ELECTRICAL INSTALLATION ENGINEER

NEWS LETTER

TAMILNADU ELECTRICAL INSTALLATION ENGINEERS' ASSOCIATION 'A' GRADE (Regn. No. 211/1992)
Old No.82 / New No. 123, Lloyds Enclave, Avvai Shanmugam Road, Royapettah, Chennai - 600 014.
Phone : 2811 1300 Fax : 2811 1908 Email : tnagrade@gmail.com Website : www.teiea.com

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EVENTS

ELECTRICIAN 2015 Trade Fair

Events Profile: Tamilnadu Electricians Welfare Association is working for the welfare & development of Electrical Workers working in the Non-formal Sector. The trade fair is open both to professional People and Public. The Visitor's Profile includes 5000 Members of our Association from SIX Districts of Tamilnadu, Students from Engineering Colleges, Polytechnics and Industrial Training Institutes in Chennai City, Electrical Contractors in Chennai, Builders and Electrical Engineers in Chennai.

Date: 26th & 27th September 2015 **Venue:** Valluvar Kottam, Nungambakkam, Chennai

Website: http://www.tnewa.org/

POWER NIGERIA
EXHIBITION & CONFERENCE

Events Profile: Power Nigeria provides a dedicated platform for utilities, contractors, consultants, distributors and other power specialists to source and discover the latest power technologies from around the world and learn from industry leaders in a 2 day free to attend conference.

Date: 3rd – 5th November 2015 **Venue:** EKO Hotel, Lagos - Nigeria

Website: http://www.power-nigeria.com/

SOLAR PROJECT DEVELOPMENT & FINANCE TOUR INDIA

Events Profile: "The most efficient way to explore project development, financing and investment opportunities in the Indian solar PV market". Meet key-stakeholders and government representatives in interactive sessions exclusive for the solar tour participants. Build and expand your Indian network with over 100 local key players. Meet with leading banks and investors to get a complete overview of the opportunities and challenges for financing in the solar energy sector. Get a complete overview of the opportunities and challenges for financing in the solar energy sector in India from the leading experts in the field.

Date: 5th – 7th October 2015 & 7th – 9th October 2015 **Venue:** Taj Palace, Delhi & Park Hyatt, Hyderabad

Website: http://www.solarfinancetourindia.com/

POWER-GEN MIDDLE EAST
FOCUSING ON POWER GENERATION, T&D AND WATER
مؤتمر ومعرض الكهرباء والماء

Events Profile: This event allows us to be in the market place that everyone knows. Here the latest Energy Efficient Solutions from renowned speakers and industry experts. Engage with Leading Companies, First Class Products and Services.

Date: 4th – 6th October 2015

Venue: Abu Dhabi National Exhibition Centre, Abu Dhabi

Website: http://www.power-gen-middleeast.com/index.html

AUSTRALIA EXHIBITION & CONFERENCE
ALL-ENERGY 2015
CLEAN ENERGY COUNCIL

Events Profile: All-Energy Australia 2015 and start organising meetings and saving your favourites. Prepare yourself for the future of energy. Program by experts in CEC's Solar Accreditation team.

Date: 7th – 8th October 2015

Venue: Melbourne Convention & Exhibition Centre, Melbourne, VIC, Australia

Website: http://www.all-energy.com.au/

EDITORIAL

Dear Members, Fellow Professionals and Friends

Seasons Greetings To One And All!

"Happy Engineers' Day"

September is a month of Pride for all Engineering Fraternity as we celebrate the Annual Engineers Day on the 15th September to commemorate the birthday of the legendary engineer **"Bharath Rathna" Sir Mokshagundam Visvesvaraya**, an eminent Indian engineer and statesman with outstanding contribution to the society who was known as the precursor of economic planning in India. A theme of national importance is chosen every year and the theme chosen for this year is **"Engineering Challenges for Knowledge Era"**.

There has been tremendous all round growth in the World since 1900 with extensive Industrialization matching with the growth of Civilization, Human Comforts, Transportation and so on. The contribution of Electrical Engineering in general and in particular, the technologies pertaining to Generation, Transmission, Distribution, Utilization of Electricity, Transformers, Switchgears, Motors, Controls and Cables and Conductors have all been very significant. There are tremendous developments taking place continuously in science, technology and engineering world over and the knowledge has become the new currency of national economics. Engineers have a pre-eminent role in the knowledge economy. Innovation of new products and processes form the core of new knowledge and changing technologies, disruptive technologies and path breaking technological developments will all have to be mastered and exploited in all engineering disciplines.

Engineering and Technologies pertaining to Renewable Energy, Energy Storage and Smart Energy Distribution, Energy Efficiency have all been receiving special attention. All these areas have tremendous scope for application in our Country. Due to massive use of **'Fossils'** to meet the Energy needs over the past 100 years, the depletion of Fossil reserves continues to create panic and the dangers like Global Warming due to excessive use of Fossils are also matters of serious concern. Continued technological developments in the areas of Renewable Energy and their adaptations are assuming priorities. Technologies pertaining to 'Waste to Energy' and technologies addressing use of waste and surplus Biomass for Generation of Power, production of Bio Coal, Bio Crude and alternative Bio Fuels are some of the examples where our Country, with its huge potential, can take the lead for extensive use of Renewable Energy.

International Ozone Layer Protection Day falls on the 16th of September and this is yet another area of challenge for Engineering and Technology. Use of CFC in appliances and applications is discovered to be one of the important reasons and the technologies of safe alternatives are in the process of being adopted.

World Heritage Day is also celebrated during September on the 24th and we can cherish with pride our Great Heritage, not only in the areas of Knowledge and Civilization but also in Engineering and Technology. It is History that when Vascodagama was sailing to Indian shores in one of the largest ships known to them at that time, they were amazed by the 3 to 4 times larger merchandise ships built and used by Indians for Global Trade.

We thank all those members who have helped us by participating in the advertisements appearing for the issue August 2015 – Power Links, P2 Power Solutions Pvt. Ltd., Universal Earthing Systems Pvt. Ltd., Wilson Power and Distribution Technologies Pvt Ltd., Ashlok Safe Earthing Electrode Ltd., DEHN India Pvt. Ltd., Ledgeo Ligts Pvt Ltd., OBO Bettermann India Pvt. Ltd., Faith Power Solutions - I.P.L. Products, JL Seagull Power Products, Power Cable Corporation, FLIR Systems India Pvt Ltd., Abirami Electricals, Galaxy Earthing Electrodes Pvt. Ltd., The Motwane Mfg. Co. Pvt Ltd., Cape Electric Pvt. Ltd. EDITOR

ELECTRICAL INSTALLATION ENGINEER

President : U. BASKARAN
Secretary : K. KANNAN
Treasurer : P. SUYAMBU

Editor :
G. VENKATESH

Printer :
M. VENKATARAMAN

Advisor :
S. MAHADEVAN

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LETTERS TO THE EDITOR

30.06.2015

I am happy to see that TNEIEA magazine is very educative and interesting Month by month with new articles.

The poster on Thunder in Tamil is very useful for all. I request that poster may be printed with TNEIEA Logo and circulated to all industries and public through the electrical contractors. If it is needed for publicity it may be printed in bulk quantities and whoever order their logo or business address may be incorporated.

Likewise poster on Passenger Lift maintenance and check list also will be useful to the public.

Thank you

Dr. G.V. Rao

EDITOR'S REPLY: Thank you for your support. We shall consider your suggestions and do the needful.

08.08.2015

Appreciation for the extraordinary efforts of the organization

I would be failing in my duty if I do not take time to appreciate the Office Bearers and Editorial Team of **Tamilnadu Electrical Installation Engineer's Association 'A' Grade** for the composed Technical Contents and jokes, historical, moral messages presented in the magazine.

The contents are perpetually interesting. Moreso, I have not come across spelling mistakes which are rampant in many journals and publications. It shows the commitment of all involved.

Would like to say that my father **late Mr. H. Kalyanasundaram** was an active member of the association and he had inculcated in me the joy of review technical journals, participating in social activities. I would humbly submit that his indoctrination has been to good effect.

I would like to contribute my efforts as a fire safety consultant to the organization for any seminars etc. conducted as well.

Thanks and Warm Regards, *Yours truly,*

K. Muthukrishnan

EDITOR'S REPLY: Thank you for your appreciation. Your letter is inspirational and we shall strive to do it better.

PRODUCT OF THE MONTH

IT250G – 5KV DIGITAL INSULATION AND CONTINUITY TESTER

The Motwane had been offering comprehensive range of products designed in-house catering multiple segment of power and energy sector. Being pioneer in insulation testing the IT250G SPOT is a 5KV voltage selectable digital insulation tester measures digitally and also in analog. It is a battery operated most compact device made to give stable and reliable performance in energy intensive area. Auto power off enhance battery life and pleasant amber backlit allows user to work in dusk environment also. It is ideally suited for many troubleshooting, installation & commissioning in electrical Substations and preventative maintenance on both domestic & industrial applications. IT250G is an ideal suited for onsite testing.

Most comfortable ergonomics with strap.

Selectable test voltages from 250V, 500V, 1000V, 2500V, 5000V DC.

Insulation Resistance measurement up to 250G Ohm.

Continuity measurement.

Programmable timer from 1 sec. to 99 minutes.

Short circuit current : <=1.4mA(±0.5mA).

Safety category of CAT-IV 600V and CE conformity.

Ingress Protection of IP54.

The Motwane Manufacturing Company Pvt. Ltd.

Gyan Baug, Nashik Road - 422 101. Nashik, Maharashtra, India.

Tel. No.: +91-253-2463752 / 2463753

Asian Engineering & Services,

Address: 254, Angappa Naicken St., 1st Floor, Chennai - 600 001

Contact No.: 044-25342107, 044- 25330224, 044-42153460

Features

- Robust body with carrying strap for easy portability.
- Auto discharge facility after every test.
- Auto Power off to enhance battery life.
- Internal Data Storage up to 1000 test readings.
- Guard terminal to eliminate surface leakages.
- Battery operated with status indicator.

MEMBERS DETAILS

S.No.	Company Name	License No.	District	Contact No.
91.	Powersystem Design & Commissioning Services	EA 2292	Chennai	044-26560999, 9444048727
92.	Power Trac Engineers Pvt. Ltd.	ESA 228	Chennai	044-24992825, 90030 65358
93.	Prakash Fabricators & Electricals	EA 2893	Chennai	044-26330331, 91762 33909
94.	Prayagaa Enterprises P. Ltd.	EA 2448	Chennai	044-42074313, 99419 23975
95.	Priya Enterprises Electricals	EA 2358	Chennai	044-28263456, 94449 89022
96.	Badhri Electrical *(Formerly R.G. Power Consortium)*	EA 2900	Chennai	044-42056730, 77081 07489
97.	R.J. Enterprises	EA 2296	Chennai	044-23660031, 94441 60095
98.	R.V. Electricals	EA 2844	Chennai	044-22253025, 94441 52300
99.	Rathnam Enterprises	EA 2367	Chennai	044-24990002, 98416 01060
100.	Richards & John Wesley Engrs P. Ltd.	EA 2829	Chennai	044-26542285, 94449 04520
101.	Royal Constructions	EA 2888	Chennai	044-45020191, 98401 11610
102.	S.R.P. Electricals	EA 1703	Chennai	044-23820351, 94441 31536
103.	S.S. Enterprises Electricals	EA 2340	Chennai	044-24862007, 99401 23851
104.	Saidapet Electricals	EA 1674	Chennai	044-24912881, 94458 14169
105.	Sakthi Electrical Traders	ESA 175	Chennai	044-24362656, 93810 17440

KNOW THY POWER NETWORK - 96

It is really great to reconnect with you all after a month's gap.

Before starting our regular topic, let us have a passing glance at a few stray thoughts on the term "Mechanical" which is always related to machines. Generally when people use the term "Mechanical", they try to explain an event or situation or a behaviour which is impersonal or unemotional or showing no signs like a machine. In reality, the machines stand far away from this remark / comment. It seems that they have a mind of their own; they have a special trait of keeping everything under wraps or in silence i.e. they never express / reveal their happiness nor sorrow / distress loudly to the outside world. The machines express their distress only by "signals"; we have to understand / decode / unfold these signals. Needless to say that they have a knock of putting their minds a pretty good use while communicating with the outside world. Thus several thrillers are created in the making of their problems and their solutions.

Humans may not have created any machine at all if they were not the machines at the hands of nature (God). To a certain level of reality, even now most of us are working as "Machines" only. We create the machines with our imagination as an extension of our potentials or realization of our aspirations. In addition, when we work with the machines, we form a close bond or relationship with them. Through this, we transfer / convey our behaviour / personal traits, life style, social relationship and mental contacts to them. Thus inadvertently or unintentionally we invest some of our creative powers to them and it makes the related machines to initiate / copy our behaviour. Thus at any time, these machines can out grow, out smart / out step and out perform us in an invisible way. It holds good for all the machines that include "Super Computers" (During this friendly process, the opposite can also occur i.e. human beings begin to behave as machines). All these make the title of our ongoing topic viz. **Happiness index for in service electrical equipment** by mapping or profiling its health status is an apt one and meaningful. Sincerely hope that the readers will whole heartily endorse / appreciate this view.

In this context, I would like to emphasize one of the repeated fundamental rule relating to the machines. It is here under – "Don't treat the symptoms or signals emanating from the machines in isolation; don't make adhoc or makeshift or quick fix solutions; always find out the root cause of the malady and mitigate / treat it. Finally it is to be stressed that with good maintenance and an appropriate operating conditions (with good quality inputs and quality electric power) the machines will feel comfortable and relaxed; so they will beam with joy and express their happiness by way of efficient and smooth running; on the other hand, if their basic requirements are not met with, they will simply scream with their disillusionment and discontent and express their unhappiness, displeasures with wild and loud noises, vibrations, very high temperatures and finally end with "fire" (destruction of the machine itself). So let us probe the behaviour of electrical machines in a new light.

Before actually kick starting our topic viz. "Significance of Tests Conducted on Electrical Equipment", let us take a quick look at some related topics like main components of electrical machines, the history of the development of dielectric materials, various phases / stages in the service life of an electrical equipment, how its inservice performance is impacted by various factors and finally the types and nature of ageing through which it is undergone before meeting its end.

I Components of an Electrical Equipment - an Outline

1. **Generator and Motor –** Stator, Rotor, Bearings and other structural components and cooling medium
2. **Transformer –** Primary and Secondary windings, core, Bushings and other structural materials and components and accessories and cooling medium. Essentially it is made up of Magnetic Circuit, Current Circuit and Dielectric Circuit
3. **Reactors** – Its construction is more or less similar to that of a transformer
4. **Capacitor** – Dielectric medium (Paper, Poly propylene or composite dielectric), impregnating synthetic liquids and other structural components
5. **Cables** – Dielectric materials, copper / aluminium conductors, shielding and reinforcing materials and jointing and termination accessories

II History of the Development of Electrical Insulation

The history of electrical insulation spans more than 125 years. Its evaluation started from the year 1886 when materials available in nature were used with a minimum processing. Because of its enormity of its size, it is well nigh impossible to wrap up or cover up all the details related to the development of insulation / dielectric materials in one or two pages. Any how a sincere attempt has been made here.

Three states of matter viz. solids, liquids and gases are used as insulating materials depending upon the needs (depending upon the requirements of electrical machines cables or application). Solid insulation development has

been generally influenced by rotating machines and cables, liquid insulation by transformers, reactors, capacitors and cables and finally the advancement of air / gaseous insulation is influenced by switches, circuit breakers and switchgears and substations. To start with, naturally available cellulosic paper were used as the solid insulating material. Then many development had taken place in the arena of solid, liquid and gaseous insulating materials. These details are briefly and chromologically furnishes as follows:

A. Development of Solid Insulating Materials:

1	Cellulosic Paper	Processed natural products were used as solid insulating materials during the period from 1860 early 1930
	Varnished Paper	
	Impregnation of paper insulation by hot oil	
	Bitumen	
	Resins	
	Cellulose products like wood, cotton, hemp, manilla	
	Vitrified and semi vitrified shapes ceramics (porcelain) quartz and glass	
	Mineral substances like Mica, Slate, Asbestos, China Clay, Alumina and Magnesia are used fillers	
	Vulcanized Rubber	
2	Phenolic resins, Formal, dehyde resins	After 1930 to Till date
	Fibre glass nylon synthetic fibres	
	Thermosetting resins	
	Synthetic thermo plastic resins (nylon and polystyrene)	
	Polymers of various types that include PVC acrylic EPR and Urethane	
	Epoxy resins	
	Polyethylene cross linked polyethylene	
3	Nano materials	Presently under trials

B. Development of liquid insulating material

Petroleum based mineral oils	In use from 1887 till date
Synthetic liquids - Askorel or Polychlero Biphynol (PCB)	In use from 1932 -1980 banned now because of its dangers to environment and operating personnel
Silicon fluids High fire point hydrocarbon commercial fluids (wecosol & wemcol), freons (chloro fluro carbon family)	From 1980 – Till date used in transformers and power capacitors

C. Development of gases as insulating materials

Though gases are generally used as "dielectric", they do not have exceptional electrical strength under atmospheric pressure. Their dielectric behaviour varies with density pressure, temperature and ingress of impurities like moisture. Dry and non-ionized gases produce high resistance and negligible dielectric loss.

Air at atmospheric pressure	In use forms large stages of development to till date
Compressed Air	
Compressed Nitrogen gas in transformers	
Electro negative gases like SF_6 (Sulphur Hexa Fluoride)	From 1940 to till date

D. Various Stages / Phases in the Service Life of an Electrical Equipment

Here life of an electrical equipment has been assumed as 25 years. It can be more or less depending upon its service conditions. Then the stages in the life of an electrical equipment can be simply stated as,

Supply period	It moves from the manufactures' works to its designated place.
Erection and commissioning period	Installation and placement on its functioning site.
Initial period of its service period (upto 5 years)	Its warranty period-during this period, the problems due to inadequate design mishandling, improper erection manufacturing defects and inadequate caring will be revealed.
Normal service period (5-15 years)	During this period, it will be subjected to proactive maintenance, periodical / preventive maintenance corrective maintenance and other condition monitoring tests. Its failures will be a reflection of the service conditions experienced by it.
Residual portion of its service (15-20 years)	Experiences frequent repairs. At times it goes for retro fitting / reconditioning
Final / last stage of its life (20-25 years) (off service and disposal period)	Troublesome period – faces problems / repairs mainly due to ageing related factors – it is exposed to decommissioning and final disposal as "Scrap"

E. Factors that Impact the Service Life of an Electrical Equipment and Accelerate Its Ageing – An Over View

This topic has always been of intense interest and concern. No one wants to lose his / her equipment; every one wants it to last forever. But this aspect can never be achieved; both animate and inanimate have their own ends. The end of life for an electrical equipment comes for many reasons. At least let us recognize some dominant factors.

- Operation at very high temperature (thermal ageing)
- Failures induced by very high voltages, higher moisture ingress, chemical attack and higher mechanical stresses. All these may act independently or in combination with thermal ageing
- Structural and bearing failures
- Physical ageing due to poor operating environment which reduces its insulation capability to face life threatening over voltage stresses like lightning and switching surges and the attendant mechanical stresses.
- Short term and long term over loads
- Frequent exposure to high intensity close up faults
- Development of frequent internal faults in the equipment due to inherent defects
- Problems in the cooling system
- Poor design, employment of poor quality of materials in the manufacture and also the poor manufacturing process.
- Poor service conditions and inadequate / improper maintenance works
- Improper selection of the equipment; not optimal running of the equipment

F. Significance of Tests in the Life of Electrical Equipment

All the items / factors associated with any equipment can never be made perfect always. A gap always exists to be bridged or a need exists for the equipment to be operated within tolerance limits. Further none can get a clear picture of all the players involved. Hence we need some props / support to facilitate the smooth / operation of the equipment with out any problem / failure. One the common methods available to find out the health condition of the equipment is regular performance of preventive / proactive tests. On having learnt the significance of testing, let us more further to understand the difference between normal health check tests and conclusive diagnostic tests and also the importance of the concepts like tan delta, partial discharges and dielectric losses as related to "Insulation".

With this I would like to "sign-off".

Next month: Testing will be dealt with in detail. In addition, the difference between sparks and arcs and cos p and tan d (power factor) will be discussed; also a brief on ageing of insulation system will be given.

(To be continued…)

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

HYBRID RENEWABLE ENERGY SYSTEMS HAVE A FUTURE

Hybrid renewable energy systems, drawing energy from different sources, are more economical than those running on a single source, a study finds.

A team of researchers from the University of Agder, Norway, which studied the sizing of a mini-grid for electrifying a rural community left out of the national grid, reports that the most economical configuration is a combination of solar, wind and diesel generators. The report to be published in the September issue of *Sustainable Energy Technologies and Assessments* also says that hybrid systems are economically viable whether operated off-grid or connected to the grid.

The researchers based their study on Siyambalanduwa, a remote Sri Lankan village with about 150 households, drawing about 270 kilowatt hours of energy daily with a night time peak of about 25 kilowatts. They hypothetically divided the village population into three income categories with different consumption levels and also considered power usage by a community centre.

The monthly average solar irradiation and wind speed data were obtained from the NASA Surface Meteorology and Solar Energy Database. Calculations based on these numbers showed that, the most economical configuration would be 40 kilowatts from wind turbines, 30 kilowatts from solar panels, 25 kilowatts from a diesel generator with the system supplemented by a battery bank with a capacity of 222 kilowatt hours.

Many villages in Sri Lanka are too remotely located to be connected to the national grid. Recently, the Ceylon Electricity Board released a list of more than a thousand villages that cannot be connected to the national grid in the near future. There are no off-grid hybrid renewable energy systems in Sri Lanka, says Iromi Ranaweera, fellow at the Norwegian University of Science and Technology, Trondheim and one of the authors of the report. "There are several examples in India, Nepal and China. They are reliable and economical when compared to grid expansion," Ranaweera tells *SciDev.Net.* Debajit Palit, associate director and senior fellow at The Energy and Resources Institute, New Delhi, says that "unlike other South Asian countries, Sri Lanka doesn't have proactive policies to promote off-grid energy projects."

The Siyambalanduwa study has the drawback that it is not based on actual electrical loads. "Without a detailed survey, one can't categorise the village into rich, medium income, and poor," says Binayak Bhandari, assistant professor of mechanical engineering at Woosong University, Daejeon, South Korea. "Also, the electricity consumption of these families and the community centre should be supported by at least one month of ground data to validate the assumptions," Bhandari said.

CELEBRATION OF 48TH ENGINEERS DAY – 2015

Theme: *Engineering Challenges For Knowledge Era*

September 15 is celebrated every year in the country as **"Engineers' Day" to commemorate the birthday of the legendary engineer Sir Mokshagundam Visvesvaraya**. Sir Visvesvaraya, an eminent Indian engineer and statesman was born in a remote village of Karnataka, the State that is incidentally now the Hitech State of the country. Due to his outstanding contribution to the society, Government of India conferred **"Bharat Ratna"** on this legend in the year 1955. He was also called the precursor of economic planning in India. His learned discourse on economic planning in India, Planned Economy for India and Reconstructing India, was the first available document on the planning effort of the country and it is still held as the parent source matter for economic planners. A theme of national importance is chosen every year by the National Council of the Institution and deliberated at its various State/Local Centres to educate the engineering fraternity in general and the society in particular. This year the National Council of the Institution has selected the theme as **"Engineering Challenges for Knowledge Era".**

Tremendous developments are taking place in science, technology and engineering world over and the knowledge has become the new currency of national economics. Engineers have a pre-eminent role in the knowledge economy. Innovation of new products and processes form the core of new knowledge which has to be governed by intellectual property rights related safe guards including applicability of Cyber loss. Changing technologies, disruptive technologies and path breaking technological developments will have to be mastered exploited in all engineering disciplines.

Promoting research and development, nurturing entrepreneurship and succeeding in making world class products all will form major activities in this regard. Further interdisciplinary team efforts are needed to succeed in mapping the benefits of knowledge economy.

Technology manpower planning in the networked economy hinges on developing base of skilled and knowledgeable manpower of high calibre to usher in a talent-drive economic revolution. Both the Industry and Academia has equal responsibility to share to ensure that the engineers become ready to face the growing and ever-changing need in this knowledge era.

IEI has an important role in this endeavour.

The theme chosen for Engineer's Day 2015 celebrations "Engineering challenges for Knowledge Era" will address all these aspects.

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

ICONIC SYDNEY OPERA HOUSE BECOMES A GREEN STAR

Australia's most recognisable landmarks, the Sydney Opera House, have been awarded a 4 Star Green Star – Performance rating by the Green Building Council of Australia.

The announcement was made this morning by NSW deputy premier and minister for the arts Troy Grant, along with GBCA chief executive Romilly Madew and Sydney Opera House buildings director Greg McTaggart. GBCA chair Tanya Cox; Sydney Opera House director of building Greg McTaggart; NSW deputy premier Troy Grant; and GBCA chief executive Romilly Madew.

The Opera House now joins a small handful of World Heritage buildings that have achieved green certification globally. "This is an amazing achievement," Ms Madew said on the stage of the Concert Hall, which was bathed in green LED light for the occasion. "If you think about this project most buildings in Australia that have achieved a Green Star rating – we've had 970 achieve a Green Star rating – 860 of those have been new buildings. So only 100 have achieved a Performance rating. This would really have to be the most challenging of all those buildings that have achieved a rating.

She said that there was a view that it was "too hard" to upgrade existing buildings, but the Opera House had shown that is was possible. "If you can green the Opera House, you can green anything," Ms Madew said.

"The Opera House is an icon of Sydney and a symbol of modern Australia so it's vital that it sets the standard," he said. "The endorsement of the Opera House by the GBCA sends a clear message that green buildings don't have to be new – even the most recognisable and historic landmarks can earn a place among the most celebrated sustainable buildings in the world."

Sustainability projects implemented to help achieve the Performance rating include:

- a seawater cooling system for HVAC
- a "chilled ceiling" design to help control temperature
- lighting control system
- LED upgrades with a "heritage lighting" setting that has led to a 75 per cent reduction in electricity consumption and the saving of $70,000 a year
- development of a range of eco-friendly cleaning methods
- staff sustainability training
- an operational waste management plan in line with the Better Buildings Partnership best practice guidelines
- end of trip facilities
- a Reconciliation Action Plan

A SIMPLIFIED METHODOLOGY FOR DETERMINING OPTIMAL LOCATION AND CAPACITY OF SOLAR PV DISTRIBUTED GENERATION TO REDUCE LOSSES

This paper presents distribution load flow analysis for balanced radial system in conjunction with Solar Photo-Voltaic (PV) distributed generation. The proposed approach utilizes Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL) carried-out on forward and backward sweep iterative algorithm for the calculation of node voltages and currents flowing in radial branches. The power generated from solar PV system is determined by developing a mathematical model of solar PV modules that adopts to the Indian meteorological conditions. The distribution load flow analysis carried out by taking into the effect of this Solar PV generation. Optimal location for the distributed generation is determined by considering total system losses that can occur in 24 hours and the capacity to be installed is based on desired voltage improvement. The proposed approach has been implemented on standard 69bus radial distribution network. The simulation results obtained with and without inclusion of Solar PV generation are compared and discussed.

Keywords: *Distribution load flow; Heuristic approach, Losses, optimal, Solar PV generation, Voltage profile*

1.0 INTRODUCTION

Electricity, one of the basic needs of modern world is experiencing a consistent rise in demand. On the other hand the conventional resources used for its production are depleting at a rate faster. According to approximately 39% of world's electricity generation is contributed by coal, 19% from Hydro, 15% from gas, 16% from nuclear and 10% from oil. Also, the quality and reliability of produced power is of a great importance in the present day scenario. Even with today's advanced power system technologies the losses in the system are very high which need to be decreased for higher efficiencies and better receiving end voltages. This is experienced even more in distribution system where there is a direct impact on customer, owing to long radial lines in a country like India. Hence a solution that addresses both the concerns is of a great interest. This paper proposes a solution with distributed renewable generation in the system at an overall optimal location and optimal capacity that is required / possible to be installed by solving distribution load flow.

Since renewable generation will not completely replace the conventional generation, in near future the solution to this lies in effective diversion of load demand onto distributed generation. India being a tropical country where 300-330 solar day are available in a calendar year and is one among the energies attracting lot of investors. Hence solar energy is chosen for the study presented in this paper. Solar PV modules are modelled for the study and the exact output based on the available solar insolation and temperature is calculated.

Attempts have been made in the recent past to study the effect of distributed generation on the distribution system. The distributed generation was successful in reducing total system losses and also show improvement in the voltage profile. All these works are made on an hourly basis and has the disadvantage of not considering the intermittence effect of both the load and renewable energy throughout the day.

This paper makes an attempt to study the effects of both, optimal distribution generation capacity and optimal location in the distribution system on 24 hour basis taking into consideration the variable impact of load factor. The approach has been implemented on a balanced 69bus system supplied by a 12.66KV substation applying the forward/backward sweep iterative radial distribution load flow algorithm for the computation of node voltages and branch currents. The solar PV modules has been mathematically modelled using the descriptions published in and applied with 12 hours of solar spectrum subjected to its availability. The simulation results of the proposed approach obtained with and without inclusion of Solar PV generation are presented and compared.

2.0 MATHEMATICAL MODELLING FOR SOLAR PV

The electrical equivalent circuit of the PV cell can be described as a current source in parallel with a diode & leakage resistor (Rp) which are in series with resistor (Rs) where for simplicity Rp is neglected as shown in Figure 1. The output of the current source is proportional to the photons falling on the PV cell.

The I-V characteristics of a PV cell can be mathematically modelled by Shockley diode equation and the two parameters V_{oc} & I_{sc}, are determined to describe PV cell.

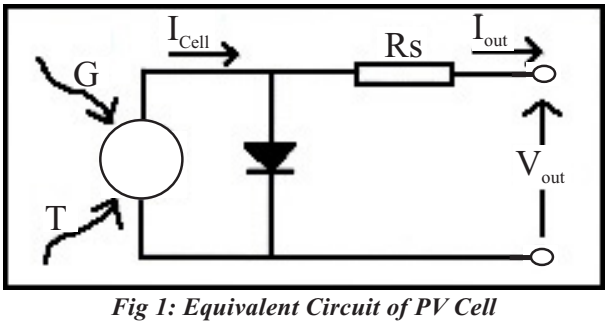


Fig 1: Equivalent Circuit of PV Cell

The mathematical modelling of a PV cell is as follows:

$$I_{Out} = I_{Cell} - I_0(e^{q(V_{out} + I_{out} R_S)/nkT} - 1) \quad ...(1)$$

$$I_{Cell} = I_{Cell(T_1)} - (1 + k_0(T - T_1)) \quad ...(2)$$

$$I_{Cell(T_1)} = G * \frac{I_{SC(T_1,nom)}}{G_{(nom)}} \quad ...(3)$$

$$k_0 = \frac{(I_{SC(T_2)} - I_{SC(T_1)})}{(T_2 - T_1)} \quad ...(4)$$

$$I_0 = I_{0(T_1)} * \left(\frac{T}{T_1}\right)^{\frac{3}{n}} * e^{\frac{qV_g}{nk\left(\frac{1}{T} - \frac{1}{T_1}\right)}} \quad ...(5)$$

$$I_{0(T_1)} = \frac{I_{SC(T_1)}}{e^{\frac{qV_{oc}(T_1)}{nkT_1}} - 1} \quad ...(6)$$

$$R_S = -\frac{dV_{Out}}{dI_{V_{oc}}} - \frac{1}{X_V} \quad ...(7)$$

$$X_V = I_{0(T_1)} * \frac{q}{nkT_1 * e^{\frac{qV_{oc(T_1)}}{nkT_1}}} \quad ...(8)$$

To analyze the described mathematical model, Solarex manufactured Photovoltaic Cell of type MSX60 and 60W capacity is considered. The PV Cell specifications and results obtained at a temperature of 25°C and illumination of 1 Sun are shown in Table 1. The I-V curve and P-V curve obtained are shown in Figure 2. The inverter operation efficiency is assumed 100%.

TABLE 1

INDUSTRIAL SPECIFICATIONS VS MATLAB RESULTS

MSX60 60W PV-Cell	Industrial Specification	Matlab Results
P_{Max}	60W	60.47W
V_{Max}	17.lV	17.08V
I_{Max}	3.5A	3.5405A
I_{Sc}	3.8A	3.8A
V_{Oc}	21.1V	21.06V

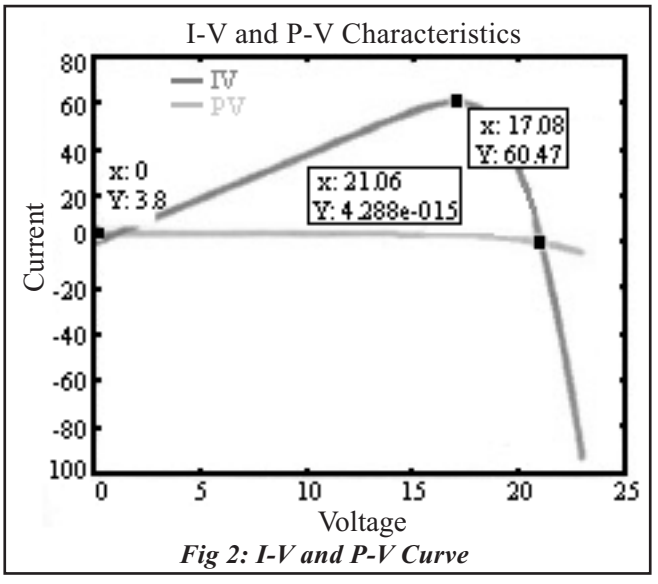


Fig 2: I-V and P-V Curve

3.0 BALANCED RADIAL DISTRIBUTION LOAD FLOW

The radial distribution load flow solves algebraic equations expressed in terms of sending end voltage (V_S) and receiving end voltage (V_R), iteratively. The method of forward/backward sweep has been considered owing to its accuracy and fast convergence. The receiving end voltage can be expressed in general by equation (9).

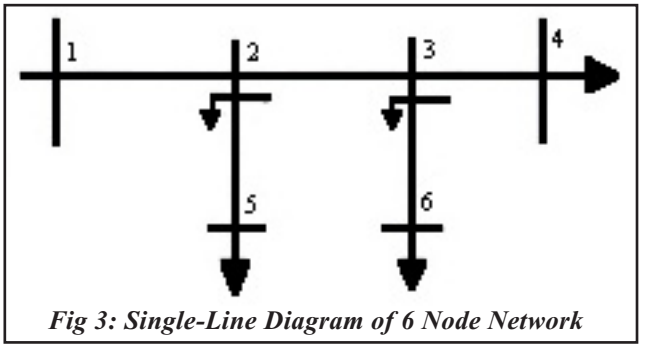


Fig 3: Single-Line Diagram of 6 Node Network

$$V_R = V_S - I_{SR}Z_{SR} \quad ...(9)$$

Example: Consider the single line diagram of a radial distribution network with 6 nodes as shown in Figure 3.

then

$$V_2 = V_1 - I_{12}Z_{12} \quad ....(10)$$

$$I_{12} = I_{23} + I_{25} + I_{22} \quad ....(11)$$

Load current at node-i can be calculated as

Equation

$$I_{ii} = \frac{P(i) - jQ(i)}{V^*(i)} \quad ....(12)$$

The iteration procedure starts with backward sweep where node currents are calculated using Eq.l2 assuming flat voltages at all the nodes at the beginning. In the successive iterations the updated voltages are used in calculating the nodal currents thereafter branch currents using Eq.l1. Node-l is considered as voltage controlled bus with a voltage of 1 pu and all the node voltages are updated using Eq.9 during forward sweep utilizing the calculated branch currents from backward sweep. This iteration process of backward/forward loop continues until the maximum difference in voltage magnitude of successive iterations is less than 10^{-6}, which is the convergence criterion.

The total loss in the system is the sum of the losses in all branches. Complex power loss in any branch ij can be given as:

$$(P_L + jQ_L)_{ij} = V_i I^*_{ij} + V_j I^*_{ji} \quad \text{....(13)}$$

The work presented in this paper considers PV generation as negative load for the modelling purpose. For a given day the 24-hours solar insolation and temperature are considered and P_{pv} is calculated. Figure 4 is considered as 24 hours load curve. The load for k^{th} hour is calculated using the equation (14) and is used in the radial distribution load flow.

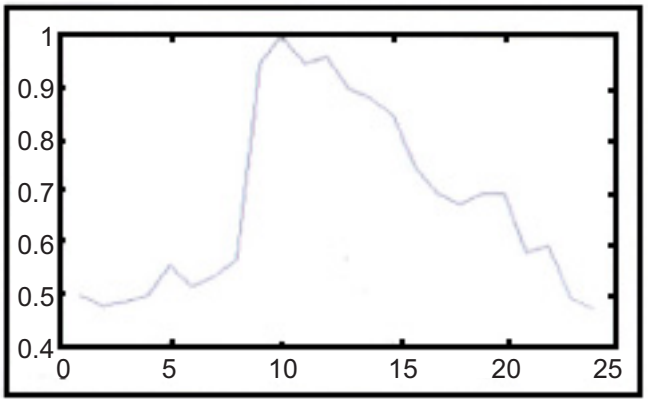


Fig 4: 24 Hrs Daily Load Curve

Net load at i^{th} node in k^{th} hour =

$$(P + jQ)_i * (Lf_k) + (P_{PVi})_k \quad \text{....(14)}$$

The Distribution generation helps in the reduction of real and reactive losses and also improves the node voltages.

Effect of PV generation on real and reactive loss and on voltage profile, every hour for the whole day is given by the indices [3]:

$$L_P(i) = 1 - \frac{\textit{Real losses with DG in hour } i}{\textit{Real losses without DG in hour } i} \quad \text{....(15)}$$

$$L_Q(i) = 1 - \frac{\textit{Reactive losses with DG in hour } I}{\textit{Reactive losses without DG in hour } i} \quad \text{....(16)}$$

$$L_V(i) = \frac{\textit{Minimum Voltage with DG in hour } i}{\textit{Minimum Voltage without DG in hour } i} \quad \text{....(17)}$$

4.0 OPTIMAL PLACEMENT

For the purpose of finding optimal location and penetration capacity many methods like artificial neural networks, particle swarm optimization, genetic algorithms etc. may be used. For the simplified analysis a heuristic approach is followed here. Penetration capacity and optimal location are found by maintaining the minimum voltage greater than 0.95 and the maximum voltage less than 1.05 for the whole day. The method proposed has been implemented on a 69bus system as shown in Figure 5. Buses between 53 and 65 (13 buses) are considered from the test system for the analysis, owing to the lowest voltages obtained at these buses by running a distribution load flow without any DG in the system. The buses are given scores accordingly from 1-13 based on the reduction in system losses, by incrementally varying the capacity of DG installed at the node, for all 24 hours. The bus having the least sum of scores throughout the day is considered as the optimal location for installing DG.

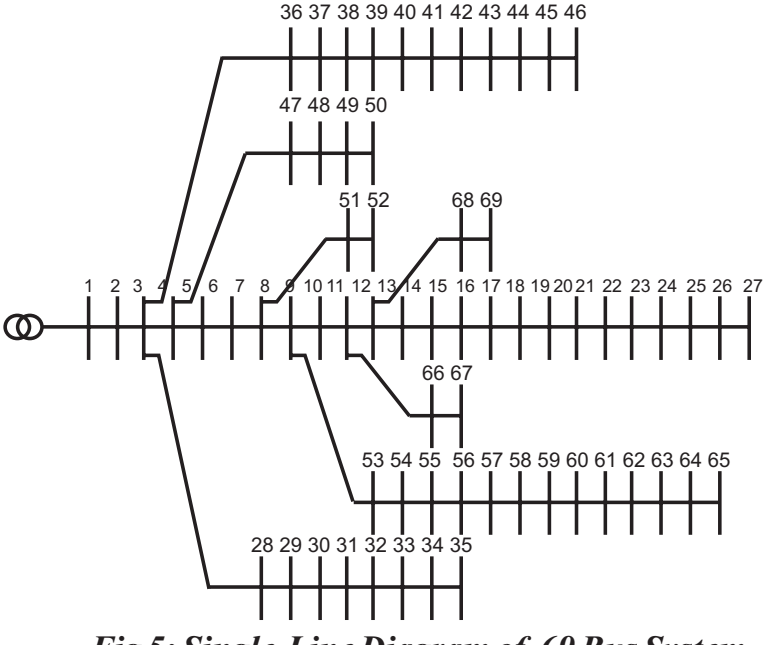


Fig 5: Single-Line Diagram of 69 Bus System

5.0 SIMULATION RESULTS

Table 2 shows the scores obtained by all the buses between 53 and 65. Bus 61 having lowest score is the optimal location for DG installation with the penetration level of DG settling at 1148kW.

In Figure 6 and 7, 6 to 18 hours indicate three days effect of PV generation in reduction of real and reactive losses with respective their insolation and temperature. Figure 8 shows the improvement in voltages. The curves attain maximum during mid-day because of high insolation. It is also seen that PV generation from 0 to 6 Hrs and 18 to 24 Hrs does not have any impact on the distribution system as the insolation during this time is zero. Table 3 shows system losses(k) and the minimum voltage (per unit) attained during day time.

TABLE 2 - BUS SCORES

Node	Score	Node	Score
53	312	60	100
54	286	**61**	**24**
55	258	62	48
56	234	63	75
57	202	64	137
58	165	65	210
59	133		

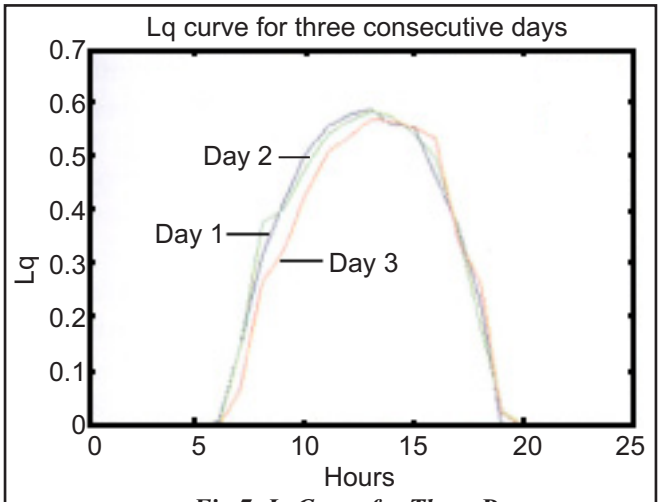


Fig 7: L_Q Curve for Three Days

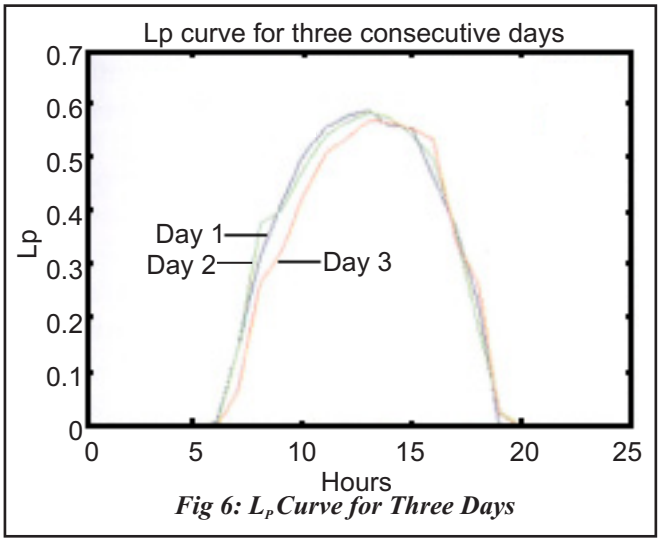


Fig 6: L_P Curve for Three Days

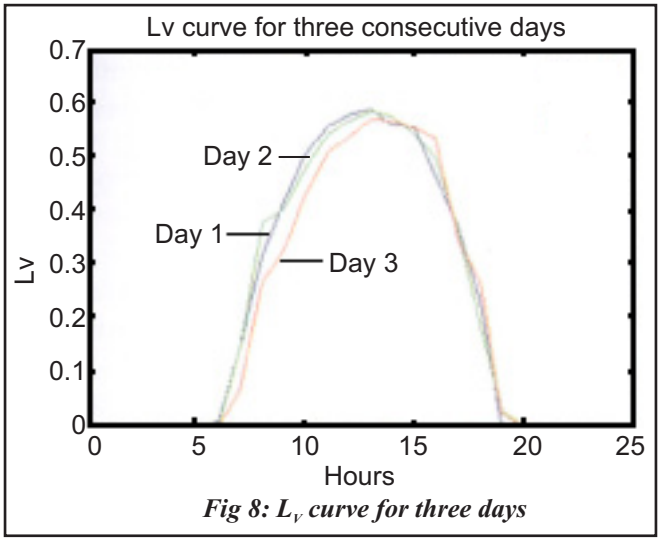


Fig 8: L_V curve for three days

TABLE 3 – REFER NEXT PAGE

6.0 CONCLUSIONS

A simplified approach to determine the optimal location and capacity for Solar PV base distributed generation in a power system is presented in this paper. The proposed method works well on a power system that has solar PV distributed generation. It considers the 24 hours scenario while considering the impact of inclusion of renewable generation with respect to a 24 hours load for the system. The proposed approach has been implemented on a 69bus system and results have been presented and discussed. As presented with the help of simulation results, the optimal location of the distributed generation can be achieved by the proposed simplified approach which reduces the real and reactive power losses of the system as well as improves the voltage profile of the buses where voltages were quite low. The proposed simplified approach is extendable to include other type of renewable energy source with small modification in the modelling, and we are working, towards including the renewable energy sources other than solar also. The proposed work will be providing a simplified way to power utilities to put renewable energy in their distribution power system.

Table 3 - MINIMUM VOLTAGES AND SYSTEM LOSSES

Hr	Day 1						Day 2						Day 3					
	Without solar PV			With solar PV			Without solar PV			With solar PV			Without solar PV			With solar PV		
	V_{min}	P_L	Q_L	V_{min}	P_L	Q_L	V_{min}	P_L	Q_L	V_{min}	P_L	Q_L	V_{min}	P_L	Q_L	V_{min}	P_L	Q_L
6	0.957	50	23	0.957	50	23	0.955	56	26	0.955	56	25	0.953	62	28	0.953	62	28
7	0.956	54	25	0.960	47	22	0.953	61	28	0.957	52	24	0.951	67	31	0.953	63	29
8	0.953	61	28	0.964	42	20	0.950	68	31	0.965	42	20	0.948	75	34	0.958	55	26
9	0.919	180	82	0.945	105	50	0.914	201	91	0.941	120	57	0.910	224	102	0.931	150	70
10	0.914	201	91	0.951	100	48	0.909	225	102	0.945	117	56	0.904	250	114	0.936	143	68
11	0.919	180	82	0.961	80	39	0.914	201	91	0.956	92	45	0.910	224	102	0.948	110	53
12	0.918	184	84	0.963	78	38	0.913	206	94	0.959	89	43	0.908	229	104	0.952	106	51
13	0.924	160	73	0.968	66	32	0.919	179	81	0.965	75	36	0.915	199	90	0.960	86	42
14	0.925	153	69	0.964	67	33	0.921	170	78	0.965	72	35	0.917	189	86	0.961	82	40
15	0.928	142	64	0.965	63	31	0.924	158	72	0.961	72	35	0.920	176	80	0.960	79	38
16	0.937	109	49	0.961	58	28	0.934	121	55	0.962	61	29	0.930	134	61	0.964	62	30
17	0.942	94	43	0.958	59	28	0.938	105	48	0.955	66	31	0.935	116	53	0.952	76	36
18	0.943	88	40	0.953	68	31	0.940	98	45	0.948	80	37	0.937	109	50	0.949	80	37

Courtesy: Amit Jain and Venkata Srinath N
CPRI, March 2014

CHINA IS BY FAR THE WORLD'S BIGGEST PRODUCER OF SOLAR PANELS, BUT THE INDUSTRY COULD BECOME A VICTIM OF ITS OWN SUCCESS

The recent turmoil in China's stock market has sent shockwaves through the country's corporate sector, including its mighty solar power industry which in recent years has grown to dominate the world market. Harnessing solar energy is considered a key way of cutting back on fossil fuel use and of meeting the challenge posed by climate change. Seven out of the world's top ten manufacturers of solar panels are China-based companies, together providing about 40% of global solar supplies. But now the industry's future expansion is under threat as companies try to cope with too much production capacity, very low profit margins and crushing amounts of debt.

In 2013 Suntech, a Chinese company which was at one time the world's biggest manufacturer, went bust. International creditors are still trying to recoup millions lent to the company. Earlier this year the Hanergy Thin Film Power Group, a Chinese company which is a world leader in the manufacture of solar products, lost half its share value amid concerns about its corporate structure and worries of over-capacity and falling profit margins in the solar market.

Export boom

Meanwhile the China-based conglomerate Yingli Green Energy Holding, another world leader in solar production, has been beset with rumours of a slowdown in demand leading to a halt in production at some of its plants. Like many other industries in China, the solar sector has grown fast: in recent years companies rushed to join in a solar export boom, bolstered by generous loans from government banks. Exports of solar products surged. But then US solar manufacturers complained of heavily subsidised China-made solar goods threatening to destroy their industry. Tariffs were imposed on a number of Chinese solar products. A slowdown in Europe's economy also hit export sales. China cut the price of its products: according to the Bloomberg New Energy Finance research group, China now sells solar panels for just over 60 US cents per watt of electricity generating capacity, down from US$4.50 per watt in 2008. While that's good news for those installing solar – and of considerable benefit in the fight against climate change – the price drop has put considerable pressure on China's solar manufacturers. It has also meant many solar companies elsewhere in the world have gone to the wall.

Ailing industry

Varun Sivaram is a researcher at the US Council on Foreign Relations, specialising in renewable energy. He says that while China's dominance of the solar market has led to low global prices, the industry is not in a healthy state. "Solar is heading down a path of profitless prosperity", says Sivaram. In effect, he says, China is subsidising the global solar industry. Sivaram says one of the damaging side effects of China's dominance of the solar market is that production has tended to stick to old technologies and innovation in the industry has been stifled. "As panel manufacturers scrape by on razor-thin margins, kept afloat by government credit, investing in fundamentally new technologies is far from a priority."

Some relief for the China industry might be provided by a government-backed campaign to boost sales in the domestic market. About a third of panels manufactured in China in 2014 were installed within the country. It's estimated that China will install 14 GWs (gigawatts) of solar panels this year, mainly involving giant solar farms in the Gobi desert and elsewhere. In central Europe an installed capacity of one GW of photovoltaics alone would be expected to produce almost 900 GWh of electricity annually, supplying around 225,000 households. In the first three months of 2015 China added the equivalent of the entire installed solar power of France to its electricity network.

Climate News Network, Kieran Cooke

SOLAR BBC

It's 2035, and across the bright tropics and the world's deserts, huge solar arrays gather the sun's energy to generate electricity to be sent down to grids deploying newly perfected wireless power transmission. Enough energy is stored to allow night-time power generation after sunset.

On millions of homes and offices, affordable and efficient solar panels and power-generating windows provide further smaller-scale energy generation in situ during daylight hours. People drive zero-emission cars that were developed back in the 2010s by major automakers like Audi, BMW, Toyota and Honda that run on hydrogen fuel – created using solar energy that splits waste water into hydrogen and oxygen. And as night falls, humanity gazes up at new glints amid the stars – giant orbiting solar arrays harvesting power 24/7 in the eternal sunlight of space, sent back to Earth via microwave or laser beams to giant ground receptors.

Fantasy? Far from it. The idea of solar power – and its potential to be Earth's dominant power source – has roots way back before the threat of climate change and depletion of easy to reach fossil fuels. The first solar energy cell was developed back in 1883, while writer Isaac Asimov published a 1941 story, Reason, describing a space station beaming down vast amounts of solar energy using microwave beams. US scientist Peter Glaser drew up plans in 1968 to make Asimov's dreams a reality, only to be stymied by the technological limitations of the time.

But technologies for a solar-powered world are here today, quieting critics who claim global solar power will never overcome issues over long-distance transmission from sunny to less sunny areas, or find storage solutions to allow it to carry on generating power when it gets dark.

China, for instance, is already building high-voltage power lines to spread output across its vast territory from burgeoning solar power facilities. The first three months of 2015, alone, saw the Asian giant add 5 gigawatts of solar capacity to its grid – equivalent to the entire solar supply of a major European nation like France.

Storage solutions already being used worldwide have successfully demonstrated the working of two methods. One uses solar energy to create molten salts, whose heat-retentive qualities allow them to provide the oomph to drive electricity turbines through the night. Other solar plants, meanwhile, are using the sun's rays to compress gas that is then released after dark to spin those turbines.

Look Upwards

A more radical answer to issues about generating power when the sun goes down is to look to a place where it never sets – space. Both China and Japan are planning space-based solar power (SBSP) stations by 2030 that will dwarf previous projects of this kind. "An economically viable space power station would be really huge, with the total area of the solar panels reaching 5 to 6 square kilometers," explains Wang Xiji from the Chinese Academy of Sciences.

But why build power stations in space? A major reason is to tap the far higher levels of solar radiation available in space – more than 60% of the sun's energy is lost due to reflection and absorption in the Earth's atmosphere – and do it around-the-clock. "Space-based solar panels can generate ten times as much electricity as ground-based panels per unit area," points out Chinese space engineer, Duan Baoyan.

SBSP poses huge challenges, in particular the need to ensure super-accurate transmission to avoid frying vast swathes of the Earth's surface with an immensely powerful wandering beam. "When transmitting power by microwaves, a significant challenge is how to transmit it with pinpoint accuracy to a receiving site on the ground. Transmitting microwaves from an altitude of 36,000 km to a flat surface 3 km in diameter will be like threading a needle," says Yasuyuki Fukumuro of Japan's JAXA space agency.

Japan's Shimizu Corporation proposes an even more startling SBSP alternative – a 400km-wide belt of solar cells around the Moon's 11,000km equator. Dubbed the Luna Ring, it could beam back enough energy to meet the world's energy needs in a heartbeat.

Other challenges are system maintenance in the hostile environment of space and getting SBSP stations into orbit. A commercially viable space power station would likely weigh over 10,000 tonnes – yet few rockets today can carry payloads over 100 tonnes.

While creating SBSP stations poses huge challenges, they echo those faced by mankind's first ventures into space in the 1960s. Many queried the point of putting humans into space at all, and yet the technological and knowledge bonanza from meeting the challenges involved continues to reverberate through our modern world.

Ground Control

But while SBSP stations provide a fantastic frontier to push technology to new limits, it's the developments on the ground where the real potential lies. The truth is enough solar energy hits the Earth's surface – however weakened by the atmosphere – to meet humanity's power demands many times over. The 2015 Global Apollo Programme published by leading UK energy experts argued that the sun provides 5,000 times more energy to the Earth's surface than humanity currently uses.

Moreover, solar electricity has been getting steadily cheaper for years. The cost of solar panels has plunged to around 1/20th of 25 years ago, while efficiencies are rising. Current silicon-based panels convert around 20% of the sunlight falling on them to electricity – treble that of early panels; new panels based on compounds like gallium arsenide (a better electricity conductor than silicon) promise further improvement. This is despite the fact that there are inherent physical limits on the ultimate efficiency of solar panels due to various factors such as energy lost by reflection and the conductivity of materials (the Shockley-Queisser limit).

So how come only 1% of the world's electricity demands are currently supplied by solar energy? The key restraint is not technological, but political inertia driven largely by the vested interests of the giant fossil fuel businesses and a lack of proper investment, according to major reports like the Global Apollo Programme and MIT's 2015 report, The Future of Solar Energy. They show how huge global subsidies obscure the true cost of electricity generated from fossil fuels, as does a failure to add the costs of environmental and health damage they cause.

Another reason boils down to a "mismatch between lawmakers, regulations and technological players," according to Stéphane Declée, vice president of the Energy, Process & Utilities industry at Dassault Systèmes, a global software company.

"Our customers need to adapt to changing regulations and requirements. Using our 3DEXPERIENCE platform, solar energy players can demonstrate the viability and safety of their solutions to many different stakeholders, from regulators to financiers, from local communities to media."

Another challenge, notes Declée, is that "with a growing share of intermittent renewable energy sources, such as solar, power generation will not always match with times of high customer demand." The solution, according to Declée, is to develop systems that will more accurately control demand, like smart-grids, that can better balance intermittent supply with a more flexible demand, for example by storing part of the renewable energy for use at a later time.

Living Examples

In addition to projects being run by countries like China and Japan, many companies are running innovative programs to find even more efficient and cost-effective ways to produce and store energy. Arizona's giant Solana plant is a good example of Concentrated Solar Power's (CSP) potential to power a solar future. Its 3,000 giant mirrors focus desert rays to create super-heated water vapour that spins giant turbines, providing enough energy to run 70,000 homes. More importantly, Solana has giant tanks filled with molten salt that store enough heat during the day to run its turbines at full capacity for six hours after the sun sets. Little wonder that the number of CSP plants is set to double worldwide by 2018.

Smaller-scale technological leaps are also smoothing the way for a solar-powered future. New transparent polymer solar cells (PSCs) underpin 'solar windows' that make electricity by absorbing infrared light, while letting visible light through. "Our PSCs are lightweight, flexible and can be produced in high volume at low cost," explains Yang Yang, leader of the UCLA team that developed them. "The solar window is a game-change idea."

In transport, too, the game is changing. 2015 has seen the gossamer-light Solar Impulse plane making sun-powered progress around the globe, though more mainstream aviation is more likely to use the sun to make hydrogen for fuel. Electric cars powered by solar-produced hydrogen are already on the road and posting impressive figures. Eicke Weber, director of Germany's Fraunhofer Institute for Solar Energy Systems, drives one that's able to travel 300km on one 5-minute charge at the solar-powered hydrogen 'pump'.

Existing technology has already opened up the road ahead to a solar future, with space-based stations to challenge our finest engineers to push our technological envelope towards the stars. All we need is a gear change in political and economic priorities for the sun to shine bright on this potential energy revolution.

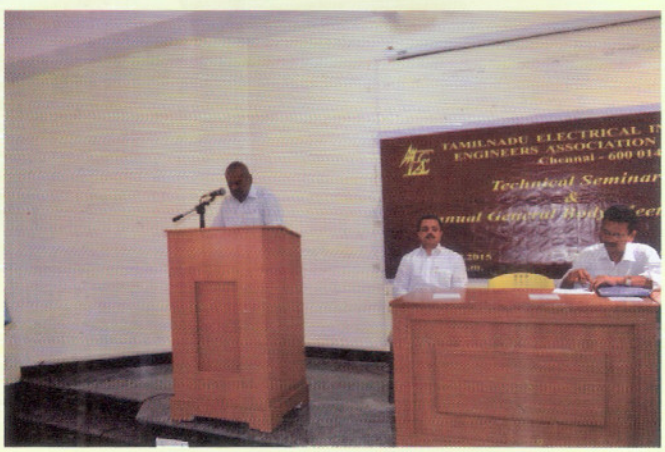
And with companies like Dassault Systèmes that help to connect the dots and bring a clearer and shared vision of what the future can bring, perhaps the dream of a solar-powered future can soon be turned into a reality.

Courtesy: BBC

TECHNICAL SEMINAR PHOTOS - 22.08.2015

Left to right: **Mr. K. KANNAN**, *Secretary, TNEIEA*;
Mr. S. JOHN, *Vice President, Tirunelveli, TNEIEA*;
Mr. U. BASKARAN, *President, TNEIEA*;
Mr. F.G. KULOOR, *AGM, Indl. Products, Havells India Ltd.*;
Mr. P. SUYAMBU, *Treasurer, TNEIEA*

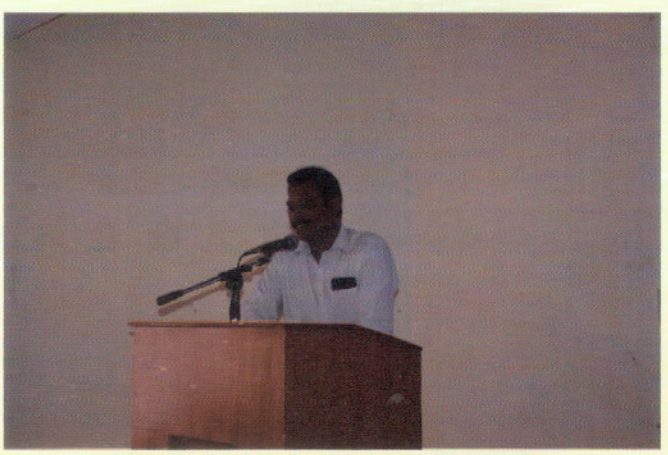
Master of Ceremony by
Mr. S. PONNAMBALANATHAN,
Vice President, Madurai, TNEIEA



Welcome Address by **Mr. S. JOHN**,
Vice President, Tirunelveli, TNEIEA

Speech by **Mr. U. BASKARAN,**
President, TNEIEA

Speech by **Mr. F.G. KULOOR,** *AGM, Indl. Products, Havells India Ltd.*



Presenting paper by **Mr. V. KUMAR,**
Sr. Branch Manager, Chennai, Havells India Ltd.

Mr. U. BASKARAN, *President, TNEIEA* honouring **Mr. V. KUMAR**, *Havells India Ltd.*

Mr. S. JOHN, *Vice President, Tirunelveli, TNEIEA* honouring **Mr. F.G. KULOOR,** *Havells India Ltd.*

Members Gathering

Vote of Thanks by **Mr. K. KANNAN**, *Secretary, TNEIEA*

AGM Photo - 22.08.2015

Left to right: **Mr. S. JOHN**, *Vice President, Tirunelveli;* **Mr. U. BASKARAN**, *President;* **Mr. K. KANNAN**, *Secretary*; **Mr. P. SUYAMBU,** *Treasurer*

Appeal for Facilitation for Dr.Govindarajulu for 50 years of service

We are happy to announce that we are organizing to celebrate a Golden Jubilee Celebration for renowned Consultant Dr.R.Govindarajulu aged 73 Years who has a formidable 52 years of experience of excellence in every aspect of Electrical Engineering. Recognizing his innovative approach in designing, admiring his dynamic decision-making capacity, technical competency, transparency in imparting his knowledge to others and his dedication in duties

We think it is an appropriate time to honour him for his services. …it will be a privilege for all of us to celebrate him in a whole hearted way. So far we have not done facilitations for any consultants like him. It is our ambition that this function should be consisting of all the members of Electrical Contractors, Electrical Traders, Colleague Consultants, Electrical Manufacturers and OEM vendors. In this regard it is our pleasure to inform you that a committee has been formed with following members for commencing the facilitation in organizing the function in a well-defined manner.

S.NO	NAME	FORUM	ORGANIZATION
1	MR.GOPALAN	MANUFACTURER	ON LOAD GEAR
2	MR.MUSHTAQ HASAN	O.E.M	ALLIANCE SERVICES
3	MR.RAKESH	TRADER	KULDEVI ELECTRICALS
4	MR.KALPESH	TRADER & MANUFACTURER	ASMON WIRE INDUSTRIES
5	MR.S.JANAKIRAMAN	CONTRACTOR	MENAKA ELECTRICALS
6	TAMIL MANI	SYSTEM INTEGRATOR	PRIYA ELECTRICALS
7	MR.BHASKAR	CONSULTANT	E-SOLUTIONS

Under the able guidance of the above committee members for various aspects of facilitation ceremony will be programmed. For conducting the function a grand and seamless manner it is decided to bring out a souvenir by collecting advertisements from all the well-wishers and also that amount will be the source for conducting the function. The following will be the tariff for various categories of advertisement.

a) **Quarter page of A4 size book – Rs.2,500/-**
b) **Half page of A4 size book – Rs.5,000/-**
c) **Full page of A4 size book – Rs.10,000/-**
d) **Separate tariff will be decided, for front page, back page, inside of front and back pages would be decided basing on the interest expressed by the advertisers.**

The advertisers are requested to pay the tariff fee either in a Crossed Account payee Cheque/RTGS/NEFT. Transactions drawn in favour of "Dr.Govindrajulu Trust"

Account Number: **154705004061**
Bank name: **ICICI BANK**
Branch: **DLF IT SEZ PARK**
IFSC code: **ICIC0001547**
MICR CODE: **600229061**
BRANCH CODE: **001547**

Address of communication:
Block 10, Ground Floor,
Home Finders Estate, 75/2,
Thiruvalluvar Salai, Ramapuram,
Chennai -600089
Phone No. – 044-22491987-88

We will also appreciate and welcome of sending appreciation letters, technical materials with regard to recent innovations in the area of Energy Conservation Measures and State of Art technology upgrades which can be added in the souvenir. We also welcome articles related to important Safety Measures in Installations, your experience or case studies which can be highlighted to all concerns. We wholeheartedly request the co-operation of all the well-wishers connected to the Electrical Engineering field to contribute for the above cause and make the function a grand success.

Thanking you,
FACILITATION COMMITTEE
DR.GOVINDARAJULU GOLDEN JUBILEE CELEBRATIONS
drgrgoldenjublee@gmail.com

POWERING ENGINEERS THROUGH TRAINING – L & T

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

CODE	PROGRAMME NAME	DAYS	SEP 2015	OCT 2015	NOV 2015	FEES Rs.
LT 01	**SELECTION OF LV SWITCHGEAR AND APPLICATIONS** Need for switchgear, LV switchgear terminologies, product standards, fault current calculation for LV system, Selection & application of low voltage switchgears - like contactors, thermal overload relays, motor starters.	5		12-16		**14000**
LT 02	**BEST MAINTENANCE PRACTICES IN LV SWITCHGEAR** Safety & good maintenance practices, complete hands-on workshop sessions on testing, troubleshooting & maintenance of low voltage switchgear.	5	7-11		16-20	**12500**
LT 03	**BREAKER MAINTENANCE WORKSHOP - C POWER ACB** Thorough hands-on training on C-Power range of Air Circuit Breakers, testing, setting & programming of various types of ACB microprocessor based protection releases like SR-71/SR21i.	3		5-7		**6750**
LT 04	**BREAKER MAINTENANCE WORKSHOP - U POWER OMEGA ACB** - Complete hands-on training on U-Power Omega range of air circuit breakers. Including pole assembly replacement, Fixing & testing of various accessories. Testing, setting & programming of various types of microprocessor based releases.	2		8-9		**4500**
LT 05	**SWITCHBOARD ELECTRICAL DESIGN** - Introduction to various standards for LV switchboard assembly including IEC 61439, types of panels, forms of seperation, fault current calculations as applicable to low voltage switchgear, bus bar selection & design.	3	2-4			**10000**
LT 06	**POWER DISTRIBUTION IN BUILDINGS** Design parameters relevant to large buildings. Procedure for load estimation; sizing of transformers and DG sets. Sizing of Low Voltage switchgears.	3				**10000**
LT 07	**ELECTRICAL SAFETY** - Basics – Safety, Importance of Safety, Electrical Safety, Types of Hazards, Fire, Shock, Effects of Fire and Shock, Safety in Residences, Safety in Industrial and Commercial premises.	1			30	**2500**
LT 08	**SELECTION & APPLICATION OF DRIVES** - Basics of LV motors, inverter duty motor, basics of LV AC VFDs, selection & application of AC VFDs, wiring diagram, parameter setting, salient features, energy conservation with AC VFDs, VFD vs soft starter. Classroom sessions supported by workshop demonstrations.	3				**10000**
LT 09	**REACTIVE POWER & HARMONICS MITIGATION** What is PF, types of LV capacitors, selection criteria, power factor improvement - concepts, methods & advantages, APFC panels, dynamic compensation.	2			26-27	**6750**
LT 10	**INTRODUCTION TO MEDIUM VOLTAGE SWITCHGEAR** Selection & application of vacuum circuit breaker, specification of vacuum circuit breaker, fault current calculation, vacuum vs SF6 as a medium of CB.	2				**6750**
LT 11	**INDUSTRIAL PROTECTION WITH NUMERICAL RELAYS** Introduction to protective relaying, terminologies,	4				**12500**

CODE	PROGRAMME NAME	DAYS	SEP 2015	OCT 2015	NOV 2015	FEES Rs.
	ANSI codes, CTs, PTs, Fault current calculations, relay co-ordination, feeder protection, motor protection, transformer protection, generator protection.					
LT 12	**CONSERVATION & MANAGEMENT OF ELECTRICAL ENERGY** Importance of energy conservation & management, fundamental concepts of ECM, terminologies, software, energy efficient technologies in electrical installations, Energy Conservation Act, ECBC, etc. including some case studies.	2			23-24	**6750**
LT 13	**REQUIREMENT OF SYSTEM & EQUIPMENT EARTHING** - Need & purpose of earthing, various types & methods of earthing, selection of earthing system, system & equipment earthing, sizing of earth conductors, generator earthing, transformer earthing, earthing of sensitive electronic equipment.	2			25-26	**8000**
LT 14	**INTRODUCTION TO INDUSTRIAL ELECTRICAL SYSTEMS** Overview of Indian power system, typical industrial electric power distribution scheme, classroom sessions with workshop demonstrations giving exposure to a wide range of low voltage switchgear like contactors.	3	21-23, 28-30	19-21	11-13	**3000**
LT 15	**FIRE DETECTION & SECURITY SOLUTIONS** - Basics of Fire Alarm System, Conventional & Addressable FAS, Field devices, Panels & Software, Design / BOQ from Floor plans.	1				**3500**
LT 16	**BUILDING MANAGEMENT & ENERGY MANAGEMENT SYSTEMS** - Basics of BMS, Components of BMS, Input & output devices, Controllers & Software, Installation & Commissioning, Energy Saving and Green building certification through BMS, Basics of Energy management, hardware and software features.	1				**3500**
LT 17	**SELECTION, PROTECTION & MAINTENANCE OF TRANSFORMER** - Selection, Classification, Operation of Power and Distribution transformer, Vector groups, Transformer protections, Routine tests for transformer, Testing of transformer oil, Transformer maintenance, Earthing of transformer, relevant IS/IEC standards.	2				**6750**
LT 18	**INDUSTRIAL ELECTRICIAN TRAINING PROGRAMME** - Safety & good maintenance practices, hands-on workshop sessions on testing, troubleshooting & maintenance of low voltage switchgear such as contactors, overload relays, motor starters, switch disconnector fuse, good termination practices.	2		26-27		**2000**
LT 19	**ELECTRICIAN TRAINING PROGRAMME FOR RESIDENTIAL BUILDINGS** - Basics of electricity, Selection of MCB, ELCB, domestic Switches, Wires and accessories e.g. Time switch, Introduction to Distribution boards, wiring demo staircase , godown lighting etc.	1		28		**1000**
LT 20	**SWITCHGEAR SELECTION - MOTOR CONTROL CENTRE (MCC)** - Motor control and protection techniques, Selection of Controlgear product range includes Contactor, O/L Relay, starter - Type-2 coordination.	2	22-23		2-3	**5500**
LT 21	**SWITCHGEAR SELECTION - POWER CONTROL CENTRE (PCC)** LV Power distribution, Latest trends and selection of ACB, MCCB, SDF, Changeover and related accessories.	2	24-25		4-5	**5500**
LT 22	**DESIGN OF CONTROL CIRCUITS** - Control Circuits & Schemes Fundamental Graphical Symbols & Nomenclatures of Various Components, Guidelines for Control Circuit Diagram.	2		29-30		**6750**

For more information about the Training Calendar and programmes.

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

ENERGY CONSERVATION THROUGH ENERGY EFFICIENCY – 7

Electrical Losses :

Electrical Losses fall under two important categories of a) Fixed or No Load or Magnetisation or Iron Losses and b) Variable or Load losses or ***I^2R losses*** or Copper Losses. Before we get on with Fixed or Iron Losses, let us look at some more important dimensions of ***I^2R losses.*** This is one of the major category or important loss accounting for substantial Electrical Losses. As we have seen earlier, wherever there is flow of current ***I*** in a conductor with resistance value of ***R,*** there is ***I^2R loss.*** We earlier saw an example of reduction of Voltage Drop or ***IR Drop,*** for saving energy through reduction of ***R,*** through use of increased sizes of cables with reduced ***R Value.*** Another important component of ***I^2R*** Loss is ***I*** which represents the quantum of current flow. This ***I*** is decided primarily by Load Condition and also by ***Power Factor,*** in case of AC System.

Power Factor:

With the advent of AC System of Electricity and use of Equipments in the System like Tube Lights, Induction Motors, Transformers etc, a ***Power Factor*** gets introduced in the System, which in effect, can increase the total quantum of current flowing in the conductor which can contribute to increased ***I^2R*** losses. Before we get on to see the basics of ***Power Factor*** and how to address to control it to reduce the ***I^2R*** Losses etc, let us look at the "Problem of ***Power Factor",*** if it is considered so, in a different perspective.

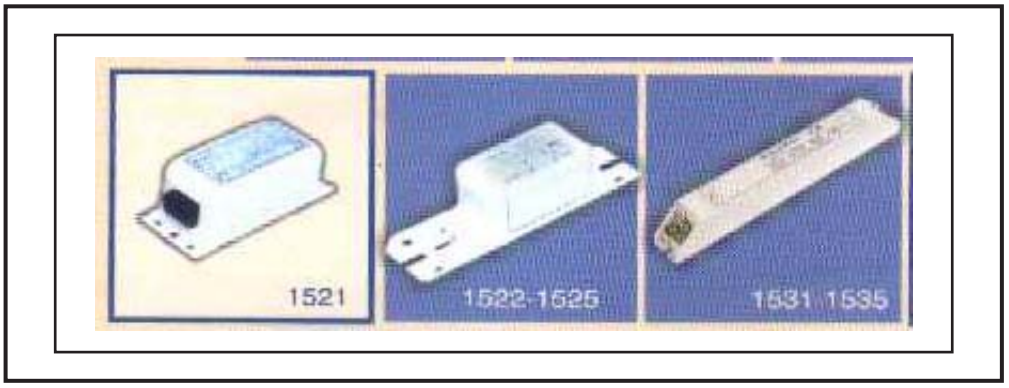
The advent of AC System enabled transmission of Electricity at High and Extra High Voltages resulting in reduction of ***I*** in the System resulting in substantial reduction of ***I^2R*** Losses. Many of the Equipments in the AC System are Energy Efficient and Efficiencies can be increased further with designs. One simple example can be ***Lighting,*** where the Power Factor of both ***Incandescent Bulbs and Halogen Bulbs*** (which are both DC and AC) is Unity, but the Efficiencies are Poor in contrast to Florescent or CFL or other Gas Discharge Lamps, where the Power Factors or less than Unity, but the Efficiencies are much Higher. Even in AC Motors, in cases of Energy Efficient and Premium Efficiency Motors, the Power Factor tends to get Lower. The Moral therefore is that the Energy Efficiencies and substantial Energy Savings are obtained along with the 'Problem of Power Factor', which really not a problem but needs to addressed. In case this is addressed successfully, we can achieve Efficient Use of Energy resulting in Energy and Resources Saving.

Given below are the details of Performance and Average life of Different Types of Bulbs.

Type	Light- Lumens/ W	Average Life
Incandescent	10 L/W	1000 hrs
Florescent	60 L/W	5000 hrs
CFL	60 L/W	8000 hrs
HPMV	50 L/W	5000 hrs
Halogen	20 L/W	3000 hrs
HPSV	90 L/W	10000 hrs
LPSV	150 L/W	10000 hrs
LED	90 L/W	> 20000 hrs

Tube Lights and Energy Consumption		
Type of TFL	W	LIGHT
Standard T -12	40	**2450 Lumens**
Standard T - 8	36	**2450 Lumens**
Thin Dia T - 5	28	**2900 Lumens**

Energy Consumption by Chokes



Basics of Power Factor and Power Factor Improvement

Two types of Electrical loads

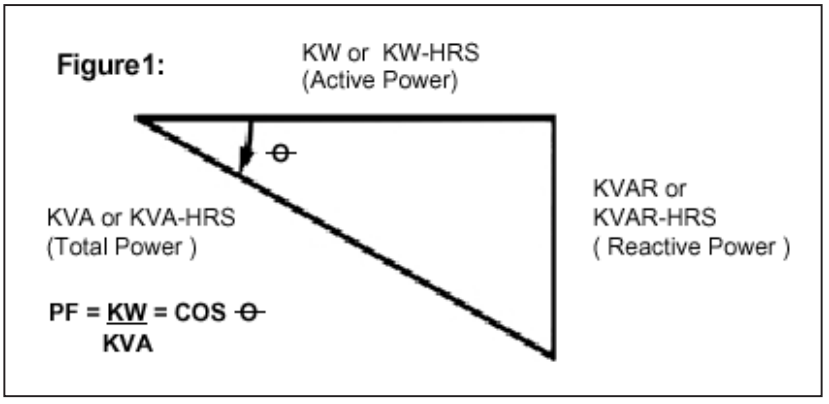
In most modern electrical distribution systems, the predominant loads are resistive and inductive.

1) Resistive loads are incandescent lighting and resistance heating.
2) Inductive loads are A.C. Motors, induction furnaces, transformers and ballast-type lighting.

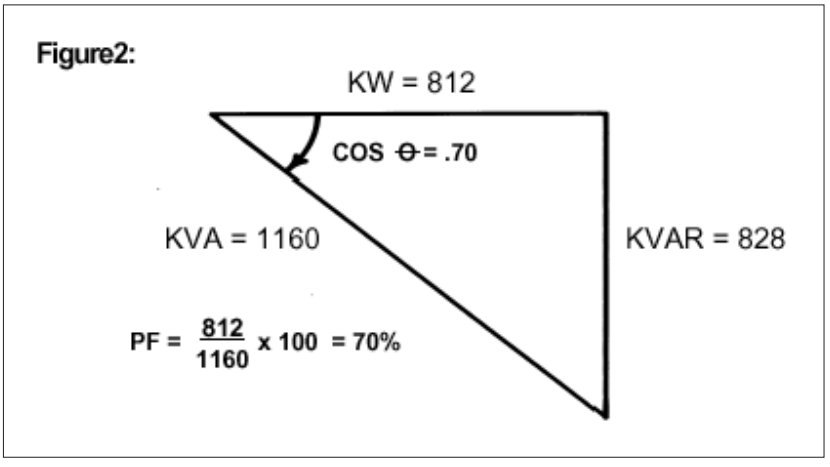
Inductive loads require two kinds of power:

1. Active (or working) power to perform the work (motion) and
2. Reactive power to create and maintain electro-magnetic fields.

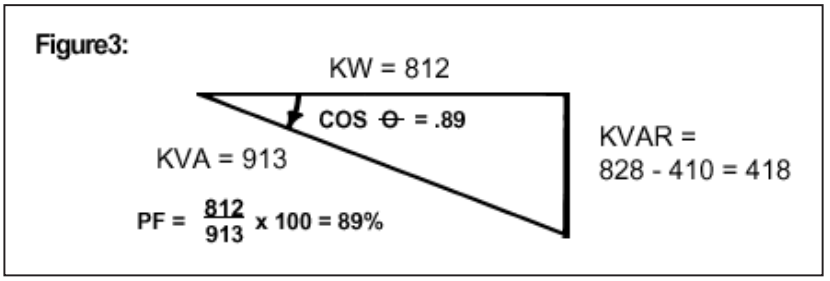
The vector sum of the active power and reactive power make up the total (or apparent) power used. This is the power generated by the utility for the user to perform a given amount of work.



If the Power Factor can be made Unity, KW = KVA or V X I = V X I The Current I will be lowest.



Transformer loading – 1160/1500 = 78 % **Assuming a Voltage of 400V, THE Current I at 0.7 PF is 2900A and at Unity PF, the Current I is 2030A**



Capacitors totaling 410 kVAr installed in each of the 13 large motors Transformer loading – 913/1500 = 61%

How to determine the Rating of capacitors required?

Example:

Method-1

The utility bill shows an average power factor of .72 with an average KW of 627. How much KVAR is required to improve the power factor to .95?

STEPS:

Cos F_1 = 0.72, Tan F_1 = 0.963

Cos F_2 = 0.95, Tan F_2 = 0.329

Kvar required = P (Tan f_1 − Tan f_2) = 627 (0.964 − 0.329) = **398 kVAr**

Method-2

1. Locate 0.72 (original power factor) in column (1). Refer table.
2. Read across desired power factor to 0.95 column. We find .635 multiplier
3. Multiply 627 (average KW) by .635 = 398 KVAR.
4. Install 400 KVAR to improve power factor to 95%.

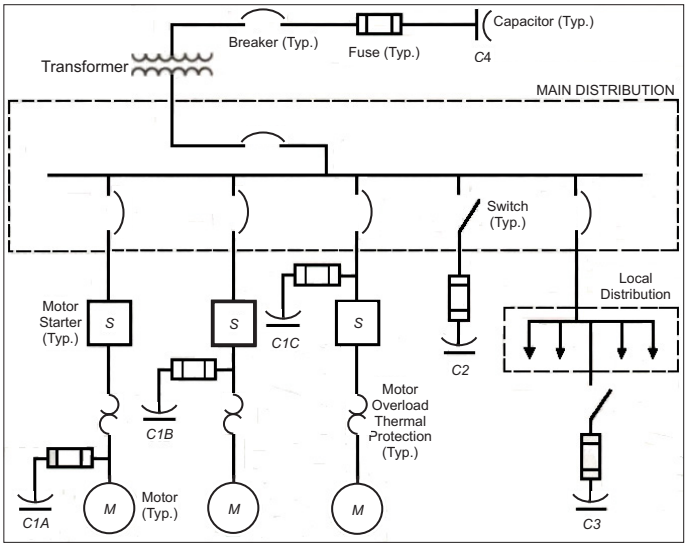
Now that we have determined that capacitors totaling 400 KVAR must be installed, we must decide where to locate them.

Where to Locate Capacitors?

For motors of 50 hp and above, it is best to install power factor correction capacitors at the motor terminals since distribution circuit loading is reduced

The second arrangement shows capacitor banks connected at the bus for each motor control centre. This compromise to Method 1 will reduce installation costs.

The least expensive method shows capacitor banks connected at the service entrance. However, the disadvantage is that higher feeder currents still flow from the service entrance to the end of line equipment.



Reduction in Distribution Loss:- As current flows through conductors, the conductors heat. This heating is power loss. Power loss is proportional to current squared (P Loss =I^2R). Current is proportional to P. F.:

Conductor loss can account for as much as 2- 5% of total load

Capacitors can reduce losses by 1- 2% of the total load

% Loss Reduction = [1 − (PF_1 / PF_2)^2] x 100

Original Power Factor	Desired Power Factor																				
	0.80	0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.90	0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1.0
0.50	0.982	1.008	1.034	1.060	1.086	1.112	1.139	1.165	1.192	1.220	1.248	1.276	1.306	1.337	1.369	1.403	1.440	1.481	1.529	1.589	1.732
0.51	0.937	0.962	0.989	1.015	1.041	1.067	1.094	1.120	1.147	1.175	1.203	1.231	1.261	1.292	1.324	1.358	1.395	1.436	1.484	1.544	1.687
0.52	0.893	0.919	0.945	0.971	0.997	1.023	1.050	1.076	1.103	1.131	1.159	1.187	1.217	1.248	1.280	1.314	1.351	1.392	1.440	1.500	1.643
0.53	0.850	0.876	0.902	0.928	0.954	0.980	1.007	1.033	1.060	1.088	1.116	1.144	1.174	1.205	1.237	1.271	1.308	1.349	1.397	1.457	1.600
0.54	0.809	0.835	0.861	0.887	0.913	0.939	0.966	0.992	1.019	1.047	1.075	1.103	1.133	1.164	1.196	1.230	1.267	1.308	1.356	1.416	1.559
0.55	0.769	0.795	0.821	0.847	0.873	0.899	0.926	0.952	0.979	1.007	1.035	1.063	1.093	1.124	1.156	1.190	1.227	1.268	1.316	1.376	1.519
0.56	0.730	0.756	0.782	0.808	0.834	0.860	0.887	0.913	0.940	0.968	0.996	1.024	1.054	1.085	1.117	1.151	1.188	1.229	1.277	1.337	1.480
0.57	0.692	0.718	0.744	0.770	0.796	0.822	0.849	0.875	0.902	0.930	0.958	0.986	1.016	1.047	1.079	1.113	1.150	1.191	1.239	1.299	1.442
0.58	0.655	0.681	0.707	0.733	0.759	0.785	0.812	0.838	0.865	0.893	0.921	0.949	0.979	1.010	1.042	1.076	1.113	1.154	1.202	1.262	1.405
0.59	0.619	0.645	0.671	0.697	0.723	0.749	0.776	0.802	0.829	0.857	0.885	0.913	0.943	0.974	1.006	1.040	1.077	1.118	1.166	1.226	1.369
0.60	0.583	0.609	0.635	0.661	0.687	0.713	0.740	0.766	0.793	0.821	0.849	0.877	0.907	0.938	0.970	1.004	1.041	1.082	1.130	1.190	1.333
0.61	0.549	0.575	0.601	0.627	0.653	0.679	0.706	0.732	0.759	0.787	0.815	0.843	0.873	0.904	0.936	0.970	1.007	1.048	1.096	1.156	1.299
0.62	0.516	0.542	0.568	0.594	0.620	0.646	0.673	0.699	0.726	0.754	0.782	0.810	0.840	0.871	0.903	0.937	0.974	1.015	1.063	1.123	1.266
0.63	0.483	0.509	0.535	0.561	0.587	0.613	0.640	0.666	0.693	0.721	0.749	0.777	0.807	0.838	0.870	0.904	0.941	0.982	1.030	1.090	1.233
0.64	0.451	0.474	0.503	0.529	0.555	0.581	0.608	0.634	0.661	0.689	0.717	0.745	0.775	0.806	0.838	0.872	0.909	0.950	0.998	1.068	1.201
0.65	0.419	0.445	0.471	0.497	0.523	0.549	0.576	0.602	0.629	0.657	0.685	0.713	0.743	0.774	0.806	0.840	0.877	0.918	0.966	1.026	1.169
0.66	0.388	0.414	0.440	0.466	0.492	0.518	0.545	0.571	0.598	0.626	0654	0.682	0.712	0.743	0.775	0.809	0.846	0.887	0.935	0.995	1.138
0.67	0.358	0.384	0.410	0.436	0.462	0.488	0.515	0.541	0.568	0.596	0.624	0.652	0.682	0.713	0.745	0.779	0.816	0.857	0.905	0.965	1.108
0.68	0.328	0.354	0.380	0.406	0.432	0.458	0.485	0.511	0.538	0.566	0.594	0.622	0.652	0.683	0.715	0.749	0.786	0.827	0.875	0.935	1.078
0.69	0.299	0.325	0.351	0.377	0.403	0.429	0.456	0.482	0.509	0.537	0.565	0.593	0.623	0.654	0.686	0.720	0.757	0.798	0.846	0.906	1.049
0.70	0.270	0.296	0.322	0.348	0.374	0.400	0.427	0.453	0.480	0.508	0.536	0.564	0.594	0.625	0.657	0.691	0.728	0.769	0.817	0.877	10.20
0.71	0.242	0.268	0.294	0.320	0.346	0.372	0.399	0.425	0.452	0.480	0.508	0.536	0.566	0.597	0.629	0.663	0.700	0.741	0.789	0.849	0.992
0.72	0.214	0.240	0.266	0.292	0.318	0.344	0.371	0.397	0.424	0.452	0.480	0.508	0.538	0.569	0.601	0.635	0.672	0.713	0.761	0.821	0.964
0.73	0.186	0.212	0.238	0.264	0.290	0.316	0.343	0.369	0.396	0.424	0.452	0.480	0.510	0.541	0.573	0.607	0.644	0.685	0.733	0.793	0.936
0.74	0.159	0.185	0.211	0.237	0.263	0.289	0.316	0.342	0.369	0.397	0.425	0.453	0.483	0.514	0.546	0.580	0.617	0.658	0.706	0.766	0.909
0.75	0.132	0.158	0.184	0.210	0.236	0.262	0.289	0.315	0.342	0.370	0.398	0.426	0.456	0.487	0.519	0.553	0.590	0.631	0.679	0.739	0.882
0.76	0.105	0.131	0.157	0.183	0.209	0.235	0.262	0.288	0.315	0.343	0.371	0.399	0.429	0.460	0.492	0.526	0.563	0.604	0.652	0.712	0.855
0.77	0.079	0.105	0.131	0.157	0.183	0.209	0.236	0.262	0.289	0.317	0.345	0.373	0.403	0.434	0.466	0.500	0.537	0.578	0.626	0.686	0.829
0.78	0.052	0.078	0.104	0.130	0.156	0.182	0.209	0.235	0.262	0.290	0.318	0.346	0.376	0.407	0.439	0.473	0.510	0.551	0.599	0.659	0.802
0.79	0.026	0.052	0.078	0.104	0.130	0.156	0.183	0.209	0.236	0.264	0.292	0.320	0.350	0.381	0.413	0.447	0.484	0.525	0.573	0.633	0.776
0.80	0.000	0.026	0.052	0.078	0.104	0.130	0.157	0.183	0.210	0.238	0.266	0.294	0.324	0.355	0.387	0.421	0.458	0.499	0.547	0.609	0.750
0.81		0.000	0.026	0.052	0.078	0.104	0.131	0.157	0.184	0.212	0.240	0.268	0.298	0.329	0.361	0.395	0.432	0.473	0.521	0.581	0.724
0.82			0.000	0.026	0.052	0.078	0.105	0.131	0.158	0.186	0.214	0.242	0.272	0.303	0.335	0.369	0.406	0.447	0.495	0.555	0.698
0.83				0.000	0.026	0.052	0.079	0.105	0.132	0.160	0.188	0.216	0.246	0.277	0.309	0.343	0.380	0.421	0.469	0.529	0.672
0.84					0.000	0.026	0.053	0.079	0.106	0.134	0.162	0.190	0.220	0.251	0.283	0.317	0.354	0.395	0.443	0.503	0.646
0.85						0.000	0.027	0.053	0.080	0.108	0.136	0.164	0.194	0.225	0.257	0.291	0.328	0.369	0.417	0.477	0.620
0.86							0.000	0.026	0.053	0.081	0.109	0.137	0.167	0.198	0.230	0.264	0.301	0.342	0.390	0.450	0.593
0.87								0.000	0.027	0.055	0.083	0.111	0.141	0.172	0.204	0.238	0.275	0.316	0.364	0.424	0.567
0.88									0.000	0.028	0.056	0.084	0.114	0.145	0.177	0.211	0.248	0.289	0.337	0.397	0.540
0.89										0.000	0.028	0.056	0.086	0.117	0.149	0.183	0.220	0.261	0.309	0.369	0.512
0.90											0.000	0.028	0.058	0.089	0.121	0.155	0.192	0.233	0.281	0.341	0.484
0.91												0.000	0.030	0.061	0.093	0.127	0.164	0.205	0.253	0.313	0.456
0.92													0.000	0.031	0.063	0.097	0.134	0.175	0.223	0.283	0.426
0.93														0.000	0.032	0.066	0.103	0.144	0.192	0.252	0.395
0.94															0.000	0.034	0.071	0.112	0.160	0.220	0.636
0.95																0.000	0.037	0.079	0.126	0.186	0.329
0.96																	0.000	0.041	0.089	0.149	0.292
0.97																		0.000	0.048	0.108	0.251
0.98																			0.000	0.060	0.203
0.99																				0.000	0.143
																					0.000

(To be continued)

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

MADRAS DAY – 22.08.2015

Madras Day marks the day the agents of British East India Company bought a small piece of land to build Fort St George.

Madras Day is a day of celebrations organised in the city of Madras (Chennai), the capital city of the Indian state of Tamil Nadu. It is celebrated on 22nd August every year, and is named after the city. It commemorates the founding of the modern city by establishing Fort St George on a small piece of land acquired from the last King of Chandragiri in 1639 by the British East India Company. The celebrations include several events organised including citizens and students and lasts for a week.

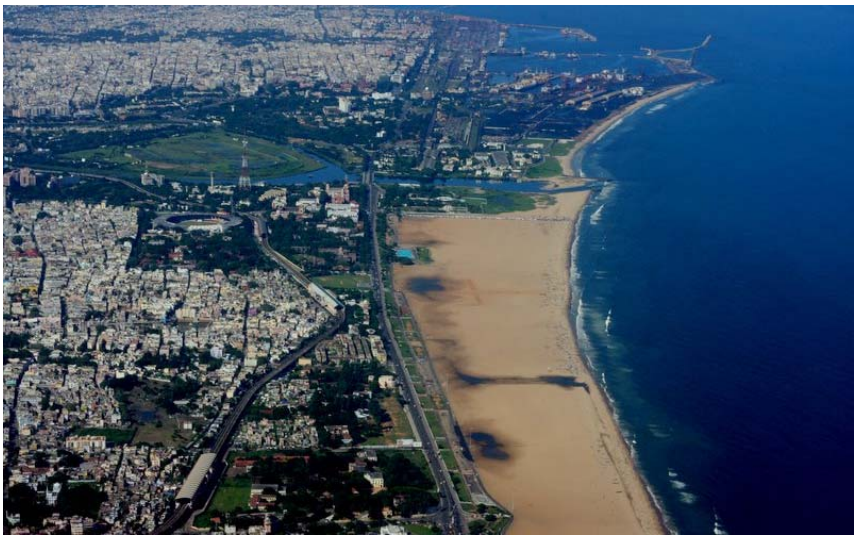
Birth of Madras Day – The idea to celebrate the birth of the city every year was born when journalists Shashi Nair and Vincent D'Souza met the city's historian and Editor of Madras Musings, S. Muthiah at his residence for coffee. It was based on the success of another event called Mylapore Festival which D'Souza had been organising every year in January. It was decided by the trio to start celebrating Madras Day from 2004. According to them, "*primary motive of celebrating `Madras Day' was to focus on the city, its past and its present.*" The idea initially started off with about five events in 2004, but with 2008, has over 60 different events associated with the day including heritage walks, photo walks, lectures, poetry and caption and quiz contests, food festivals and a Bullet tour lasting for a week.

SOME PHOTOGRAPHS OF PRESENT CHENNAI

1) Kathippara Junction

2) Chennai Southern Skyline

3) Chennai Marina



4) Anna Memorial

5) Chennai in lush Greenery

வந்து பாருங்கள் – ஆரோவில்

மாறுபட்ட ஆன்மிக அனுபவம்

உலகை சுற்றி பார்ப்பது அனைவராலும் இயலாத காரியம். அதேநேரத்தில் பெரும்பாலான உலக நாட்டவரை, ஒரே இடத்தில் பார்க்கும் குட்டி உலகம் ஒன்று உண்டு. அதுதான் ஆரோவில்.

ஆன்மிக சுற்றுலாவில் உள்முக பயணத்துக்கான இடங்கள் நாட்டில் பலவுண்டு. பல அறியாத விஷயங்களை இயல்பாய் நமக்கு புரிய வைக்கும் இடங்களில் ஒன்று *ஆரோவில் மாத்ரி மந்திர்.*

புதுச்சேரி அருகேயுள்ள விழுப்புரம் பகுதியில் ஆரோவில் சர்வதேச நகரமுள்ளது. உலகெங்கும் 121 நாடுகள், இந்தியாவிலுள்ள அனைத்து மாநிலங்களில் இருந்து மண் சேகரிக்கப்பட்டு திறந்தவெளி கலையரங்கிலுள்ள தாமரை மொட்டு வடிவமைப்பு உள்ள இடத்தில் வைக்கப்பட்டுள்ளது. அதன் அருகே **மாத்ரி மந்திர்** என்ற தியான மண்டபமும் உள்ளது. **'ஆரோவில்லின் ஆன்மா'** என்று ஸ்ரீஅன்னையால் வர்ணிக்கப் பெற்ற **'மாத்ரி மந்திர்'** என்ற வடசொல்லுக்கு **'அன்னை ஆலயம்'** என்று பொருள். **மாத்ரி மந்திர்** சிறிது தட்டையான கோள வடிவிலான ஆலயமாகும். கோளத்தின் உட்புற மேற்பகுதியில் ஒரு பெருங்கூடம் உள்ளது. அங்கு விக்கிரகங்களோ, படங்களோ கிடையாது. சடங்கு, சம்பிரதாயங்களையோ அல்லது எந்த மதத்தைச் சேர்ந்ததாகவோ இது அமைக்கப்படவில்லை.

பொதுவாக, ஞாயிற்றுக் கிழமைகளில் காலை 9.30 மணி முதல் 12.30 வரை அனுமதி உண்டு. ஏனைய நாட்களில் காலை 9.30 மணி முதல் மாலை 4.00 மணி வரை அனுமதி உண்டு.

முன் அனுமதி பெற்றவர்கள் மட்டும் குறிப்பிட்ட எண்ணிக்கை அளவிலேயே மாத்ரி மந்திரினுள் செல்ல அனுமதிக்கப்படுவதால், முன்கூட்டியே பதிவு செய்துகொள்வது நல்லது. சில குறிப்பிட்ட தினங்களில் மாத்ரி மந்திருக்குள் செல்ல அனுமதிக்கப்படாத நிலையில், முன்கூட்டியே அது பற்றிய தகவல்களைத் தெரிந்துகொண்டு செல்ல வேண்டும்.

Courtesy: தி இந்து, ஜய வருட மலர் 2014

20 MOST PEACEFUL COUNTRIES IN THE WORLD - 10

JAPAN

One of the most enchanting countries culturally, **Japan** has the third largest economy in the world. Since the World War II, Japan has been really peaceful, with little internal conflict and low crime. The country settles on an internal security force in order to maintain the peace. Japan is a peaceful as well as breath takingly beautiful country worth visiting.

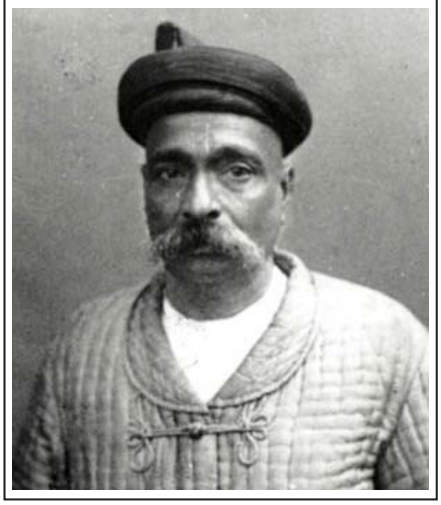
(To be continued)

Courtesy: Amerikanki

BAL GANGADHAR TILAK

Born: July 23, 1856

Died: August 1, 1920



Achievements: Considered as Father of Indian National Movement; Founded "Deccan Education Society" to impart quality education to India's youth; was a member of the Municipal Council of Pune, Bombay Legislature, and an elected 'Fellow' of the Bombay University; formed Home Rule League in 1916 to attain the goal of Swaraj. Bal Gangadhar Tilak is considered as Father of Indian National Movement. Bal Gangadhar Tilak was a multifaceted personality. He was a social reformer, freedom fighter, national leader, and a scholar of Indian history, sanskrit, hinduism, mathematics and astronomy. Bal Gangadhar Tilak was popularly called as Lokmanya (Beloved of the people). During freedom struggle, his slogan "Swaraj is my birthright and I shall have it" inspired millions of Indians.

Bal Gangadhar Tilak was born on July 23, 1856 in Ratnagiri, Maharashtra. He was a Chitpavan Brahmin by caste. His father Gangadhar Ramachandra Tilak was a Sanskrit scholar and a famous teacher. Tilak was a brilliant student and he was very good in mathematics. Since childhood Tilak had an intolerant attitude towards injustice and he was truthful and straightforward in nature. He was among India's first generation of youth to receive a modern, college education. When Tilak was ten his father was transferred to Pune from Ratnagiri. This brought sea change in Tilak's life. He joined the Anglo-Vernacular School in Pune and got education from some of the well known teachers. Soon after coming to Pune Tilak lost his mother and by the time he was sixteen he lost his father too. While Tilak was studying in Matriculation he was married to a 10-year-old girl called Satyabhama. After passing the Matriculation Examination Tilak joined the Deccan College. In 1877, Bal Gangadhar Tilak got his B.A. degree with a first class in mathematics. He continued his studies and got the LL.B. degree too. After graduation, Tilak began teaching mathematics in a private school in Pune and later became a journalist. He became a strong critic of the Western education system, feeling it demeaning to Indian students and disrespectful to India's heritage. He came to the conclusion that good citizens can be moulded only through good education. He believed that every Indian had to be taught about Indian culture and national ideals. Along with his classmate Agarkar and great social reformer Vishnushastry Chiplunkar, Bal Gangadhar Tilak founded "Deccan Education Society" to impart quality education to India's youth. The very next year after the Deccan Education Society was founded, Tilak started two weeklies, 'Kesari' and 'Mahratta'. 'Kesari' was Marathi weekly while 'Mahratta' was English weekly. Soon both the newspapers became very popular. In his newspapers, Tilak highlighted the plight of Indians. He gave a vivid picture of the people's sufferings and of actual happenings. Tilak called upon every Indian to fight for his right. Bal Gangadhar Tilak used fiery language to arouse the sleeping Indians. Bal Gangadhar Tilak joined the Indian National Congress in 1890. He was a member of the Municipal Council of Pune, Bombay Legislature, and an elected 'Fellow' of the Bombay University. Tilak was a great social reformer. He issued a call for the banning of child marriage and welcomed widow remarriage. Through the celebrations of Ganapati Festival and the birthday of the Shivaji he organized people. In 1897, Bal Gangadhar Tilak was charged with writing articles instigating people to rise against the government and to break the laws and disturb the peace. He was sentenced to rigorous imprisonment for one and a half year. Tilak was released in 1898. After his release, Tilak launched Swadeshi Movement. Through newspapers and lectures, Tilak spread the message to each and every village in Maharashtra. A big 'Swadeshi Market' was opened in front of Tilak's house. Meanwhile, Congress was split into two camps-Moderates and Extremists. Extremists led by Bal Gangadhar Tilak opposed the moderate faction led by Gopal Krishna. Extremists were in the favour of self rule while the moderates thought that time is not yet ripe for such an eventuality. This rift finally led to a split in the Congress. Tilak was arrested on the charges of sedition in 1906. After the trial, Tilak was sentenced to six years of imprisonment in Mandalay (Burma). Tilak spent his time in prison by reading and writing. He wrote the book **'GITA-RAHASYA'** while he was in prison. Tilak was released on June 8, 1914. After his release, Bal Gangadhar Tilak tried to bring the two factions of Congress together. But his efforts did not bear much fruit. In 1916, Tilak decided to build a separate organization called the 'Home Rule League'. Its goal was swaraj. Tilak went from village to village, and explained the aim of his league to the farmers and won their hearts. He traveled constantly in order to organize the people. While fighting for people's cause Bal Gangadhar Tilak died on August 1, 1920.

HOMI JEHANGIR BHABHA (1909 – 1966)

Homi Jehangir Bhabha, FRS (30 October 1909 – 24 January 1966) was an Indian nuclear physicist, founding director, and professor of physics at the Tata Institute of Fundamental Research. Colloquially known as **"father of Indian nuclear programme"**, Bhabha was the founding director of two well-known research institutions, namely the **Tata Institute of Fundamental Research (TIFR)** and the **Trombay Atomic Energy Establishment** (now named after him); both sites were the cornerstone of Indian development of nuclear weapons which Bhabha also supervised as its director.

Starting his scientific career in nuclear physics from Great Britain, Bhabha returned to India for his annual vacation prior to start of World War II in September 1939, prompting Bhabha to remain in India, and accepted a post of reader in physics at the Indian Institute of Science in Bengaluru, headed by Nobel laureate C.V. Raman. During this time, Bhabha played a key role in convincing the Congress Party's senior leaders, most notable Jawaharlal Nehru who later served as India's first Prime Minister, to start the ambitious nuclear programme. As part of this vision, Bhabha established the Cosmic Ray Research Unit at the institute, began to work on the theory of the movement of point particles, while independently conduct research on nuclear weapons in 1944. In 1945, he established the Tata Institute of Fundamental Research in Bombay, and the Atomic Energy Commission in 1948, serving as its first chairman. In 1948, Nehru led the appointment of Bhabha as the **director of the nuclear programme** and tasked Bhabha to develop the nuclear weapons soon after. In the 1950s, Bhabha represented India in IAEA conferences, and served as **President of the United Nations Conference on the Peaceful Uses of Atomic Energy in Geneva,** Switzerland in 1955. During this time, he intensified his lobbying for developing the nuclear weapons, and soon after the Sino-Indo war, Bhabha aggressively and publicly began to call for the nuclear weapons.

Bhabha gained international prominence after deriving a correct expression for the probability of scattering positrons by electrons, a process now known as Bhabha scattering. His major contribution included his work on Compton scattering, R-process, and furthermore the advancement of nuclear physics. He was awarded Padma Bhushan by Government of India in 1954. He later served as the member of the Indian Cabinet's Scientific Advisory Committee and provided the pivotal role to Vikram Sarabhai to set up the Indian National Committee for Space Research. In January 1966, Bhabha died in a plane crash near Mont Blanc, while heading to Vienna, Austria to attend a meeting of the International Atomic Energy Agency's Scientific Advisory Committee.

Early life

Homi Jehangir Bhabha was born into a wealthy and prominent industrial Parsi family, through which he was related to Dinshaw Maneckji Petit, and Dorabji Tata. He was born on 30 October 1909, in an illustrious family with a long tradition of learning and service to the country. His father was Jehangir Hormusji Bhabha, a well known lawyer and his mother was Meheren. He received his early education at Bombay's Cathedral and John Connon School and entered Elphinstone College at age 15 after passing his Senior Cambridge Examination with Honors. His fathers name, Jehangir, is from Persian, meaning "conqueror of the world."

He then attended the Royal Institute of Science until 1927 before joining Caius College of Cambridge University. This was due to the insistence of his father and his uncle Dorab Tata, who planned for Bhabha to obtain a degree in Mechanical engineering from Cambridge and then return to India, where he would join the Tata Steel Mills in Jamshedpur as a metallurgist.

At the University of Cambridge

Bhabha's father understood his son's predicament, and he agreed to finance his studies in mathematics provided that he obtain first class on his Mechanical Sciences Tripos exam. Bhabha took the Tripos exam in June 1930 and passed with first class. Afterwards, he embarked on his mathematical studies under Paul Dirac to complete the Mathematics Tripos. Meanwhile, he worked at the Cavendish Laboratory while working towards his doctorate in theoretical physics. At the time, the laboratory was the center of a number of scientific breakthroughs. James Chadwick had discovered the neutron, John Cockcroft and Ernest Walton transmuted lithium with high-energy protons, and Patrick Blackett and Giuseppe Occhialini used cloud chambers to demonstrate the production of electron pairs and showers by gamma radiation.

During the 1931–1932 academic year, Bhabha was awarded the Salomons Studentship in Engineering. In 1932, he obtained first class on his Mathematical Tripos and was awarded the Rouse Ball traveling studentship

in mathematics. During this time, the nuclear physics was attracting the greatest minds and it was one of the most significantly emerging fields as compared to theoretical physics, the opposition towards theoretical physics attacked the fields as it was lenient towards theories rather than proving the natural phenomenon through experiments. Conducting experiments on particles which also released tremendous amount of radiation, was lifelong passion of Bhabha, and his leading edge research and experiments brought great laurels to Indian physicists who particularly switched their fields to nuclear physics, one of the most notable being Piara Singh Gill.

Research in Nuclear physics

In January 1933, Bhabha received his doctorate in nuclear physics after publishing his first scientific paper, ***"The Absorption of Cosmic radiation"***. In the publication, Bhabha offered an explanation of the absorption features and electron shower production in cosmic rays. The paper helped him win the Isaac Newton Studentship in 1934, which he held for the next three years. The following year, he completed his doctoral studies in theoretical physics under Ralph H. Fowler. During his studentship, he split his time working at Cambridge and with Niels Bohr in Copenhagen. In 1935, Bhabha published a paper in the *Proceedings of the Royal Society, Series A*, in which performed the first calculation to determine the cross section of electron-positron scattering. Electron-positron scattering was later named Bhabha scattering, in honor of his contributions in the field.

In 1936, the two published a paper, **"The Passage of Fast Electrons and the Theory of Cosmic Showers"** in the *Proceedings of the Royal Society, Series A*, in which they used their theory to describe how primary cosmic rays from outer space interact with the upper atmosphere to produce particles observed at the ground level. Bhabha and Heitler then made numerical estimates of the number of electrons in the cascade process at different altitudes for different electron initiation energies. The calculations agreed with the experimental observations of cosmic ray showers made by Bruno Rossi and Pierre Victor Auger a few years before. Bhabha later concluded that observations of the properties of such particles would lead to the straightforward experimental verification of Albert Einstein's theory of relativity. In 1937, Bhabha was awarded the Senior Studentship of the 1851 exhibition, which helped him continue his work at Cambridge until the outbreak of World War II in 1939.

Return to India

In September 1939, Bhabha was in India for a brief holiday when World War II started, and he decided not to return to England for the time being. He accepted an offer to serve as the Reader in the Physics Department of the Indian Institute of Science, then headed by renowned physicist C. V. Raman. He received a special research grant from the Sir Dorab Tata Trust, which he used to establish the Cosmic Ray Research Unit at the Institute. Bhabha selected a few students, including Harish-Chandra, to work with him. Later, on 20 March 1941, he was elected a Fellow of the Royal Society . With the help of J. R. D. Tata, he played an instrumental role in the establishment of the Tata Institute of Fundamental Research in Bombay.

Atomic Energy in India

When Bhabha was working at the India Institute of Science, there was no institute in India which had the necessary facilities for original work in nuclear physics, cosmic rays, high energy physics, and other frontiers of knowledge in physics. This prompted him to send a proposal in March 1944 to the Sir Dorabji Jamsetji Tata. Tata Trust for establishing 'a vigorous school of research in fundamental physics'. In his proposal he wrote :

"There is at the moment in India no big school of research in the fundamental problems of physics, both theoretical and experimental. There are, however, scattered all over India competent workers who are not doing as good work as they would do if brought together in one place under proper direction. It is absolutely in the interest of India to have a vigorous school of research in fundamental physics, for such a school forms the spearhead of research not only in less advanced branches of physics but also in problems of immediate practical application in industry. If much of the applied research done in India today is disappointing or of very inferior quality it is entirely due to the absence of sufficient number of outstanding pure research workers who would set the standard of good research and act on the directing boards in an advisory capacity ... Moreover, when nuclear energy has been successfully applied for power production in say a couple of decades from now, India will not have to look abroad for its experts but will find them ready at hand. I do not think that anyone acquainted with scientific development in other countries would deny the need in India for such a school as I propose.

The subjects on which research and advanced teaching would be done would be theoretical physics, especially on fundamental problems and with special reference to cosmic rays and nuclear physics, and experimental research on cosmic rays. It is neither possible nor desirable to separate nuclear physics from cosmic rays since the two are closely connected theoretically."

The trustees of Sir Dorabji Jamsetji. Tata Trust decided to accept Bhabha's proposal and financial responsibility for starting the Institute in April 1944. Bombay was chosen as the location for the proposed Institute as the Government of Bombay showed interest in becoming a joint founder of the proposed institute. The institute, named Tata Institute of Fundamental Research, was

inaugurated in 1945 in 540 square meters of hired space in an existing building. In 1948 the Institute was moved into the old buildings of the Royal Yacht club. When Bhabha realized that technology development for the atomic energy programme could no longer be carried out within TIFR he proposed to the government to build a new laboratory entirely devoted to this purpose. For this purpose, 1200 acres of land was acquired at Trombay from the Bombay Government. Thus the Atomic Energy Establishment Trombay (AEET) started functioning in 1954. The same year the Department of Atomic Energy (DAE) was also established. He represented India in International Atomic Energy Forums, and as President of the United Nations Conference on the Peaceful Uses of Atomic Energy, in Geneva, Switzerland in 1955. He was elected a **Foreign Honorary Member of the American Academy of Arts and Sciences** in 1958.

Visionary behind India's Three Stage Nuclear Power Programme

Bhabha is generally acknowledged as the father of Indian nuclear power. Moreover, he is credited with formulating a strategy of focussing on extracting power from the country's vast thorium reserves rather than its meagre uranium reserves. This thorium focused strategy was in marked contrast to all other countries in the world. The approach proposed by Bhabha to achieve this strategic objective became India's three stage nuclear power programme.

Bhabha paraphrased the three-stage approach as follows:

"The total reserves of thorium in India amount to over 500,000 tons in the readily extractable form, while the known reserves of uranium are less than a tenth of this. The aim of long range atomic power programme in India must therefore be to base the nuclear power generation as soon as possible **on thorium rather than uranium**… The first generation of atomic power stations based on natural uranium can only be used to start off an atomic power programme… The plutonium produced by the first generation power stations can be used in a second generation of power stations designed to produce electric power and convert thorium into U-233, or depleted uranium into more plutonium with breeding gain… The second generation of power stations may be regarded as an intermediate step for the breeder power stations of the third generation all of which would produce more U-233 than they burn in the course of producing power.**"**

Death

He died when Air India Flight 101 crashed near Mont Blanc on 24 January 1966.

Assassination conspiracy theories

Many possible theories have been advanced for the air crash, including a conspiracy theory in which Central Intelligence Agency (CIA) is involved in order to paralyze India's nuclear program. While an Indian diplomatic bag containing newspapers, calendars and a personal letter was recovered near the crash site in 2012, it was a "Type C" diplomatic bag containing no documents of importance.

Gregory Douglas, a journalist who taped his interviews with former CIA operative, Robert Crowley, over a period of 4 years, recorded their telephonic conversations and later published their transcribes in a book titled *Conversations with the Crow*. Crowley claimed that CIA was responsible for eliminating Dr. Homi Bhabha, Indian nuclear scientist whose plane crashed into Alps, when he was going to attend a Vienna conference and Lal Bahadur Shastri, who died at Tashkent summit in 1966. Crowley said that a bomb in the cargo section of the plane went off in mid-air, bringing down the commercial Boeing 707 airliner in Alps with little evidence left to be retrieved. Crowley claimed that U.S. was wary of Indian nuclear progress and the defeat of their ally Pakistan, in 1965 war. U.S. was worried that India could well be the chief in South Asian continent along with Russian think-tanks, if India develops nuclear capabilities, thus bringing instability to the region.

Legacy

After his death, the Atomic Energy Establishment at Bombay was renamed as the Bhabha Atomic Research Centre in his honour. In addition to being an able scientist and administrator, Bhabha was also a painter and a classical music and opera enthusiast, besides being an amateur botanist. He is one of the most prominent scientists that India has ever had. Bhabha also encouraged research in electronics, space science, radio astronomy and microbiology. The famed radio telescope at Ooty, India was his initiative, and it became a reality in 1970. The Homi Bhabha Fellowship Council has been giving the Homi Bhabha Fellowships since 1967 Other noted institutions in his name are the Homi Bhabha National Institute, an Indian deemed university and the Homi Bhabha Centre for Science Education, Mumbai, India.

தண்ணீரின் மேலே உருவான ஊர்

நீங்கள் வசிக்கும் தெருவோ அல்லது சாலையோ எப்படி இருக்கும்? மண் சாலையாக இருக்கும்; தார்ச் சாலையாக இருக்கும்; சிமெண்ட் சாலையாக இருக்கும் அல்லவா? ஆனால், இத்தாலி நாட்டில் உள்ள ஒரு நகரில் இப்படியெல்லாம் சாலைகளோ, தெருக்களோ கிடையாது. அங்கே தண்ணீரில்தான் தெருக்களும், சாலைகளும் உள்ளன. ஆச்சரியமாக இருக்கிறதா?

இதைவிடப் பெரிய ஆச்சரியமும் இருக்கிறது. நாம் வெளியே செல்வதற்காக சைக்கிள், பைக், கார்களை வாங்குவோம் இல்லையா? இந்த நகரில் வசிப்பவர்கள் வெளியே செல்வதற்காகப் படகுகளை வாங்கி வைத்திருக்கிறார்கள். அது எந்த நகரம் தெரியுமா? **வெனிஸ் நகரம்**!

சரி, வெனிஸ் நகரம் தண்ணீரின் மேலே உருவானதா அல்லது நகரம் உருவான பின் தண்ணீர் சூழ்ந்ததா என்றுதானே யோசிக்கிறீர்கள்? சுமார் 2,500 ஆண்டுகளுக்கு முன்பு அங்கு மக்கள் வசிக்கப் போனபோதே அந்த இடம் நீர் நிறைந்த சதுப்பு நிலமாகத்தான் இருந்ததாம். அந்தக் காலத்தில் எதிரிகள் படையெடுப்பில் இருந்து தப்பிக்கவும் இந்த இடத்தைத் தேர்ந்தெடுத்ததாகச் சொல்கிறார்கள்.

முழுவதும் நீர் சூழ்ந்த இந்த இடத்தில் வீடுகளும் பெரிய கட்டிடங்களும் எப்படிக் கட்டப்பட்டன தெரியுமா? தண்ணீருக்கு அடியில் பாறைகளைக் கண்டுபிடித்து அதன்மீது நீளமான தூண்களைப் புகுத்திக் கட்டிடம் கட்டினார்கள். வலுவான கட்டுமானத்துக்காக மிக நீளமான பைன் மரங்களும் லார்ஷ் மரங்களும் சதுப்பு நிலத்தில் புகுத்தப்பட்டன. மரங்கள் அடுக்கப்பட்டுச் சதுப்பு மண் மறைக்கப்பட்டது. அதன் மேலே அமைந்த சமதளத்தின்மீது கட்டிடங்கள் எழுப்பப்பட்டதாகச் சொல்கிறார்கள். இது ஏதோ சில ஆண்டுகளில் நடந்த வித்தை அல்ல; பல நூறாண்டு கால முயற்சிக்குக் கிடைத்த வெற்றி.

தண்ணீரில் மேலேயே வீடுகளையும் பெரிய கட்டிடங்களையும் கட்டிய பிறகு வெளியே சென்று வர என்ன செய்வது என்று யோசித்தார்கள். இதற்காகத் தண்ணீர் வடிகால் முறையைக் கண்டுபிடித்தார்கள். பெரிய நீர் வாய்க்கால்களை அமைத்தார்கள். அப்போது வெனிஸ் நகரத்தின் நீர் மேற்பார்வையாளராக இருந்த கிறிஸ்டோ போரோ சபாடினோ என்பவர்தான் வாய்க்கால்களைச் சீரமைத்தார்.

இன்று இந்த வெனிஸ் நகரம் 118 தீவுகளைக் கொண்டுள்ளது. ஒவ்வொரு தீவையும் இணைக்கக் கால்வாய்கள் ஏற்படுத்தப்பட்டுள்ளன. வெனிஸ் நகரைச் சுற்றித் தற்போது 150 கால்வாய்கள் உள்ளன. **கொண்டோலா** என்ற படகுகள் போக்குவரத்துக்காகப் பயன்படுத்தப்படுகின்றன. இந்த நகரில் சுமார் 3 லட்சம் பேர் வசிக்கிறார்கள். **உலகில் மிக அழகிய நகரங்களில் ஒன்றாகவும், மிகப் பெரிய சுற்றுலாத் தலமாகவும் வெனிஸ் நகரம் விளங்கி வருகிறது.**

பெரு மழை பெய்து நம் தெருக்களையும், சாலைகளையும் தண்ணீர் சூழ்ந்தால், இனிமேல் வெனிஸ் நகரம் ஞாபகம் வரும் இல்லையா?

Courtesy:தி இந்து,10.06.2015

பசியைத் தூண்டும் அன்னாசிப் பூ

அன்னாசிப் பூவின் மருத்துவக் குணங்களைப் பற்றி தெரிந்துகொள்வோம். இது இந்தியா முழுவதும் காணப்படும். சைனா, கொச்சின் முதலிய இடங்களிலிருந்து இறக்குமதி செய்யப்படுகிறது. இது இனிப்பு சுவையுடன் சுறுசுறு தன்மையுடன் இருக்கும். இதன் இதழ்கள் அனைத்தும் நட்சத்திரம்போல் 8 வால்களுடன் காணப்படும் இதனுள் விதை இருக்கும்.

பசியைத் தூண்ட:

சிலர் பசியின்றி அவதிப்படுவார்கள். சாப்பிட தோணவில்லை என்பார்கள். மிகக் குறைந்த அளவு உணவைக் கூட கடமைக்கு சாப்பிடுவதுபோல் சாப்பிடுவார்கள். இத்தகைய பசியின்மைக்குக் காரணம் வாயுக் கோளாறுகளே. இந்த வாயுக்களின் சீற்றத்தால் வயிற்றுப் பகுதியில் ஒருவித மந்தத் தன்மை ஏற்படுகிறது. இந்த நிலை மாறி நன்கு பசியைத் தூண்ட தினமும் உணவில் அன்னாசிப் பூவை சேர்த்துக் கொண்டால் வாயுக்களின் சீற்றத்தைக் குறைத்து நன்கு பசியைத் தூண்டும்.

செரிமான சக்தியைத் தூண்ட:

சிலருக்கு எத்தகைய மென்மையான உணவுகளை உட்கொண்டாலும் செரிமானம் ஆகாது. நீண்ட நேரம் ஒரே இடத்தில் அமர்ந்து வேலை செய்பவர்களுக்கும், உடல் உழைப்பு இல்லாதவர்களுக்கும் இத்தகைய தொந்தரவுகள் வருவதுண்டு இதனால் புளித்த ஏப்பம், உருவாகும் மலச்சிக்கல், வயிற்றுப்புண் மூலநோய்கள் உண்டாகக் கூட வாய்ப்புண்டு. இந்த தொந்தரவு உள்ளவர்கள் எத்தகைய உணவை சமைக்கும்போதும், அதில் சிறிது அன்னாசிப் பூவை சேர்த்து சமைத்து சாப்பிட்டு வந்தால் உண்ட உணவு எளிதில் ஜீரணமாகும் குடலின் உட்புறச் சுவர்கள் பலப்படும்.

புளி ஏப்பம் மாற:

செரிமானமின்மையால் சிலருக்கு புளித்த ஏப்பம் அடிக்கடி உண்டாகும் இவர்கள் அன்னாசிப் பூவைப் பொடி செய்து ½ கிராம் அளவு எடுத்து நாள் ஒன்றுக்கு மூன்று வேளையும் உணவுக்குப் பின் நீருடன் சாப்பிட்டு வந்தால் புளி ஏப்பம் உண்டாகாது.

உடல் வலுவடைய:

உடலுக்குத் தேவையான அனைத்து சக்திகளையும் இயங்கச் செய்வது ஹார்மோன்களே இந்த ஹார்மோன்கள் சரிவர சுரக்க செய்யும் தன்மை அன்னாசிப் பூவிற்கு உண்டு. இதனால் உடலுக்குத் தேவையான சக்தி கிடைக்கும். எனவே அன்னாசிப் பூவை உணவில் சேர்த்துக்கொள்வது மிகவும் சிறந்தது. அசைவ உணவு சமைக்கும் போது அதில் மறக்காமல் அன்னாசிப்பூ சேர்ப்பது நல்லது. இதனால் அசைவ உணவுகள் எளிதில் செரிமானம் ஆகும். மேலும் நல்ல சுவையுடன் நறுமணமும் கிடைக்கும். அன்னாசிப் பூவின் விதையிலிருந்து எடுக்கப்படும் எண்ணெய்யை இளம்பிள்ளை வாத நோயால் பாதிக்கப்பட்ட குழந்தைகளுக்கு மேல் பூச்சாகப் பூசுகிறார்கள்.

Courtesy: Pesot, March 2015

POWER YOUR MIND

WORK LIKE A MASTER

Flattery, jealously,
Pettiness and greed
These are the traits of
An eternal slave
Who works under pressure
But thinks he is brave.
Never is he happy
Heart full of wants.
Why do you fear,
Be bold and brave
Work like a master,
Don't be a slave

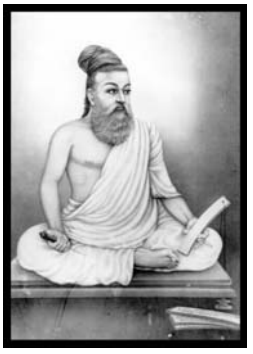
Courtesy: Swami Srikantananda

LIVE IN SPIRIT

Living in the body is good
As long as it remains an
Obedient servant.
Living in mind is far better
Since it can control the body
And senses leading to higher
Achievements through
Concentration.
But it is wonderful
If we can live in the Spirit
For that opens the
Doors of infinite bliss
And Blessedness

You should work like a master and not as a slave; work incessantly, but do not do slave's work.
- Swami Vivekanada

TIRUKKURAL AND MANAGEMENT IN A 'NUTSHELL' – 29



It is a sad state of affairs today, particularly in our country, that mostly, the Government, Executive and Judiciary as well as many Corporations and Financial Institutions are all headed by not so "Worthy" Men. It will be very apt to examine at this point, and also inscribe in our minds, what Tiruvalluvar prescribes for being Worthy and rendering useful Service to Society and Business.

Tiruvalluvar devotes one whole Adhikaram of ten Kurals to convey what make Worthy Men and each one is a Gem. He prescribes that they are Men of Blemishless Character and are sensitive to shame, they have love for all, they consider their duty is only to do Good Things, they are absolutely Truthful and they consider that Humility is the strength of the strong. The more we read, the more we long for such leaders everywhere, as shamelessness, extraordinary Greed total truthlesness in the name of strategy is spread everywhere.

Gunanalam Sandror Nalane; Piranalam
Ennalaththu Ullathooum Andru Kural 982

குணநலம் சான்றோர் நலனே; பிறநலம்
எந்நலத்து உள்ளதூஉம் அன்று குறள் 982

"The Worthiness of the Worthy is the Worthiness of their Character: all other distinctions add nothing to their Worth"

Anbunaan Oppuravu Kannottam Vaimaiyodu
Inthusalbu Oondriya Thoon Kural 983

அன்புநாண் ஒப்புரவு கண்ணோட்டம் வாய்மையொடு
ஐந்துசால்பு ஊன்றிய தூண் குறள் 983

Love to all, Sensitriveness to Shame, Complaisance, Indulgence to the fault of others and Truthfullness; these five are the pillars that support the edifice of a Noble Character"

Kadanenba Nallavai Yellam Kadanarinthu
Sandranmai Merkkol Bavarkku Kural 981

கடன்என்ப நல்லவை எல்லாம் கடன்அறிந்து
சான்றாண்மை மேற்கொள் பவர்க்கு குறள் 981

"Behold the men that know their duties and want to cultivate Worth in themselves; every thing that is Good will be a Duty in their eyes"

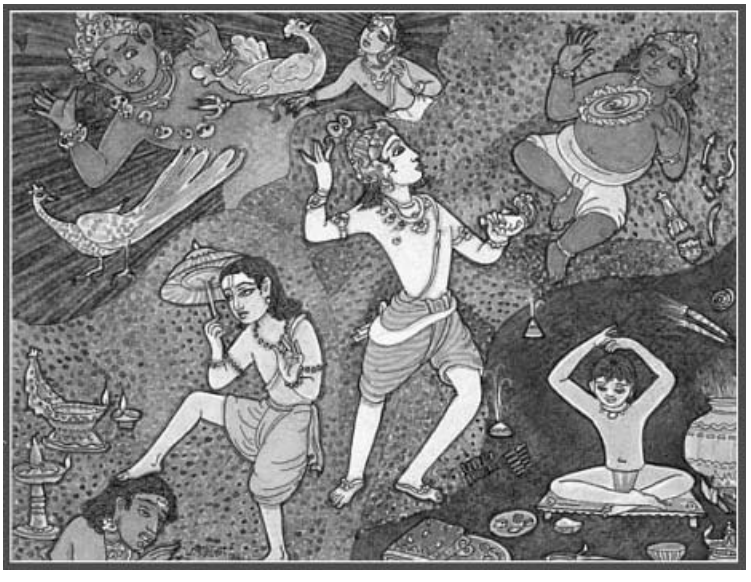
Kolla Nalaththathu Nonmai; Pirartheemai
Solla Nalaththathu Salbu Kural 984

கொல்லா நலத்தது நோன்மை பிறர்தீமை
சொல்லா நலத்தது சால்பு குறள் 984

"The Virtue of the Saint is non killing: and the Virtue of the Worthy Man is the abstaining from scandalous speech".

HOME FESTIVALS – 10

Aippasi - ஐப்பசி (October/November)



Skanda shasti is the first festival of this month (right), commemorating the victory of Lord Murugan over the demon Sura, of the higher, spiritual self over the lower nature. Dipavali is the major event of Aippasi, celebrated everywhere Hindus live and by Buddhists and Jains, too. In one story of its origins, Vamana, the dwarf avatar of Lord Vishnu, requests the amount of land from King Bali that he can cover in three steps. Granted the request, Vamana covers with his first step all of the Earth, with the second all of the sky, and then asks the king where to take the third step. The king offers his own head (lower left), and in commemoration of the king's humility, the day was established. In another story, Lord Vishnu (center) kills the demon Nagagasvaran with His discus. The various observances (lower right) of Dipavali include an oil bath, gifts of new clothes, fireworks (sufficiently indulged in Chennai to rattle dishes off the kitchen shelves), oil lamps for display and abundant pots of delicious food. The early morning bath is always considered to be in the Ganga itself, so one greeting of the day is, "Did you have the Ganga bath?"

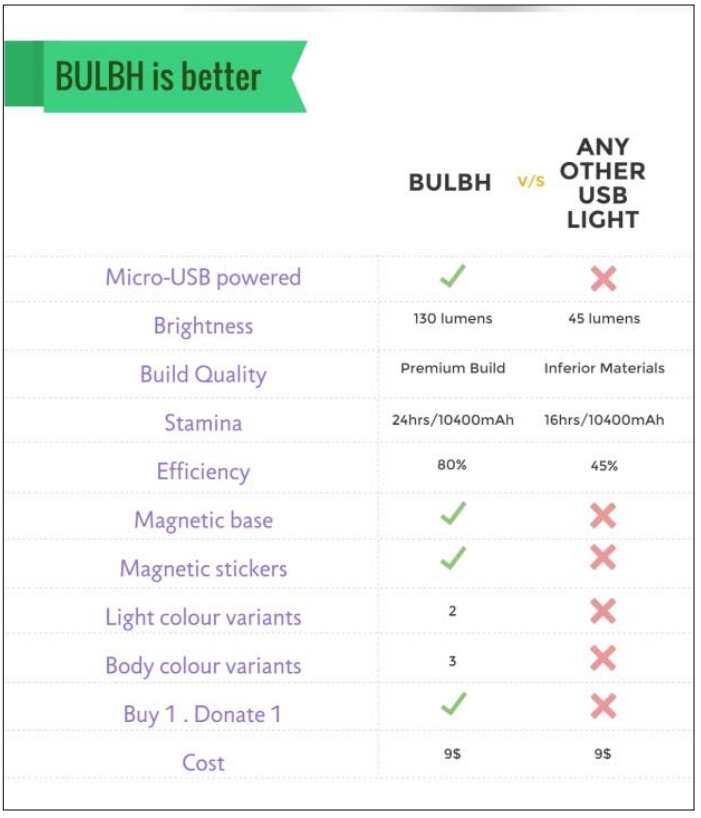
(To be continued)

THE BULBH: THE 'BRIGHTER' LED FOR A 'BRIGHTER' INDIA

23-year old from Bangalore has created a coin-sized micro-USB powered 1.2 watt white LED bulb, which he has christened as Bulbh. It emits twice the usual light than a one-watt compact fluorescent light (CFL) bulb.

The idea was conceived and the product was invented in Aditya Agarwal's startup My Dream Bird. Bulbh is a small, slim, micro-USB powered light which can emit 120-130 lumens of light as compared to the normal 60 lumens per watt of a CFL and 12-17 lumens per watt of an incandescent lamp.

Talking of the usage, the bulbh can be used as an emergency light, a cycle light, night light, in wardrobes, for photography, or as a helmet light. Speaking of it, he says, "The Bulbh can be powered by any micro-USB chord that can be connected to a power source such as a mobile device adapter, a power bank, a personal computer or a laptop. It has been ergonomically designed for use in various conditions and emits bright light. It is specifically targeted for mobile phone users of the world who already have micro-USB adapters."

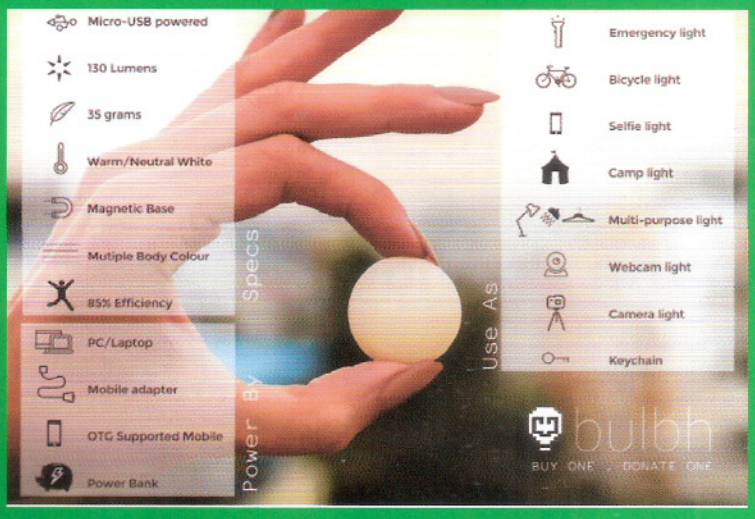


The custom casing of silicon and thermoplastic alloy prevents Bulbh from heating up, even after 24 hours of continuous use. To achieve the color rendering index (CRI) of 80, which is equivalent to any CFL, and twice the lumens per watt than a CFL, Aditya has created Bulbh by using six 0.2 watt Everlight LEDs, each with a capacity of emitting 24 lumens of light. On the outside, each Bulbh is fitted with a neodymium magnetic base so that the users can stick it on any metal surface.

Standing at 0.6 inches in height and 1.3 inches in width, and weighing between 30-35 grams, this bulb looks like the Indian sweet *Batasha*.

What's even interesting is that Agarwal has plans to launch it in September this year, in a unique **'buy one, donate one'** model, where in for every Bulbh that is sold online, one unit will get donated in India to the communities that are still using incandescent bulbs to reduce their cost of living.

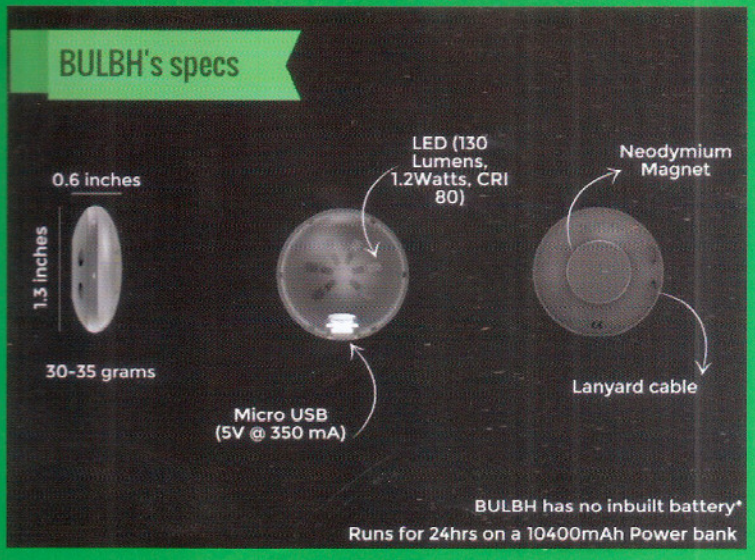
Talking of **Buy One, Donate One plan**, Aditya says, "The idea of donating Bulbh occurred to me when I saw hawkers in Kolkata selling their goods under candle light. I found out that they do not buy incandescent bulbs or CFLs as they get heated up and they cannot afford LED lights. Hence, for each Bulbh that is sold online, I plan to donate one to such communities and users in India," Bulbh will be launched in the U.S. and European markets by September 2015. Once he is able to raise $400,000 (Rs 2.5 crores) funding, Aditya plans to open-source the project.



BULBH is inspired

Inspired from a very popular Indian sweet called "batasha"

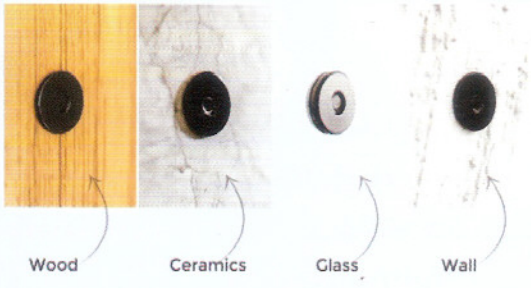
BULBH's specs



BULBH has no inbuilt battery*
Runs for 24hrs on a 10400mAh Power bank

BULBH has variety

BULBH sticks anywhere



Bulbh sticks on iron objects by default
For rest of the surfaces we provide 2 magnetic stickers

BULBH has it's perks

Donate
1 BULBH
5$

Donate a BULBH to someone who needs it.

- Hawkers, students, underprivileged children, elderly

Buy 1
Donate 1
9$

You get one BULBH -and We donate one to someone who needs it.

Donate
250 BULBHs
1000$

Donate 250 BULBHs
+
After video has your name
+
Bulbhs donated will have your name on it

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