# ELECTRICAL INSTALLATION ENGINEER

## NEWS LETTER

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

# TECHNICAL SEMINAR PHOTOS - 10.08.2013 - SALEM

Lighting the
Kuthuvilakku by
**Er. S. APPAVOO,** B.E.,
Chief Electrical Inspector
to Government

Honouring
**Er. S. APPAVOO,** CEIG
by our President
**Mr. U. BASKARAN**
with our Secretary
**Mr. K. KANNAN** (Right)
and
Vice President
**Mr. R. RAMACHANDRAN**
(Left)

Participants gathering
at the Meeting

# EDITORIAL

Dear Members, Fellow Professionals and Friends

"HAPPY INDEPENDENCE DAY" AND SEASONS GREETINGS TO ONE AND ALL!

We celebrate with Pride the Independence Day on the 15th of August and it is time that we remember again 9th August of 1942, the "Quit India Movement Day" as our borders are now threatened with infiltrations by our neighboring countries and we have to be determined and prepared to ensure that they quit.

August is a month with full of Festivals and we can feel Happy about the prosperity marked by rains in many parts and Mettur and other Dams getting good inflow. Agricultural production forecasts are very good and we should be looking forward to a Prosperous and Happy Pongal time.

The Decades ending with 2014 and 2015 are Internationally marked respectively as Decade of Education for Sustainable Development and Decade of Water for Life. Both these aspects are very important to our Nation and though there have been some efforts in the right directions with regard to Education and Sustainable Development, particularly with regard to Energy and Renewable Energy, we have not commenced any meaningful efforts with regard to Water for Life. Water comes in abundance and in unbearable quantities many times as it happened in many parts this year and lives are taken away. We curse the abundance and all steps are taken to put out all the waters into the sea as best and fast as possible. It is time for revival and commencement of implementation of all the massive actions planned for creating equal distribution of waters of all the Rivers of the Country, through "Flood Water Harvesting" and creation of "National Water Ways". These can help both the Sustainable Development and Water for Life Objectives, as in the words of Tiruvalluvar, "Water sustains the World……"

With regards to sustainable Development of Energy, the need and the role of Renewable Energy is well realized and the activities and plans for harnessing Solar and Wind sources are encouraging. This should be followed with vigor by the Bio Energy Mission which has huge potential and challenges with regard to adoption of right Technologies and speedy implementation of all "Wastes into Energy" ideas and projects. Our Country with its huge population of people, large activities of Agriculture and Industries and very sizable population of Cattles and animals provide huge opportunities and many challenges. Engineering and Technology, with a responsive and responsible approach can find and implement solutions with timely response with policies and support by the Governments. We the Professional Fraternity have the ongoing responsibility to ensure Safety and Efficiency in all Energy Actions.

Let us Wish Happy Birth Day to CHENNAI which is celebrated on 21st August. It is interesting to note that the celebrations which started with celebrating the Day, then Celebrations for a Week is now consists of Celebrations spread over a month in different parts of the City with Pride and Vigor. Among the Metros, the City still holds the position as the City of Culture and Fine Arts and no wonder it presently occupies a Top Position not only in Indian Cinema but also World Cinema.

***We thank all those members who have helped us by participating in the advertisements appearing for the issue July 2013 – Prolite Autoglo Ltd., Hensel Electric India Pvt. Ltd., Intrans Electro Components Pvt. Ltd., Pentagon Switchgear Pvt., OBO Bettermann India Pvt. Ltd., Power Links, Universal Earthing Systems Pvt. Ltd., Axess Seven, Universal Power Equipment Pvt. Ltd., Cape Electric Pvt Ltd., K-Lite Industries, Power Cable Corporation, Wilson Power and Distribution Technologies Pvt. Ltd., RPG Cables, Galaxy Earthing Electrodes Pvt. Ltd., Ashlok Safe Earthing Electrode Ltd.*** ***EDITOR***

# *Congratulations and Best Wishes*

## EASUN REYROLLE BUYS 82% STAKE IN AUSTRALIAN FIRM

Easun Reyrolle (ERL), through its wholly-owned subsidiary and over-seas investment arm, ERL International Pte, has acquired 82% equity and ownership control in Australian firm Electrical Distribution Solutions Pty (EDS) for an undisclosed sum.

ERL India had recently obtained an order from EDS to supply medium-voltage switchgear products to Australian utility Energex in Queensland. The total value of the order, which would be supplied over the next seven years, is $84 million. Energex has been managing the energy distribution network of the state of Queensland for more than 100 years.

"The synergic and strategic acquisition would help ERL India establish and hold presence in the prospering Australian power transmission and distribution market," the company said. ERL India recently established a global manufacturing facility in Bangalore to make switchgear products.

These products are designed by Switchcraft (Europe) GmbH in which ERL India has 80% stake. The Rs.227 crore ERL is now establishing its global footprint with wholly owned subsidiaries.

***Courtesy: The Times of India, dt: 30.07.2013***

# LETTERS TO EDITOR

Sir/Madam,

**Sub:** Free issue of Electrical Installation Engineer to our library – reg.

This is to inform you that we are having 6000 students and 300 faculty members in our institution. We are offering courses at under Graduate and Post Graduate level, we happy to receive your free issue of Electrical Installation Engineer to our library. Please send as the same to our institution for the benefit of user community of our library.

Thanks with regards

**Dr. K. Jothivenkatachalam,** *Coordinator (Library)*
**Anna University**, *BIT Campus*
*Tiruchirappalli - 620024*

# OBITUARY

**R. RAMAMURTHY**
(21-04-1945 - 23-07-2013)

On behalf of the **Tamilnadu Electrical Installation Engineers Association 'A' Grade** extends **Heartfelt Condolences** for the demise of Our Member **Mr. R. RAMAMURTHY**, Proprietor of M/s. Arthy Electricals, 42-A, Brayant Nagar, 1st Street, Tuticorin – 628 008. Ph: 0461-2375541. He is one of our active Senior Member.

***We pray the almighty to rest his Soul in Peace.***

ELECTRICAL INSTALLATION ENGINEER

**President : U. BASKARAN**

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# URGENT APPEAL FOR UTTARAKHAND FLOODS

As the magnitude of tragedy caused in Uttarakhand continues to unfold, **Prime Minister Dr. Manmohan Singh has issued an appeal to the public** for generous donations to support the victims who have suffered "**extensive devastation**".

**"I appeal to all citizens to donate generously to the Prime Minister's National Relief Fund," he said.**

We request all our members to contribute to this noble cause.

Please send your contributions by way of Cheque or Demand Draft drawn in favour of "**The Chief Minister's Relief Fund Uttarakhand**"

***Please send your Cheques to Association office before 30th September 2013 (Revised Date).***

*With the cheque or Demand Draft please enclose the following details.*

**1. Name :**

**2. PAN No. :**

**3. Address :**

**4. Mobile No. :**

**5. Tel No. :**

We shall acknowledge your contributions in the Newsletter.

*Please note that the receipt will be sent by Chief Minister's Office to the Remitter directly to your address for claiming deduction u/s Section 80G of Income Tax Act, 1961.*

# CONTRIBUTIONS TO THE CHIEF MINISTER'S RELIEF FUND UTTARAKHAND

We glad to inform that the following members have contributed towards *"Chief Minister's Relief Fund Uttarakhand":*

| | | |
|---|---|---|
| 1. | Madhu Electricals & Engineering, Sriperumbudur | Rs.10,000/- |
| 2. | R.J. Enterprises, Chennai | Rs.10,000/- |
| 3. | SVE Energy Pvt. Ltd, Chennai | Rs.5000/- |
| 4. | Sri Vignesh Electricals, Chennai | Rs.5000/- |
| 5. | Er. M. Anantharaman B.E., Coimbatore ***(Non-Member)*** | Rs.3000/- |
| 6. | Mr. M. Vedachalam B.E., Chennai ***(Non-Member)*** | Rs.1000/- |

# MEMBERS DETAILS

| S.No. | Company Name | License No. | Place | Contact No. |
|---|---|---|---|---|
| 266. | N. Vasu EA Electrical Contractor | EA 2738 | Vellore | 94434 45837, 98942 99787 |
| 267. | Arun Rohith & Co | EA 2764 | Vellore | 94432 25778 |
| 268. | Madras Cements Ltd. | EA 1134 | Virudhu Nagar | 04562-256245 |
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| 271. | Aruna Electricals | EA 2628 | Chennai | 044-27935463, 98404 14956 |
| 272. | A.P. Sen & Co | EA 2806 | Chennai | 044-24454514, 94449 28286 |
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| 274. | Celestial Associates | EA 2465 | Chennai | 044-43513003, 94440 37968 |
| 275. | CVT Enterprises | EA 2315 | Chennai | 94440 81304 |
| 276. | Gajendraa Electric Company | EA 2055 | Chennai | 94440 34200, 98840 69970 |
| 277. | Kumaran Industries | ESA 305 | Chennai | 044-22388265, 98400 37776 |
| 278. | Shri Shakthi Electricals | EA 1896 | Chennai | 044-28474069, 93835 70257 |
| 279. | Orient Poles | ESA 180 | Chennai | 044-22454047, 98400 37989 |
| 280. | Padma Electricals | EA 1924 | Nagercoil | 99942 39219, 98945 91310 |

# KNOW THY POWER NETWORK – 71

**2.3** The learning about Asset Management is continued. There are many risks in the operating life of a substation in an electrical network. Some of them are highlighted in the last article which is based on the information given in "T&D world" May 2013. Each of the said risks can occur at any time. Can you think that three or four of the risks exist simultaneously at the same place with the same set of assets? No doubt, the probability of such occurrence may be remote; yet there lies a possibility for a real-time coincidence of these risks. Hence it becomes important to forecast these coincidences so the risk can be averted altogether. That is, the utilities should take necessary steps and move ahead of these types of cascading or increasing risk problems.

**2.4** In this context, Dynamic Asset Risk Management and other types of Risk Management projects will be of much use. Dynamic Asset Risk Management provides real-time Operational information, forecasting for decision support and decision-making analysis for the management people. It helps to view all aspects of the operation of the assets and the possible risks scenario and enough coordination to ward off the risks at lower cost or suggest best possible solution in a situation. It is a real-time analysis of all data streams. It can be considered as a forecast tool and a visualization method. It provides enough vision, view points and other basic needs and facilitates decision-making people to go for a right /correct decision. It is a process of data integration/ automation and information management.

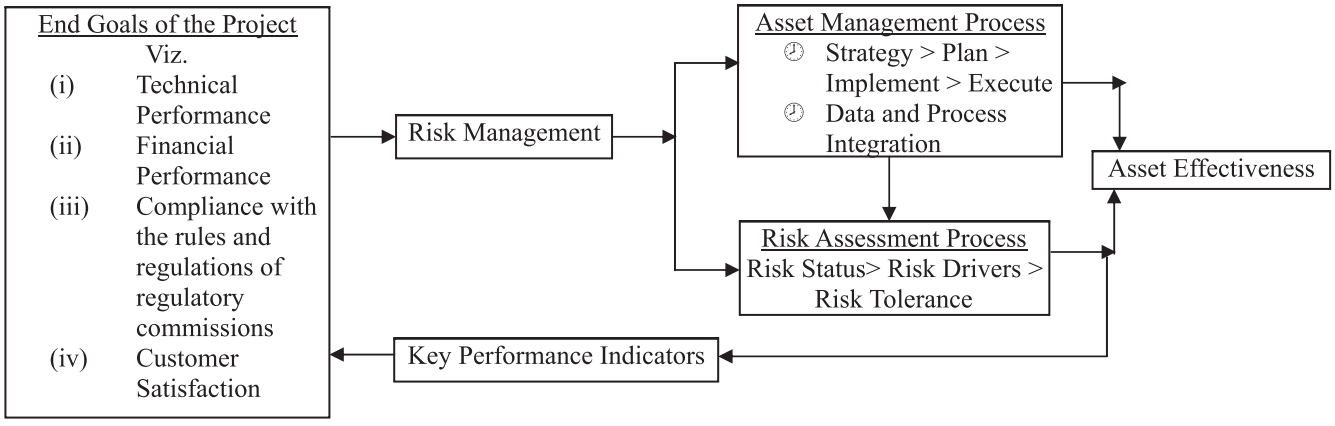
**2.5** In earlier decades, the reliability-centered maintenance was widely adopted. Now maintenance optimization and maintenance work prioritization are considered as the basic concepts for "Risk-Optimization", Risk based asset management or Dynamic Asset risk Management-a complex and predictive approach- is based on this. Probabilistic methods are used for assessing and optimizing the risks. Risk assessment and optimization are performed in a near real-time and continuous basis. It gives the dynamic characteristic for the study. High performance or cloud computing are used for this study.

The important applications of this study may be found in the areas related to

- the planned maintenance of transmission lines
- The development of risk models of individual transmission circuits and system components
- The possible risk optimization scenario with its impact on System reliability

**2.6** You may feel in what way the probability based risk models are better than the present deterministic methods. On a closer look, you can see that probability-based risk models provide better understanding of the risks associated with various combinations of critical parameters and also the overall risks faced by a complex system which have many independent and interrelated risk parameters. Analysis of various combinations of individual parameters used in the probabilistic studies is more likely to identify high-risk operating scenario than that obtained with a deterministic approach. The multi-parameter approach can be used both for short term operational decision and a long term capital investment decisions.

## 3.0 COMPONENTS OF AN ASSET MANAGEMENT PROJECT




## 4.0 RELIABILITY

**4.1** While dealing with the Asset Management process in a power utility, we have to focus our attention on the reliability aspects also, because the measurement of reliability of an electrical utility will not only indicate its operational status but also the effectiveness of its Asset Management methods. That is, we have to get a bigger picture of its operational health conditions rather than satisfying with the continuity of supply or the percentage of time the power is flowing without interruption in the network. Similarly, excellence is required in the areas of safety, System improvement and the development of workforce and managers.

**4.2** Reliability statistics are valuable for good decision-making and self-evaluation. It is provided in many forms like reliability index and Average service availability index. It cannot be used for comparisons with the performance of other utilities. It is because of the basic differences that exist in each electrical network and their operating environment which include weather conditions, strength and skills of the work force and the characteristic features of the end users. In a way, its value depends upon the utility-consumer relationship. To cite an example, if the customers come forward to pay more for reliability measures and meet a part of the capital needed for efficient equipment, then the reliability of the network can be enhanced to a higher level. We will deal with the next topic viz the focus required for "Safety", which plays an essential role in Asset Management in the ensuing article.

Till then kindly stay tuned. ***(To be continued…)***

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

## AT RS. 4 A UNIT, SOLAR POWER CHEAPER THAN GRID IN M.P.

There has, of late, been talk of solar power tariffs falling and the imminence of 'grid parity'. But in Madhya Pradesh, some solar power plants are selling electricity at tariffs below those of conventional electricity.

These plants, located in two solar parks created by the BSE-listed M and B Switchgears Ltd, sell power directly to large consumers at around Rs. 4 a unit. The offer is at a 20 per cent discount to the tariff the local power utility charges consumers.

Solar power generators are generally registered to get 'solar renewable energy certificates', which can be sold in the market for cash. However, Vikalp Mundra, Director, M and B Switchgears, says that it works out profitable for solar plant owners even if 20 per cent of the RECs they acquire are sold in the market. ***Courtesy: M.Ramesh, Chennai, Aug.1***

## DEPRECIATION BENEFIT

This may sound fantastic, but it does works because those who own solar projects get also the 'accelerated depreciation' benefit — a fiscal incentive that allows them to write off the cost of the project as depreciation, saving on tax payment.

M and B Switchgears was set up in 1979 to manufacture transformers, but in the last couple of years, the company shifted focus to the solar business. Today, it mainly puts up large, modular solar projects and sells the plants to customers.

In Ragarh in Madhya Pradesh, the company has a 15 MW park, in which it owns 2 MW of assets — the rest are owned by other solar investors. Elsewhere in the State, it is putting up a 27 MW project, of which 13 MW of assets are operational and the rest will be by the end of August. M and B Switchgears will own 12 MW of the 27 MW, Mundra said.

Mundra told Business Line M and B Switchgears sells solar plants at around Rs. 7.5 crore a MW, including land cost. The company promises investors generation of 1.5 million units per MW, and says the actual has been consistently higher.

***Courtesy : ramesh.m@thehindu.co.in***

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

271. Hopes Engineering (2013-14)
272. Sivasakthi Electricals (2012-14)
273. Shobha Developers (2013-14)
274. Tandem Enterprises (2013-14)
275. DNR Consultant (2013-14), ***Non Member***
276. Arthy Electricals (2012-13)
277. Sudhan PowerTech (2012-13)
278. Krishna Bharathy System (2013-14)
279. Karuna Electrical (2012-14)
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294. Ganga Consultants & Contractors (2010-11)
295. MM Engineers (2011-14)
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297. R.J.Enterprises (2012-14)
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302. Dakshin Electricals (2011-14)
303. Tech up Engineering Pvt Ltd (2012-14)
304. Paower Tech Engineers (2012-14)
305. Power & Services (2013-14)

We request other members also to send their contribution for NEWSLETTER early.
(***Please help us to serve you better***)

# DEVELOPMENTS AND CHALLENGES IN SUBSTATION AUTOMATION

*This article looks at the development of substation automation systems and associated issues and challenges. The new but already quite popular IEC61850-based substations automation systems are discussed. The issue of interoperability which has been remarkably solved by IEC61850 has also been discussed. Additionally, issues and challenges associated with implementing these substation automation systems have been discussed.*

## 1.0 INTRODUCTION

A power system comprises of devices that makeup the physical systems that generate, transmit, and distribute electric power. Instrumentation and control (I&C) system refers to the collection of devices that monitor, control and protect the power system. Now when we say power system automation, it refers to the use of these I&C devices to perform automatic decision making and control of the power system. Power system automation can be defined as a system for managing, controlling and protecting an electrical power system. To achieve this, we have to obtain the real-time information from the system, having powerful local and remote control applications and advanced electrical protection. Hence, power system automation, by definition, consists of the following main components, electrical protection, control, measurement, monitoring and data communication [1].

Electrical power substations, as we know, are the key nodes in the electrical power system. These substations are monitored, controlled and protected by automation systems known as Substation Automation Systems (SAS). SAS has many components such as IEDs, Remote Terminal Units (RTUs), Bay controllers, human machine interfaces (HMIs) and communication infrastructure which are used to link all these various devices and also to link remote SCADA systems. A substation automation system has to support many functionalities and features [1] like, control and monitoring of all substation electrical equipment from a central point, interface to remote SCADA system control of electrical equipment in a bay locally, monitoring of electrical equipment in a bay locally, status monitoring of automation equipment, system database management, energy management and condition monitoring of substation electrical equipment (switchgear, transformers, relays, etc.)

This paper deals with a technology in the area of SASs known as IEC61850-based Substation Automation Systems. These advanced systems use communication infrastructure and Intelligent Electronic Devices (IEDs) for realizing an effective and robust Substation Automation System. Before going further into IEC61850-based SAS, let us look at few other important aspects, such as the evolution of the Substation Automation System, its importance in realizing a smarter grid and also it would be wise to look into the reasons which made the utilities to shift to the IEC61850-based SASs.

## 2.0 EVOLUTION OF SUBSTATION AUTOMATION SYSTEMS

A substation consists of large number of switchgears, which are monitored, controlled and protected by an SAS. The advancement in the protection relays, communication technology and automation industry has surely helped SAS gain momentum in becoming more reliable, stable and supporting many more sophisticated functions. Protection relays have evolved as IEDs, which have two or more processors and can perform protective functions along with control and measurement functions and can communicate with other IEDs. Advancement in communication technology has helped in a major way by which communication between the IEDs and other SAS equipment has become more reliable and faster. Also, automation industry has helped SAS migrate from old hardwired relay logic to more sophisticated SCADA and Distributed Control Systems. Now, let us have a look at the evolution of SASs.

In simple words, a substation automation system would consist of IEDs distributed across the substations which are connected by the communication network. IEDs which were previously electromagnetic relays and standalone metering systems, and the advancement in the communication system were the two major factors which increased the pace towards the development of 'digital substations'.

The shift from electromagnetic relays to microprocessor-based relays happened in late 1980s. These microprocessor-based relays were used for protection purposes. They were provided with some communication ports via which the user could debug and introduce the necessary changes in the relay settings. These communication ports were not really used to interconnect these various relays, so that they could 'talk' to each other. Further, these relays used to be connected to SCADA systems. These connections used to be hardwired. Interfacing drivers, software were used to interface and retrieve the data.

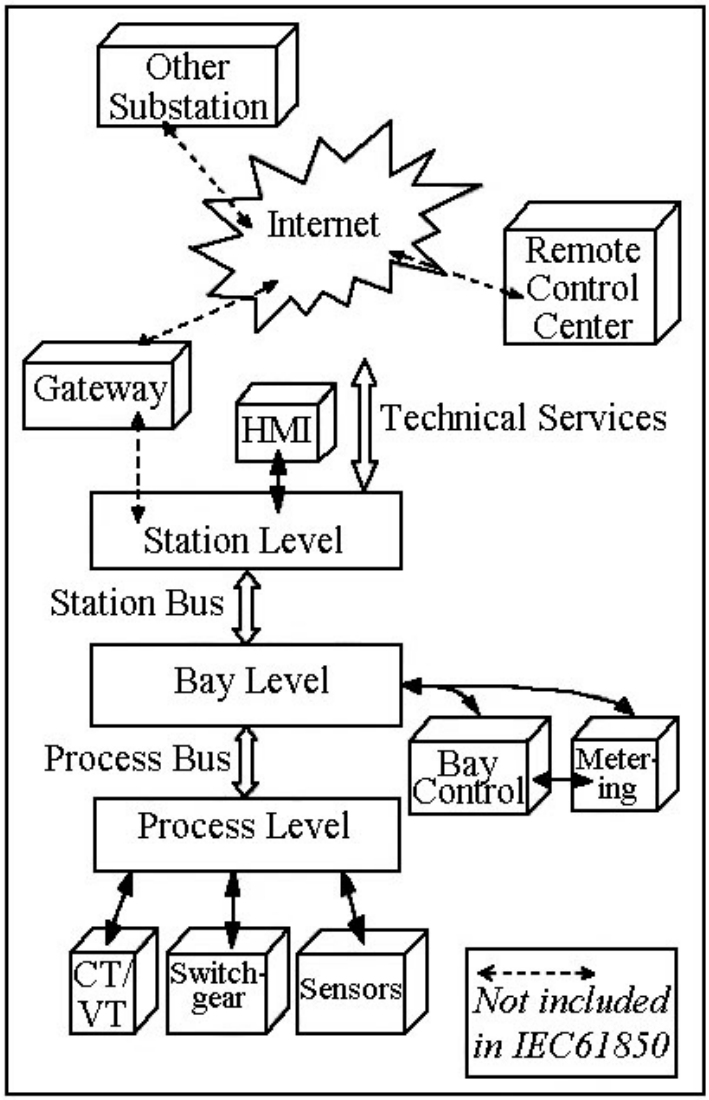
Advancement in the field of computers and microprocessors made the computing power greater and more importantly, cheaper. Now it became possible to integrate many functions into a single device. These devices could now do many things; along with monitoring, controlling and protection capabilities, these devices were

capable of communicating data (status data, metering data, etc.) to the SCADA system and also to its peer devices.

Hence, technology is now available to communicate voltage and current information to various IEDs within the substation through what is called as 'Process bus', and communicated within themselves and the remote control center on 'Station bus'. But, inspite of all these technological developments, there were still no open standards defined for these systems. Plug and play type solutions were still not in the picture. Proprietary solutions were developed by various vendors, thus it was very difficult (nearly impossible) for the utilities to use a different vendor's equipment in the existing system which was designed by a different vendor. Hence, issue of interoperability came into picture.

It was the IEC61850 standard which took care of the interoperability issue quite remarkably. We will look into more of IEC61850-based SAS. Figure 1 shows the architecture of an IEC61850-based Substation Automation System. The whole of communication infrastructure within the substation is based on Ethernet. The Figure shows the architecture of an IEC61850-based SAS, whose backbone is LAN.

**3.0 REASONS WHICH MADE SAS EVOLVE AS 'IEC61850-BASED SAS'**




*Advent of IEDs:* The advancement in the field of microprocessor-based multifunctional IEDs helped in integrating more functionality into fewer devices which resulted in simpler designs with reduced wiring. IED-based protection solutions have been successful because they offer substantial cost savings while fitting very well into pre-existing frameworks of relay application. IED's communication capabilities made information be available at remote places which resulted into fewer visits to the substation.

*Interoperability:* In terms of SCADA integration, the first of such systems were not very successful, especially in cases where the end-user got locked into a solution offered by a single vendor. The reason being that the IEDs from other vendors could not be integrated easily which invariably led to interoperability issues on the SCADA side. Integration solutions required to be customized. Owners of such systems also faced long-term support and maintenance issues.

*Lower data speeds:* Early SCADA systems integrated information from generation stations and substations through Remote Terminal Units (RTUs) to provide operators with system-wide knowledge. To gather system information, these RTUs and SCADA systems typically used additional transducers and contacts that were separate from the protection systems. The information updates for these systems were not available at fast speeds. The information was available at the order of several seconds to minutes. But, by now IEDs were performing more system automation and control functions. Almost all the information required by system operators (and more) was available from these IEDs once they were networked together. Thus, the use of these substation IED networks reduced or eliminated additional transducers, input and output contacts, and even RTUs. More importantly, they are also able to provide data at much faster speeds.

*Shift towards Ethernet-based solutions:* To accommodate these new and increasingly popular IED network functions, substation communications infrastructure also experienced dramatic changes. Substation integration systems now were based on IED networks built using EIA-232 point-to-point and EIA-485 multidrop communications ports within the IEDs. These ports communicate at a speed ≤ than 38.4 kilobits per second (kbps). The information exchanges are carried out using such register/address-based protocols as DNP3, Modbus [2]. But as the data from substations was huge in size, it was clear that the networks now should be

capable of carrying this huge amount of data comfortably. The need for instantaneous availability of information required much higher communication speeds. Hence, substation IED network communications now started migrating to Ethernet-based communication networks and used protocols like Internet Protocol (IP), transmission control protocol (TCP) and File Transfer Protocol (FTP) for information and file exchanges.

The above reasons led the Electric Power Research Institute (EPRI) in USA to work on a Utility Communications Architecture (UCA) in the early 1990s to develop a communication architecture that would ease the design of systems for protection, control, monitoring and diagnostics in the substation. The target was to achieve an industry consensus regarding substation integrated control, protection and data acquisition, and to further reduce the amount of engineering and wiring required. This work developed to produce UCA2 which showed that true interoperability was possible. With many years of competing protocols and integration challenges, UCA2 was taken forward by International Electrotechnical Commission's (IEC) Technical Committee 57 (TC 57: Power system control and associated communications) to produce the standard IEC61850 that revolutionized substation automation [3].

The IEC61850 has been developed with the involvement of representatives from utilities, suppliers and communication experts. The development took many years and was focused on building a framework in which devices from any vendor could be connected to another to share data, services and functions. The key targets of the standard were to ensure interoperability of products from different suppliers, easy expansion of existing systems, and future-proof protocols and data structures which could be applied across a wide range of interconnection technologies, even as they developed further [4].

## 4.0 IMPORTANCE OF POWER SYSTEM AUTOMATION IN SMART GRID

A smarter grid is the integration of new technologies that allow utilities and manufacturers to rethink the design and operation of electrical networks. According to the IntelliGrid Architecture Report, the Electric Power Research Institute (EPRI) defines the Smart Grid as [5]:

1. A power system made up of numerous automated transmission and distribution (T&D) systems, all operating in a coordinated, efficient and reliable manner.
2. A power system that handles emergency conditions with 'self-healing' actions and is responsive to energy-market and utility needs.
3. A power system that serves millions of customers and has an intelligent communication infrastructure enabling the timely, secure and adaptable information flow needed to provide power to the evolving digital economy. Smart Grid impacts many of the information systems including Supervisory Control and Data Acquisition (SCADA), feeder automation and substation automation [6]. Reference [7] clearly specifies the importance of a smart substation and feeder automation as integral part of the Smart Distribution System. Hence, it is clear that power system automation is a building block if we want to gradually upgrade the power grid to a Smart Grid.

## 5.0 INTRODUCTION TO IEC61850

*IEC61850: Communication networks and systems in substations [8]:* IEC61850 is a standard for the design of electrical substation automation systems. It aims at being a next-generation SCADA protocol which aims at becoming an open standard for substation automation systems. It standardizes the way the digital data is exchanged between different equipments. The standard highly relies on the concept of virtualization. The standard specifies the mechanism by which the data is accessed and exchanged within the substation. It defines the communication between IEDs in the substation and the related system requirements. It supports all substation automation functions and their engineering. The standards define a consistent methodology for interconnecting IEDs in substations using Ethernet LAN-based technologies, a set of communication services, and applications built on a standardized set of plant and equipment models (logical nodes).

The standard contains an object-oriented data model that groups all data according to the common user functions in objects called Logical Nodes (LN). All related data attributes are contained and defined in these Logical Nodes. Access to all the data is provided in a standardized way by the services of the standard, which are defined to fulfill the performance requirements. The data model and services of the standard are mapped to a mainstream communication stack consisting of Manufacturing Message Specification (MMS), TCP/IP and Ethernet with priority tagging.

IEC61850 includes high-speed peer-to-peer communications using Generic Object Oriented Substation Event (GOOSE) messages and Sampled Analog Values (SAV). To implement these mechanisms, the hard wiring between the relays and between the control station and the breakers has been replaced by communication infrastructure.

The standard that defines the IEC61850 protocol suite is divided into 10 parts:

**Part1 -** *Introduction and overview:* This part contains the introduction and overview of the IEC61850 standard. This part also contains the history of the standard.

**Part 2 -** *Glossary:* This part contains the collection and definition of all the terms which have been used in the standard document.

**Part 3 -** *General requirements:* This part speaks about the general requirements of the communication network, with emphasis on the quality requirements. It also contains the guidelines for environmental conditions and auxiliary services, with recommendations on the relevance of specific requirements from other standards and specifications. This part extensively refers to two standards: IEC60870 for telecontrol equipment and systems, and IEC61000 for electromagnetic compatibility (EMC).

**Part 4 -** *System and project management:* This part deals with the system and project management with respect to the engineering process and its supporting tools; the life cycle of the overall system and its IEDs; the quality assurance beginning with the development stage and ending with discontinuation and decommissioning of the SAS and its IEDs.

**Part 5 -** *Communication requirements for functions and device models*: This part refers to the communication requirements of the functions being implemented in the SAS and to device models. All known functions and their communication requirements are identified. It talks about the logical nodes approach, logical communication links, Piece of Information for communication (PICOM) concept, logical nodes and related PICOMs. 'Dynamic scenarios' (information flow requirements for different operational conditions) are used to define the exchanged data and their required performance.

**Part 6 -** *Configuration description language for communication in electrical substations related to IEDs:* This part specifies a file format for describing communication-related IED configurations and IED parameters, communication system configurations, switch yard (function) structures, and the relations between them. This part describes the system and configuration parameter exchange file format based on XML containing primary system schematic (single line) description, communication connection description and IED capabilities. To do so, Substation Configuration description Language (SCL) is used. SCL is based on the Extensible Markup Language (XML) version 1.0.

**Part 7-1 -** *Basic communication structure for substation and feeder equipment-Principles and models:* This part provides the 'conceptual point of view' assistance to understand the basic modeling concepts and description methods. This part contains the introduction to parts IEC 61850-7-x.

**Part 7-2 -** *Basic communication structure for substation and feeder equipment-Abstract communication service interface (ACSI):* This part gives the description of the ACSI, specification of the abstract communication services and the model of the device database structure. The ACSI provides an abstract interface describing communications between a client and a remote server. It also provides an abstract interface for fast and reliable systemwide event distribution between an application in one device and many remote applications in different devices and for transmission of sampled measured values.

**Part 7-3 -** *Basic communication structure for substation and feeder equipment-Common data classes:* This part specifies common attribute types and common data classes related to substation applications. This standard is applicable to the description of device models and functions of substations and feeder equipment.

**Part 7-4 -** *Basic communication structure for substation and feeder equipment-compatible logical node classes and data classes:* This part gives the definitions of logical node classes and data classes (logical node classes are composed of data classes). It also specifies the compatible logical node names and data names for communication between IEDs. This includes the relationship between Logical Nodes and Data. The names defined in this document are used to build the hierarchical object references applied for communicating with IEDs in substations and on distribution feeders. In short, this part specifies the information model of devices and functions related to substation applications.

**Part 8-1 -** *Specific communication service mapping (SCSM) - Mappings to MMS (ISO/IEC9506-1 and ISO/IEC9506-2) and to ISO/IEC8802-3:* This part speaks of mappings of services commonly used for communication within the whole substation. It specifies a method of exchanging time-critical and non-time-critical data through LAN by mapping ACSI to MMS and ISO/IEC8802-3 frames.

**Part 9-1 -** *Specific Communication Service Mapping (SCSM)-Sampled values over serial unidirectional multidrop point-to-point link:* This part of IEC61850 specifies the mappings for the communication between bay and process level, and it also specifies a mapping on a serial unidirectional multidrop point-to-point link in accordance with IEC60044-8.

**Part 9-2 -** *(SCSM)-Sampled values over ISO/IEC8802-3:* This part defines the SCSM for the transmission of sampled values according to the abstract specification in IEC61850-7-2. The mapping is that of the abstract

model on a mixed stack using direct access to an ISO/IEC8802-3 link for the transmission of the samples in combination with IEC61850-8-1.

**Part 10 -** *Conformance testing:* This part specifies the procedure for conformance testing of products implemented with this communication protocol. Hence, it talks about conformance test procedures, quality assurance and testing required documentation, device-related conformance testing, certification of test facilities, and requirement and validation of test equipments.

## 6.0 CHALLENGES AND ISSUES

The lack of skilled personnel is surely a big obstacle considering the amount of domain- specific knowledge required during the engineering process. To understand this document of IEC61850 standard, which is of over 1400 pages, needs quite a good amount of knowledge of software engineering and communication networks.

The biggest challenge would be to upgrade the current substation automation systems to IEC61850-based systems. This shift has to be done with the highest level of engineering thought being put in place, as there will be cases where the old equipment would not properly integrate into the new system. Protocol converters and redesigning the system will be needed because discarding the old equipment which is still in good condition will not be an economical solution.

The issue of cyber security is also a big concern. There have been instances around the world when these automation systems became vulnerable to the cyber attacks. Being a LAN-based technology and the use of remote communication via wireless technologies give us more reasons to consider the cyber security of these systems more seriously.

The attempts are going on to make use of IEC61850 for wide are communication and protection systems [9]. The first edition of the standard did not talk about the remote access to the substation and communication between two substations. These being very necessary, the next addition of the standard aims at addressing these issues. The standard IEC61850-90-1 will deal with the inter-substation communication. Likewise, the use of the standard at power generation side was viewed as an important addition to the standard. The IEC61850-7-410 takes care of communication standard for supervision of a hydropower plant. Also, IEC61850-7-420 defines the communication systems for the Distributed Energy Resources (DER). IEC61400-25 defines logical nodes for the communication between wind power plant components and SCADA systems [10].

To achieve true interoperability, a great teamwork needed between all the manufacturers along with in-depth knowledge of the standard itself. The importance of this issue is more clearly seen implementation of the first IEC61850-based Multi-Vendor project in USA in Tennessee [11].

The standard stresses a lot on the relay and switchgear side of these systems. There are no standardized procedures as far as the configuration of the clients is concerned.

## 7.0 MAJOR ADVANTAGES

The advantage of interoperabi1ity, which was the main target while developing this standard, has been seen practically in implementations of IEC61850-based projects around the world. The features of the standard like GOOSE messaging have been successfully implemented in many of these projects.

The conventional hardwired configurations have been replaced by Ethernet cables and other communication infrastructure. This has greatly reduced the wiring. On this new communication infrastructure, all the functions like monitoring, protection and control operations can be implemented.

Because of this reduced wiring and use of LAN cables instead, the installation costs have been reduced considerably. The configuration of these systems has become smoother and cost-effective. Most of the devices are plug and play type [12].

The design of these systems has become comparatively easy now. This can be attributed to the object-oriented methodology of design and also the use of a standardized Substation Configuration description Language (SCL).

The huge support provided by ACSI to many services like GOOSE, SMV has been unique feature of this standard. These features were not possible to implement using the legacy protocols.

## 8.0 CONCLUSION

From what we have seen, the evolution of the substation automation systems, it is easy to conclude that IEC61850 has been the revolutionary standard in the design and implementation of these systems. There are still few issues with, but the extensive participation from the industry and the researchers to address these problems will help the standard become more reliable and ambiguity free. Substation automation system will play a major role in realizing a smart grid and reducing blackouts in our country.

***Courtesy: Yashwant K and Swarup K S, CPRI Journal, March 2012***

***It won't take much Energy to Conserve Energy***

# ELECTRICAL PROTECTION OF TRANSFORMERS IN LARGE POWER PLANTS

**1.0 Introduction**

A typical power plant is equipped with following power transformers:

a) Generator Transformer (GT); b) Station Transformer (ST); c) Unit Transformer (UT)

Generator transformer evacuates the generated power. In a plant with Generator circuit breaker (GCB), GT can also be used to feed the auxiliaries via Unit transformer. Refer Fig.1. Unit Transformer feeds the unit auxiliary loads and Station Transformer feeds the station auxiliary loads. In a plant without GCB Station Transformer draws power from the grid to provide startup power.

This article discusses the protection philosophy for the above transformers. It excludes interconnecting transformer (ICT), HV and LV Auxiliary transformers.

**2.0 Transformer Protections**

The protections provided for the power transformers are detailed below:

**2.1 Protection of Generator Transformer (GT)**

**2.1.1 Electrical protections**

**2.1.1.1 GT differential protection (87GT)**

a) In case of three phase units, GT differential typically covers the overhead section of the switchyard in addition to the transformer. Refer Fig.2.

b) For a bank of single phase transformer, the GT differential generally covers only the transformer. A separate differential protection (87L) covering the HV winding and overhead section is also provided for bank of single phase transformer. Refer Fig. 3.

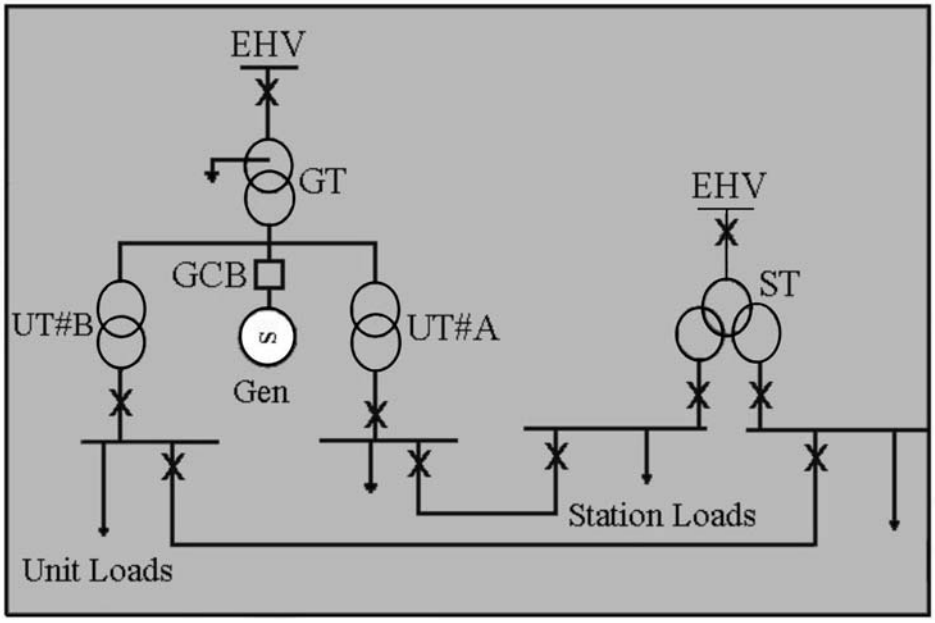



***Fig.1: Single Line Diagram of Auxiliary System in Power Plant with Generator circuit Breaker***

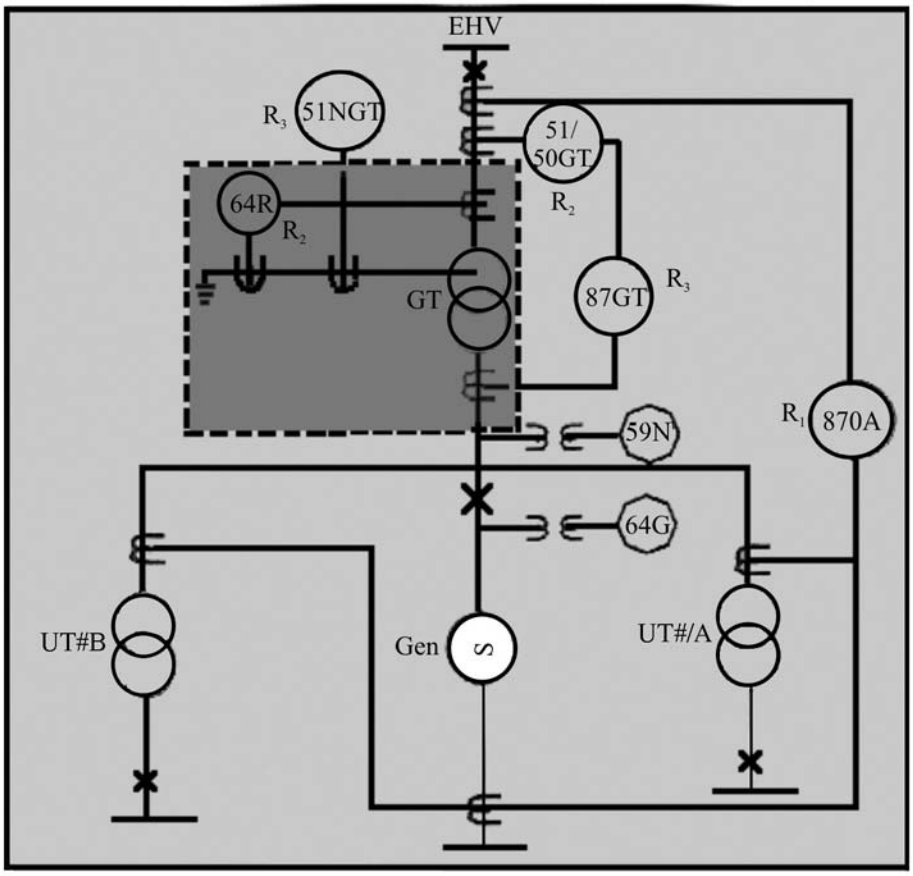



***Fig.2:*** **Three Phase GT Protection**

c) It may be noted that CTs shown in shaded area in Fig 2 and Fig 3 are bushing CTs.

**2.1.1.2**

a) For a bank of single phase transformers, differential protection is shown in Fig 4.

b) Two CTs, on either side of LV windings are provided, intrinsically to cover ground faults in the delta winding. [Ref (1)]. This scheme is built on the premise that sufficient current will flow on occurrence of earth fault.

c) However in a power plant, high resistance grounding is provided for generator neutral. The earth fault current on the delta side of GT is limited within 10A.

d) The differential protection of generator transformer cannot sense the ground fault in the delta winding. It can be sensed only by voltage based earth fault sensing scheme provided on generator terminals. (59N and 64G in Fig.2 and Fig.3)

e) In view of the above, provision of one CT on delta winding is sufficient. Refer Fig.5. This philosophy is adopted in all recently engineered power plants in authors' company.

**2.1.1.3**

a) Overhang differential protection (87L) or HV Restricted earth fault (REF) protection (64) – Overhang differential protection (87L) is a biased three phase differential protection covering the HV windings as well as the overhead conductors from switchyard to the transformer. This protection is provided for a bank of single phase transformers. This protection is implemented as a differential protection of each individual HV winding and its EHV overhead connection. For this purpose one CT is provided at the HV neutral bushing and its corresponding CT is provided at the EHV breaker end. Refer Fig.6. In this case separate REF protection is not required for generator transformer. Alternatively a single pole differential can act as a REF protection.

b) For three phase generator transformer, high impedance restricted earth fault protection (64) is provided. The restricted earth fault protection usually covers only the HV windings. Refer Fig.2.

c) The zone covered by differential protection and REF protection in case of 3 x single phase GT bank and three phase GT is summarised in Table 1.

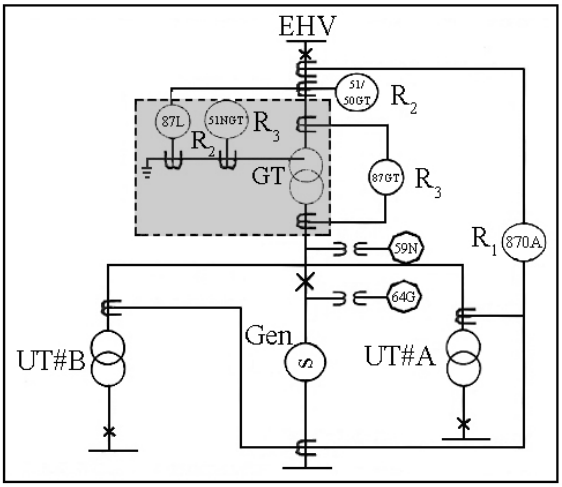



***Fig.3:*** **Bank of Single Phase GT Protection**

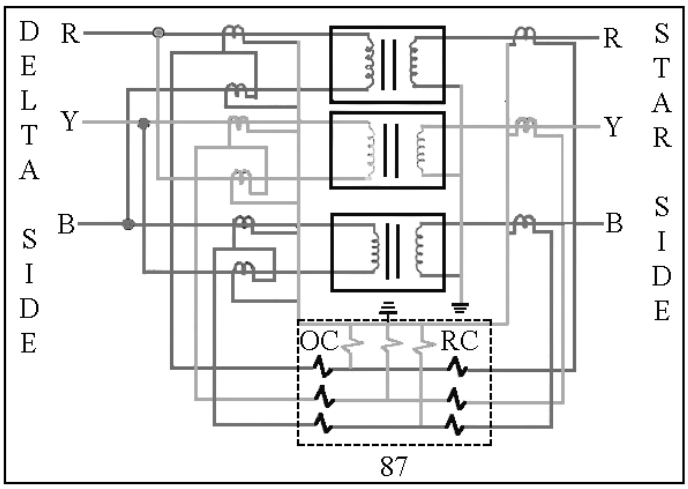



***Fig.4: Conventional Differential Scheme for Single phase transformer bank***

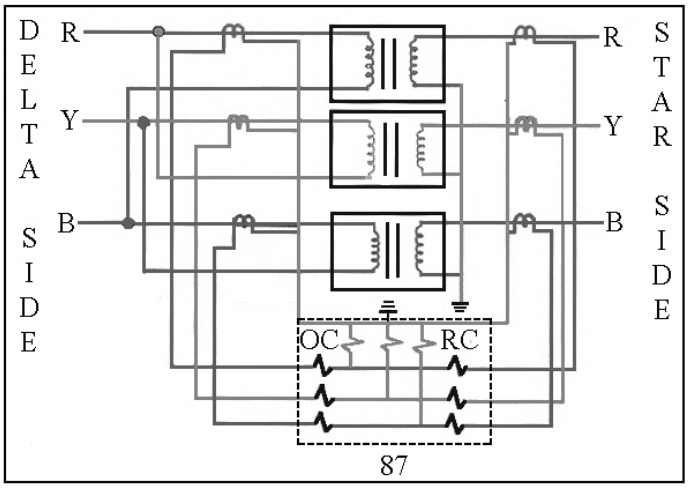



***Fig.5:*** **Differential scheme with single CT in delta winding**

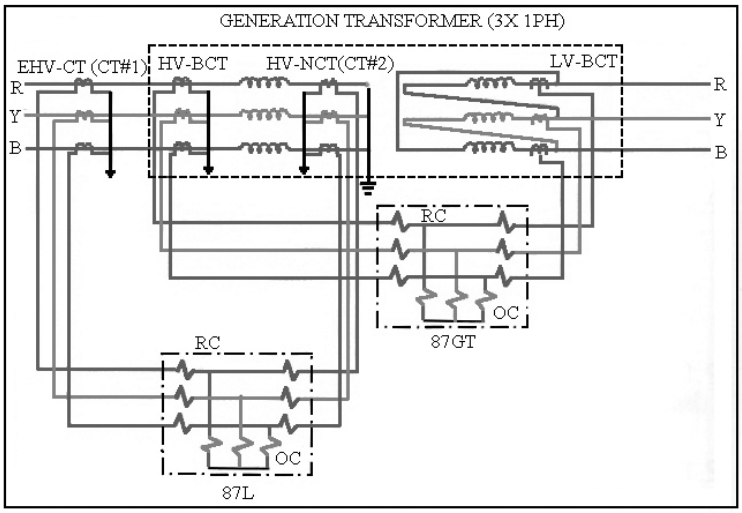



***Fig.6: Differential Protection for Single Phase Generator Transformer***

**2.1.1.4** Overall differential protection (87OA) – This covers the Generator and the GT and functions as a backup to the GT differential protection.

**2.1.1.5** Instantaneous over current protection acts as a backup to GT differential protection (50GT).

**2.1.1.6** GT HV side over-current protection (51 GT)

**2.1.1.7** GT HV side stand-by earth-fault protection (51 NGT)

**2.1.1.8** GT Over-fluxing protection (24) – sensed from selected EHV bus voltage (not shown in figure)

Protections listed in 2.1.1.6 to 2.1.1.8 are provided for protection against uncleared grid faults/disturbances.

**Table 1**

| Type of GT | Protection | Zone covered | CTs used | Remarks |
|---|---|---|---|---|
| 3 x Single Phase GT Bank | Differential protection (87GT) | Transformer windings | Currents from LV bushing CTs are compared against currents from HV bushing CTs. | Ref Fig. 3 |
| | Overhang differential protection (87L) | Transformer HV windings and EHV connection | Currents from HV neutral bushing CTs are compared against currents from EHV CTs. | 1. Ref Fig. 3<br>2. Will respond to phase and earth faults.<br>3. REF protection (64R) need not be provided if this protection is provided.<br>4. Widely used |
| | REF protection (64R) | Transformer HV windings and EHV connection | Summated currents of HV neutral bushing CT is compared against summated currents of EHV CTs. | 1.Ref Fig. 3<br>2.Will respond to earth faults only.<br>3. 87L protection need not be provided if this protection is provided.<br>4. Rarely used |
| Three phase GT | Differential protection (87GT) | Transformer HV windings and EHV connection | Currents from LV bushing CTs are compared against currents from EHV CTs. | Ref Fig. 2 |
| | REF protection (64R) | Transformer HV windings | Current on HV neutral bushing CT is compared against summated currents of HV phase bushing CTs | Ref Fig. 2 |

**2.1.2 Thermal Mechanical protections**

a) OTI / WTI - alarm and trip; b) Pressure Relief Device trip; c) Buchholz - alarm and trip; d) Oil level low alarm

For single phase transformers all the above protections are provided for each of the phase units.

**2.1.3** In addition to the above, fire protection is also provided for the GT.

**2.1.4** The electrical protections mentioned in CI 2.1.1 are suitably grouped in two or three numerical relays. The grouping is done in such a manner that each acts as a backup to the other.

A typical suggested grouping of functions for bank of single phase transformers is given in Table-2.

**Table -2**

| **Protection function for bank of single phase transformers** |
|---|
| **Relay-1 (R1): Trafo Protection Relay** |
| Overall differential protection (87OA) |
| **Relay-2 (R2): Trafo Protection Relay** |
| Overhang differential protection (87L) |
| GT HV side instantaneous and IDMT phase over current protection (50/51 GT) |
| **Relay-3 (R3): Trafo Protection Relay** |
| GT Differential Protection (87GT) |
| GT HV side stand-by earth-fault protection (51 NGT) |
| Overfluxing (24) |

A typical suggestive grouping of functions for three phase transformers is given in Table-3

**Table -3**

| **Protection function for three phase transformers** |
|---|
| **Relay-1 (R1): Trafo Protection Relay** |
| Overall differential protection (87OA) |
| **Relay-2 (R2): Overcurrent and Earth fault relay** |
| REF protection (64) |
| GT HV side instantaneous and IDMT phase over current protection (50/51 GT) |
| **Relay-3 (R3): Trafo Protection Relay** |
| GT Differential Protection (87GT) |
| GT HV side stand-by earth-fault protection (51 NGT) |
| Overfluxing (24) |

**2.2 Protection of Station Transformer (ST)**

**2.2.1** Electrical protections (Refer Fig.7)

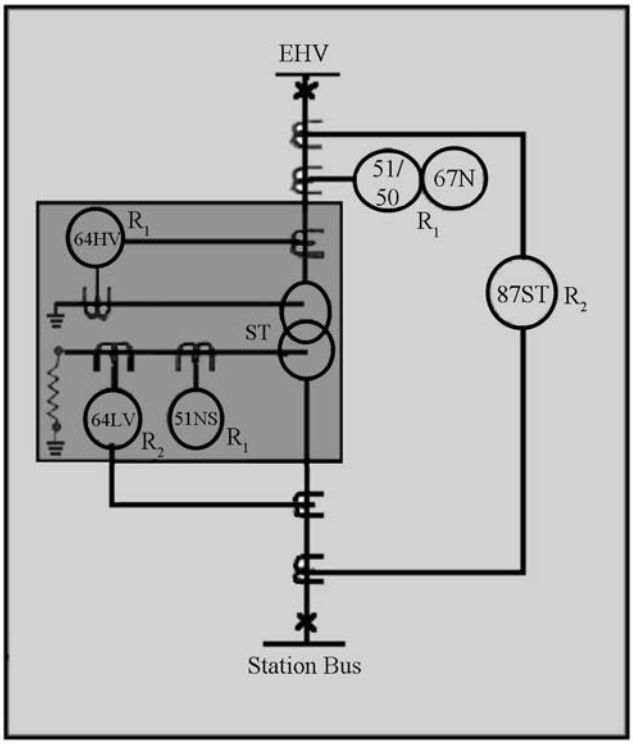



***Fig.7: Station Transformer Protection***

**2.2.1.1** ST differential protection (87ST) - ST differential covers the overhead section of the switch yard in addition to the transformer and busduct connecting the LV winding with the switchgear.

**2.2.1.2** HV winding Restricted Earth fault (REF) protection (64HV) High impedance REF protection is usually provided for HV side winding.

**2.2.1.3** HV phase over-current and directional earth fault protection (50/51/67N) The instantaneous (50) stage of phase and earth fault protection is set to clear HV side faults instantaneously. The IDMT stage of phase overcurrent protection is coordinated with LV side relays. The overcurrent protection also acts a backup to differential protection for HV side faults. The earth fault element is directionalised to ensure pickup for ground faults towards ST and not in grid.

**2.2.1.4** LV winding Restricted Earth fault (REF) protection (64LV) Low impedance REF protection is envisaged for LV side winding. A low impedance REF scheme provides sensitive protection without provision of interposing CT and stabilising resistor as required in high impedance protection scheme.

**2.2.1.5** LV Stand-by Earth fault protection (51 NS) – This protection is provided to clear uncleared earth faults on LV side. It acts as backup to LV REF protection also.

**2.2.1.6** ST Over-fluxing protection (24) – This protection is provided to protect the transformer against grid over voltages. It is sensed from selected EHV bus voltage (not shown in figure)

**2.2.2** Thermal/Mechanical protections

a) OTI / WTI – alarm and trip; b) Pressure Relief Device trip; c) Buchholz – alarm and trip; d) Oil Surge Relay – trip; e) Oil level low alarm

**2.2.3** In addition to the above, fire protection is also provided for the ST.

**2.2.4** It may be noted that CTs shown in shaded area in Fig 7 are bushing CTs.

**2.2.5** The electrical protections are grouped in two numerical relays. The grouping is done in such a manner that each acts as a backup to the other. The grouping of functions can be as per Table-4.

**2.3 Protection of Unit Transformer (UT)**

**2.3.1** Electrical protections (Refer Fig.8)

**2.3.1.1 UT differential protection (87UT)** – UT differential covers the transformer and busduct connecting the LV winding with the switchgear.

**2.3.1.2 HV phase over-current protection (50/51)** – The instantaneous stage of phase overcurrent protection is set to clear HV side faults instantaneously. The IDMT stage of phase over-current protection is coordinated with LV side relays. It also acts a backup to differential protection for HV side faults.

**2.3.1.3 LV winding Restricted Earth fault (REF) protection (64LV)** – Low impedance REF protection is envisaged for LV side. The comments made for ST are applicable here also.

**2.3.1.4 LV Stand-by Earth fault protection (51 NS)** – This protection is provided to clear uncleared earth faults on LV side. It acts as backup to LV REF protection also.

**2.3.2 Thermal/Mechanical protections**

a) OTI / WTI - alarm and trip; b) Pressure Relief Device trip; c) Buchholz - alarm and trip; d) Oil Surge Relay - trip; e) Oil level low alarm

**2.3.3** In addition to the above, fire protection is also provided for the UT.

**2.3.4** It may be noted that CTs shown in shaded area in Fig 8 are bushing CTs

**2.3.5** The electrical protections are grouped in two numerical relays. The grouping is done in such a manner that each acts as a backup to the other. A typical grouping of functions could be as per Table-5.

**3.0 Grouping of Protection functions**

**3.1** There is usually an apprehension regarding provision of LV side REF and differential protection in one relay (Relay 2 in Table-4 and Table-5) as suggested in CI 2.2.5 and 2.3.5.

**3.2** The vector group of ST is star/star with EHV side solidly earthed. UT is a delta/star transformer. On HV side of UT, earth fault is restricted within 10A. Current based protections do not respond to earth faults on HV side of UT. The earth fault is sensed only by voltage based earth fault scheme provided on generator terminals. (59N and 64G in Fig.2 and Fig.3)

**3.3** LV side of UT and ST is earthed through neutral grounding resistor (NGR) restricting the earth fault current to typically 300A. Operation of differential protection is doubtful for earth faults on LV side especially for faults within the winding [Ref (2)]. Only REF and SEF protection will definitely respond to LV side earth faults.

**Table-4**

| **Protection function** |
|---|
| **Relay-1 (R1): Overcurrent and Earth fault relay** |
| LV side stand-by earth-fault protection (51 NS) |
| HV side phase over current and earth fault protection (50/51/67N) |
| HV REF protection (64HV) |
| **Relay-2 (R2): Trafo Protection Relay** |
| ST Differential Protection (87ST) |
| LV REF protection (64LV) |
| Overfluxing (24) |

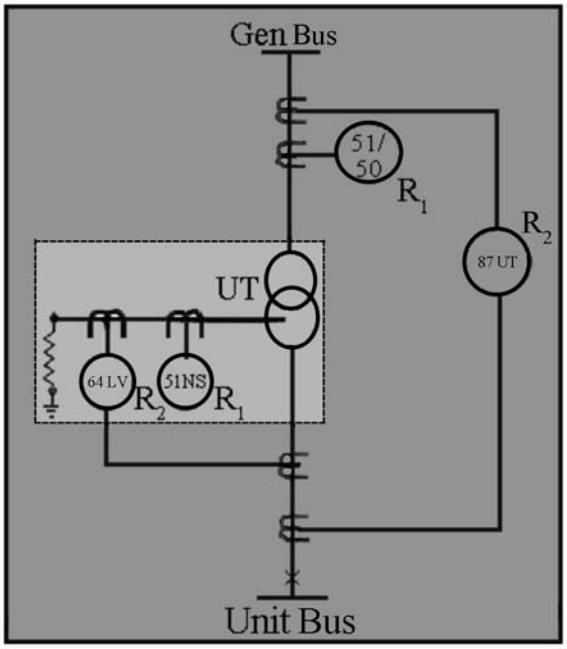



***Fig.8: Unit Transformer Protection***

**Table-5**

| **Protection function** |
|---|
| **Relay-1 (R1): Overcurrent and Earth fault protection** |
| LV side stand-by earth-fault protection (51 NS) |
| HV side phase over current protection (50/51) |
| **Relay-2 (R2): Trafo Protection Relay** |
| UT Differential Protection (87UT) |
| REF protection (64) |

**3.4.1** The responses for differential protection, REF and backup over current and earth fault protection under various fault conditions for ST and UT are tabulated in Table-6A and 6B respectively.

**Table-6A: Protections for ST**

| Faults | Protections | | | | |
|---|---|---|---|---|---|
| | **Differential Protection** | **LV REF Protection** | **HV side IDMT OC** | **HV side Inst OC & EF** | **LV Standby Earth Fault** |
| HV side Phase fault | X | --- | X | X | --- |
| HV side earth fault | X | --- | X | X | --- |
| LV side Phase fault | X | --- | X | --- | --- |
| LV side earth fault | Operation doubtful due to limited sensitivity | X | --- | --- | X |

*X - Responds to fault*

**Table-6B: Protections for UT**

| Faults | Protections | | | | |
|---|---|---|---|---|---|
| | **Differential Protection** | **LV REF Protection** | **HV side IDMT OC** | **HV side Inst OC** | **LV Standby Earth Fault** |
| HV side Phase fault | X | --- | X | X | --- |
| HV side earth fault | --- | --- | --- | --- | --- |
| LV side Phase fault | X | --- | X | --- | --- |
| LV side earth fault | Operation doubtful due to limited sensitivity | X | --- | --- | X |

*X - Responds to fault*

**3.5** As seen from Table-6A and 6B, for phase faults over-current protection acts as backup to differential. For earth faults on LV side, standby earth fault acts a backup to REF protection.

**3.6** Providing LV REF and differential protection in separate relays has no true value addition, as differential protection will not back up REF protection in majority cases.

**3.7** In addition to the electrical protections, mechanical protections are also provided for fast fault clearance of transformer internal faults.

**4.0 Conclusions and Recommendations**

**4.1** The scheme (Fig 5) suggested in this article can be adopted for differential protection of bank of single phase generator transformers. It eliminates three CTs compared to conventional scheme without sacrificing stability and sensitivity of scheme.

**4.2** The zones covered by each protection element have been clearly brought out.

**4.3** Suggestions are given (Tables 2 to 5) for grouping protection elements in two or three numerical relays.

**4.4** Justification for including LV REF and differential protection in the same relay for station transformer / unit transformer is given.

***Courtesy: By K.Rajamani & Bina Mitra, Reliance Industries Ltd, Mumbai***
***IEEMA Journal, June 2013***

## POWER DEFICIT STATES CAN GET ELECTRICITY FROM SURPLUS REGIONS

The government has said power surplus states can transfer surplus electricity to ones grappling with shortage through a new system. “The surplus power from the states can be transferred to power deficit states through the Inter-State Transmission System (ISTS) from the source of supply between the point of supply and point of drawl,” an official statement said.

“Central Government through Electricity Act (2003), trading mechanism and Power Exchange in accordance with the relevant regulations notified by CERC facilitate this process,” the statement said.

National Grid, for evacuation of power from generating sources located in different regions in the country and facilitating transfer of power from surplus to deficit regions, is in place, it said. In addition, licenses have been granted for trading of power. Power exchanges have also been set up for facilitating transfer of power from surplus to deficit States. Power can also be supplied under bilateral arrangements.

***Courtesy: IEEMA Journal, June 2013***

# ACHIEVING ISO 50001:2011 CERTIFICATION A MILESTONE IN DCW'S JOURNEY TOWARDS ENERGY EXCELLENCE

Individual Organization cannot control energy prices, Govt. policies or the global economy, but they can improve the way they manage energy in the here and now, improving energy performances that can provide rapid benefits for an organization by maximizing the use of its energy sources and energy related components, thus reducing both cost and consumption.

Indian Register Quality Systems

(A Department of Indian Register of Shipping)

52A, Adi Shankaracharya Marg, Opp. Powai Lake, Powai, Mumbai - 400 072. India.

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Certificate Of Approval

This is to certify that the Energy Management System of

**DCW Limited**

Sahupuram P.O., Thoothukudi District,
Tamil Nadu – 628 229

has been found to conform
to the requirements of the Standard:

**ISO 50001 : 2011**

with respect to the following scope:

Manufacture of Industrial Salt, Chlor Alkali Chemicals, Trichloroethylene, Synthetic Rutile, Yellow Iron Oxide, PVC Resin and Thermal Power Generation

This Approval is subject to continued satisfactory maintenance of the Energy Management System of the Organization to the above Standard, which will be monitored by IRQS

Certificate No.: *IRQS/13100390* granted on: 25th June 2013

Current Certification Effective Date: 25th June 2013
Current Certificate Expiry: 24th June 2016

( for detailed scope see Annexure )

C. Sriramamurthy
Chief Surveyor & Senior Vice President

Conditions overleaf

ISO 50001:2011, Energy Management System (EnMS) provides a recognized frame work to establish the system and processes necessary to improve the energy performance that includes energy efficiency, use and consumption. Implementing an energy management system in accordance with this international standard not only improve the Organizational performance but it also leads to reductions in Green house gas emissions to mitigate the worldwide effect of Global warming and other related environmental impacts through a systematic management of energy.

ISO 50001 is very similar to other standards that has been developed, ISO 9001 (Quality), ISO 14001 (Environment), OHSAS 18001 (Occupational Health & Safety). Since DCW Sahupuram Works has already adopted these QHSE Management Systems comprising of ISO 9001:2008 (from Mar 2007), ISO 14001:2004 (from Dec 2003) & OHSAS 18001:2007 (from Mar 2007), implementing ISO 50001, Energy Management System was relatively easy. DCW has integrated all the above management systems as IMS, with common Apex Manual and Procedure Manuals.

With this background, DCW Ltd, Sahupuram started its journey towards getting ISO 50001:2011 Certification in July 2012, beginning with the release of revised Energy Management Policy, after getting commitment and support from Top Management.

We followed the PDCA approach for establishing the energy management systems, keys activities of which are outlined below:

**(A) Plan:**

1. Updating our existing Energy Policy to meet the requirement of the standard.
2. Determining applicable legal requirements and methods for ensuring compliance
3. Defining and documenting boundaries to be considered and scope of EnMS
4. Establishing a methodology for Energy Review, identifying current energy sources, evaluating past / present energy use and consumptions.

5. Based on the analysis, identify areas of Significant Energy Use (SEU), identify the facilities, equipment, systems, processes and personnel working on or behalf of the organization that significantly affect energy use & consumption, identify relevant variables affecting significant energy uses.
6. Establishing energy baselines (EnBs) as a reference for comparing future the energy consumption trends, considering a data period suitable to DCW's energy use & consumption and identifying Energy Performance Indicators (EnPIs) appropriate for monitoring & measuring the energy performances in various energy boundaries.
7. Establishing Energy Objectives & targets at the relevant functions, levels, processes or facilities within the Organization to improve the energy performance.
8. Establishment of energy measurement plan with details of measurements to be made, equipment to be used, recording, analysing & calibrating frequency, responsibility for data collection and reporting

**(B) Do:**

9. Integrating energy influencing parameters (operating criteria) into existing operation and maintenance procedures
10. Establishing and implementing the energy management action plans for achieving the Energy Objective & Target set.
11. Implement processes to train employees connected with significant energy uses, communicate, control documents & records, operation control, design and procurement of energy intensive equipment and devices critical to energy

**(C) Check:**

12. Monitor and measure the processes and the Energy Performance Indicators that determine energy performance against energy policy, objectives and report the results

**(D) Act:**

13. Take actions to continually improve energy performance and the EnMS, with periodical management review.

DCW Sahupuram Works is having a pool of 8 BEE certified Energy Managers / Auditors at various plants/ departments. A highly motivated core Energy Management Team & Management Representative has been appointed by our Managing Director directly for implementing the Energy Management System. The core team is a cross functional team comprising of Certified Energy Managers/Auditors by BEE, Process Engineers and Maintenance Engineers from various plants / departments of DCW Sahupuram Works. This team has undergone intensive training on Energy Management System and the core member's in turn trained the other employees working at their respective areas and established the EnMS at all relevant functions.

As a part of ISO 50001, DCW Sahupuram Works has voluntarily established a Green Procurement Policy and various measures like Life cycle costing for procurement decisions, Environmental life cycle assessment, Evaluating the suppliers & service providers on the basis of energy performance, etc have been implemented in the process of procurement of energy centric equipments, products and energy services.

The Stage I Audit by certifying body (IRQS, Chennai) was conducted during the 1st week of April 2013 and after addressing the areas of concerns, Stage II Audit was conducted in the 3rd week of May 2013. After verifying the closure of system non conformances identified in the Stage II Audit in June 2013, IRQS has certified DCW Ltd, Sahupuram Works for ISO 50001:2011 Certification with effect from 25.06.2013 valid for a period up to 24.06.2016.

By maintaining and improving the energy management system in accordance with ISO 50001:2011, DCW Ltd Sahupuram will be able to reap numerous benefits:

- ✓ Increase energy cost savings by reducing energy costs via a structured approach to manage our energy consumption
- ✓ Effective controls on variables that affect significant energy use, wherever practicable
- ✓ Increased knowledge of equipment efficiencies by integrating with existing management systems
- ✓ Increased awareness among employees at all levels and create transparency on how energy sources are managed
- ✓ Improved operational efficiencies and maintenance practices
- ✓ Enhanced security of energy supply, as we have identified energy risk exposure areas and commenced processes to reduce them.
- ✓ Enhanced energy performance throughout the supply chain

***by T.Chandru, Sr.GM (Electrical) & Management Representative***
***ISO 9001, 14001, 28000, 50001 Management Appointee, OHSAS 18001,***
***DCW Limited, Sahupuram, Ph: 94431 58363, E mail: tchandru@shpm.dcwltd.com***

# PRODUCT OF THE MONTH

## RETROFIT LINE

**Energy and multi-function meters for existing installations**

Existing sites, having been built before optimised energy consumption was a consideration, are especially in need of a dedicated energy efficient solution.

To meet this requirement, the Retrofit Line allows you to easily add metering and measuring points in electrical enclosures which are very restricted in terms of integration.

The Retrofit Line is composed by COUNTIS Retrofit and DIRIS Retrofit associated with TCO split-core current transformers. Together they allow measuring, metering, monitoring and analysis of single and three phase networks up to 600 A, including inside the most cramped cabinets.

For More info: http://www.socomec.co.in

**To All Members,**

**When the Contractor / Consumer not able to represent their Client / Company directly to CEIG / EI Offices regarding Drawing Scrutiny Report, Defect Report and Safety Certificate, for authorising a person to represent on your behalf, the following authorisation letter to CEIG / EI Offices in the format mentioned below must be given in your Letterhead.**

## SPECIMEN LETTER

Date:

To,

**The Chief Electrical Inspector to Govt**

Thiru vi ka Industrial Estate,

Guindy, Chennai-32.

### AUTHORISATION LETTER

We here by authorise ..... on our behalf to sign and execute all papers and documents and to receive consumer's drawing scrutiny report and safety certificate and all related papers with Electrical Inspectorate for the Electrical Installation work at ..... whose specimen signatures are furnished below.

**Specimen Signatures of Authorised person**

1)

2)

**/Attested/**
**Signature of the Consumer (or)**
**Consumer Authorised Signatory**
**with Company seal**

## PHOTOVOLTAICS FROM ANY SEMICONDUCTOR

A technology that would enable low-cost, high efficiency solar cells to be made from virtually any semiconductor material has been developed by researchers with the U.S. Department of Energy (DOE)'s Lawrence Berkeley National Laboratory (Berkeley Lab) and the University of California (UC) Berkeley. This technology opens the door to the use of plentiful, relatively inexpensive semiconductors, such as the promising metal oxides, sulfides and phosphides, that have been considered unsuitable for solar cells because it is so difficult to tailor their properties by chemical means."It's time we put bad materials to good use," says physicist Alex Zettl, who led this research along with colleague Feng Wang. "Our technology allows us to sidestep the difficulty in chemically tailoring many earth abundant, non-toxic semiconductors and instead tailor these materials simply by applying an electric field."

Zettl, who holds joint appointments with Berkeley Lab's Materials Sciences Division and UC Berkeley's Physics Department where he directs the Center of Integrated Nanomechanical Systems (COINS), is the corresponding author of a paper describing this work in the journal Nano Letters. The paper is titled "Screening-Engineered Field-Effect Solar Cells." Co-authoring it were William Regan, Steven Byrnes, Will Gannett, Onur Ergen, Oscar Vazquez-Mena and Feng Wang. Solar cells convert sunlight into electricity using semiconductor materials that exhibit the photovoltaic effect – meaning they absorb photons and release electrons that can be channeled into an electrical current. Photovoltaics are the ultimate source of clean, green and renewable energy but today's technologies utilize relatively scarce and expensive semiconductors, such as large crystals of silicon, or thin films of cadmium telluride or copper indium gallium selenide, that are tricky or expensive to fabricate into devices."Solar technologies today face a cost-to-efficiency trade-off that has slowed widespread implementation," Zettl says. "Our technology reduces the cost and complexity of fabricating solar cells and thereby provides what could be an important cost-effective and environmentally friendly alternative that would accelerate the usage of solar energy."

This new technology is called "screening-engineered field-effect photovoltaics," or SFPV, because it utilizes the electric field effect, a well understood phenomenon by which the concentration of charge-carriers in a semiconductor is altered by the application of an electric field. With the SFPV technology, a carefully designed partially screening top electrode lets the gate electric field sufficiently penetrate the electrode and more uniformly modulate the semiconductor carrier concentration and type to induce a p-n junction. This enables the creation of high quality p-n junctions in semiconductors that are difficult if not impossible to dope by conventional chemical methods.

"Our technology requires only electrode and gate deposition, without the need for high-temperature chemical doping, ion implantation, or other expensive or damaging processes," says lead author William Regan. "The key to our success is the minimal screening of the gate field which is achieved through geometric structuring of the top electrode. This makes it possible for electrical contact to and carrier modulation of the semiconductor to be performed simultaneously."Under the SFPV system, the architecture of the top electrode is structured so that at least one of the electrode's dimensions is confined. In one configuration, working with copper oxide, the Berkeley researchers shaped the electrode contact into narrow fingers; in another configuration, working with silicon, they made the top contact ultra-thin (single layer graphene) across the surface. With sufficiently narrow fingers, the gate field creates a low electrical resistance inversion layer between the fingers and a potential barrier beneath them. A uniformly thin top contact allows gate fields to penetrate and deplete/ invert the underlying semiconductor. The results in both configurations are high quality p-n junctions.

Says co-author Feng Wang, "Our demonstrations show that a stable, electrically contacted p-n junction can be achieved with nearly any semiconductor and any electrode material through the application of a gate field provided that the electrode is appropriately geometrically structured."The researchers also demonstrated the SFPV effect in a self-gating configuration, in which the gate was powered internally by the electrical activity of the cell itself."The self-gating configuration eliminates the need for an external gate power source, which will simplify the practical implementation of SFPV devices," Regan says. "Additionally, the gate can serve a dual role as an antireflection coating, a feature already common and necessary for high efficiency photovoltaics."

## TN GOVT ALLOCATES RS 1,260 CR FOR CONSTRUCTION OF SOLAR-POWERED GREEN HOUSES

The Tamil Nadu government has allocated Rs 1,260 crore for the construction of 60,000 solar-powered green houses under phase three of a programme meant to provide houses to underprivileged people.

According to an official release, chief minister J Jayalalithaa has allocated the sum for the current fiscal year.

The programme launched by the AIADMK government guaranteed a house for an underprivileged person in a 300sqft built-up area. The cost of each house is estimated to be Rs 2.1 lakh. This includes Rs 30,000 for the installation of solar panels.

As many as 60,000 houses were constructed in the first phase of the scheme and the second phase is nearing completion, the release said.

In the first year, the state spent Rs 1.8 lakh for each unit and allocated Rs 1,080 crore. Keeping with the rise in the prices of construction material, the cost was revised this year.

The government plans to complete three lakh houses in its five-year term.

***Happiness can be found in the darkest of times, if one only remembers to turn on the light***

## SEPARATE GRID FOR SOLAR, WIND PROJECTS ON ANVIL

The government would set up a green corridor to generate power from solar and wind capacities that were established at a cost of Rs 50,000 crore, Planning Commission member BK Chaturvedi told Financial Chronicle.

"The green corridor is the answer to the high cost of transmission of solar and wind power… The separate grid is proposed to be set up with the help of Power Grid Corporation," he said. If states buy electricity from the solar and wind power plants, the cost of transmission goes up.

The National Action Plan on Climate Change has recommended that India generate 10 per cent of its power needs from solar, wind, hydropower and other renewable sources by 2015, and an additional 5 per cent by 2020. India has the world's fifth-largest wind power capacity of 17,000 mw. Of this, Tamil Nadu alone has 7,000 mw capacity. The Planning Commission has targeted 10,000 mw of solar power and 15,000 mw of wind power by 2016-17.

India's electricity sector is among the world's most active players in renewable energy and its use, especially wind energy. As of December 2011, the installed capacity was 28,000 mw of renewal technologies-based electricity, more than the total installed electricity capacity in Austria using all technologies.

The green corridor would attempt to synchronise power produced from solar and wind energy with the grid. The present transmission line finds it difficult to evacuate wind and solar power because of fluctuating voltage. Once the region gets connected to the grid by next January, the southern states would get a big relief from power shortages, said Chaturvedi. The northern, western, eastern and northeastern regions are now connected to the grid.

Once the south is linked, Tamil Nadu, Andhra Pradesh and Karnataka would gradually see fewer power outages because it would then be possible to transfer surplus power to that region.

The power situation in the south would improve in the coming months with the first unit of the Kudankulam nuclear power plant already on stream. The unit would add 1,000 mw to the region.

The second 1,000 mw unit is expected to go on stream by the end of the year. Work has begun on the third and fourth unit of similar capacity at Kudankulam.

Chaturvedi said he expected the Jaitapur nuclear power plant in Maharashtra to come up only during the 13th plan. Nuclear energy, he said, would get a big push in 13th and 14th plans.

The 12th plan, he said, would perhaps be the first to achieve its power generation target. "I would not be surprised if we do the 88,000 mw targeted for the plan. We have done 20,000 mw in the first year – a record," he said.

Coal linkaged have already been tied up for 60,000 mw of thermal power to be added during the plan.

Chaturvedi said with solar power now costing just Rs 6.5 per unit without much recurring cost, many states have drawn up plans to step up solar power generation.

"Many people are preparing for their own plants (solar power). Many state units have there own (solar) plants. The thermal (cost of generation) is Rs 3.5-4 per unit because coal is cheap and subsidised. If you depend on imported coal, then the cost (of solar electricity) would be more or less the same as thermal power," he said.

There are already several off-grid initiatives to encourage solar power. Solar lanterns have been a hit. A huge number of them are being distributed by various agencies, including NGOs.

Two other positives have emerged: the creation of adequate power equipment manufacturing capacity and resolution of the problem of tariff. Several states have revised tariffs to reflect the increase of costs; others are in the process of doing so.

"What is not so positive is availability. Domestic coal availability is 65-75 per cent. Thermal plants' in the past needed 85 per cent," he said. This would bring down the plant load factor from 79-80 per cent to 70 per cent.

"It is now the question of transition, of getting used to this sort of situation." He added the additional coal requirement would have to be met through imports or increasing power generation from renewable sources.

## RAASI GROUP PLANS TO SET UP EIGHT SOLAR ENERGY PARKS

Raasi Group plans to set up eight solar parks in Tamil Nadu and Andhra Pradesh in the coming years.

As part of its expansion programme, the Tamil Nadu-based Raasi Clean Earth Energy (P) Ltd proposed to set up a solar energy park here in joint venture with TIDCO, its Chairman C. Narasimhan said.

To start with, foundation stone has been laid in Paramakudi block in Ramanathapuram district last fortnight for a solar park which would generate 100 MW before April, he told PTI here today.

After the Paramakudi park, Raasi will look at Krishnagiri and the northern part of Tiruchi district, where lands have already been identified.

Raasi Group also planned to set up solar energy parks in Tiruvannamalai and Ariyalur districts with 100 MW each and Pudukottai, Dharmapuri, Perambulur and Tiruchi (all 50 MW each). He said the group was also holding discussions with the Andhra Pradesh Government on setting up a 100 MW capacity solar park.

***Courtesy: Press Trust of India, Tiruchi, dt: 01.08.2013***

## ITC TO INVEST RS. 300 CR IN WIND POWER

Diversified conglomerate ITC Ltd plans to invest nearly Rs. 300 crore to add 48 MW wind power generation capacity by early next fiscal. The capacities will be located in Andhra Pradesh. The company currently has a 70 MW wind farm capacity, mostly in Tamil Nadu. According to Pradeep Dhobale, Executive Director, ITC Ltd, about 40 per cent of the energy consumed by ITC comes from renewable sources. "We plan to set up windmills in Andhra Pradesh and add another 48 MW capacity," Dhobale told reporters here on Thursday, on the sidelines of a conference on green building organised by CII. According to a company spokesperson, ITC's info-tech park in Bangalore is completely powered by renewable energy. Five of ITC's hotels — Windsor and Gardenia in Bangalore, Grand Chola in Chennai, Maratha in Mumbai and Rajputana in Jaipur — are mostly run on renewable energy. "We have earned close to half-a-million carbon credits (carbon emission reduction units) since 2006 through renewable energy projects," Dhobale said.

***Courtesy Business Line, Kolkata, dt: 01.08.2013***

# LAUNCH OF MISSION PLAN 2012-2022 FOR ELECTRICAL EQUIPMENT INDUSTRY


Mr. Praful Patel, Hon'ble Union Minister of Heavy Industries & Public Enterprises releasing the Indian Electrical Equipment Industry Mission Plan 2012-2022, for the rapid development of the domestic electrical equipment industry and to enhance its competitiveness.

The Mission Plan seeks to steer, coordinate and synergise the efforts of all stakeholders to accelerate and sustain the growth of the domestic electrical equipment industry.

Vision 2022 for the Indian electrical equipment industry as articulated in the Mission Plan is to make India the country of choice for the production of electrical equipment and reach an output of US$ 100 billion by balancing exports and imports. The Mission Plan has been evolved by the Department of Heavy Industry (DHI), Government of India, through an elaborate exercise involving all stakeholders and with the support of the Indian Electrical & Electronics Manufacturers' Association (IEEMA).

Union Minister for Heavy Industry Shri Praful Patel, while launching the Mission Plan, said, "it is imperative to build our own industry to make it competitive for its global growth, also looking at ways and means to draw in more investment. The size of the sector is growing, and companies can pool their resources for investing in R&D for moving ahead". He said that the Indian electrical industry has been halted in its onward march by a slowdown in the entire power sector. He admitted that policy makers may have adopted a lopsided approach to problems in the past, which was the cause of sluggish progress and the attendant problems in the sector. Imports have grown while exports have lagged; while imports from China were on the rise, while a multiplicity of controls was not helping the cause of industry, either. Huge capacities have been added, which coupled with the overall economic slowdown, has badly affected the electrical industry. This imbalance needs to be corrected, he said, while calling for capacity addition to be made in the optimum measure in order to restore the power sector to health.

Shri Praful Patel said "while India's electrical exports currently stood at a rather modest $5 billion, it is a matter of no small satisfaction that the country's products are now being increasingly accepted and in demand in the global marketplace". He agreed that India is a power-deficient country, a situation compounded by the fact that the country also doesn't produce cost-effective power. The resource allocation for power generation in the Eleventh, Twelfth and future Plans is there, but there is a lot of mismatch, which has to be rectified in order to achieve better growth. Plan allocation should aim at the production of more power; the cost of producing power was on the increase, as a result of which realization suffered, with the utilities being unable to pay the IPPs. He also laid emphasis on directional change, which would be seen more in the areas of nuclear, hydro, solar and wind power, etc. It is regrettable that despite our ample potential in solar power, the country doesn't manufacture a single chip of silicon, preferring to import them from overseas. China, on the other hand produces about 60% of the world's silicon.

Shri Praful Patel said that the Indian electrical industry has come a long way, with both big and small companies having contributed to its growth. He said that while making plans was the easier part, industry and the government needed to work in synergy to translate them into reality. On an important note, the Union Minister stated, "the government's positive intervention was required to give domestic industry the needed boost, specifying that the government would protect its own industry. This is the norm the world over, and we should not shy from according preference to our industry. We have to look at the larger issues". The industry and government together shared a huge responsibility to develop the economy and build the nation. The target of 8 to 9% GDP growth would be attainable if both worked together in that direction. He was confident that new products would continue to be developed and promised all cooperation from the government, citing the capital subsidy provided to microprocessor chips to save on import costs and make industry competitive. He called for industry to develop its own manufacturing base. While the Ministry was only a facilitator, it is the industry that needs to be more proactive, along with a consistent approach on the part of all stakeholders.

Detailed recommendations have been formulated for strategic and policy interventions in five critical areas that need to be addressed by the industry, with support from the government. These are industry competitiveness, technology up gradation, skills development, exports and conversion of latent demand. To carry forward the recommendations arising out of the Mission Plan, Inter-Ministerial Groups, comprising of representatives of the Department of Heavy Industry and other concerned Ministries / Departments, IEEMA, industry and other stakeholders will be constituted for monitoring the implementation of the recommendations and for periodic follow-up of its status.

# GOVERNMENT SET TO SAVE 250 MW POWER THROUGH PROCUREMENT OF ONLY EFFICIENT APPLIANCES

In its endeavour to ensure energy security of the nation, with the initiatives of the Hon'ble Minister of State for Power (Independent Charge) and the Secretary (Power), Bureau of Energy Efficiency (BEE), Ministry of Power has been undertaking several measures to cope up with the ever increasing energy demand of the country. One of such effort is to procure efficient appliances in public sector establishments which is estimated to **save up to 15-20% of its energy use** (heat and electricity). Public procurement of energy efficient appliances would not only ensure adequate energy savings but will also contribute to monetary savings of 1700 million (Rs.170 crore) every year through energy cost reduction and 12500 million (Rs. 1250 crore) expected avoided installation of a 250 MW capacity thermal power plant, which would have been required to feed extra energy required by inefficient appliances.

In the Intitial stage, the appliances which have been considered for public procurement includes Split air conditioners, frost free refrigerator, ceiling fans and water heaters. The cumulative effects of this will not only work to India's national action plan for Climate change but will also catalyze the market transformation for energy efficient appliances.

Government is keen to demonstrate its commitment by leading the initiative through self-adoption of this concept. ***All government departments, ministries, attached and subordinate offices are being directed to ensure that all the procurement of the specified product categories must carry the threshold BEE stat rating indicated against them, or higher***, in an office memorandum no.26/6/12-PPD dated 21st January 2013 issued by Ministry of Finance.

Bureau of Energy Efficiency, which is a statutory body under Ministry of power has worked out life cycle cost analysis of the above mentioned product categories, based on which the threshold ratings have been awarded to understand the cost base economy of the product. The increased incremental investment made on the purchase of the higher star rated efficient appliances is paid back by the money saved in the energy bill during its operation. The threshold star rating of these appliances are as given below:

| Appliance | Threshold star rating |
|---|---|
| Split Air Conditioners | • 5 star (under normal conditions where annual usages are expected to be more than 1000 hrs.)<br>• 3 star (where usage of air conditioning is limited, e.g., in Conference Rooms) |
| Frost Free Refrigerators | • 4 star |
| Ceiling Fans | • 5 star |
| Water Heaters | • 5 star |

With this policy initiative, the government is giving special emphasis on energy efficiency in the public procurement. In future, energy consuming appliances will no longer be guided only on the basis of lower initial cost, which is presently the main trend. Energy efficiency will now also be a major consideration and will play a significant role in procurement policy. BEE star rating labeling programme of equipment / appliances is thus set to lead the market transformation. Benefits from Public procurement of energy efficient appliances in government facilities and operations will not only generate lower energy bills but will also reduce greenhouse gas emissions, demand on electric utility systems, and dependence on imported oil.

*For more information, please contact:*

**The Director General, Bureau of Energy Efficiency, Sewa Bhawan, R.K. Puram, Sector 1, New Delhi.**

# 10 YEARS OF THE ELECTRICITY ACT, 2003 – A CRITICAL REVIEW

A decade ago, a watershed legislation known as the Electricity Act, 2003 came into effect. For India's power sector, which was reeling under below par performance and acute financial crisis since late 1990s, the legislation described the path to a vibrant and competitive future.

Over the past ten years, power sector in India, under the guidance of the Act, made reasonable progresses. These include Regulatory Commissions that were set up in almost all states; the unbundling of erstwhile state power utilities into separate entities for generation, transmission and distribution; tariff restructuring, albeit in a limited way. However, the euphoria was short-lived.

The lack of sustained efforts to reform the power sector primarily at the state level has impaired the sector's overall performance. As a result, the financial crisis in state power sector returned with greater vigor in 2011. While the steps are again been taken to contain the crisis and put checks and balances, we all realise that the actual measure is to continuously reform the power sector on sustained basis.

In this regard, we at FICCI aim to review the past ten years of implementation of the Act and critically evaluate our successes and failures through a national conference "**10 Years of the Electricity Act, 2003 – A Critical Review**" on **August 1–2, 2013 at Federation House, Tansen Marg, New Delhi**. The event will attempt to bring together the experts connected with the design and implementation of the Act for a review of the legislation.

***Courtesy: FICCI***

# MAJOR RELIEF TO THE INDUSTRIAL SECTOR

In a major relief to the industrial sector, Tamil Nadu has withdrawn power cuts for heavy industries until September 30, except during peak hours between 6pm and 10pm.

The state power utility also agreed to consume the entire power generated by windmills run by private producers. This is the first time in over a year that industries in the state will not have to cope with scheduled power cuts. "The existing 40% power cut to HT (high tension) industrial and commercial services may be totally relaxed other than peak hours," Tangedco said on Tuesday.

**Govt move after dip in domestic demand, better production**

Also, during peak hours, while companies were earlier allowed to draw only 10% power, this cap has been increased to 60%. "Relaxation beyond September 30 can be considered separately based on power availability," the order said.

The government's decisions are because of the dip in domestic demand due to weather conditions and improved production in hydro stations, where dams are brimming over. Evacuation of wind power has also increased due to expanded transmission capacity within the state.

"Members are now eligible to use wind energy both in banking and in current generation for consumption at their mills without restriction," said Tasma's chief advisor K Venkatachalam.

Chairman of CII-Southern Region and managing director , Saint-Gobain Glass India , B Santhanam, said smaller industries which were hit hard by power cuts would benefit more than the larger ones. "We are entering a good period now. Though it is not all hunky-dory , it is better than the past," he said.

Textile mills in the region have hailed the state government's move. Both wind power producers and industries that use high tension power will benefit, said Southern India Mills' Association chief S Dinakaran. The decisions would help generate additional employment and improve performance of industrial units, he said. The state would be further relieved of the power crisis if Tangedco is able to firm up power purchase with third parties, he said. "HT consumers will be able to use their capacities to the fullest extent after a long period of five years," said Tamilnadu Electricity Consumers Association D Balasundaram . With the first reactor of the Kudankulam nuclear plant expected to add power to the grid shortly and other augmentation measures in the offing, he exuded confidence that the relaxation for high tension users might be extended even after the end of September 2013.

*Courtesy: Times Of India, dt:14.08.2013*

# POWER CUTS HIT 61 PERCENT INDIAN FIRMS: FICCI

An estimated 61 percent of Indian firms suffer above 10 percent shortfall in production due to power cuts, industry lobby FICCI said here today. The finding emerged from a survey by the Federation of Indian Chambers of Commerce and Industry and Bureau of Research on Industry and Economic Fundamentals (BRIEF), titled "Lack Of Affordable and Quality Power: Shackling India's Growth Story".

The survey, done over the last three months, covered 650 large, medium and small industries in 20 states across the country.

Only three percent of the total sample were government-run units and two percent multinationals.

The study found no segment of industry pan-India safe from the negative impact of power losses and outages.

Overall, 32 percent of industrial units across India face power shortage of over 10 hours a week.

Thirteen percent of firms suffer two-five percent shortfall in production, 12 percent suffer 6-10 percent and only 14 percent, mainly in Gujarat, Karnataka and Maharashtra, suffer less than two percent production losses, assuming that the firms do not rely on power back-up to ensure continuous production, the report said.

Revenue losses owing to power cuts range between less than Rs.1,000 to above Rs.40,000. Even small and medium firms incur losses above Rs.40,000.

The survey reveals that companies in Gujarat incur low losses as power shortages are negligible in the state. Companies in Karnataka are in the IT-enabled services sector, which being less power intensive suffer less production shortfall as compared to electricity intensive sectors like iron and steel and aluminium.

The survey found that Maharashtra, which, like Gujarat, has a mix of both IT and manufacturing companies, does not suffer as acutely by power shortages as some of the other states

Among the survey's recommendations for providing affordable and quality power to industrial consumers are increasing capacity of installed sources, implementing smart grids, operationalising open access for consumers, thus allowing them to choose their distributors.

The FICCI-BRIEF report also recommends stricter laws and penalties for theft and unsanctioned use of electricity.

***Courtesy FICCI Post, dt: 14.01.2013***

# ENERGY STORY

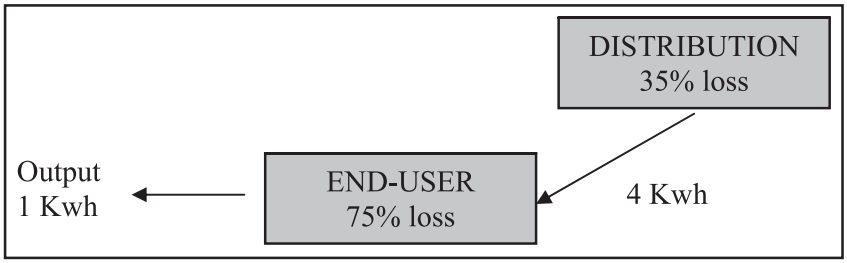
# ENERGY EFFICIENCY – THE FIFTH FUEL - PART 5

**EFFICIENT ELECTRICAL ENERGY UTILIZATION**

We saw in the First part about the losses at different stages of Electricity Generation to end use.

As seen in the earlier parts of the article and as dealt in part4, substantial Transmission and Distribution losses at present open up tremendous scope and challenges to tap the "Fifth Fuel".

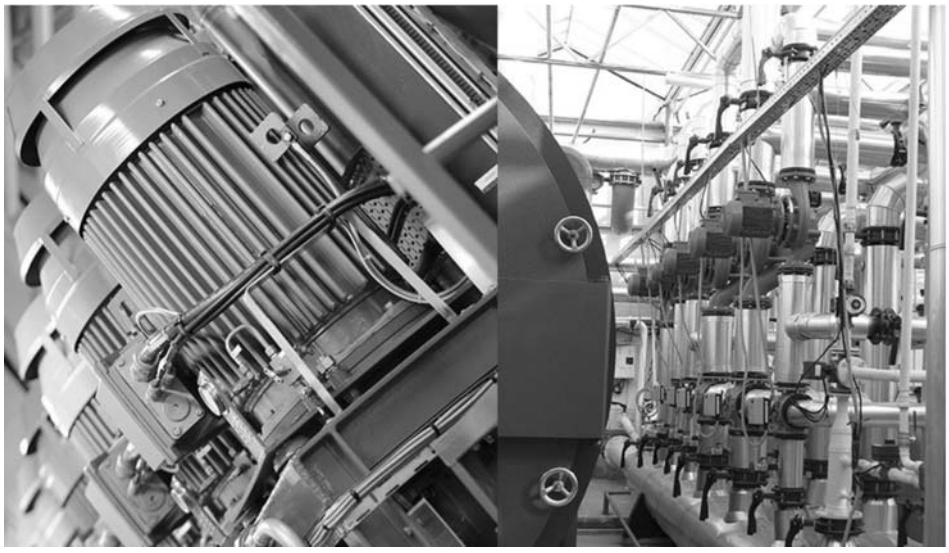
The Illustration below shows the enormous wastages and scope for "Fifth Fuel" on 'End Use' of Electricity, where the losses can be anywhere from 10% and below to a moderate and easily achievable level of 50% or more.




Many may not realize that a very large percentage of Electrical Energy, to the extent of 75% or more is used ***through*** Electric Motors. In fact the main purpose and function of Electricity is to be converted to Mechanical Power for use for Industrial, Commercial, Agricultural or Domestic applications.

It may be appropriate at this point to understand that except for very specialized applications like Furnaces for Special alloys or Heat Treatment furnaces etc, it will be very inefficient use of resources, if Electrical Energy is used for heating purposes.

Let us look at a Simple Example – 1000 Units of Heat is converted to Electricity at an overall Efficiency of, say 35% -Electricity equivalent is 350 Units of Heat.



Transmission and Distribution Losses, say 35%, - Electricity equivalent received at the place of use is 122.5 Units

If the Heating Efficiency is 60%, the actual output is 73.50 Units of Heat Equivalent.

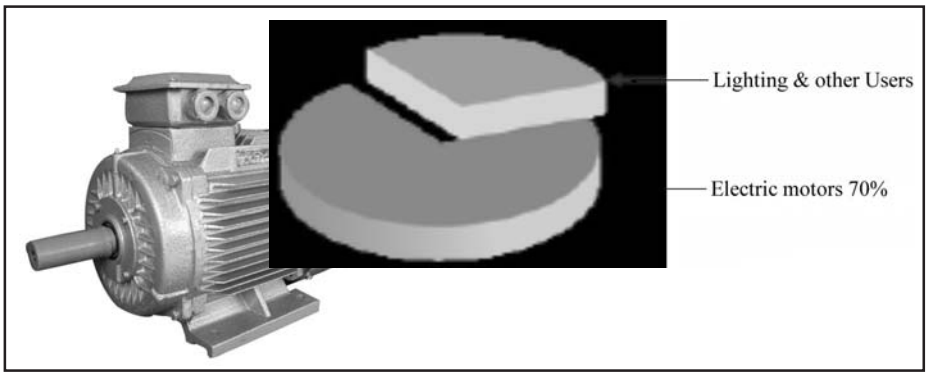
The 1000 Units of Heat, even if burnt with 50% Efficiency, for utilization as heat, the output will be 500 Units.

Alternatively, if the final requirement is only 73.50 Units equivalent of heat, with 50% Efficiency, we need to use heat source of 147 Units only, instead of exhausting 1000 Units. Hence the saving is 853 Units of Heat or saving of 85.3%.

The above example will look very simple, some may even find it silly, but this is the reality.

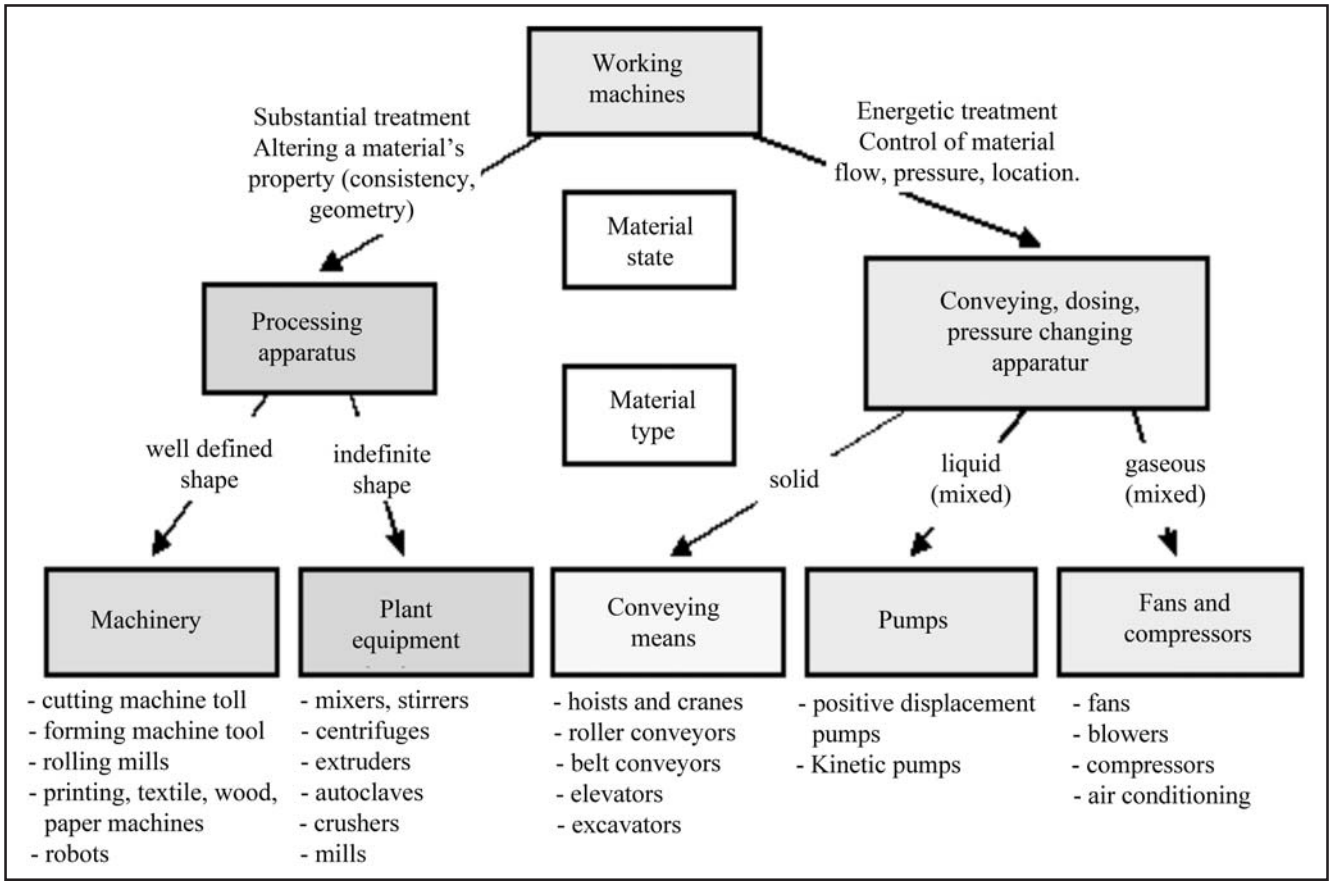
That is why, very rightly, hardly 5% of Electricity is used for heating, which itself is very high.

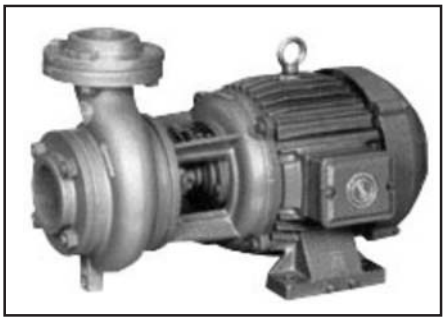
The electric motors consume **the most energy in the industry**

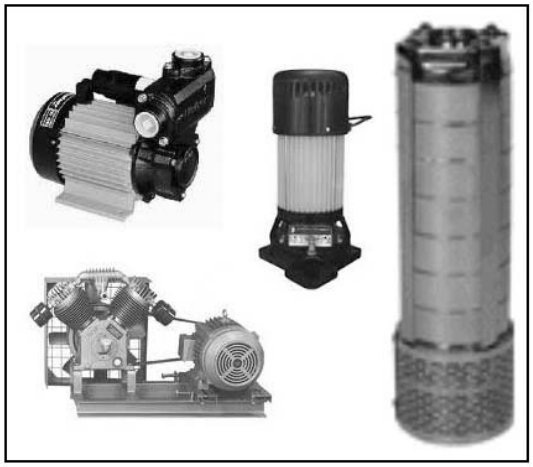



**It looks Right, but NO -** Motors only convert Electrical Energy to Mechanical Energy – EE Motors consume

'Minimum Conversion Losses' – Mechanical Energy use to be made 'Efficient'





The Details and the Breakup below will illustrate the point further:

***Electrical Energy – How used?***

***Sector wise Analysis***

| | | | | | |
|---|---|---|---|---|---|
| **i)** | **Total Consumption** | MOTORS | 76% | | |
| | **Break-up** | LIGHTING | 10% | | |
| | | OTHERS | 14% | | |
| **ii)** | **Sector-wise** | INDUSTRIAL | 46% | (Motors | 36%) |
| | **Break-up** | COMMERCIAL | 19% | (Motors | 11%) |
| | | AGRICULTURE | 22% | (Motors | 21%) |
| | | DOMESTIC | 13% | (Motors | 8%) |
| | | | 100% | | 76% |

Before we get into more details and assess the enormous potential of the "Fifth Fuel" particularly in the areas of Motors and Applications, it may be worthwhile to reflect one fundamental point with regard to Energy used per Unit of GDP generation or Energy Intensity.

Energy Intensity of Japan is taken as 1, India's energy intensity is 3.7 times, 1.55 times USA, 1.47 times Asia and 1.5 times world average.

***(To be continued)***

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

For a successful technology, reality must take precedence over public relations, for Nature cannot be fooled. - RICHARD P. FEYNMAN

# TOWARDS A GREENER HOME

**Making your home energy-efficient can be done without spending too much time or money**

Doing your part to protect the environment once meant separating your waste, opting to take public transportation over your own car or trying to plant trees. But these days, there is a lot more you can do to create a green and healthy home. With soaring energy costs and global warming becoming a big concern across the world, adopting eco-friendly living means conserving natural resources whenever and however we can. It also means making some lifestyle changes to help save the planet. The good news is these changes don't need to cost a lot. Here are a few tips for a greener home–

1. Want Hardwood floors? Opt for bamboo. Bamboo is considered an environmentally friendly flooring material due to its high yield and the relatively fast rate at which it replenishes itself. It takes just four to six years for bamboo to mature, compared to 50-100 years for typical hardwoods. They look great and also provide cooling in hot temperatures.
2. We throw away millions of polyethylene plastic bags each year–from grocery and trash bags to shopping bags. Unfortunately, plastics are made from petroleum–the processing and burning of which is considered one of the main contributors to global warming, according to the EPA. In addition, sending plastics to the landfill also increases greenhouse gases. Reduce, re-use and recycle your plastics as it is one of the best ways to combat global warming.
3. Compact Fluorescent Light Bulbs (CFLs) use 66% less energy than a standard incandescent bulb and lastup to 10 times longer. Replacing a 100-watt incandescent bulb with a 32-watt CFL can save a lot in energy costs over the life of the bulb.
4. According to Environment Protection Agency, many conventional paints contain solvents, toxic metals and volatile organic compounds (VOCs) that can cause smog, ozone pollution and indoor air quality problems with negative health effect. These unhealthy ingredients are released into the air while you're painting, while the paint dries and even after the paints are completely dry. Opt instead for zero-or-low-VOC paint that is both healthy for you and also not harmful to the environment.
5. Be eco-friendly in your garden space as well. Use natural compost, as it provides a full complement of soil organisms and the balance of nutrients needed to maintain without the chemicals of synthetic fertilizers. And healthy soil minimizes weeds and is important to producing healthy plants, which in turn can avert many pest nuisances.

***Courtesy: The Hindu, advertorial and promotional feature, dt: 14.07.2013***

# CANNA PLANT SOLVE YOUR WATER WOES

*Recycling grey water with the roots of plants like Canna can give you a perennial source of water. Hema Vijay tells you how*

In Gandhi Nagar at Adyar, an eight-flat apartment complex revels in the luxury of a perennial ground water source, enabled by a simple plumbing arrangement and a few Canna Lily plants. Here, a PVC pipeline takes grey water (bath water, wash basin water and washing machine run-off water) from the apartment to a narrow Canna plant bed.

As grey water trickles down, it gets purified by the action of the Canna roots and the natural microbes present in the soil, and the treated water enters the ground water table. "This system is absolutely safe and easy. Our bore well has never gone dry, and we have never needed to buy water", says V.S. Sukumar, who built and lives in this apartment block.

Since grey water accounts for 50-60 per cent of a household's average daily water consumption of around 920 litres, this apartment recharges its ground water with roughly 4,000 litres of water every day.

Elsewhere in the city, former DGP V. Vaikunth and President of Home Exnora S. Indrakumar too recycle grey water in their homes. Dr. Indukanth S. Ragade, grey water recycling (GWR) expert and author of *Self-reliance in Water – A Practical Manual for Town and City Dwellers* has installed GWR systems in a few apartments.

At a time when our parched city is looking everywhere for water, these isolated efforts hold out a crucial roadmap.

**Make it mandatory?**

Countries like Japan and Israel have successfully addressed water shortages by recycling used water. In the US, states like Arizona and New Mexico promote GWR with tax credits. Should GWR be made mandatory in Tamil Nadu? "The law which made rainwater harvesting mandatory in October 2002 also says that grey water has to be recovered in situ and used for flushing of toilets. (chennaimetrowater.com). Known as the TN Municipalities Building Rules Act (1972), it was amended to include RWH and grey water reuse," says Dr. Sekhar Raghavan, founder, Rain Centre.

In practice, we have unfortunately ignored GWR.

**Purification process**

"Plants like Canna indica (Kalvazhai), hedychium (sugandhi) and heliconium supply oxygen to the soil in the root zones. Using this oxygen, soil bacteria break down organic compounds in grey water and render the water clean," says Ragade. Grey water consists of very small quantities of exhausted and unexhausted soaps and detergents, and small quantities of organic salts like washing soda. "Bacteria consume the organic components like Linear Alkyl Benzene Sulphonate

(LABS). Detergents also contain inorganic compounds called STPP (Sodium Tri Poly Phosphate). This acts as a nutrient for the plants and is consumed under aerobic conditions," says Raghavan. Adds Ragade, "The treated water may be used to recharge groundwater, or collected in dug wells/sumps and used for flushing toilets; it is safe for these uses." The treated grey water has been tested by the Chennai water and sewerage board (CMWSSB) and found satisfactory.

However, kitchen waste water does not quite work. It contains suspended organic matter that could lead to foul smells; it requires much larger soil spaces (6-8 sq. ft per person). Bath and wash water are safer for recycling.

While organic alternatives are available and preferable, mild cleaning chemicals can still be handled by the natural cleansing action of soil and plant roots. However, do avoid powerful synthetic chemicals and detergents that promise swift action.

**HOW TO DO IT**

- Pick a spot that gets at least moderate sunlight.
- You need 2.5 sq.ft of soil per person
- Plant species like Canna at one-foot intervals and water moderately
- Prune plants once in two months, and remove debris from soil surface
- Keep the pipeline for grey water open at the soil surface
- Incorporate a simple mechanism to direct grey water to the underground drainage pipes (in case there's an overload or when it's too wet to let grey water filter down fast enough)

Meanwhile, a few recycling residents have been inspired to go totally organic. "I use soap nut powder with ash and a little baking soda, which keeps my vessels spotless; vinegar for cleaning ceramic ware; activated effective microorganisms (AEM) as a toilet cleaning agent; soap nut powder as washing powder, and lemon grass oil for floor cleaning," says Kavitha Ramakrishnan.

**CONTACTS**

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- V.S.Sukumar: +919840622611
  www.indiawaterportal.org

***Courtesy: The Hindu, dt: 20.07.2013***

# AKSHAYA PATRA MEAL FIT FOR A HARVARD STUDY

Tucked away on busy West of Chord Road, the Akshaya Patra kitchen on the Iskcon temple campus is a place where hygiene is non-negotiable. Anyone entering the automated kitchen has to wear gloves and caps, which are not reused. Meals are churned out like clockwork in this kitchen, which was set up 13 years ago, ever since the midday meal scheme began in the year 2000.

The Akshaya Patra Foundation feeds 1.3 million children in 19 locations across nine states in India every day, and served up its billionth meal last year. In Karnataka, the kitchens are located in Bangalore, Hubli and Bellary.

Akshaya Patra kitchens are technology-driven, which ensures the entire cooking process is untouched by human hand. These centralized, automated kitchens can cook close to 6,000 kg of rice, 4.5-5 tonne of vegetables and 6,000 litres of sambar, in under six hours.

Akshaya Patra uses customized industrial steam generators and specifically designed vegetable cutting machines. The vehicles that transport cooked food to schools are heat insulated and dust-free special purpose vehicles.

Such are the measures taken to ensure cleanliness in this three-tier kitchen, that rice is tilted out of the silo through a computer controlled flow valve. Once the cooking is done and food dispatched to schools for the day, the vessels are steam washed and ready for the next day.

Little wonder the scheme was a Harvard Business School case study.

**MASTER COOK**

- Roti-making machines can make 60,000 rotis per hour
- High-quality meals at Rs.675 per child per year
- Caters to local dietary preferences and serves a three-item menu meal
- ISO 22000 certification given for 11 Akshaya Patra kitchens

***Courtesy: The Times of India, dt:20.07.2013***

# THROAT CARE TIPS

In case of glandular swelling in the neck, consult your doctor.

We rarely give much thought to our throat unless it begins to hurt, feel dry or wake up one day with no sound coming out of it. When this happens, then we think about our throat all the time. Especially when we feel pain every time we swallow. Then we run around looking for something to take to help it return to normal. During flu and cold season, most of us are getting better at preparing to head off as many germs as possible. We build up our immune system, get a flu shot, wash our hands more often and learn to direct our cough and sneezes into our bended arm. You can't be part of the human race and not come in contact with all sorts of germs and people who are sick. Practicing good health habits is the best way to avoid getting sick.

- Avoid the use of irritants to the throat such as smoking, chewing tobacco/ paan, etc.
- Avoid putting coins, marbles, pins, etc. in the mouth.
- Do not shout, scream etc. this causes hoarseness. In case of hoarseness, rest the throat without misuse fill hoarseness passes.
- If hoarseness persists for more then 7 days, consult your doctor.
- Avoid taking excessively cold/hot spicy foods.
- Avoid talking when food/water is in the mouth.
- Eat food calmly-avoid hurry.

**6 ways for keeping your throat healthy**

Your throat is a finely tuned structure of tissues, nerves, glands and blood vessels and needs looking after. If you overuse some of the delicate organs and tissues of the throat, you end up with problems and the effects can be damaging. Learning how to take care of your throat is easy and in most cases the benefits are well worth the effort. Here are 6 of my favorite ways for keeping your throat healthy.

**1. Protect your throat from the cold temperatures:- Get in the habit of wearing a scarf around your neck** to keep the throat area warm. Do you know that the neck is one of the most overlooked sources of heat loss? Anywhere from 40 to 50 percent of our body heat can be lost from the surface of the head and neck. Changes in extreme temperature such as going from a heated car into the cold outside and vice versa should be avoided when possible.

**2. Avoid sharing eatings utensils:- Do not drink from the same glass, cup or bottle that someone else is using**, as you may be at risk of cross contamination. The same is true for sharing eating utensils and even napkins.

**3. Clean the toothbrush:- One source of infection that is over looked by most people is the toothbrush**. Left over night, it can be a potential source of problem for the throat and mouth. Every morning, before brushing the teeth, soak your toothbrush in a glass of hot water to which a teaspoonful of common salt has been added. This helps to disinfect the toothbrush and also helps keep it clean.

**4. Gargle with salt:- Gargle every night with a mixture of warm water and salt.** Just a pinch of salt will do. During cold and flu season this is a habit that will help to disinfect the mouth and throat. Your grandmother knew the benefits of making this a habit. And if you catch a sore throat early enough, salt water will give you fast relief. Salt water can also be used to clear a stuffy nose. Just "snuff" the above mixture into each nostril. You'll instantly begin breathing better through the nose.

**5. Use honey and ginger for protection:-** One of the very best ways to protect the throat is with ginger juice and honey. After a good brushing in the morning, squeeze a little fresh ginger juice (3-4 ml) with 5 ml of honey and see for yourself what a good insurance policy this is for protecting your throat all day. I make my own ginger juice by boiling 2 or 3 slices of real ginger (found in the vegetable section), then cooling it a little. I have also used turmeric. Simply take 1/2 cup of hot water and add a pinch of salt and 5 gms of turmeric powder to it. Drink this every night during cold and flu season to protect your throat. Another tip for relieving sore throat pain, is to gargle with warm water and cayenne pepper.

**6. For professionals, including teachers:-** Daily vocal warm ups are a must for singers, speakers, doctors, actors and the like. But not just any warm ups will do. In fact some warm ups can do more damage to the throat than not engaging in any warm ups. Slow, gentle humming on comfortable tones are excellent warm ups. Feel for vibrations across the mask area. To keep the lips loose and relaxed, include the buzzing sound (the way you would buzz the lips on a babys belly to make the baby giggle).

Sigh lightly on a soft ahhhh, feeling completely relaxed. Even yawning is an excellent warm up for the voice.

***Courtesy: http://www.texasvoicecenter.com/advice.html***

# FROM 50 PAISE, SHE NOW EARNS Rs.200,000 A DAY

She started her career 31 years ago as an entrepreneur, selling eateries from a mobile cart on the Marine Drive beach a midst all odds — battling a failed marriage, coping with her husband, a multiple addict, and taking care of two kids.

Today, she has overcome the hurdles and owns a chain of restaurants.

She married against the will of her parents. Unfortunately, the marriage failed but her parents never forgave her and she was on her own along with 2 children.

" I knew I should either succumb to the burden or fight; I decided to fight my lonely battle." she said.

She started selling pickles, squashes and jams she made at home.

Eventually she started her own cart on Marine Drive, Mumbai. On the first she just sold one cup of coffee, making 50 paise the first day. But she never lost hope and earned as high as Rs.25,000 a day.

One day the Slum Clearance Board gave her an offer to run the canteen at their office with a proper kitchen. The chairman met her during her morning walk. It was a huge success. Thereafter, she never looked back.

She suffered the second shock of her life in 2004 when she lost her daughter and son-in-law in a road accident. The ambulance refused to carry their dead bodies. Finally, somebody carried all the dead bodies in the boot of a car. She couldn't bear the scene and broke down. That is when she decided to keep an ambulance on that very spot to help people whether the victims are alive or dead. It is in memory of her daughter.

Today Patricia along with her son runs the chain of restaurant 'Sandeepha' in her daughter's memory and around 200 people work under her.

She was awarded 'Ficci entrepreneur of the year' in 2010.

# WHAT IS THE DIFFERENCE?

**Between LAPTOP and NOTEBOOK**

**THE NOTEBOOK COMPUTER**

A notebook computer is designed to provide mobile computing that won't break your back yet still offer all the power the mobile users requires for work and some leisure pursuits. This portability normally comes at a price. The level of minituarization involved comes at a cost and high end notebooks can prove to be quite expensive. A standard notebook has the following features:

1. Ultralight. Less weight is better.
2. 4 - 5 hour battery life.
3. No internal floppy drive.
4. Minimal graphics subsystem.
5. No internal DVD or CD system.
6. 12" - 14" TFT screen.
7. Low profile (thin).
8. Integrated modem and network connection.
9. Smallest possible keyboard that retains functionality.
10. Low power consumption Celeron/Centrino or Sempron style processor.

**THE LAPTOP COMPUTER**

Now for the laptop computer. Again look at the name. A laptop is designed to sit on your lap and you can therefore expect it to be quite large and loaded down with features and power. The standard laptop computer would have some ,if not all, of the following features:

1. 14" - 17" (widescreen) TFT screen.
2. Nvidia GeForce or ATI Radeon graphics subsystem.
3. Internal DVD-ROM or DVD-RW drive
4. Large full featured keyboard.
5. 3 hour+ battery life.
6. Upgradeable.
7. Integrated modem, network, Bluetooth and Wi-Fi capabilities.
8. High quality integrate audio and speaker system.
9. Low power consumption, high performance Intel Centrino style processor.

From reading the above information you'll see that the notebook is the exact opposite of the laptop. Notebooks offer reasonable power and extreme portability. Laptops are designed to be capable of replacing an entire desktop PC if necessary whilst still offering desktop performance in a mobile platform.

# QUALIFICATION OF BEING A MOTHER

*A Long Time ago, the Officer At The Driving License Counter had asked me :*

*"What is Your Occupation?"*

*I was a bit Puzzled.*

*So The Officer Said "Ma'am, Are You Employed,*

*Have you Your Own Business or.....*

*Gree I enthusistically replied: "Oh, Yes!! I Have A Full Time Occupation. I Am A Mother "*

*Officer: "We Don't Have 'Mother' As An Option For Occupation. I Will Write it Down As 'Housewife'. That Takes Care Of All Questions."*

*AND I WAS BLESSED WITH A LICENCE !!*

*This Had Happened Long Ago,and Was almost Forgotten.*

*Years Later, When I Went To Get my License RENEWED, The Public Relations Officer Was A Somewhat Pompous and Curt Woman.*

*" Your Occupation?"*

*She asked in a rather Authoritative Tone.*

*I was tempted to mention the word "House-wife", and in fact, almost did, But I just had an impromptu Inspiration and replied:*

*"I AM A RESEARCHER AND A PRACTICENAR IN THE FIELD OF CHILD DEVELOPMENT, NUTRITION, INTER-PERSONAL RELATIONSHIPS AND ADULT SENIOR CITIZEN MANAGEMENT."*

*THE LADY OFFICER STARED AT ME IN AMAZEMENT.*

*I Calmly Repeated My Statement And She Wrote it Down Verbatim.*

*Then, Unable To Conceal Her Curiosity,*

*She Politely Asked "What Exactly Do You Do in Your Profession, Ma'am?"*

*I Was Feeling Good About Having Described My Occupation So Calmly And Confidently. So I Replied "My Research Projects Have Been Going On For A Number Of Years (Mothers Never Retire!!). My Research is Conducted in The Laboratory As Well As in The Field. I Have Two Bosses. (One is God and the other is my entire family). I Have Received Two Honors in This Field. (A son and a daughter) My Topic is Considered To Be The Most Difficult Part Of Sociology. (All Moms will Agree!!). I Have To Work More Than 14 Hours Every Day. Sometimes Even 24 Hours Are Not Enough And The Challenges Are Tougher Than Many Other Professions. My Compensation is in Terms Of Mental Satisfaction Rather Than Money"*

*I Could See That The Officer Was Thoroughly impressed. After Completing The License Renewal Formalities, She even came to the Door to see Me off!!*

*This New Viewpoint About My Occupation Made Me Feel Much Better On My Way Back Home.*

*I Was Welcomed By My 5 Year Old Research Assistant At The Door.*

*My New Project (My 6 Month old Baby) Was Energetically Practicing Her 'Music'. I Had Earned A Small Victory Over The Governmental Red Tape Today. I Was No Longer 'Merely A Mother', instead I Was Now A Highly Placed Functionary in A Service Vital For Mankind -Motherhood!!*

*'MOTHER' - Isn't it A Great Title. Fit To Be Added To The Nameplate On The Door!!*

*By This Standard, Grandmothers Deserve To Be Called Senior Research Officers, And Great Grandmothers Qualify As ' Research Directors '.*

*Aunts And Other Ladies Of That Age Group Can Be Called ' Research Facilitators'*

***My mother's love for me was so great I have worked hard to justify it. - MARC CHAGALL***


# CHEMPAKARAMAN PILLAI (1891-1934)


**Chempakaraman Pillai**, also **Cemapakaraman Pilla** (September 15, 1891 – May 26, 1934) was an Indian revolutionary during the Anti-British Movements in India, who went abroad to organise an army to declare war against the British for the self-rule in Indian subcontinent.

**Early life**

Chempakaraman Pillai was born of Tamil descent in Thiruvananthapuram (Trivandrum), capital of the erstwhile "native" State of Travancore in southernmost India. His father, Chinnaswami Pillai, who was a police head constable in Travancore State Government Service, and mother, Nagammal, lived in Thiruvananthapuram. Chempakaraman had his primary and high school education in the Model School, Thycaud, Thiruvananthapuram city. As a school boy he happened to meet Sir Walter Strickland, a British biologist, who visited Thiruvananthapuram in search of botanical specimens; Chempakaraman and another boy, a cousin of Chempakaraman by the name of Padmanabha Pillai, became close friends of Strickland, who on his return voyage, took the two boys with him. But Padmanabha Pillai ran away at Colombo and came back to Thiruvananthapuram. Chempakaraman, then fifteen years old, continued the journey with Strickland and landed in Europe. Strickland got him admitted to a school in Austria from where he completed his high school education.

**In Europe**

Pillai later joined a Technical Institute and took a Diploma in Engineering. On the outbreak of the First World War, Pillai formed the International Pro-India Committee with Zurich as its headquarters in September 1914 and himself as its President. Around this time the Indian Independence Committee was formed in Berlin by a group of Indian expatriates in Germany with Virendranath Chattopadhyaya, eldest brother of Sarojini Naidu, Indian National Congress leader under Mahatma Gandhi and a well-known poet in English,as its President and including Bhupendranath Dutta (brother of Swami Vivekananda, Punnackal A. Raman Pillai. a student in the University Göttingen, Taraknath Das, Barkatullah, Chandrakant Chakravarty, M. Prabhakar, Birendra Sarkar, and Herambalal Gupta. Chempakaraman Pillai moved to Berlin in October 1914 and joined the Committee. The International Pro-India Committee formed by Chempakaraman Pillai in Zurich was merged in the Berlin Committee, which continued as the guiding and controlling institution for all the Pro-Indian revolutionary activities in Europe.Lala Har Dayal was also persuaded to join the movement. Soon the Committee's branches sprang up in Amsterdam, Stockholm, Washington, and in many other parts of Europe and America.

**War activities**

**He was the first to raise "Jai Hind" slogan; later joined with INC chief Subash Chandra Bose.**

Main articles: Berlin Committee and Hindu-German Conspiracy

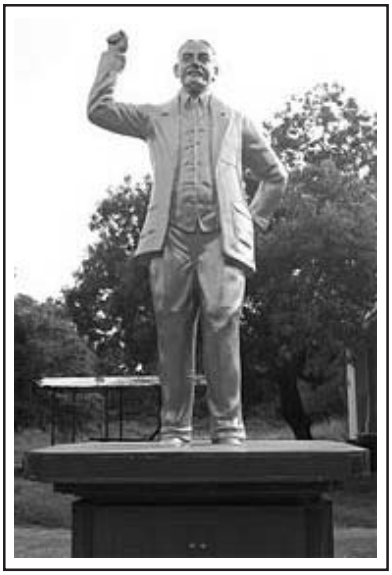
The Indian Independence Committee ultimately became involved in the so-called Hindu-German Conspiracy along with the Ghadar Party in the United States of America. The German Foreign Office under Kaiser paid for the anti-British activities of the Committee. Chempakaraman Pillai and A. Raman Pillai, both belonging to Travancore, and both students in German Universities used to carry on correspondence with each other on the Committee's activities. Quite a few of Chempakaraman's letters to A. Raman Pillai. then a student in the University of Goettingen, are in the safe custody of Raman Pillai's son, Rosscote Krishna Pillai, an author, science writer, media person and social activist in Thiruvananthapuram. The letters reveal some aspects of Chempakaraman's life in Germany during 1914-1920. In July 1914, Chempakaraman Pillai from Berlin called upon Indian soldiers in the British Indian Army to rise in revolt and fight against the British. After the end of World war and Germany's defeat, Chempakaraman stayed back in Germany; he was working as a technician in a factory in Berlin; when Netaji Subhas Chandra Bose visited Vienna, Chempakaraman met him and explained his plan of action to him.

Pillai had the privilege of being the Foreign Minister of the Provisional Government of India set up in Afghanistan in December 1915, with Raja Mahendra Pratap of Kabul as President. Maulana Barkatulla as Prime Minister. However, the defeat of the Germans in the war shattered the hopes of the revolutionaries. The Germans were all along helping the Indian revolutionaries with a selfish motive. Though the Indian patriots made it clear to the Germans that they were equal partners in their fight against the common enemy – British imperialism – and what was expected of them

was help by way of funds, arms, and ammunition, to the revolutionaries who were abroad and at home fighting the British, the Germans wanted to exploit the revolutionaries for their propaganda work and gathering military intelligence. When they started losing the battle, the Germans lost their interest in the revolutionaries and even started looking upon many with suspicion. This strained the relationship between the Indian revolutionaries and the Germans. Pillai raised his voice against the view of Adolf Hitler that Indians were still incapable of ruling themselves, and he even forced Hitler to apologise in writing. But he fell a victim to the wrath of the Nazis. In 1931 Pillai had married Lakshmibai of Manipur, whom he had met in Berlin. It is reported that the Nazis under orders from Hitler killed Chempakaraman by food poisoning on May 26, 1934

**His last wish**

Pillai's last wish was that his ashes be carried to his homeland, and his wife fulfilled this thirty-three years after his death. She underwent indescribable sufferings and hardships during this period, and the Nazis made her life miserable. However, to fulfill her mission of preserving his ashes, his diary, and secret documents, she faced all hardships and lived in Berlin, Italy, and Spain and later reached Mumbai. The Indian Navy's warship, I.N.S. Delhi, flying the flag of Free India, brought Pillai's ashes to Cochin on September 16, 1966.

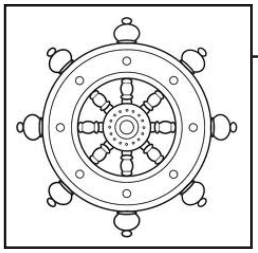


# HOME FESTIVALS

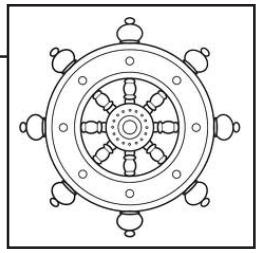
**Purattasi (September/October)**

Navaratri ("nine nights") is the principal festival this month (above left). The Goddess is worshipped in Her many forms, and on the ninth day, Sarasvati (center of the painting) is invoked to bless musical instruments, account books, agricultural instruments and home tools(upper left). On Vijaya Dasami, the day following Navratri, Goddess Durga is invoked as children are given their first instruction, worship their school books and honor their teacher (bottom left). A decorated display of dolls (lower right) is displayed through the nine days, then dismantled and stored on the tenth day. Vijaya Dasami is also the birthday of Lord Venkateshwara (upper right), presiding Deity of Tirupati temple in Andhra Pradesh, India's wealthiest temple.

*(To be continued)*



# DHARMA-4



**Fundamentals of Dharma**

The Vishnu Samhita enumerates forgiveness, truthfulness, control of the mind, purity, practice of charity, control of the senses, non-violence, service of the Guru, visiting places of pilgrimage, compassion, simplicity, absence of greed, worship of the gods and the Brahmanas, and absence of malice as the ingredients of Samanya Dharma, the general law for all men.

The Mahabharata enumerates as the fundamentals of Dharma: 1.The performance of Sraddha or offering oblations to the forefathers, 2.Religious austerity, 3.Truth, 4.Restraint of anger, 5.Satisfaction with one's wife, 6.Purity, 7.Learning, 8.Absence of envy, 9.Knowledge of the Self and 10.Forbearance

It is said in Padma Purana that Dharma proceeds from continence, truthfulness, austerity, charity, self-control, forbearance, purity, non-violence, serenity and non-thieving and that one should recognise Dharma by these ten factors. According to this Purana, bestowing gifts on deserving persons, fixing one's thoughts on Lord Krishna, adoration of one's parents, offering a portion of the daily meal to all creatures and giving a morsel of food to a cow are the characteristics of Dharma.

According to Matsya Purana, freedom from malice, absence of covetousness, control of the senses, austerity, celibacy, compassion, truthfulness, forbearance and fortitude constitute the fundamentals of Sanatana Dharma. Patanjali Maharshi, the exponent of Raja Yoga philosophy, recommends that ten virtues should be practised by all men. The first five are: Ahimsa (non-violence), Satya (truthfulness), Brahmacharya (celibacy in thought, word and deed), Asteya (non-stealing) and Aparigraha (non-covetousness). These constitute Yama or self-restraint. The other five virtues are: Saucha (internal and external purity), Santosha (contentment), Tapas (austerity), Svadhyaya (study of scriptures or recitation of Mantra) and Isvarpranidhana (consecration of the fruits of all works to the Lord). These constitute Niyama or religious observance.

The Gita enumerates the following virtues as Daivi-Sampat or divine qualities: fearlessness, purity of heart, steadfastness in the Yoga of Wisdom, alms-giving, self-restraint, sacrifice, study of the scriptures, austerity, straightforwardness, harmlessness, truth, absence of wrath, renunciation, peacefulness, absence of crookedness, compassion to living beings, non-covetousness, mildness, modesty, absence of fickleness, vigour, forgiveness, purity and absence of envy and pride. All these virtues are manifestations of the four fundamental virtues: **1. Non-violence, 2. Truth, 3.Purity, 4.Self-control**

All the above virtues come under the above four cardinal virtues. The virtues that are enumerated under the Noble Eightfold Path of Buddhism and the virtues prescribed by Lord Jesus in his Sermon on the Mount, also come under the above fundamental virtues.

The development of the divine qualities is indispensable for the attainment of Self-realisation. Brahman or the Eternal is purity. The Eternal cannot be attained without the attainment of purity. Brahman is Truth. The Eternal cannot be attained without practising truth. Brahman is fearlessness. The Eternal cannot be attained unless you become absolutely fearless. Attachment to the body causes fear and Dehadhyasa. If only you become fearless, then the identification with the body will vanish.You have rendered the heart harder than flint, steel or diamond through greed, miserliness, harshness and rudeness. You can soften it only through the practice of mercy, sympathy, charity, generosity, magnanimity, harmlessness, mildness, disinterested action and untiring service of the poor. You have made the heart crooked and narrow through hypocrisy, untruthfulness, backbiting and tale-bearing. You can expand it through the practice of straightforwardness, truthfulness, purity of heart, alms-giving and non-covetousness. You have rendered the heart impure through lust. You can purify it through the practice of celibacy in thought, word and deed.

**Non-violence**

Ahimsa or non-violence is the most important virtue. That is the reason why Patanjali Maharshi has placed it first in Yama. Practice of Ahimsa must be in thought, word and deed. Practice of Ahimsa is not impotence or cowardice or weakness. It is the highest type of heroism. The practice demands immense patience, forbearance and endurance, infinite inner spiritual strength and gigantic will-power.

Ahimsa is a modification or expression of truth only. Satyam (truth) and Ahimsa always go together. He who is established in Ahimsa can move the whole world. In his presence, all hostilities vanish; lion and cow, cobra and mongoose, live together peacefully.

*[**Note:** In support of this statement of Swami Shivananda, we cite the example from the life of Sri Ramana Maharshi as observed by the Scottish scientist Alick McInnes. The following extract is taken from the book "The Secret Life of Plants" by Peter Tompkins and Christopher Bird. Chapter titled 'Dowsing Plants for Health'. The book was first published in 1973. :*

*"In South India, Alick McInnes, a Scottish scientist, witnessed the strange spectacle of Sri Ramana Maharshi on his evening walk. Within seconds of*

*his leaving his house, cattle tied up in stalls in the village half a mile away would struggle to get out of their ties. When released they careered along the road to accompany the old man on his walk, followed by all the dogs and children of the village. Before the procession had gone very far wild animals and even snakes joined it from the jungle. Thousands of birds appeared, almost blotting out the sky. There were tiny tits, huge kites, heavy-winged vultures and other birds of prey, all flying in harmony around the Maharshi on his walk. When he returned to his room, said McInnes, all the birds, animals and children would quietly disappear."*

*-From the book "The Secret Life of Plants" by Peter Tompkins and Christopher Bird.]*

We continue below with Swami Shivananda's explanations on the topic of 'Non-violence' :

Hinduism, Buddhism and Jainism lay great stress on Ahimsa. Lord Jesus also has emphasised much on Ahimsa in his Sermon on the Mount. He says: "If any one beats you on one cheek, show him the other cheek also". He who is firmly established in Ahimsa can hope to attain Self-realisation. He who practises Ahimsa develops cosmic love to a maximum degree. Practice of Ahimsa eventually leads to realisation of oneness or unity of Self. Such a man only can attain self-restraint. Retaliation – tooth for tooth, blow for blow – is the maxim, doctrine or principle of an Asura or a man of diabolic nature. This belongs to the beastly nature. To return good for evil is divine. Constant vigilance and alertness are needed in the practice of Ahimsa. If you are careless even a little bit, you will be carried away by the force of previous wrong Samskara (impression or tendency) and impulses and will become a victim of Himsa (violence), despite your good intentions.

**Truth**

Brahman (the Supreme Reality) is Sat or Existence-Absolute. Truth must be observed in thought, word and deed. If you are established in truth, all other virtues will cling to you by themselves. Harishchandra sacrificed everything for the sake of truth. He lives still in our hearts. Yudhishthira was also devoted to truth. There is no virtue higher than truth. Practice of truth and Ahimsa constitute the crown and glory of ethical life. In the Taittiriya Upanishad, the preceptor says in his convocation address to the students: "Satyam vada"- Speak the truth. The world is rooted in truth. Dharma is rooted in truth. All religions are rooted in truth. Honesty, justice, straightforwardness and sincerity are only modifications or expressions of truth.

**Purity**

Purity comprises both external purity and internal purity. Purity implies both purity of body and purity of mind.

Purity of body is only the preliminary to purity of mind.

The body is the temple of God. It should be kept clean by daily bathing and clean dress. Cleanliness is a part of godliness. The restriction in diet is best calculated to make the mind pure. Food exercises a direct influence on the mind. Sattvic food makes the mind pure. Purity of food leads to purity of mind. Mind is only made up of the fine essence of food. As the food is, so is the mind.

You must be pure in thought, word and deed. Your heart must be as pure as crystal; as pure as the Himalayan snow. Then only the divine light will descend. Purity comprises such virtues as frankness, innocence, straightforwardness and absence of all evil thoughts. He who is endowed with purity will find it easy to tread the spiritual path.

**Self-control**

You must have perfect self-control or self-mastery. Self-control implies both control of the body and control of the mind. Self-control does not mean self-torture. You must lead a well-regulated and disciplined life. You must keep all the senses under your perfect control. The senses are like turbulent and wild horses. This body is like a chariot. Mind is the reins. Intellect is the driver. The Atman is the Lord of the chariot. If the senses are not kept under proper control, they will throw this chariot into a deep abyss. You will come to ruin. He who keeps the reins firm and drives this chariot intelligently by controlling the horses (senses), will reach the destination (Moksha or the abode of Eternal Bliss) safely.

Self-control implies self-sacrifice, annihilation of egoism, patience, endurance, forbearance and humility. Overcome Raga or attachment by Vairagya or dispassion. Dispassion will dawn in your mind if you look into the defects of sensual life such as birth, death, disease, old age, pain, sorrow, etc. (Mithya-Drishti and Dosha-Drishti). Overcome anger and hatred by Kshama or forgiveness, love and selfless service. Overcome evil by good. Return good for evil. Overcome lust by the practice of Brahmacharya and regular Japa (repetition of Mantra or Lord's name) and meditation. Conquer greed by charity, generosity and disinterested actions. Conquer pride by humility and delusion by discrimination and enquiry. Overcome jealousy by magnanimity, Atma-Bhava and nobility. Conquer egoism by self-sacrifice, self-surrender, self-abnegation and meditation on the non-dual, eternal, self-luminous Brahman, thy innermost Self, the Inner Ruler, the immortal.

May you all attain eternal bliss and immortality through the practice of the cardinal virtues or the fundamental Dharma.

***(To be continued)***

***Dharma is an ancient word for truth***

# HUMOUR

Some interesting "One Liners "

Having one child makes you a parent; having two you are a referee.

I believe we should all pay our tax with a smile. I tried - but they wanted cash.

Don't feel bad. A lot of people have no talent.

Don't marry the person you want to live with, marry the one you cannot live without, but whatever you do, you'll regret it later.

You can't buy love, but you pay heavily for it.

Bad officials are elected by good citizens who do not vote.

Laziness is nothing more than the habit of resting before you get tired.

Marriage is give and take. You'd better give it to her or she'll take it anyway.

My wife and I always compromise. I admit I'm wrong and she agrees with me.

Those who can't laugh at themselves leave the job to others.

A successful marriage requires falling in love many times, always with the same person.

You're getting old when you enjoy remembering things more than doing them.

Real friends are the ones who survive transitions between address books.

Saving is the best thing. Especially when your parents have done it for you.

They call our language the mother tongue because the father seldom gets to speak!

Man: Is there any way to have a long life?

Dr: Get married.

Man: Will it help?

Dr: No, but then the thought of long life will never come.

Why do couples hold hands during their wedding? It's a formality just like two boxers shaking hands before the fight begins!

Its funny when people discuss, *Love Marriage vs. Arranged Marriage*. It's like asking someone, if suicide is better or being murdered.

***Sweet Jokes – Very much true***

***Cicero's philosophy***

Rome's Cicero's (106 - 43 BC) "the legendary silver tongued orator" philosophy is still valid even today, for any country of our globe:

1. The poor: work and work,
2. The rich: exploit the poor,
3. The soldier: protects both,
4. The taxpayer: pays for all three,
5. The wanderer: rests for all four,
6. The drunk: drinks for all five,
7. The banker: robs all six,
8. The lawyer: misleads all seven,
9. The doctor: kills all eight,
10. The undertaker: buries all nine,
11. The Politician: lives happily on the account of all ten.

***Not far from the truth even today!!***

Do you know what is the real expansion for "P.T.O."?

**P**lease **T**hink-for **O**riginal !

You got it ?.... Yes....It is....

"PAKKATAI TIRUPPA OYI " (Tamil) .,

"PUTANU TIPPA OYEE " (Telugu)

***By M. Sri Rama Prasad***

# TIRUKKURAL AND MANAGEMENT IN A 'NUTSHELL' - 4

Communication plays a very important role in Management, it is brief, effective and simple communication, communication that can be understood clearly and easily. Another important dimension of 'Communication' and Management is the ability to understand the communication and the implied meaning and objective of the communication, so that meaningful decisions can be taken and satisfactory progress can be made. The core concept of Marketing Management today is 'Communication' with your customers through all modes and media.

Tiruvalluvar in one Kural conveys the whole weight of communication in all its dimensions and purposes.

He brings out in the following Kural that –

Communication made should be:

- Full of substance
- Simple to understand

Communication received should be:

- Understood clearly
- Understood for the implied meaning and objectives

***EnnPorul Aagachchelachcholli ThanPirarvai***
***NunPorul Kanpathu Arivu Kural 424***

**எண்பொருள் ஆகச்செலச்சொல்லித் தான்பிறர்வாய்**
**நுண்பொருள் காண்பது அறிவு. குறள் *424***

**"**Speaking out thoughts in clear trends
Wisdom subtle sense comprehends."

# TAMILNADU ELECTRICAL INSTALLATION ENGINEERS ASSOCIATION 'A' GRADE

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***Every evening, the Eiffel Tower is adorned with its golden covering and sparkles for 5 minutes every hour while its beacon shines over Paris.***

# *The Golden Lighting Dates From 1985*

***Unveiled on the 31st December 1985, invented by Pierre Bideau**, a lighting engineer. It consists of 336 Light projectors equipped with high-pressure, yellow-orange sodium lamps.*

*The projectors are turned on in under 10 minutes. This is activated upon nightfall by the sensors.*

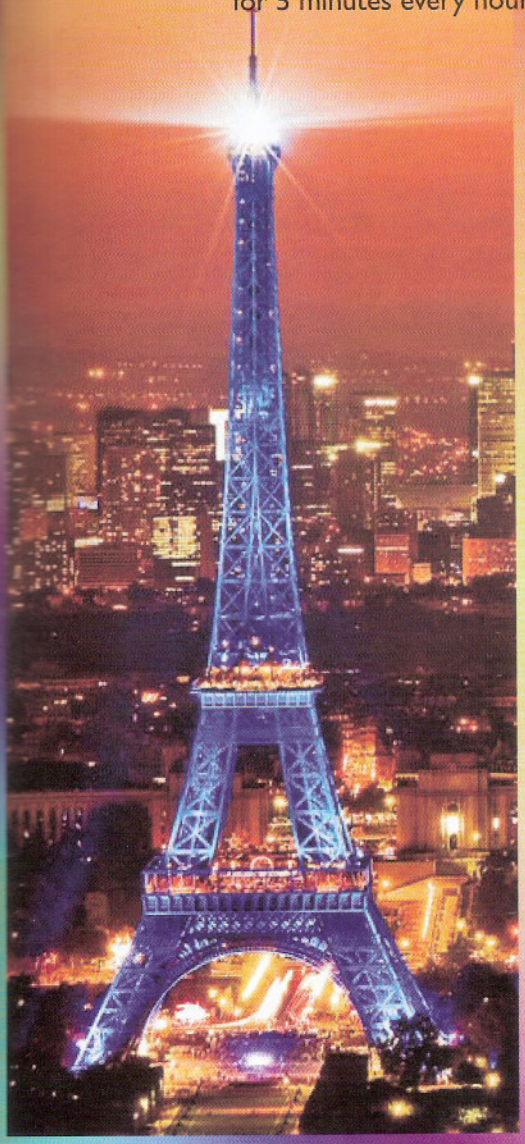
*In 2004, they were replaced by projectors with an electrical power of 600 watts as opposed to the previous 1KW, i.e. an energy consumption saving of around 40%. Inspite of consuming lesser energy, due to energy efficient lighting the brightness went up by 50%*

***The beacon**, sending out two light beams with a reach of 80 kilometers, is composed of 4 motorised projectors. They are operated through computer programming. Since their rotation sweep is 90°, they are synchronized to form a double beam in a cross that pivots around 360°. The Xenon 6000 watt lamps are chosen for their longevity. These lamps are cooled to prevent overheating and a heating system is activated when the temperatures drop below zero Centigrade whilst the lights are off.*

***Installing the lights is about as impressive as the lighting itself :***

- *25 mountain climbers for the 5 month installation ;*
- *20,000 special light bulbs (5,000 per side) attached one at a time ;*
- *40 kilometers of strings of light and electrical cords ;*
- *40,000 joints and 80,000 various metallic parts weighing 60 tons ;*
- *230 enclosed lighting fixtures and electrical boxes ;*
- *10,000 m² of safety nets ;*
- *120 kilowatts of power ;*
- *Budget total: 4.55 million Euros*

Every evening, the Eiffel Tower is adorned with its golden covering and sparkles for 5 minutes every hour on the hour, while its beacon shines over Paris



# 13 Glorious Years of Earthing

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