ft of land on a 100-acre salubrious stretch in Malaikodi, about 6 km from Vellore in north Tamil Nadu. According to official sources, the gold bars were purchased through RBI in "a transparent manner."

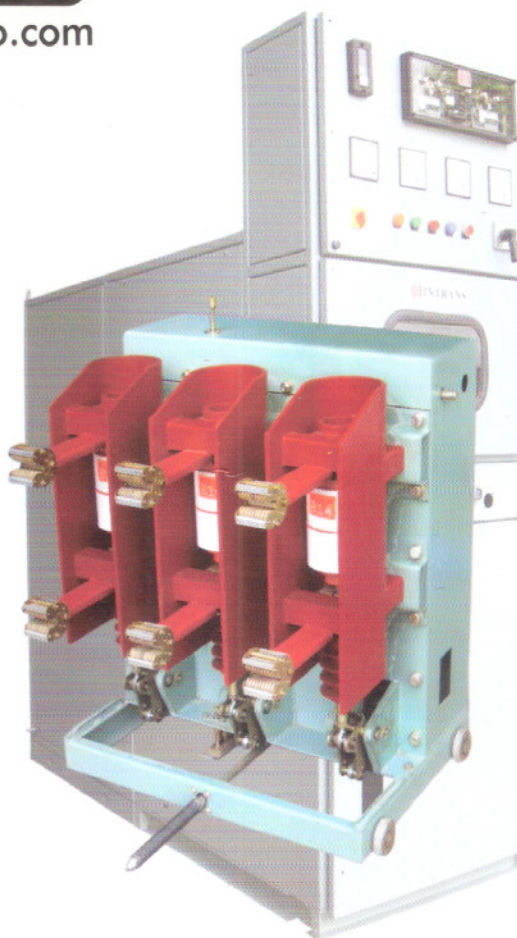
First the coppersmiths set to work creating a copper base on the temple structure with engravings and etchings before the gold, beaten into nine layers of foils, was draped around it. The sanctum sanctorum will hold the deity of Mahalakshmi made of stone granite, but covered with gold kavacham (adornments).

SRIPURAM





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