



ELECTRICAL INSTALLATION ENGINEER

NEWS LETTER

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

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JANUARY 2014



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Event Profile: The World Future Energy Summit (WFES) 2014 will bring together global leaders in policy, technology and business to discuss the state of the art, develop new ways of thinking and shape the future of renewable energy.

Date: 20th – 22nd January 2014 **Time:** 10:00 AM - 06:00 PM

Venue: Abu Dhabi National Exhibition Company - Abu Dhabi

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



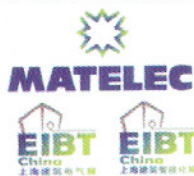
Event Profile: Middle East Electricity is the largest meeting place for energy industry professionals from over 100 countries worldwide

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Date & Time: 11th – 13th February 2014

Venue: Dubai International Exhibition Centre

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



Event Profile: MATELEC EIBT China 2013 has gained herself a strong market position for the future. Based on the enormous industry resources and professional international organization experience, MATELEC EIBT China 2014 will build the most efficient trading platform for 400 exhibitors and 12,000 visitors with 12,000 m² show space.

Date: 25th – 27th March 2014 **Venue:** No.77, Xing Yi Road, INTEX, Shanghai

Website: www.matelecchina.com



Organizer: Solar Promotion International GmbH

Date: 26th – 28th March 2014

Venue: Beijing, China

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



EnerTech World Expo

The Comprehensive Energy Industry Event in India

Event Profile: India is the world's 6th largest energy user, comprising about 3.3% of the overall global energy expenditure per year. The EnerTech Exhibition and Conference is the latest event to be organised by the Chemtech Foundation. This will focus on the growing importance of renewable energy sources in India. EnerTech will be held for the first time in 2010 and is the first such event of its kind.

Date: 10th – 12th February, 2014

Venue: Bombay Convention & Exhibition Centre, Goregaon (East), Mumbai

Website: <http://www.chemtech-online.com/events/enertech/index.html>

EDITORIAL

Dear Members, Fellow Professionals and Friends,

Happy New Year! Happy "Pongal"!!

Happy Republic Day !!!

A New Year commences on January 1st and we can certainly look back with pride the 13 years of the New Millennium we have completed, particularly in the area of Energy Efficiency and Energy Conservation. Since the passing of Energy Conservation Act in 2001 and the formulation of Bureau of Energy Efficiency, India continues to see measures and implementations starting from Standards and Labeling. India has huge potential in any thing we consider and in the area of "Fifth Fuel" that represents Energy Efficiency also our potential continues to be very substantial. In simple terms, we are still consuming 2 to 3 times more Energy per Unit Production of GDP compared to the World Average and the World's Best. We have been publishing a series of Articles on this Topic for the benefit of our readers and we welcome more ideas and cases. As Electrical Energy forms almost two thirds of the secondary 'Forms' of Energy, our role and responsibility increases. In the area of Lighting, the improvements and the awareness and the adoptions have certainly been very encouraging in the recent years. Another area where more concentrated efforts are needed is the "Drive – Driven – and Controls" area, including the Power Quality. Some of the recent advancements in Air Conditioners and Fans in terms of Efficiency are simple examples, but the potentials in the Manufacturing and Agriculture and other sectors are very sizable. An Integrated Engineering Approach that is successfully employed has shown tremendous results and they have to be adopted more and taken forward.

We Celebrate the Republic Day on the 26th of January marking the time for us to Salute the Nation and take a Pledge to contribute our BEST for Welfare and Development of our Country. We can feel proud that we continue to remain a Vibrant Democracy, in spite of all kinds of problems, being one of the most diverse countries of the world. What is keeping us united is our Culture and Heritage as advocated by Swami Vivekananda whose 150th Birth Anniversary we celebrated recently. The First 50 years of the 20th Century, for India was historical with Peaking of Freedom Struggle and worsening of Economy in all dimensions. We commenced the Second Half as a Republic with our Constitution in place, but with utter poverty and the total Economy in shambles. We can rightly feel proud to day that we are among the Nations with High Economic Growth now and are aspiring to become an Economic Super Power. All of us are also very clear that it is the deep rooted corruption, on one hand resulting in siphoning out of our Wealth and on the other percolating up to the level of common man, that is bothering us most, which really stands in the way our reaching the Glory. Let us resolve to contribute to the Cleaning up starting from ourselves and all around us.

In many Countries of the World, 1st January is celebrated as "Family Day" and we can feel proud that we as a Nation have always believed in Family Way of Life. It was even argued by Economists that it is our Family Culture and Planned Savings by the Families and for the Families that has kept our Economy fairly intact in the face of collapse in many Nations.

We thank all those members who have helped us by participating in the advertisements appearing for the issue December 2013 – Electrotherm (India) Ltd., Ashlok Safe Earthing Electrode Ltd., Pentagon Switchgear Pvt Ltd., Power Links, Abirami Electricals, Hensel Electric India Pvt. Ltd., V-Guard Industries Ltd., OBO Bettermann India Pvt. Ltd., Universal Earthing Systems Pvt. Ltd., Wilson Power and Distribution Technologies Pvt. Ltd., Servomax India Ltd., Supreme & Co. Pvt. Ltd., Cape Electric Pvt. Ltd., Easun Reyrolle Ltd., Galaxy Earthing Electrodes Pvt. Ltd.

EDITOR

LETTER TO EDITOR

28.10.2013

Dear Sirs,

I have come across your magazine and find the technical Articles published in it are very informative. Congratulation to you and your team for covering the details. And this will keep me in Updating of my knowledge.

Here with I enclosed Demand Draft Rs.2000/-. Details are State Bank of India, Indu Nagar branch dated on 23.10.2013. DD No: 826785 **towards subscription for the year of 2013 and 2014 for News letter.**

Please kindly send News letter to above my residence.

Thanking You,

Yours Sincerely,

R. Ramalingam,

The Nilgris District,

Ph: 9443932679.

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349. Elec Proj India, (2010-14)
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351. Mr. Soundaranayagam, B.E, MIE, M.Phil, (2013-14),
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We request other members also to send their contribution for NEWSLETTER early.

(Please help us to serve you better)

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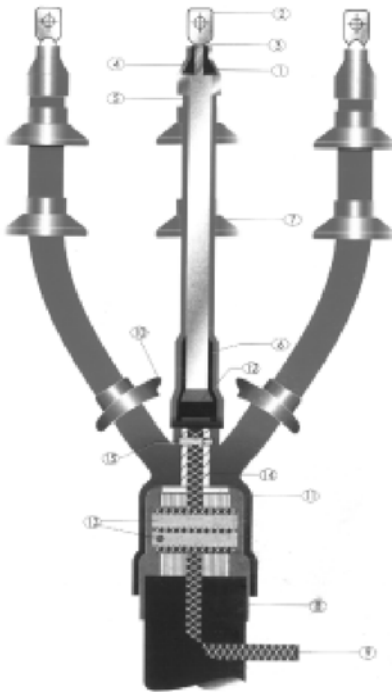
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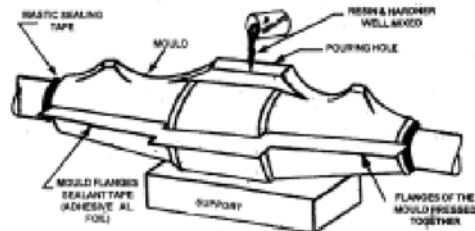
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ALL MEMBERS

We publish below the copy of the Circular received from Chief Electrical Inspector to Government of Tamil Nadu

CIRCULAR

Letter No. 16671/CEIG/EI/Tech/2013, dated. 13.11.2013

Sir,

Sub: Electricity – Government Electrical Standards Laboratory (GESL) – Accreditation by National Accreditation Board for Testing and Calibration Laboratories (NABL) – Facilities available for calibration of meters – Intimation - Regarding.

Ref: NABL calibration certificate for Electro – Technical parameters C-0832.

The Government Electrical Standards Laboratory (GESL) is to enhance the services of Electrical Inspectorate Department. This laboratory is in existence for more than 50 years. GESL is accredited by NABL as per ISO/IEC 17025:2005 and our NABL Accreditation certificate number is C-0832 for Electro-Technical parameters.

With this scope of NABL accreditation and the facility of high precision power / energy comparator, Power / Energy meters of accuracy class 0.1 can be calibrated at GESL, with a best uncertainty of 270ppm. With this facility, calibration of meters from power plants can be undertaken now. There are only five laboratories in India at this level.

Hence, testing of energy meters and metering sets including current transformer and potential transformers under dispute whenever referred by Honourable Courts and TNERC can be undertaken at GESL.

Further, the Government Electrical Standards Laboratory, have the valuable reference standards / working standards to achieve the following:

- a) Calibration of Precision energy standards maintained by various State Electricity Boards, calibration of trivector meters of power plants, single and poly-phase energy meters of upto 0.1 class, calibration and Testing of Rotating Sub-Standard Meters (RSS), Electronic Sub-Standard Meters (ESS).
- b) Pre-Commissioning Tests on HV & EHV Installations, Measurement of Soil Resistivity and Earth Electrode Resistance, Power Quality Analysis (Harmonic Distortion) of 3phase AC System, Calibration and Testing of all type of Power Protection Measuring Relays.
- c) Calibration of contractor grade instruments like insulation resistance tester, earth resistance tester, clamp meter used by electrical contractors for verifying the safety of electrical installations, calibration of instruments of similar types received from various private organizations.
- d) Testing of current transformer and potential transformer of various high voltage installations upto 33KV.
- e) Further, GESL have High voltage calibration laboratory by which we can undertake the Power Frequency High Voltage withstand tests on Transformers, Breakers, Cables, Generators Panel Boards, Dielectric Strength of Rubber Mats, Dielectric Strength (BDV) of insulating oils used in Transformer, Switchgear, etc.,
- f) Also GESL have motorized Hydraulic Pressure Testing Kit which enables an efficient Hydraulic Pressure testing of Portable Fire Extinguishers.

Hence, I inform that the facilities now available at GESL may be availed at all times.

Sd/-

For Chief Electrical Inspector to Government

KNOW THY POWER NETWORK – 76

Kindly rejoin with our study stream and also revisit the descriptions made so far. It is believed that by now you are all well versed with the topic in point Viz “Smart Grid”. Needless to say, it will make the End Consumers more knowledgeable and help them to participate and have a greater role in the power projects of the country. In addition to the knowledge of the power sector events, they get the feel of the electricity that flows into their premises, its security and reliability levels (i.e.) they can easily visualize their electricity consumption, its cost and the capability of the network as a reliable “Carrier of Energy”. This brings the role of consumers to the centre stage; they can have a ring-side view of all the issues connected with electrical energy. All these are made possible only by the wide spread application of Smart electronic devices and intelligent meters. This ‘rosy picture’ of Smart Grid may drive you to think that all issues connected with ‘Smart Grid’ are “Green” only. *But in reality, it is not so. It has its own “grey areas”. The wide use of Smart switch mode electronic devices in the Smart Grid Network trigger the power quality aberrations like Harmonics, Voltage swells and sags.* Thus it points out that the Smart Grid is no way different from other natural events that obeys the “Universal Law”, which states that “one can not gain any thing without losing /sacrificing some thing.

SMART GRID VISION AND ROAD MAP FOR INDIA

Now it is time to learn about the development of Smart Grid in our country. As a pioneer project, the Power Grid Corporation of India, a Govt of India Undertaking, have started a project with the features of Smart Grid at Pondicherry Union Territory with the installation of 1400 Smart meters. This project is now under progress and it will become operational by next year. A Smart Grid Vision and Road map for India has also been launched by Govt of India. Calling for a nationwide rollout of Smart grids by 2027.

Salient features of this vision are,

- ◆ Adoption of Integrated technology pilot schemes in selected areas by the year 2015.
- ◆ Full roll out of Smart grids in the Pilot Project areas by 2017 and in major urban areas by 2022.
- ◆ A phased national AMI rollout for all consumers with loads > 20 KW by 2017 and all three phase consumers by 2022.

To achieve the objectives thus envisaged, India Smart Grid Task Force and India Smart Grid Forum have been formed by the Ministry of Power, GOI. The main vision is to “Transform the India’s Power Sector into a secure, adaptive, sustainable and digitally enabled eco system that provides reliable and quality energy for all with active participation of stake holders.” It is also planned to enhance the generating capacity of the country to 230 GW in the near future and to 900 GW by 2032 and to increase the renewable generation to very high levels and wide use of electrical vehicles and appreciable reduction of losses in the Power Network.

Electrical vehicles have been assigned with greater roles in the Smart Grid Schemes.

As per the present proposal of the Govt, 60 lakh electrical vehicles are expected to touch the road by 2020. Out of these 60 lakh vehicles, two wheelers constitute 40 lakhs and the rest will be assigned to four wheelers. The energy needs of these vehicles are proposed to be met from the changing units installed at parking lots, fuel stations, institutional buildings, high ways and apartment blocks. These vehicles may be considered as “Power plots”. The vehicles in point can be used as electrical storage units when the electricity grid has excess energy. Likewise, they can supplement the electricity grids when the latter suffer from generation shortages. This step is made possible by this On-going vehicle-to-grid technology. The development of the required charging stations and battery parks are also on the anvil.

Now you can learn that a Smart Grid will function and offer all the benefits expected from it only “*when it is connected and used in the way as it should be.*” If any failure or short comings happens/ occurs on this front as a consequence of it inadequate security or any other issue, then the expected “Smart Connect” will not occur (i.e.) the voice and data services employed for this Smart Grid Operations should not only provide coverage across all our entire Operation but also have unparalleled security and reliability. This step will increase the operational efficiencies in the crucial areas like Advanced Metering Infrastructure (AMI) and Distribution Automation and also help to clamp down/ bring down the network down time from storms or other natural disasters. So it becomes necessary for us to learn what are the facilities available for Smart connection and how best we can use them for utilitie’s works.

The Five implementation areas which are connected with Smart Grid are,

- ◆ Build-up of the infrastructure for a Smart Power Grid.
- ◆ Arrangements for enabling Smart Consumers [Smart Homes and Buildings]
- ◆ Smart Transportation (Electrical vehicles)

- ◆ Smart Renewable Energy availability
- ◆ Smart Electricity Service

The construction of Smart Power Grid involves the build up of a monitoring and control systems of the Power Grid. It should have features like a Failure Prediction and Automatic Recovery system of the Power Grid. As regards the “Smart Place”, it requires a wide distribution of Smart Meters and an Automated Energy Management System.

The area related to “Smart Transportation” demands a nationwide charging infrastructure and an ICT – Based Electric Vehicle Operating System.

The Smart Renewable Sector requires a large scale Renewable Energy Generation Complex and the development of a large capacity Energy Storage Devices.

Finally the Smart Electricity Service needs the build-up of an effective Pricing System and a Comprehensive Electricity Trading Systems for the Consumers.

Thus the “Smart Grid”, a ubiquitous and widely used term stands for our future. It offers various opportunities for innovation, job creation and economic growth in the coming decades.

By this time, you may be “fully loaded”/ saturated with “Smart Grid”. So I would like to sign off” here.

Let us restart our journey in next month.

(To be continued...)

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

COIMBATORE CORPORATION BAGS ENERGY CONSERVATION AWARD

Union Ministry of Power has chosen Coimbatore Corporation for the second prize in the general category of the National Energy Conservation Award-2013.

A communiqué from Ministry’s Deputy Secretary says that the Commissioner G. Latha would receive the award from President Pranab Mukherjee on December 16.

According to sources, the Corporation had applied for the award highlighting its achievements that included power conservation in street lights, using energy-efficient motors to pump ground water, replacement of conventional lights with energy-efficient lights among others.

The Corporation saved power in street lights by classifying roads as A1, A2, B1 and B2 and dimming lights late at night. On the A1 and commercially active roads the civic body dims the lights by 11 p.m. On other roads it brings down the brightness by 10 p.m. This means that the civic body dims 140 connections by 11 p.m. and the remaining 2,460 connections by 10 p.m.

Such an energy-conservation measure, implemented with the help of a contractor, has helped the civic body save on power bills by 32 per cent.

In power unit terms it worked to saving 79, 51,512 units and Rs. 2.62 crore a year.

The sources said that the Corporation was the only urban local body implementing the project in Tamil Nadu.

The civic body also informed the Central Government in the newly added areas – 40 wards – that it planned to replace the 19,446 conventional street lights with energy-efficient lights at Rs. 21 crore. This will be in addition to the 712 solar energy-powered lights the Corporation had installed in slums.

The Corporation has also switched to energy-efficient lighting systems at its offices and at the Mettupalayam bus stand.

The sources said that the civic body highlighted to the Government that it had installed solar water heating systems at maternity centres and schools. And such installation had led to reduction in power load during peak hours.

In operating the 700-odd borewells it had across the city, the Corporation learnt through an energy audit that it could save around 30 per cent power if it were to improve the efficiency of the motors and change a few worn out parts. After it took the remedial measures, the civic body had observed that it was not only able to increase the availability of water across the city but also reduce emission at 3.5 tonne a bore well a year. It also conserved power equalling 4,084 kWh.

The civic body also spoke about its gassifier crematorium and other such measures. The sources said that its achievements had helped the Corporation bag the award, which was another feather in its cap.

Courtesy: The Hindu

MEASUREMENT AND CONTROL OF ELECTRICAL ENERGY FOR THE EFFICIENT ENERGY MANAGEMENT

“Measurement and Control of Electrical Energy for the Efficient Energy Management” is based on smart energy metering which has its own distribution, controlling and monitoring system for the amount of electrical energy (KWh). It is also equipped with the control of alternative source of electricity (solar energy). This hardware project measures the electrical energy (kWh) as well as controls the amount of electrical energy from supply to load during day and night automatically. The measurement can be performed up to ten lac (10,00,000) units and controlling can be upto two lac (2,00,000) units with a unit range selection of 0-20 units and 20-2,00,000 units. In the controlling part, when the energy consumption from the main supply exceeds the preset limit, then the main supply will be automatically tripped and the project provides the alternative power supply in the absence of this mains supply by using the renewable (solar) energy source.

1.0 INTRODUCTION

Electrical energy measurement and controlling are very important tasks in many applications. It is also important with a view to prevent the electrical energy crisis.

As very less work in electronic metering as one chip solution is reported, therefore, this work gives directions in the energy metering devices as follows: one-chip solution for the energy metering device, low power consumption of the device itself, measurement and controlling of the energy consumption. Therefore, the project discussed here focuses on low power consumption with increased integration of components into a single system on Chip-based IC (SoC), thereby reducing the area. The low power and small area will enable low-cost meters in the near future, which is not possible with traditional approaches.

The system described here is designed to provide electrical energy for the purpose of measurement and controlling and also provide power for lighting pathways at nights. Renewable energy on a small scale is still a relatively expensive option compared to “conventional energy” use. In the current situation, the use of renewable energy (except from large wind farms) to meet energy demand is not cost-effective compared to the use of conventional fuel-based energy, where this energy is supplied via a mains electricity supply network. However, renewable energy has environmental appeal even though this is less quantifiable in terms of the reduced pollution compared to conventional energy. Hence, it is hoped that projects such as this will foster enthusiasm and encourage the use of renewable energy.

2.0 DESIGN AND DEVELOPMENT OF HARDWARE

The block diagram of the hardware in its simplest form is shown in Figure 1.

“Measurement and Control of Electrical Energy for the Efficient Energy Management” can be worked in two ways: either for electrical energy measurement or for electrical energy control.

For the electrical energy measurement, according to the block diagram (Figure 1), the supply from the electricity board (mains) is given to the energy measurement circuit. Here, the energy measurement has not been applied for the renewable energy supply, since the renewable energy supply is free in the environment. Now, the energy measurement circuit sends the pulses to the energy control circuit. This project works on 100 pulses per kWh, means that 100 pulses will be required to register 1 unit of electrical energy. On the basis of these pulses, the energy control circuit then processes on these pulses and converts it to the respective amount of electrical energy (kWh or units). This amount of electrical energy is then displayed on the 7-segment display.

For the electrical energy, this circuit measures and controls the amount of electrical energy in kWh or units during day and night automatically. When the energy consumption of the load from the mains supply exceeds the preset limit, then the mains supply will be automatically tripped and after tripping, this project can provide the power supply from any renewable energy source.

3.0 DESIGN AND DEVELOPMENT OF SUB-CIRCUITS

3.1 Rectifier and Switching Circuit

Rectifier circuit is designed to provide the power supply to the system, whereas, the design of switching circuit is based on the block diagram which is shown in Figure 2(a) and the developed hardware on the basis of this design is shown in Figure 2(b).

Various parts of rectifier and switching circuit are as follows.

3.1.1 Optocoupler

The input of optocoupler is LED, which glows with the help of two input signals. These two signals come from day-night selection relay and g-segment from range switch. This LED then switches ON and OFF the transistor circuit.

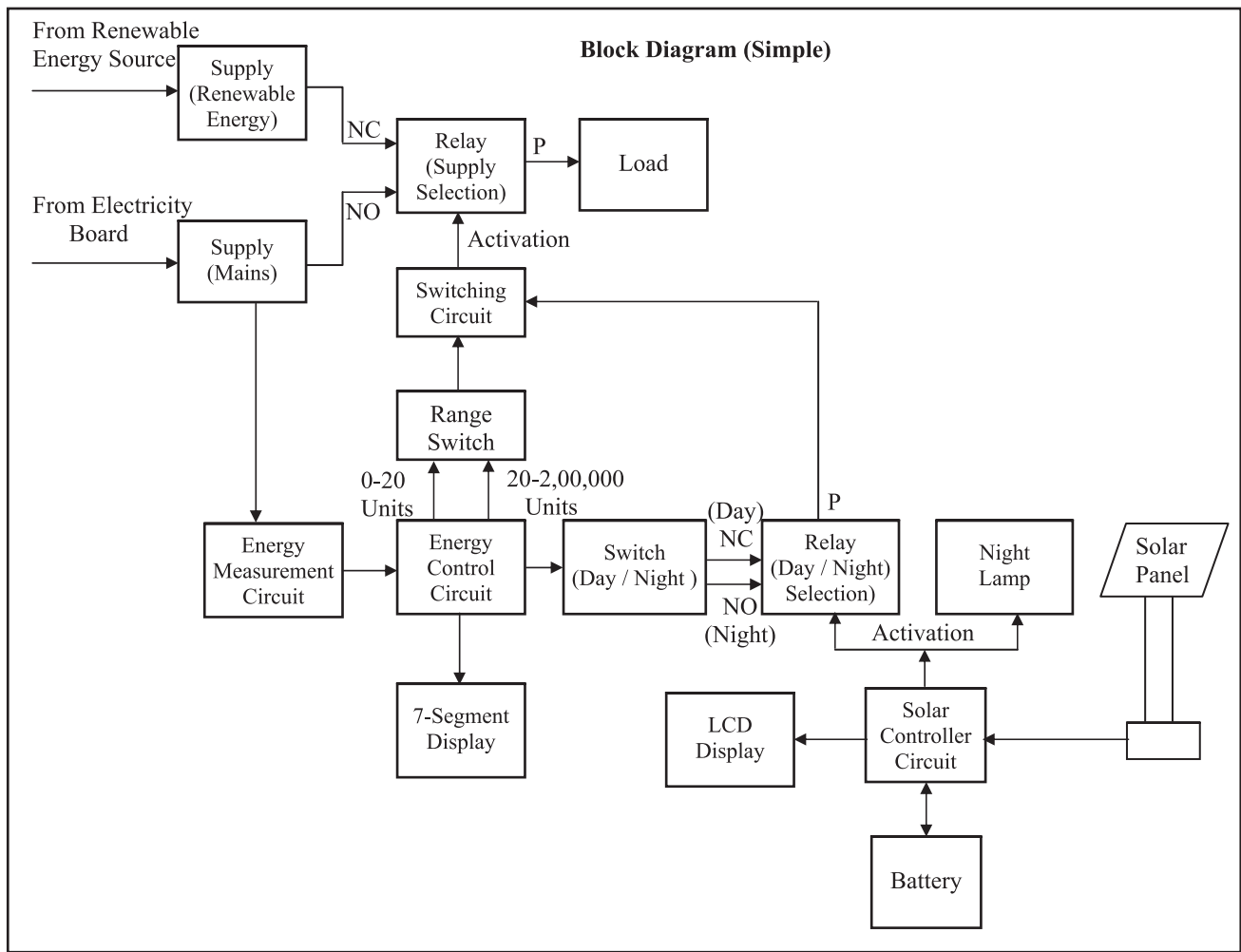


Fig.1: Block diagram of the system

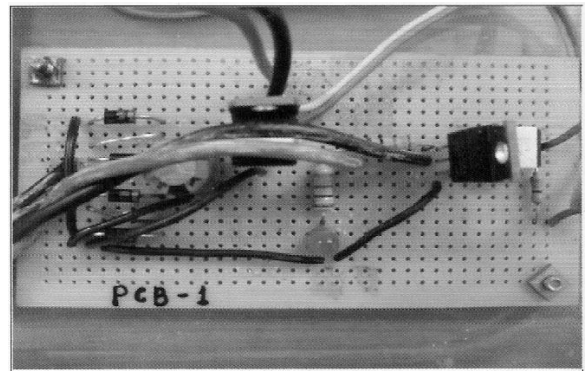
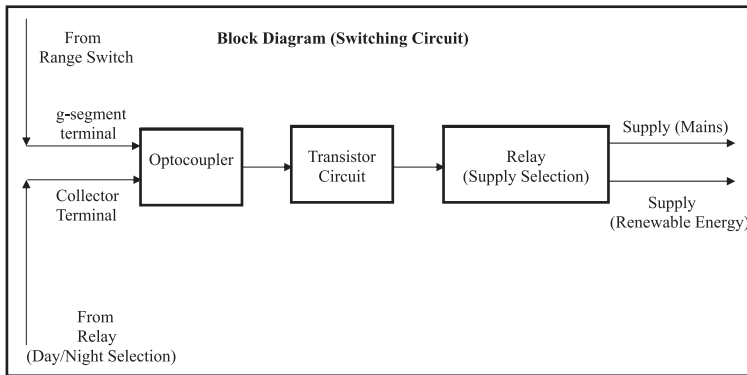


Fig.2: (A): Design block diagram of switching circuit

(B): Development of rectifier and switching circuit

3.1.2 Transistor Circuit

Transistor is also a part of optocoupler, one of the transistors is inside the optocoupler. Another transistor used to operate the relay is Power MOSFET IRF540N. Only the output of this transistor circuit is connected to the relay (supply selection). Power MOSFET has been chosen so that higher values of relay can also be connected for the higher amount of supply selection.

3.1.3 Relay (Supply Selection)

This relay decides whether mains supply or the supply from renewable energy has to be fed to the consumer load. This relay chooses only one supply at a time. The NC contact of this relay is connected to the renewable energy source so that freely available renewable energy can be fed to consumer all the time without switching on the project.

3.2 Energy Measurement Circuit

The design of this circuit is shown in the Figure 3(a). This designed circuit was further implemented on the PCB. This developed hardware has been shown in the Figure 3(b).

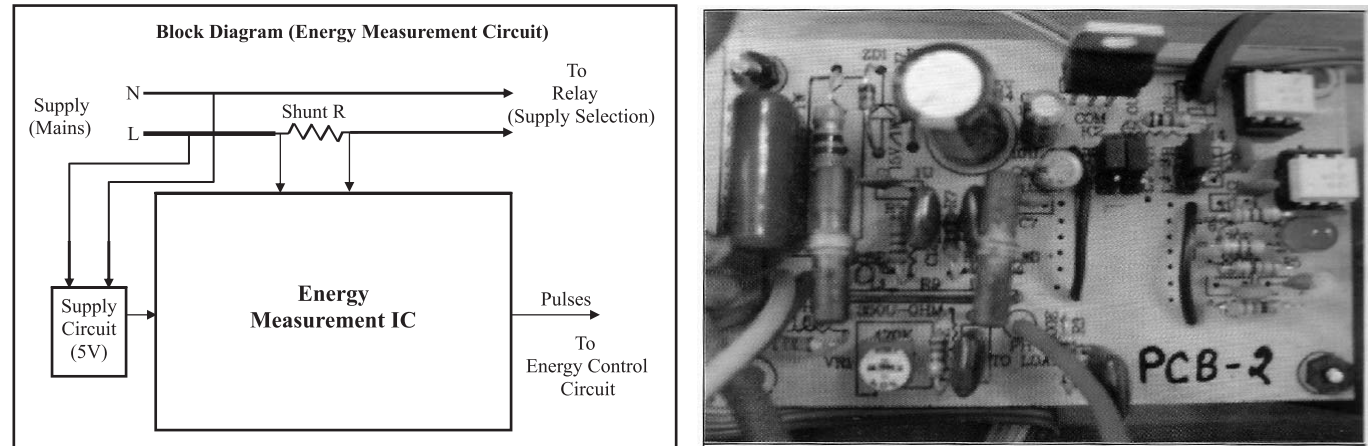


Fig.3 (A): Block diagram designing of energy measurement circuit (B): Development of energy measurement circuit

Energy measurement circuit comprises of IC ADE7757 and some additional circuits for the working of this IC. It measures the electrical energy across the shunt resistance. This circuit is for the measurement of mains electrical energy only and not for the measurement of renewable energy supply, since it is free in the environment. The important blocks shown in Figure 3(a) are as follows.

3.2.1 Supply Circuit

This supply circuit is used to provide 5V DC supply to the energy measurement circuit. This supply is provided with the help of half wave rectifier, zener diode for stepping down voltage and a linear regulator IC 7805.

3.2.2 IC ADE7757

The ADE7757 is an accurate electrical energy measurement integrated circuit. It is a pin reduction version of ADE7755 with an enhancement of a precise oscillator circuit that serves as a clock source to the chip. The ADE7757 eliminates the cost of an external crystal or resonator, thus reducing the overall cost of a meter built with this IC. The chip directly interfaces with shunt resistor. The ADE7757 provides instantaneous and average real power based on line current and voltage. The part specifications surpass the accuracy requirements as quoted in the IEC 1036 standard. The only analog circuitry used in the ADE7757 is in the ADCs and reference circuit. All other signal processing (e.g., multiplication and filtering) is carried out in the digital domain. This approach provides superior stability and accuracy over extremes in environmental conditions and over time. The small analog input full scale allows the chip to interface to low-value shunt resistances without losing dynamic range. The ADE7757 is available in 16-lead SOIC narrow-body package.

3.3 Energy Control Circuit

The design block diagram of this circuit is shown in Figure 4(a), which was further implemented on the PCB as shown in the Figure 4(b).

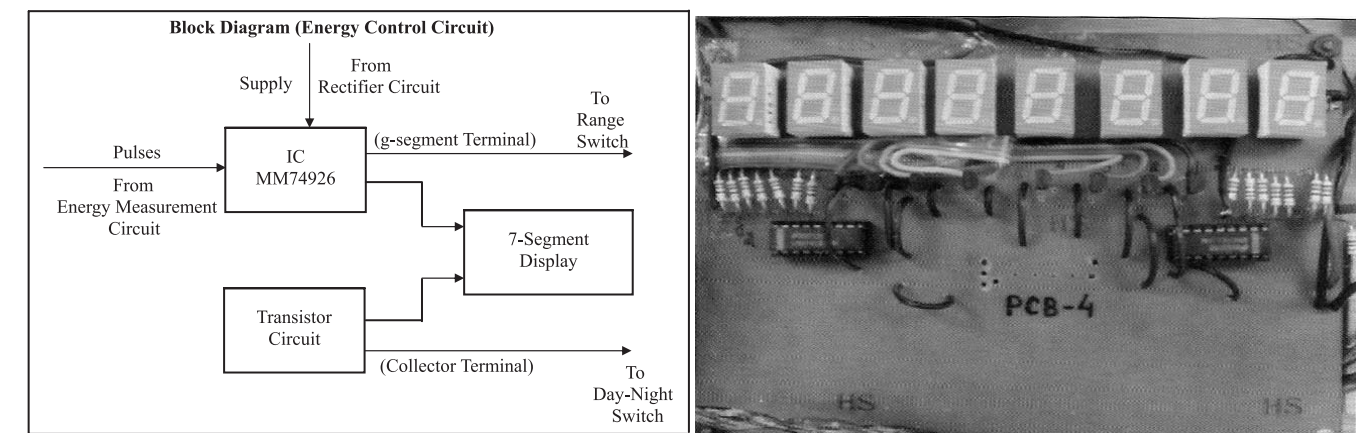


Fig.4 (A): Block diagram designing of energy control circuit (B): Development of energy control circuit

The energy control circuit uses two ICs MM74926 for sending the signal from g-segment from each IC to the two terminals of the range switch. Transistor circuit is used to send the signal from its collector terminals of 8-transistors to the day-night switch. Various blocks associated with the energy control circuit shown in Figure 4 are as under.

3.3.1 IC MM74926N

Two MM74926 ICs are cascaded to act as an 8-digit ripple counter. The MM74C926 CMOS counters consist of a 4-digit counter, an internal output latch, NPN output sourcing drivers for a 7-segment display, and an internal multiplexing circuitry with four multiplexing outputs. The multiplexing circuit has its own free running oscillator, and requires no external clock. The counters advance on negative edge of clock. A HIGH signal on the Reset input will reset the counter to zero, and reset the carry-out LOW. A LOW signal on the Latch Enable input will latch the number in the counters into the internal output latches. A HIGH signal on Display select input will select the number in the counter to be displayed; a LOW level signal on the Display Select will select the number in the output latch to be displayed. The MM74C925 is a 4-decade counter and has Latch Enable, Clock and Reset inputs. The MM74C926 is like the MM74C925, except that it has a display select and a carryout used for cascading counters. The carry-out signal goes HIGH at 6000, goes back LOW at 0000.

3.3.2 Transistor Circuit

The transistor circuit is nothing but a group of 8 transistors. The base of all these transistors is connected to the IC MM74C926N; collector terminals are connected to the eight 7-segment displays and all the emitter terminals are commonly connected to the ground. All the collector terminals are also connected to two 1-poles, 9-throw rotary switch, which are parallelly connected to each other. From this rotary switch, one collector terminal can be selected at a time for further controlling.

3.3.3 7-Segment Display

This display is used to show the amount of electrical energy to be measured. It also displays the amount of units up to which the electrical energy has to be controlled.

3.4 Solar Controller Circuit

The design block diagram of this circuit is shown in the Figure 5(a) which was further implemented on the PCB as shown in the Figure 5(b).

In a block diagram shown in Figure 5(a), solar panel is used to give the DC output supply to the relay circuit. This relay is activated by the microcontroller according to the day and night condition. During the day condition, solar panel is connected to the battery, whereas during night, it is disconnected from the panel with the help of relay circuit. The battery voltage status is sent to the ADC circuit, which converts the battery's variable analog voltage signal to the digital signal. This digital signal is then sent to the microcontroller, which is then used to display the status of the battery voltage on the LCD display. The charged battery is used to give the supply for the working of ADC circuit, microcontroller and LCD display. The charged battery is also used to switch on

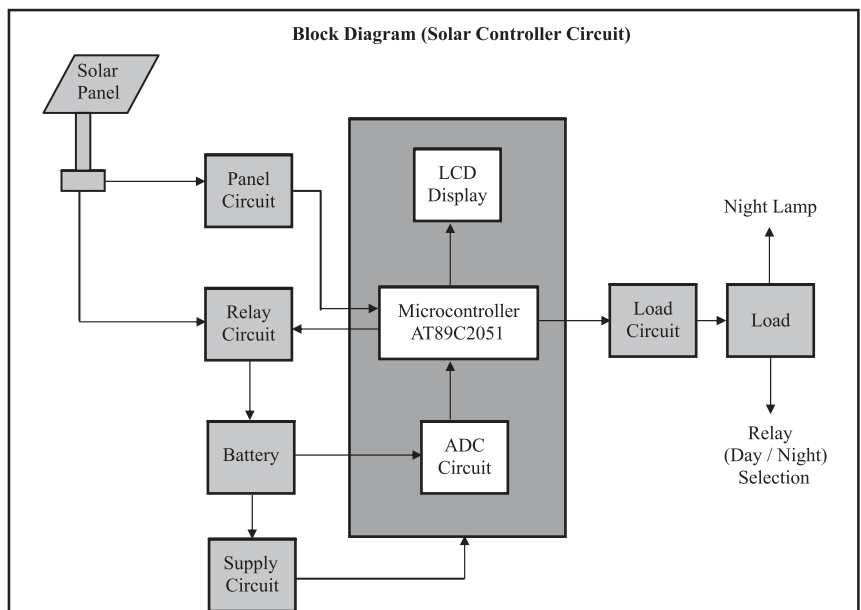


Fig.5 (A): Block diagram designing of solar controller circuit

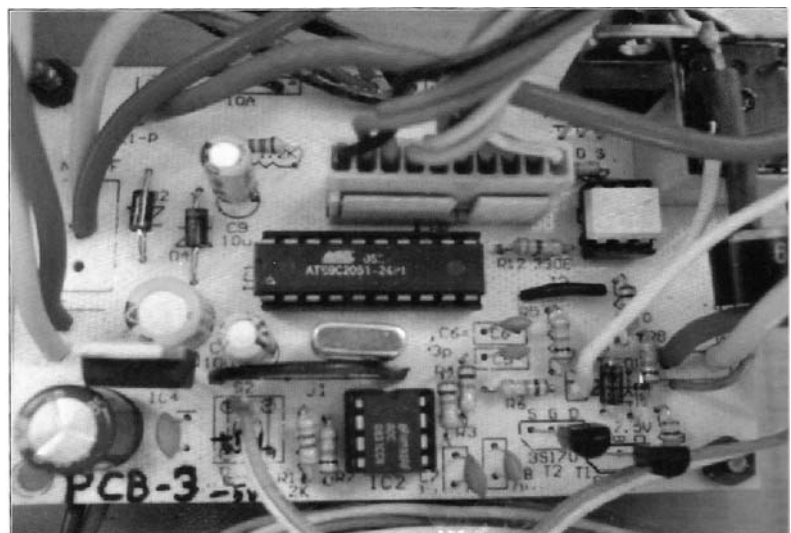


Fig.5 (B): Development of solar controller circuit

the load with the help of load circuit during night. This load circuit is again controlled by the microcontroller. Different blocks shown in Figure 5.

3.4.1 Microcontroller (AT89C2051)

Microcontroller (AT89C2051) is the heart of the circuit. It is a low-voltage, high-performance, 8-bit microcontroller that features 2 kB of Flash, 128 bytes of RAM, 15 input/output (I/O) lines, two 16-bit timers/counters, a five-vector two-level interrupt architecture, a full-duplex serial port, a precision analogue comparator, on-chip oscillator and clock circuitry. A 12 MHz crystal is used for providing the basic clock frequency. All I/O pins are reset to '1' as soon as RST pin goes high. Holding RST pin high for two machine cycles, while the oscillator is running, resets the device. Power-on reset is derived from resistor R1 and capacitor C4. Switch S2 is used for manual reset.

3.4.2 Serial ADC (ADC0831)

The microcontroller monitors the battery voltage with the help of an analogue-to-digital converter. The ADC0831 is an 8-bit successive approximation analogue-to-digital converter with a serial I/O and very low conversion time of typically 32 μ s. The differential analogue voltage input allows increase of the common-mode rejection and offsetting of the analogue zero input voltage. In addition, the voltage reference input can be adjusted to allow encoding of any smaller analogue voltage span to the full eight bits of resolution. It is available in an 8-pin PDIP package and can be interfaced to the microcontroller with only three wires.

3.4.3 LCD Module

The system status and battery voltage are displayed on an LCD based on HD44780 controller. The backlight feature of the LCD makes it readable even in low-light conditions.

The LCD is used here in 4-bit mode to save the microcontroller's port pins. Usually, the 8-bit mode of interfacing with a microcontroller requires 11 pins, but in 4-bit mode, the LCD can be interfaced to the microcontroller using only 7 pins.

3.4.4 Solar Panel

The solar panel used here is meant to charge a 12 V battery and the wattage can range from 10 to 40 watts. The peak unloaded voltage output of the solar panel will be around 19 volts. Higher-wattage panels can be used with some modifications to the controller unit.

3.4.5 Rechargeable Battery

The solar energy is converted into electrical energy and stored in a 12 V lead-acid battery. The ampere-hour capacity ranges from 5 Ah to 100 Ah.

3.4.6 Panel Circuit

Panel circuit is also called the sensor circuit, as it senses the day-night condition. For example, solar home lighting system, solar lantern or solar streetlight-the load (the light) is switched on at dusk (evening) and switched off at dawn (morning). During daytime, the load is disconnected from the battery and the battery is recharged with current from the solar panel. The microcontroller needs to know the presence of the solar panel voltage to decide whether the load is to be connected to or disconnected from the battery, or whether the battery should be in charging mode or discharging mode. A simple sensor circuit is built using a potential divider formed around resistors, zener diode and transistor for the presence of panel voltage.

4.0 DEVELOPMENT OF SOFTWARE PROGRAM

Software program for microcontroller-based solar controller circuit is developed in assembly language and assembled using Metalink's ASM51 assembler. Software program can be divided into following parts according to its functioning:

- a) Main program containing a continuous loop
- b) Function for checking solar panel voltage
- c) Function for checking battery voltage
- d) Function for battery overcharging protection
- e) Function for pulsed charging in case of battery full charged
- f) Function for controlling load according to the day-night condition

5.0 TESTING AND RESULTS

The circuit is tested in the 'Solar Energy Lab, MANIT, Bhopal'. The results obtained are very close to expected values. These results shows in Tables 1-4.

***"MAKE SURE ALL ELECTRIC CORDS ARE TUCKED AWAY, NEAT AND TIDY"
Pets might chew on electrical cords, and people might trip and fall.***

TABLE 1: RESULT FOR RECTIFIER AND SWITCHING CIRCUIT

| Sl. No. | Input supply (Switch position) | | Rectifier circuit | | Switching circuit (Supply selection relay) | | Supply to load |
|---------|--------------------------------|------------------|-------------------|----------------------|--|---------------|------------------|
| | Mains | Renewable energy | O/P voltage | Indication LED (Red) | Coil | Pole Position | |
| 1. | OFF | OFF | 0 V | OFF | De-energize | NC | No supply |
| 2. | ON | OFF | 5 V, 12 V | ON | Energize | NO | Mains |
| 3. | ON | ON | 5 V, 12 V | ON | Energize | NO | Mains |
| 4. | ON | OFF | 5 V, 12 V | ON | De-energize | NC | No Supply |
| 5. | ON | ON | 5 V, 12 V | ON | De-energize | NC | No Supply |
| 6. | OFF | OFF | 0 V | OFF | De-energize | NC | No Supply |
| 7. | OFF | ON | 0 V | OFF | De-energize | NC | Renewable Energy |

TABLE 2: RESULT FOR MEASUREMENT OF 0.01 KWh of ENERGY

| Sl.No. | Load(kW) | Time Measured | | Energy | |
|--------|---|---------------|--------|--------------------|----------------|
| | | mm:ss:00 | Hour | Measured(kWh) | Displayed(kWh) |
| 1. | 0.52 (100 W x 4 bulbs + 60 W x 2 bulbs) | 01:09:87 | 0.0194 | 0.52x0.0194=0.0100 | 0.01 |
| 2. | | 01:11:20 | 0.0197 | 0.52x0.0197=0.0102 | 0.01 |
| 3. | | 01:10:96 | 0.0197 | 0.52x0.0202=0.0102 | 0.01 |
| 4. | | 01:09:38 | 0.0192 | 0.52x0.0192=0.0100 | 0.01 |
| 5. | | 01:10:82 | 0.0196 | 0.52x0.0196=0.0102 | 0.01 |

TABLE 3: RESULT FOR ENERGY CONTROL DURING DAY TIME

| Sl. No. | Input Supply (Switch position) | | Load (kW) | Time (Measured) | | Energy(kWh) | | Supply to load |
|---------|--------------------------------|------------------|---|-----------------|--------|---------------------|-----------|------------------|
| | Mains | Renewable energy | | mm:ss:00 | hour | Measured | Displayed | |
| 1. | OFF | OFF | 0.521 (100 W x 4 bulbs + 60W x 2 bulbs) | -- | -- | -- | -- | No Supply |
| 2. | ON | OFF | | 00:02:52 | 0.0007 | 0.52x0.0007 =0.0003 | 0.00 | Mains |
| 3. | ON | OFF | | 01:09:87 | 0.0194 | 0.52x0.0194 =0.0100 | 0.01 | Mains |
| 4. | ON | OFF | | 02:18:96 | 0.0386 | 0.52x0.0386 =0.0200 | 0.02 | No Supply |
| 5. | ON | ON | | 02:18:26 | 0.0386 | 0.52x0.0386 =0.0200 | 0.02 | Renewable Energy |

TABLE 4: RESULT FOR BATTERY CHARGING

| Sl.No. | Time | Solar panel voltage(Volts) | Battery voltage (Volts) |
|--------|----------|----------------------------|-------------------------|
| 1. | 10.45 am | 17.22 | 6.34 |
| 2. | 11.30 am | 17.24 | 6.86 |
| 3. | 12.05 pm | 17.50 | 7.42 |
| 4. | 12.45 pm | 17.70 | 7.51 |
| 5. | 01.30 pm | 18.41 | 8.75 |
| 6. | 01.45 pm | 18.50 | 9.50 |
| 7. | 02.30 pm | 18.20 | 10.50 |
| 8. | 03.30 pm | 18.01 | 10.65 |
| 9. | 04.05 pm | 17.52 | 10.72 |
| 10. | 04.35 pm | 17.20 | 11.10 |
| 11. | 05.15 pm | 16.05 | 111.52 |

All these results have been obtained from the running condition of the implemented hardware. Various Figures 6-11 and 12(A), 12(B), 12(C) related with this implemented hardware are as follows.

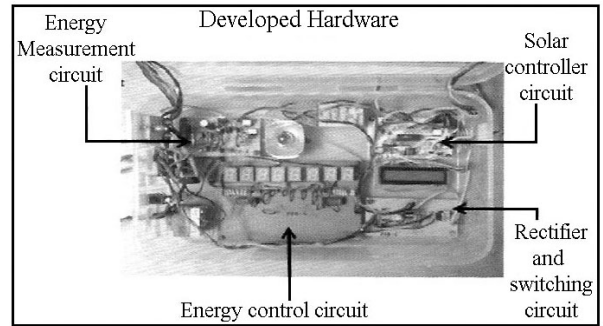
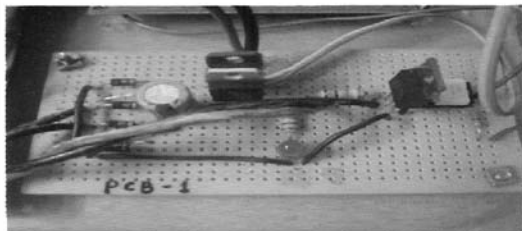


Fig.6: Hardware of the developed system

Rectifier and Switching Circuit



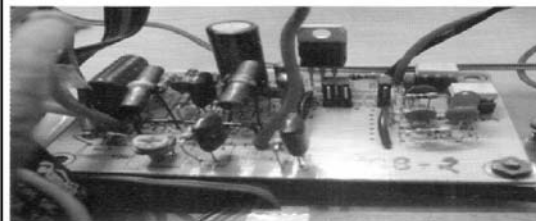
OFF Condition



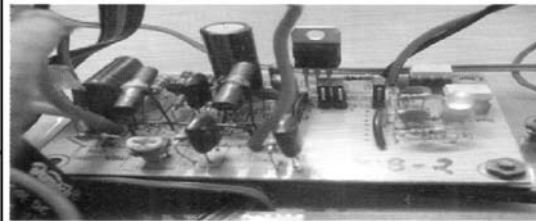
ON Condition

Fig.7: Result for running condition of rectifier and switching circuit

Energy Measurement Circuit



OFF Condition



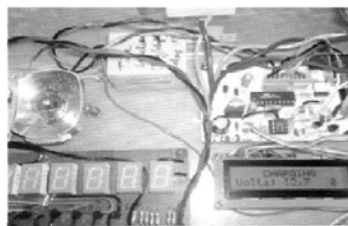
ON Condition

Fig.8: Result for running condition of energy measurement circuit

Solar Controller



Lead-OFF, Battery-Low Condition



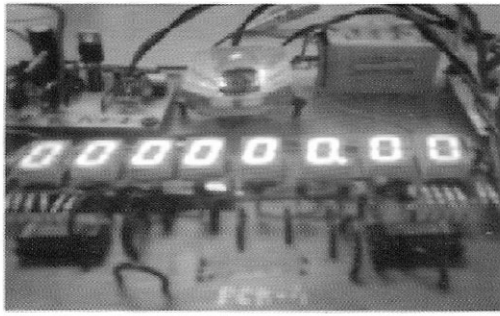
Lead-OFF, Battery-Charging



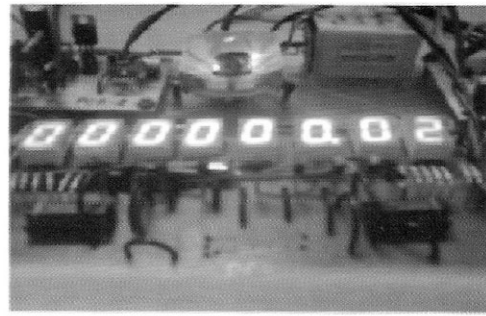
Lead-OFF, Battery-Discharging

Fig.9: Result for running condition of solar controller circuit

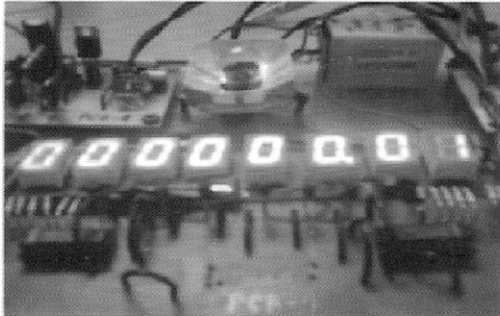
Electrical Energy (Day)



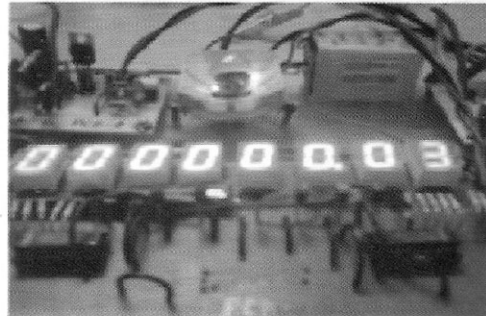
0 Unit (k Wh)



0.02 Unit (k Wh)



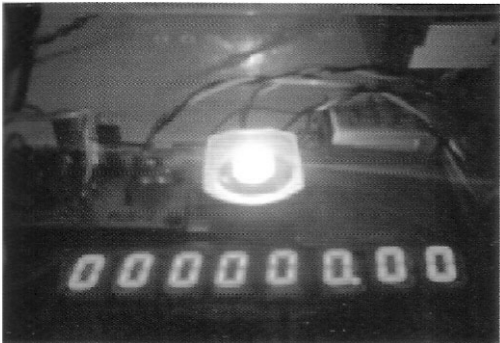
0.01 Unit (k Wh)



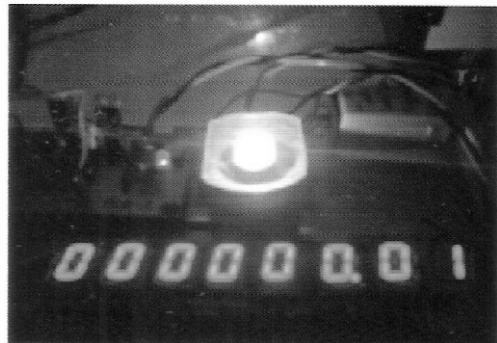
0.03 Units (k Wh)

Fig.10: Result for electrical energy during day time

Electrical Energy (Night)



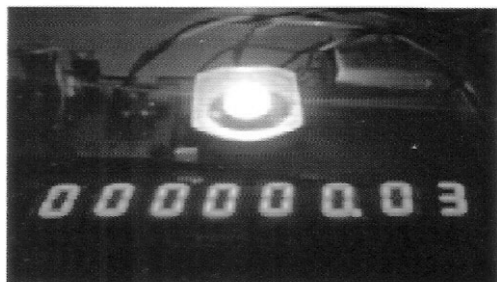
0 Unit (k Wh)



0.01 Unit (k Wh)



0.02 Unit (k Wh)



0.03 Unit (k Wh)

Fig.11: Result for electrical energy during night

Electrical Energy, Load-OFF, Battery-Low Condition

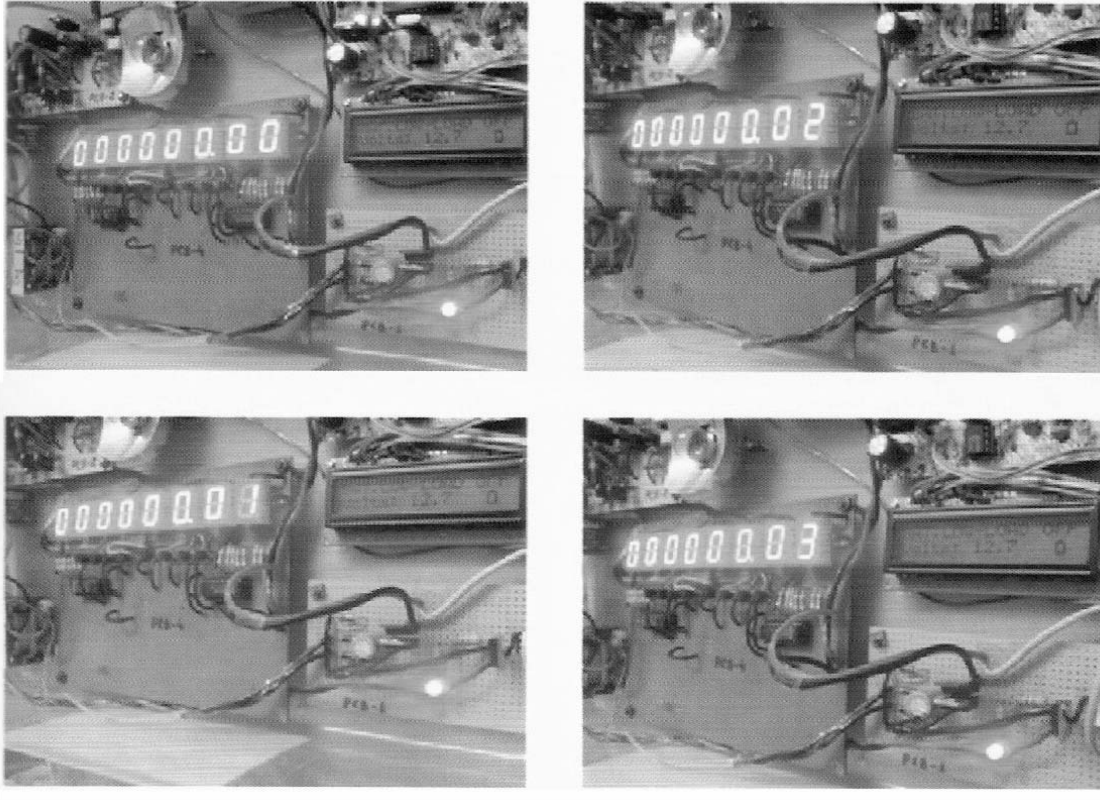


Fig.12 (A): Combined system result showing electrical energy, load-off and battery low-condition

Electrical Energy, Load-OFF, Battery Charging

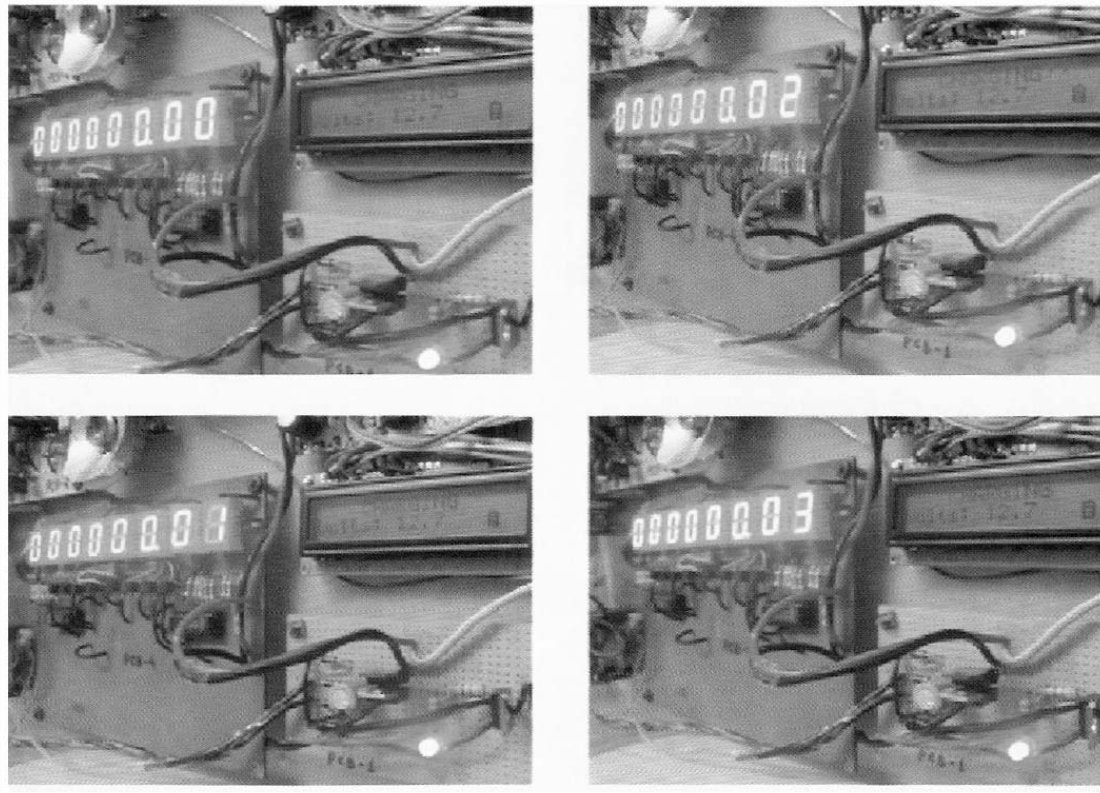


Fig.12 (B): Combined system result showing electrical energy, load-off and battery-charging

Electrical Energy, Load-ON, Battery - Discharging

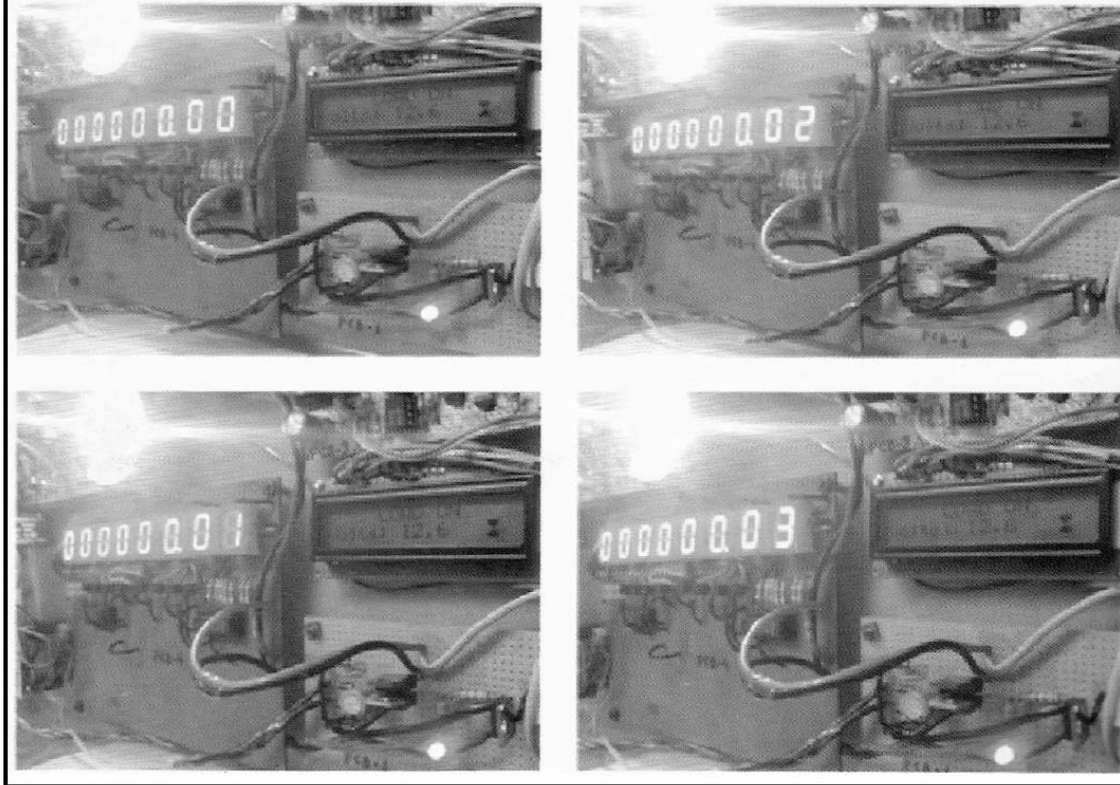


Fig.12 (C): Combined system result showing electrical energy and load-on using battery-discharging

6.0 CONCLUSION

The “Measurement and Control of Electrical energy for the Efficient Energy Management” has an architecture that matches the requirements of electrical energy providers.

One contribution of this system is the ability to control the electrical energy without using expensive technologies like GPRS, mobile communication control, etc., since it uses natural solar energy as a comparator for day and night shifting of energy control. Hence, this project saves the cost. Another contribution is the capacity to measure electrical energy up to 10,00,000 units and to control it up to 2,00,000 units. Such a high amount of electrical energy can be utilized for large number of consumers.

This circuit is capable of replacing conventional analog energy meters which are still being used.

It allows the visualization of electrical energy measurement and controlling both and is more accurate, more reliable and cheaper.

The technique presented in this work provides a means for digital measurement of electrical energy over a wide range. Results obtained exhibited linear behaviour over the range used. With this circuit, good results under various loading conditions have been obtained.

This circuit is very useful in areas where single-time controlling of electrical energy is required, specially in rural and distant areas because internet, wireless connection or even the human interfering are not required for the controlling of electrical energy, if once the controlling range is selected.

When fixed at electricity pole, it will have its own lighting. Thus, it can be identified at a far distant. Also, the energy measurement and controlling display is 7-segment LED display, so that one can see the amount of electrical energy supplying at a distant and it is a cheaper way, since the LCD cannot be seen at a distant and is more costly.

This whole project setup can work on solar energy; hence it can save the electrical energy. With the help of this project, the objective of utilizing the renewable energy sources can be achieved.

Courtesy: Manish Kumar Ghodki, CPRI Journal, March 2012

“KEEP ELECTRICAL STUFF FAR AWAY FROM WATER”

Most electrical accidents around the house happen when people use electricity near water.

தேசிய எரிசக்தி சேமிப்பு வார விழா மதுரை டிசம்பர் 20.12.2013

தமிழக அரசின் மின் ஆய்வுத்துறை சார்பில், தேசிய எரிசக்தி சேமிப்பு வார விழா மதுரையில் சனிக்கிழமை (20.12.2013) நடைபெற்றது. விழாவை குத்து விளக்கு ஏற்றி தொடக்கி வைத்தவர் மாவட்ட ஆட்சியர் இல. சுப்பிரமணியன். மேலும் தமிழக தலைமை மின் ஆய்வாளர் சு. அப்பாவு, மதுரை மண்டல மின் ஆய்வாளர் பெ. பழனி மற்றும் பலர் கலந்து கொண்டனர். மதுரை மண்டல மின் ஆய்வாளர் பெ. பழனி விழாவில் வரவேற்புரை ஆற்றினார்.

மேலும் விழாவில் தலைமை மின் ஆய்வாளர் சு. அப்பாவு தன் உரையில் - மின்சாரம் பல வகையில் மனித வாழ்க்கையோடு பின்னிப்பிணைந்துள்ளது. ஆனால் மின் உற்பத்திக்காக நாம் பயன்படுத்தும் மரபு சார்ந்த எரிபொருள்கள் 100 ஆண்டுகளில் காலியாகும் சூழல் உள்ளது. இந்த பூமியில் இன்னும் 100 ஆண்டுக்கான நிலக்கரிதான் உள்ளது. இதேபோல, 60 ஆண்டுக்கான இயற்கை எரிவாயு, 130 ஆண்டுக்கான யுரேனியத்தான் இருக்கின்றன. எனவே, மாற்று எரிபொருளை கண்டுபிடிக்க வேண்டிய கட்டாயம் நிலவுகிறது.

இந்தியாவில் ஒரு தனி மனிதன் ஆண்டுக்கு 400 மெட்ரிக்டன் எரிபொருளை செலவழிக்கிறான். ஆனால் அமெரிக்காவிலோ ஓராண்டுக்கான தனி மனித எரிபொருள் செலவு 2400 மெட்ரிக்டன்னாக உள்ளது. நாடு வளர வளர எரிபொருள் தேவை அதிகரிப்பதைத் தவிர்க்க முடியாது. ஆனால், சிக்கனமாகப் பயன்படுத்த முடியும்.

தமிழகத்தில் ஓராண்டுக்கு 72 பில்லியன் யூனிட் மின்சாரம் செலவிடப்படுகிறது. மின்சிக்கனத்தைக் கடைப்பிடித்தால், விவசாயத்தில் 3 பில்லியன் யூனிட்டையும், வீடுகளில் 2.6 பில்லியன் யூனிட்டையும், தொழிற்சாலைகளில் 1.9 பில்லியன் யூனிட் மின்சாரத்தையும், வர்த்தக, அலுவலக மின்சாரத்தில் 0.2 பில்லியன் மின்சாரத்தையும், சேமிக்க முடியும். இது 1200 மெகாவாட் மின்நிலைய உற்பத்திக்கு சமமாகும்.

எரிசக்தி திறன் ஊக்க செயல்சட்டம் என்ற புதிய சட்டம் 2001 ஆம் ஆண்டு செப்டம்பர் மாதம் 20-ம் தேதி கொண்டுவரப்பட்டது. இச்சட்டம் இதுவரை நடைமுறைப்படுத்த படவில்லை. ஆனால், விரைவில் இச்சட்டம் நடைமுறைப்படுத்தப்பட உள்ளது. இச்சட்டத்தில், கட்டாயப்படுத்தி மின் சிக்கனத்தை செயல்படுத்துதல், தானாக முன்வந்து மின்சிக்கனத்தை கடைப்பிடித்தல் என இரண்டு ஷரத்துக்கள் உள்ளன.

இச்சட்டத்தின்படிதான், ப்ளோரோசென்ட் டியூப்லைட்டுகள், ஏ.சி. பிரிட்ஜ் போன்ற 4 பொருள்களில் தரக்குறியீடு கட்டாயப்படுத்தப்பட்டுள்ளது. அடுத்து டி.வி. வாஷிங் மெஷின், சீலிங் பேன் உள்ளிட்ட 14 வீட்டு உபயோகப் பொருள்களுக்கும் தர நிர்ணயம் கட்டாயப்படுத்தப்பட உள்ளது.

அதேபோல, கட்டடங்கள் கட்டும்போது, மின்சிக்கனத்துக்கு உதவும் மின் சாதனங்களைப் பொருத்தினால் மட்டுமே அதற்கு அனுமதி வழங்க இச்சட்டத்தில் இடம் உள்ளது. இரும்பு, தெர்மல், டெக்ஸ்டைல் உள்ளிட்ட 9 வகையான தொழில்களில் ஈடுபட்டுள்ள 41 நிறுவனங்களைக் கண்டறிந்து, வருகிற 2015-ம் ஆண்டுக்குள் மின்சிக்கனத்தில் குறிப்பிட்ட இலக்கை கட்டாயம் எட்ட வேண்டும் என்று உத்தரவிடப்பட உள்ளது என்றார்.

இவ்விழாவில், எரிபொருள் சிக்கனம் குறித்த கருத்தரங்கில் தியாகராசர் பொறியியல் கல்லூரிப் பேராசிரியர் வி. சரவணன், செட்டிநாடு சிமென்ட் கூடுதல் பொது மேலாளர் எல். வி. செந்தில் குமார் ஆகியோர் உரையாற்றினார்கள். இறுதியில் தலைமை கணக்கர் எஸ். அழகுதுரை நன்றி உரையாற்றினார்.

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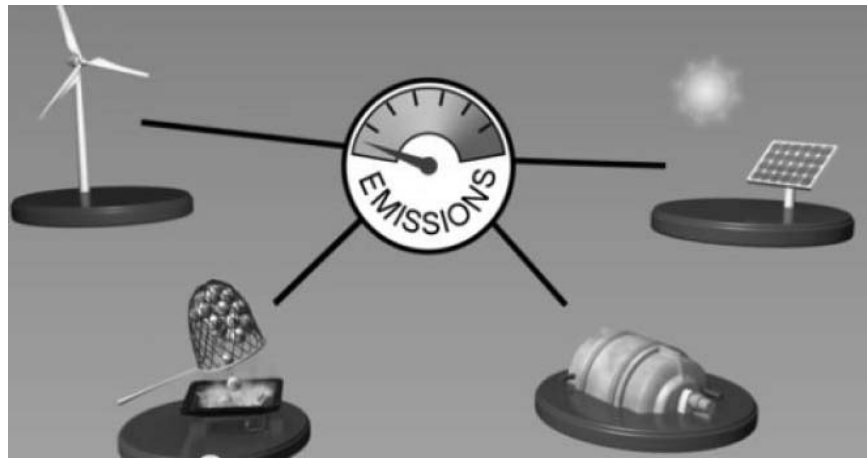
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CAN WE TURN UNWANTED CARBON DI OXIDE INTO ELECTRICITY?

Researchers are developing a new kind of geothermal power plant that will lock away unwanted carbon dioxide (CO₂) underground—and use it as a tool to boost electric power generation by at least 10 times compared to existing geothermal energy approaches.

The technology to implement this design already exists in different industries, so the researchers are optimistic that their new approach could expand the use of geothermal energy in the U.S. far beyond the handful of states that can take advantage of it now.



At the American Geophysical Union meeting on Friday, Dec. 13, the research team debuted an expanded version of the design, along with a computer animated movie that merges advances in science with design and cognitive learning techniques to explain the role that energy technologies can have in addressing climate change. The new power plant design resembles a cross between a typical geothermal power plant and the Large Hadron Collider: It features a series of concentric rings of horizontal wells deep underground. Inside those rings, CO₂, nitrogen and water circulate separately to draw heat from below ground up to the surface, where the heat can be used to turn turbines and generate electricity.

The design contrasts with conventional geothermal plants, explained study co-author Jeffrey Bielicki, assistant professor of energy policy in the Department of Civil, Environmental and Geodetic Engineering and the John Glenn School of Public Affairs at The Ohio State Univ.

“Typical geothermal power plants tap into hot water that is deep under ground, pull the heat off the hot water, use that heat to generate electricity, and then return the cooler water back to the deep subsurface. Here the water is partly replaced with CO₂ or another fluid—or a combination of fluids,” he said.

CO₂ extracts heat more efficiently than water, he added.

This approach—using concentric rings that circulate multiple fluids—builds upon the idea to use CO₂ originally developed by Martin Saar and others at the University of Minnesota, and can be at least twice as efficient as conventional geothermal approaches, according to computer simulations.

“When we began to develop the idea to use CO₂ to produce geothermal energy, we wanted to find a way to make CO₂ storage cost-effective while expanding the use of geothermal energy,” said Jimmy Randolph, postdoctoral researcher in the Department of Earth Sciences at the University of Minnesota.

“We hope that we can expand the reach of geothermal energy in the United States to include most states west of the Mississippi River,” Bielicki said.

The current research team includes Ohio State, the University of Minnesota and Lawrence Livermore National Laboratory, where geoscientist Tom Buscheck came up with the idea to add nitrogen to the mix.

He and his colleagues believe that the resulting multfluid design will enable geothermal power plants to store energy away—perhaps hundreds of gigawatt hours—for days or even months, so that it is available when the electricity grid needs it. The underground geothermal formation could store hot, pressurized CO₂ and nitrogen, and release the heat to the surface power plant when electricity demand is greatest. The plant could also suspend heat extraction from the subsurface during times of low power demand, or when there is already a surplus of renewable power on the grid.

“What makes this concept transformational is that we can deliver renewable energy to customers when it is needed, rather than when the wind happens to be blowing, or when spring thaw causes the greatest runoff,” Buscheck said.

In computer simulations, a 10-mile-wide system of concentric rings of horizontal wells situated about three miles below ground produced as much as half a gigawatt of electrical power – an amount comparable to a medium-

sized coal-fired power plant – and more than 10 times bigger than the 38 megawatts produced by the average geothermal plant in the United States.

The simulations also revealed that a plant of this design might sequester as much as 15 million tons of CO₂ per year, which is roughly equivalent to the amount produced by three medium-sized coal-fired power plants in that time.

Bielicki noted the possibility of expanding the use of geothermal energy around the country. Right now, most geothermal power plants are in California and Nevada, where very hot water is relatively close to the surface. But the new design is so much more efficient at both storing energy and extracting heat that even smaller-scale “hotspots” throughout the western U.S. could generate power.

The eastern U.S. is mostly devoid of even small hotspots, so geothermal power would still be limited to a few particularly active areas such as West Virginia, he said.

Another caveat: The geothermal plant would probably have to be connected to a large CO₂ source, such as a coal-fired power plant that is scrubbing the CO₂ from its own emissions. That connection would likely be made by pipeline.

Buscheck added, however, that the study showed that this design could work effectively with or without CO₂, and said a pilot plant based on this design could initially be powered solely by nitrogen injection to prove the economic viability of using CO₂. The research team is currently working on more detailed computer model simulations and economic analyses for specific geologic settings in the U.S.

The project is unusual in part because, as they were refining their ideas, the engineers joined with Shannon Gilley, then a master of fine arts student at the Minneapolis College of Art and Design. Bielicki worked with Gilley for more than a year to create the computer animated video titled “Geothermal Energy: Enhancing our Future.” Part of Gilley’s task was to communicate the more complex details of climate change, CO₂ storage and geothermal energy to the general public.

“We built this concept of public outreach into our efforts not just to communicate our work, but also to explore new ways for scientists, engineers, economists and artists to work together,” Bielicki said.

Co-authors on the presentation also included Mingjie Chen, Yue Hao and Yunwei Sun, all of Lawrence Livermore National Laboratory. Work at the University of Minnesota and Ohio State has been funded by the National Science Foundation, while work at Lawrence Livermore National Laboratory has been funded by the U.S. Department of Energy’s Office of Energy Efficiency and Renewable Energy.

Heat Mining Co. LLC, a startup company spun off from the University of Minnesota, expects to have an operational project, based on an earlier form of the approach, in 2016.

‘ELECTRICAL AATHICHUDI’ FOR ENERGY CONSERVATION

At a time when the State has been facing acute power crisis, Tamil Nadu Generation and Distribution Corporation (TANGEDCO) has decided to carry the message of energy conservation to school students through ‘Aathichudi’, one of the most popular pieces of ancient Tamil literature.

Titled ‘**Electrical Aathichudi**,’ the message on importance of energy conservation has been jotted down in an alphabetical list of Tamil vowels. It would be forwarded to all schools in the district for “energising the students,” said M. Balasubramanian, Chief Engineer-Distribution (in-charge), TANGEDCO. He said that there were plans to conduct elocution and essay writing competitions for school students during the energy conservation week to be celebrated between December 14 and 20.

Pamphlets and stickers on energy conservation would also be distributed in cinema halls and other public places. On its part, Tamil Nadu Electrical Inspectorate (TNEI) had also come out with a list measures on conserving energy. It has suggested use of microwave ovens, front loading washing machines, mono block water pumps, electronic chokes in tubelights and so on for saving electricity.

Assistant Electrical Inspector C.J. Christopher Signy of TNEI said on Friday that electricity could be conserved even through simple measures such as cleaning the dust on tube lights and bulbs regularly and keeping the outdoor units of split air-conditioners under the shade of trees.

“People must know that they should not stuff too many things in a refrigerator.” he said.

“Pamphlets will be distributed in cinema halls and other public places”

DIESEL ENGINE

Designed to provide the motive force for a variety of supertankers and container ships, it comes in 6 cylinder in-line through to a whopping 14 cylinder version. The cylinder bore is 38 inches and the stroke is just over 98 inches. Each cylinder displaces 111,143 cubic inches (1820 litres) and produces 7780 horsepower. Total displacement comes out to 1,556,002 cubic inches (25,480 litres) for the 14-cylinder version.

At a length of 89 feet and a height of 44 feet, the total engine weight is 2300 tons - the crankshaft alone weighs 300 tons.

The RTA96C-14 can achieve a maximum power output of 108,920 hp at 102 rpm and astonishingly, at maximum economy the engine exceeds 50% thermal efficiency. That means, more than 50% of the energy in the fuel is converted to motion. Its Brake Specific Fuel Consumption (BSFC) at maximum power is 0.278 lbs/hp/hr.

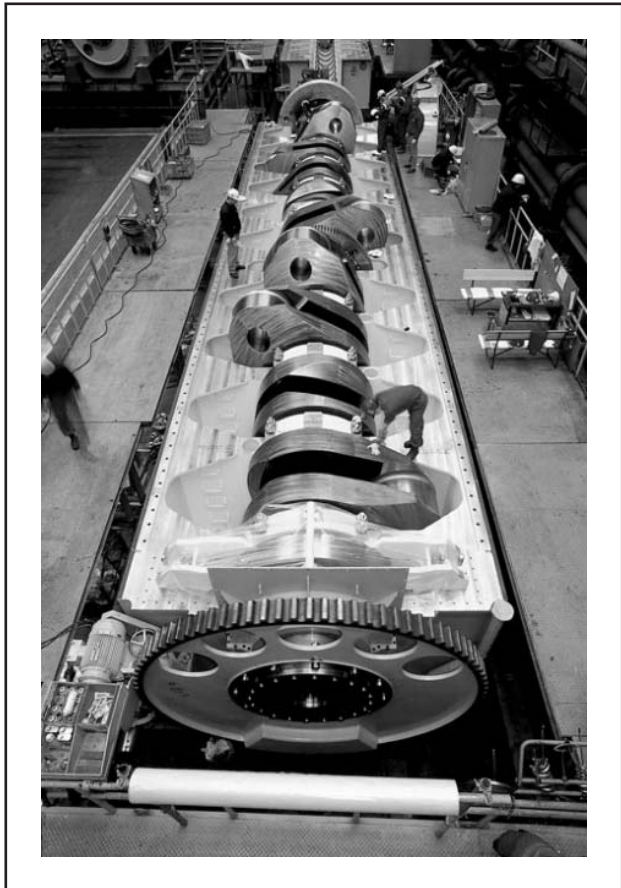
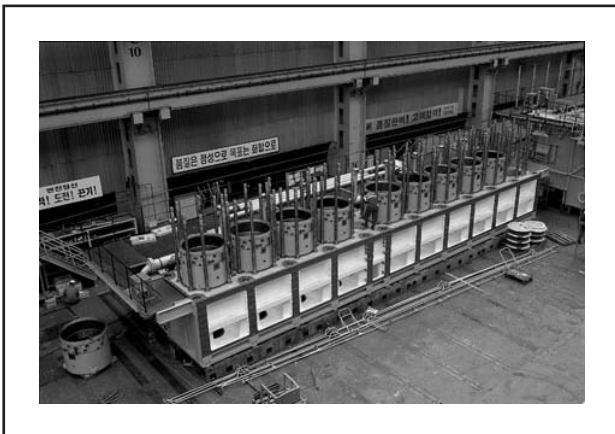
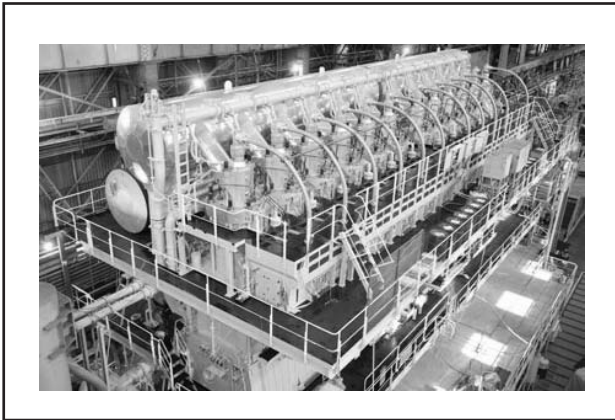
The peak capabilities of the 14-cylinder RTA96C engine now exceed 80 MW, making it adequate for a single-screw Post-Panamax container liner, which is as large as container liners will get considering their greater cost-effectiveness.

Sulzer have also managed to increase cylinder output since they began first operation in 1997, due to the maintenance experience accumulated with the large number of RTA96C engines currently in service. The new kW rating of the new engine achieves a power output of 68,640 kW, a four percent increase on the initial RTA96C.

Despite the large amounts of power produced by these engines, surprisingly low wear rates have been achieved. Diametral cylinder liner wear is in the order of only about 0.03 mm/1000 hours.

This low cylinder wear is possibly attributed to a connecting rod that attaches to a “crosshead” which rides in guide channels, a fundamental difference to most automotive engines where the top of the connecting rod is attached directly to the piston. Instead, in this engine the top of the connecting rod attaches to a “crosshead” and a long piston rod then connects the crosshead to the piston. This lowers the sideways forces produced by the connecting rod and is absorbed by the crosshead and not by the piston. Sideways forces are what makes the cylinders in an auto engine become oval-shaped over time.

Fuel consumption at maximum economy is 0.260 lbs/hp/hour. Comparatively, most automotive and small aircraft engines can only achieve BSFC figures in the 0.40-0.60 lbs/hp/hr range and 25-30% thermal efficiency range.



தேசிய எரிசக்தி சேமிப்பு வார விழா, டிசம்பர் 18, 2013



தலைமை மின் ஆய்வாளர் திரு. சு. அப்பாவு அவர்கள் மாண்புமிகு மின்துறை அமைச்சர் திரு. நத்தம் ரா. விசுவநாதன் அவர்களுக்கு நினைவு பரிசு அளித்தல்.



தமிழ்நாடு எலக்ட்ரிகல் இன்ஸ்டலேஷன் இன்ஜினியர்ஸ் அசோசியேஷன் ஏ கிரேடு தலைவர் திரு. உ. பாஸ்கரன் அவர்கள் மாண்புமிகு மின்துறை அமைச்சர் திரு. நத்தம் ரா. விசுவநாதன் அவர்களுக்கு பொன்னாடை போர்த்தி கௌரவித்தல்.



விழாமேடை



தலைமை மின் ஆய்வாளர் திரு. ச. அப்பாவு அவர்கள் மாண்புமிகு மின்துறை அமைச்சர் திரு. நத்தம் ரா. விசுவநாதன் அவர்களுக்கு பூங்கொத்து அளித்து வரவேற்றல்.



மாண்புமிகு அமைச்சர் மற்றும் தலைமை மின் ஆய்வாளர் மற்றும் பலர் அரங்கினுள் நுழைதல்



மாண்புமிகு அமைச்சர் குத்து விளக்கேற்றி விழாவை துவக்குதல்



தலைமை மின் ஆய்வாளர் குத்து விளக்கேற்றி விழாவை துவக்குதல்



பார்வையாளர்கள்



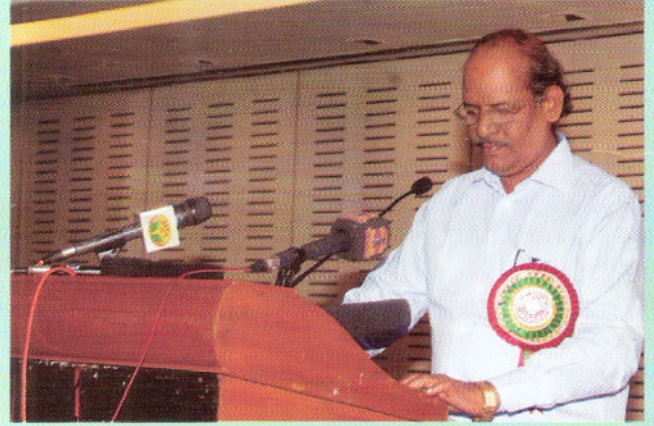
தமிழ்நாடு எலக்ட்ரிகல் இன்ஸ்டலேஷன் இன்ஜினியர்ஸ் அசோசியேஷன் ஏ கிரேடு செயலாளர் திரு. கி. கண்ணன் அவர்கள் மாண்புமிகு மின்துறை அமைச்சர் திரு. நத்தம் ரா. விசுவநாதன் அவர்களை கௌரவித்தல்



விழாமேடையில் சிறப்பு விருந்தினர்கள்



மாண்புமிகு மின்துறை அமைச்சர் திரு. நத்தம் ரா. விசுவநாதன் அவர்கள் உரையாற்றினார்



தலைமை மின் ஆய்வாளர் சு. அப்பாவு அவர்கள் உரையாற்றினார்



மாண்புமிகு அமைச்சர், தலைமை மின் ஆய்வாளர் மற்றும் பலர் மின்சேமிப்பு உபகரணங்களை பார்வையிடுதல்



தலைமை மின் ஆய்வாளர் மற்றும் மின் ஆய்வாளர் அலுவலக அலுவலர்கள்

தேசிய எரிசக்தி சேமிப்பு வார விழா டிசம்பர் 14-20, 2013

தேசிய எரிசக்தி வார விழா, சென்னை 18.12.2013

ஆண்டுதோறும் டிசம்பர் 14 ஆம் தேதி முதல் 20-ந் தேதி வரை தேசிய எரிசக்தி வார விழா கடைப்பிடிக்கப்படுகிறது. அதன் அடிப்படையில் இவ்வாண்டும் சென்னை கிண்டியில் உள்ள நட்சத்திர ஓட்டல் லீ ராயல் மெரிடியனில் 18 டிசம்பர் 2013 தமிழக அரசின் மின் ஆய்வுத்துறை சார்பில் தேசிய எரிசக்தி வார விழா நடந்தது.

தமிழ்த்தாய் வாழ்த்துடன் விழா தொடங்கியது

வரவேற்புரை

விழாவில் திரு. ச. அப்பாவு, தமிழ்நாடு அரசு முதன்மை ஆய்வாளர் அவர்கள் வரவேற்புரை ஆற்றினார்கள். தன் வரவேற்புரையில் முதலில், பல்வேறு பணிகளுக்கு இடையில் இந்த விழாவிற்கு வருகைதந்து தலைமை ஏற்கும் மாண்புமிகு அமைச்சர் திரு. நத்தம் ரா. விசுவநாதன் அவர்களை வருக வருக என வரவேற்றார்

மின் ஆய்வுத்துறையின் கீழ் இயங்கி வரும் மின் ஆய்வுக்கூடத்தின் தரத்தை, தேசிய அளவில் முதல் பத்து இடங்களில் வருவதற்கு மாண்புமிகு அமைச்சர் அவர்கள் அனைத்து ஊக்குவிப்புகளையும் அளித்துவருவதாக கூறினார்.

பின்னர் மேடையில் இருந்த முக்கிய, இதர தொழில் பிரமுகர்களையும் மின் ஆய்வுத்துறை சார்பில் வரவேற்றார்.

1961இல் மின்ஆய்வுத்துறை ஆரம்பிக்கப்பட்டதையும், அதன் அடிப்படைக் கொள்கைகளையும், அதன் பணிகளையும் சுருக்கமாக விளக்கினார். மின் வரிகள் மூலமாக ரூ.350 கோடி வரை ஆண்டுக்கொருமுறை அரசாங்கத்திற்கு கிடைக்க வழிசெய்கிறது.

எரிசக்தி சேமிப்பின் சட்டபிரிவுகள் பெரும்பாலும் தானே முன்வந்து செயலாக்கும் முறைகளிலேயே (voluntary) பின்பற்றப்படுகின்றது. அதிகப்படியான மின்சாரம் உபயோகிக்கும் சில நுகர்வோர்களை கண்டறிந்து அவர்களுக்கு மின்சாரத்தை சேமிக்கும் இலக்கையும் நிர்ணயித்து, மத்திய அரசு, மார்ச் 2015க்குள் இலக்கினை எட்டவேண்டும் என்று பணித்திருக்கிறது, இதன்படி தமிழ்நாட்டில் மட்டும் சுமார் 500 மெகாவாட் வரை சேமிக்கும் வாய்ப்பு இருப்பதாக தன் உரையில் தெரிவித்தார்.

எரிசக்தி சேமிப்பை விளக்கும் விழிப்புணர்வு பிரச்சாரங்கள், PILOT PROJECT என்று சொல்லப்படுகின்ற மாதிரி திட்டங்கள், LED Village Campaign போன்றவைகளில் தங்கள் துறை ஈடுபட்டு வருவதாக தனது உரையில் தெரிவித்தார்.

Waste Heat Recovery என்று சொல்லப்படுகின்ற வீணாகும் வெப்பத்தை உபயோகப்படுத்தும் முறையை ஒரு கொள்கையாக அரசாங்கம் கொண்டுவர திட்டம் உள்ளதாக தெரிவித்தார்.

மேலும் வருகைதந்திருந்த மின் ஆய்வுத்துறை அதிகாரிகளையும், மின்துறை அதிகாரிகளையும், மின் ஒப்பந்தக்காரர்களையும், பொதுமக்களையும் வரவேற்று உரை ஆற்றினார்.

சிறப்பு விருந்தினர், மின்சாரம், மதுவிலக்கு மற்றும் ஆயத்தீர்வை துறை மாண்புமிகு அமைச்சர் திரு. நத்தம் ரா. விசுவநாதன் அவர்களின் சிறப்புரை

அவ்வூரையில் உணவு, உடை, இருப்பிடம் என்ற அத்தியாவசிய தேவையில் இன்று 4-வது அம்சமாக மின்சாரமும் சேர்ந்து கொள்கின்ற அளவுக்கு மின்சாரம் மனித வாழ்க்கையில் முக்கிய அம்சமாக பின்னி பிணைந்துள்ளது. நாள் ஒன்றுக்கு 7 சதவீதம் முதல் 8 சதவீதம் வரை மின் தேவை அதிகரித்து வருகிறது. ஆனால் அதே விகிதாச்சார அளவுப்படி மின் உற்பத்தியை பெருக்காத சூழ்நிலையால், மின் உற்பத்திக்கும், தேவைக்குமான இடைவெளி அதிகரித்துள்ளது.

மாண்புமிகு முதல்அமைச்சர் ஜே. ஜெயலலிதா அவர்கள் ஆட்சி பொறுப்பேற்றவுடன் மின்வெட்டை போக்குவதற்காக பல சிறப்பு திட்டங்களை செயலாற்றி வருவதன் மூலமாக தமிழகத்தில் மின்வெட்டு படிப்படியாக குறைந்து வருகிறது. வரும் நிதி ஆண்டுக்குள் தமிழ்நாட்டில் மின்வெட்டே இல்லாத சூழ்நிலை ஏற்படும் என்று நம்பிக்கை தெரிவித்தார்.

14 லட்சம் சி.எப்.எல். பல்புகள்

மின்சார சிக்கனத்தை வலியுறுத்தி 14 லட்சம் ஏழை குடிசைவாசிகளுக்கு சி.எப்.எல். பல்புகளை முதல் அமைச்சர் ஜெயலலிதா ஓரிரு வாரங்களில் வழங்க உள்ளார். மழைநீர் சேமிப்பை போன்று மின்சார சேமிப்பையும் முதல் அமைச்சர் ஜெயலலிதா வெகுஜன இயக்கமாக மாற்றி உள்ளார். ஒரு யூனிட் மின்சாரத்தை சேமிப்பது, 2 யூனிட் மின்சாரம் உற்பத்திக்கு சமமாகும் என்று மாண்புமிகு அமைச்சர் நத்தம் விசுவநாதன் அவர்கள் கூறினார்.

விழிப்புணர்வு நாடகம்

விழாவில், மின்சார சிக்கனத்தின் அவசியத்தை பற்றி தமிழ்நாடு மின்சக்தி ஒழுங்கு முறை ஆணையத்தின் உறுப்பினர் நாகல்சாமி, என்.பி.சி. இயக்குனர் ஜே. நாகேஷ்குமார், ரினால்ட் நிசான் கார் உற்பத்தி தொழிற்சாலை துணை தலைவர் பிஜி பாலேந்திரன், ஓட்டல் லீ ராயல் மெரிடியன் தலைவர் பழனி ஜி. பெரியசாமி ஆகியோர் சிறப்புரையாற்றினார்கள்.

இந்நிகழ்ச்சியில் மின் சேமிப்பு விழிப்புணர்வை பற்றி தமிழக அரசின் மின் ஆய்வுத் துறையில் தலைமை மின் ஆய்வாளர். திரு. ச. அப்பாவு அவர்கள் வரவேற்று பேசினார். முதுநிலை மின் ஆய்வாளர் வ. ஜெயலால் நன்றியுறையாற்றினார். மின் சேமிப்பை பற்றிய விழிப்புணர்வு நாடகத்தை விளக்கும் வகையில் ரெயில் பிரியா குழுவினரின் நாடகம் நடைபெற்றது.

ELECTRIC BUS

In a few weeks, we will see an electrically operated K9 bus making rounds of the city. The bus, which has already arrived in Bangalore and is stationed in BMTC's Shantinagar depot, armed with an Automobile Research Institute of India (ARI) certification, is awaiting permission (temporary registration) from the Transport Commissioner before it can operate on city roads.

Confirming this, officials in BMTC said that a letter had been written to the Transport Commissioner. "We plan to run trial operations of the bus for three months before any decision is made on purchasing it. It depends on how it performs on the city's roads. We have also received permission from BESCOM with regard to additional power that will be needed to charge the buses," said a BMTC official.

The bus, the K9 D Specs, comes with four Ferrous batteries, each with a capacity of 540 Volts. Manufacturers of the bus claim that it can run a distance of 250 kms once the batteries are fully charged for six hours and this is what BMTC wants to check.

The charging facility of the bus will be set up at Kempegowda bus station. BESCOM has sanctioned additional power of 90,000 volts, said BMTC officials. The corporation, however, has not decided on which route the bus will operate, although it is likely that it will be put on long, congested roads to see how the bus fares in these conditions. Four drivers will also be trained in operating the bus.

The air-conditioned vehicle, weighing 14,300 kgs, is 12 metres long and has a seating capacity of 29, plus a wheelchair, besides the driver. It can run at a maximum speed of 96 km per hour and can go from 0-50 km per hour in 20 seconds.

The bus is currently running in countries like China (Shenzen - 300 buses), Singapore and Malaysia said Vishwas Shetty, director, Utopia Automation and Control. "We have slightly modified it to suit Indian conditions and we hope that it works out here," he said.



Advantages of eBUS

Zero Pollution

Low running cost - Rs 4 per km

Low Maintenance - No IC Engine completely motor driven & Engine oil is not required

Low Noise

Quick charging - charged 50 per cent in three hours

Long Range - 250 - 300 km for single charge

Wheelchair ramp for physically disabled

Fully air-conditioned

Solar charging option

Courtesy: Indian Express

ELECTRICITY - the safe way is the best way

TERI LAUNCHES BIOMASS COLD STORAGE IN SITAPUR

Union minister of new & renewable energy Farooq Abdullah assured all possible financial help to villages of Uttar Pradesh to help them develop alternative sources of electrification while inaugurating the '**Biomass energy based village electrification**' and '**cold storage**' project in a village of Sitapur on Thursday.

The project is first of its kind in UP where biomass is being used to supply power to a cold storage in a village to preserve fruits and vegetables of farmers. UP farmers have always been grappling with poor grid supply in villages which has been affecting their irrigating practices, children's studies and household chores. Even companies are reluctant to set up industries in villages which have insufficient power supply. This results in poor job avenues for locals, who then migrate to cities for livelihood. Also, due to lack of proper storage and transit facilities, about 22% of agricultural produce, especially fruits and vegetables is spoiled. The wastage in fruits and vegetables is estimated to be worth about Rs.330 billion in **India**. To end this vicious circle, The Energy and Resources Institute (TERI) launched the concept of using indigenously available biomass resources for operating small and decentralised cold storage at village level.

In addition, they also wanted to supply off-grid (alternative energy) power to electrify households of villages. TERI installed its first project in Bilariya village of Sitapur with support of two Australian agencies, AusAid (managing Australia's overseas aid program) and CSIRO (Australian premier research organization). TERI said apart from electrification of households, the project will benefit in many other ways like creating job opportunities, developing alternative power source and recharging electronic lamps, mobile phones, etc.

The project is supplying electricity to over 140 households in nearby villages and a cold storage facility in Bilariya. A prepaid metering system is installed in households to ensure that villagers are paying only for the number of units they are consuming. The biggest advantage is that the cold storage (15 metric tonnes capacity) can easily preserve agrarian produce at 0 degree Celsius.

R K Pachauri, director-general of TERI, said, "We aim to install more such projects in villages of UP. We have met several times with the officials and the CM but there seems a lack of initiative from the state government to support such projects." Alternative energy projects are solution to the current power shortage in country. "States should help such projects financially as villagers cannot afford to run it on their own", he added.

The biomass electrification project has a capacity of 50 kilowatt but due to paucity of financial resources and lack of raw material to run the plant, the project is currently running at a capacity of 15 KW. A village community has been formed to maintain and operate the facility and look after villagers' requirements. TERI would assist the project for 2 years, after which it would be transferred to the community.

Villagers were apprehensive about sustainability of the model as they were facing challenges in sourcing funds from the government. The minister assured that he would extend financial help to the villages to develop more such alternative energy projects.

SHELL ECO-MARATHON 2013 ROTTERDAM – HIGHLIGHTS

The Shell Eco-marathon is a competition for students to push self-built machines to the limits of fuel efficiency. Liquid-fuel cars and electric vehicles must travel a set distance with the least amount fuel or electric energy possible.

At the 2013 event in May, the top teams achieved nearly 3,000km from one litre of gasoline or a single kilowatt-hour of electricity, calculating their car's efficiency from several ten-lap sessions completed at 25kph.

200 teams from 24 nations entered (Shell also hosts Eco-marathons in the US and Asia) and car design varied hugely. However, each fit into one of two categories. The Prototypes are built for pure efficiency – stripped to the minimum they're ultra-streamlined and lightweight. The more practical Urban Concept cars have upright seats, lights and windscreen wipers.

"Our hope is that students take away insights into new energies and how to solve real problems," says Norman Koch, technical director of **Shell Eco-marathon**, who oversees technical and safety inspections. "We want them, in their future lives, to have an appreciation for the energy challenge that lies ahead of us and a backpack of ideas and knowledge about how to address it."

Although innovative design and advances are a given at the three global events, Shell isn't using the Eco-marathons to mine for game-changing ideas. Instead, it hopes to inspire participants to consider a future in science or engineering.

It's part of Shell's commitment to what it calls Smarter Mobility. With this in mind, teams choose from a variety of fuel types. "We offer seven different options to teams," says Koch. "From gasoline and diesel, to biofuels – like ethanol and FAME – and gas-to-liquid. And there's hydrogen for fuel cells and battery EVs."

WORLD BANK SAYS KEEN TO SUPPORT INDIA'S SOLAR POWER EFFORTS

The World Bank is keen to financially support **India's** efforts to emerge as a global leader in solar power, its Country Director for **India** Onno Ruhl has said.

For **India** to achieve its target of adding 20,000 MW of solar capacity by 2022, there is a need to address key issues such as structural constraints to commercial financing, Ruhl told reporters here.

The World Bank on Thursday launched a report titled 'Paving the Way for a Transformational Future: Lessons from Jawaharlal Nehru National Solar Mission Phase 1.

India should take a serious look at subordinated debt financing to provide long-term finance for solar power projects, said Ashish Khanna, Lead Energy Specialist, World Bank.

One of the constraints is that the **Indian** banking system is unable to provide long-term funding for large infrastructure projects. Financial innovations such as credit enhancement, and subordinate debt lending should be looked into for addressing this issue, Khanna said.

No bank help

Under Phase-I of **India's** National Solar Mission, financing for projects mainly came from export credit agencies, multilateral financial institutions and some non-banking financial companies, and not from scheduled commercial banks. "Government needs to design risk reducing financing instruments such as sub-ordinated public finance in order to attract long-term commercial lending to ensure long-term viability," the report says.

The installation of grid-connected solar power is a continuing process, and so far, 2,101 MW capacity has been installed, according to the Ministry for **New & Renewable Energy**.

'No plan to revise GDP growth forecast'

World Bank has no immediate plan to revise its recent **India** GDP growth outlook for 2013-14, **India** head Onno Ruhl has said.

"**India's** second-quarter GDP growth (4.8 per cent) was encouraging. So we are going to stick as of now to our recent growth forecast", the World Bank official told Business Line.

In October this year, World Bank had revised downwards its growth forecast for the current fiscal to 4.7 percent.

This was against the 6.1 per cent GDP growth projected in April.

India's economic growth is, however, expected to accelerate to 6.2 percent in 2014-15, the World Bank had projected in its **India** development update released in October.

ODISHA SET TO IMPLEMENT CLIMATE CHANGE PLAN WITHOUT CENTRAL FUNDING

Bhubaneswar: Concerned over the impact of climate change in the state, Odisha government has decided to implement the Climate Change Action Plan without waiting for central assistance. This was decided at a meeting of the Monitoring and Advisory Committee on Odisha Climate Change Action Plan chaired by Chief Secretary J K Mohapatra on Wednesday. Representational image. Reuters Representational image. Reuters "Availability of funds will not be a bottleneck in the process. Required funds will be made available to the implementing departments and agencies," Mohapatra said. Asking the line departments to take up activities with commitments, he said their actions were crucial for future growth and survival. Forest and Environment Department has been asked to increase plantation and intensify the raising of nurseries at block and district levels. The department has also been asked to increase density of tree converge in 20,000 sq km forests. The chief secretary said around Rs 1,700 crore was available for plantation under different schemes and more funds, if required, would be made available. The energy secretary has been asked to take measures for reducing transportation and commercial loss of energy to save it and reduce the requirement for more production. The energy department has been told to create a common pool of funds for incentivising solar project initiatives and increase the use of energy saving devices, an official said. Around Rs 20 crore is available for promotion of solar projects, energy secretary P K Jena said. The department has been asked to scale it up to Rs 50 crore. Two state-run agencies were directed to work out specific target oriented action plan for promoting improved chullah and Bio-gas plants. The Department of Fisheries and Animal Resource Development, Water Resources have been asked to undertake activities under the action plan. The meeting also decided that incentives would be provided to private houses for having roof top solar panels and rain water harvesting system.*PTI*

COLOURED ENERGY-GENERATING SOLAR GLASS LAUNCHED IN DUBAI

Dubai Investments (DI), the largest investment company listed on the Dubai Financial Market (DFM), on Monday announced the launch of the first-of-its-kind, coloured solar glass, which is capable of generating energy on its own.

The launch of the coloured solar glass coincides with the announcement of a new entity, Emirates Insolaire, which will introduce the breakthrough concept in the region and across the world.

Emirates Insolaire is part of Glass, the glass pioneers in the Middle East, and a wholly-owned subsidiary of DI. The newly announced entity is a joint venture that uses the Kromatix technology of SwissINSO, a Switzerland-based pioneer in the development and application of new solar technologies and products.

The company will produce the solar glass at the Emirates Glass manufacturing facility in the UAE, which has been modified to adapt the new technology.

The breakthrough glass, which comes in virtually any colour, is optimised for both photovoltaic modules, which use cells to convert solar radiation into electricity, as well as solar thermal collectors. The glass provides a matte coloured, architecturally aesthetic appearance to solar panels, preserving more than 90 per cent of efficiency.

Khalid bin Kalban, managing director and chief executive officer of Dubai Investments, said: “We are thrilled with the launch of this revolutionary solar glass technology here, which could literally transform the manner in which we use solar energy for our homes, offices as well as the commercial buildings. This is a significant paradigm shift in solar glass technology, and we see significant growth opportunities going forward as we accelerate market penetration.”

“In the coming 18 months we will be roughly spending around €2 million to purchase equipment that will help us boost production,” Kalban revealed.

Industry estimates reveal that over a billion square meters of solar glass, both photovoltaic and thermal, will be installed across the world by 2015. The photovoltaic market, in particular, has achieved exponential growth globally over the years.

The market was 40GW in 2010, representing 200 million square meters of glass, and has grown 40 per cent year-on-year. The number of installations foreseen for 2015 is 160GW, which is approximately 800 million square meters of glass.

The thermal solar glass market was 183 million square meters in 2006, and has been growing by 12 per cent year-on-year since then. Emirates Insolaire is targeting 10 per cent of the global solar glass market in the coming years. The company estimates that it will be selling 300,000sqm of solar glass in 2014.

“Kromatix is a first-of-its-kind business model not only in the region, but across the entire world. The technology is highly sustainable and is a major innovation for potential application in commercial and residential projects across the region,” Kalban revealed.

Rafic Hanbali, chairman and CEO of SwissINSO, said: “The coloured solar glass technology is expected to become the norm and standards in the construction industry over the next three to five years, particularly when considering the present and expected growth of solar integration into buildings. These buildings, by will or by law, will have to become energetically independent and Kromatix is the only road available today for this integration.”

Courtesy: Khaleej Times

ATOMIC POCKET WATCHES

Modern time is maintained by atomic clocks that monitor the vibrations of cesium atoms. For most of us, we get this time secondhand, radioed from GPS satellites or relayed through digital networks. But a select few will be able to keep their own atomic time—losing only 1.5 seconds every thousand years—thanks to the Hoptroff No. 10, a pocket watch with a built-in cesium gas oven. The No. 10 is technically a marine chronometer, and with a sextant, it can be used to navigate across oceans. The London-based watchmaker Hoptroff will make only 12 of these timepieces. Customers will have to pass a security check before taking delivery next year, lest the precision timing technology be reverse engineered for things such as missile guidance. Pricing is on request but will be in the high five figures (U.S. dollars).



Richard Hoptroff, the company’s founder and managing director, notes that there is little economic justification for the No. 10 but that once the key piece of technology became available—a miniaturized cesium oven made by Symmetricom—he had a “compulsion” to build it.

HARVESTING ELECTRICITY: TRIBOELECTRIC GENERATORS CAPTURE WASTED POWER

With one stomp of his foot, Zhong Lin Wang illuminates a thousand light-emitting diode (LED) bulbs—with no batteries or power cord. The current comes from essentially the same source as that tiny spark that jumps from a fingertip to a doorknob when you walk across carpet on a cold, dry day. Wang and his research team have learned to harvest this power and put it to work.

A prof. at the Georgia Institute of Technology, Wang is using what's technically known as the triboelectric effect to create surprising amounts of electric power by rubbing or touching two different materials together. He



believes the discovery can provide a new way to power mobile devices such as sensors and smartphones by capturing the otherwise wasted mechanical energy from such sources as walking, the wind blowing, vibration, ocean waves or even cars driving by.

Beyond generating power, the technology could also provide a new type of self-powered sensor, allowing detection of vibrations, motion, water leaks, explosions—or even rain falling. The research has been reported in journals including *ACS Nano*, *Advanced Materials*, *Angewandte Chemie*, *Energy and Environmental Sciences*, *Nano Energy* and *Nano Letters*.

“We are able to deliver small amounts of portable power for today’s mobile and sensor applications,” said Wang, a Regents prof. in Georgia Tech’s School of Materials Science and Engineering. “This opens up a source of energy by harvesting power from activities of all kinds.”

In its simplest form, the triboelectric generator uses two sheets of dissimilar materials, one an electron donor, the other an electron acceptor. When the materials are in contact, electrons flow from one material to the other. If the sheets are then separated, one sheet holds an electrical charge isolated by the gap between them. If an electrical load is then connected to two electrodes placed at the outer edges of the two surfaces, a small current will flow to equalize the charges.

By continuously repeating the process, an alternating current can be produced. In a variation of the technique, the materials—most commonly inexpensive flexible polymers—produce current if they are rubbed together before being separated. Generators producing DC current have also been built.

“The fact that an electric charge can be produced through triboelectrification is well known,” Wang explained. “What we have introduced is a gap separation technique that produces a voltage drop, which leads to a current flow in the external load, allowing the charge to be used. This generator can convert random mechanical energy from our environment into electric energy.”

Since their first publication on the research, Wang and his research team have increased the power output density of their triboelectric generator by a factor of 100,000—reporting that a square meter of single-layer material can now produce as much as 300 W. They have found that the volume power density reaches more than 400 kW per cubic meter at an efficiency of more than 50%. The researchers have expanded the range of energy-gathering techniques from “power shirts” containing pockets of the generating material to shoe inserts, whistles, foot pedals, floor mats, backpacks and floats bobbing on ocean waves.

They have learned to increase the power output by applying micron-scale patterns to the polymer sheets. The patterning effectively increases the contact area and thereby increases the effectiveness of the charge transfer.

Courtesy: www.rdmag.com

***I understand
it isn't a question of how powerful my 'GOD' is
but it's a question of how powerful my 'FAITH' is!***

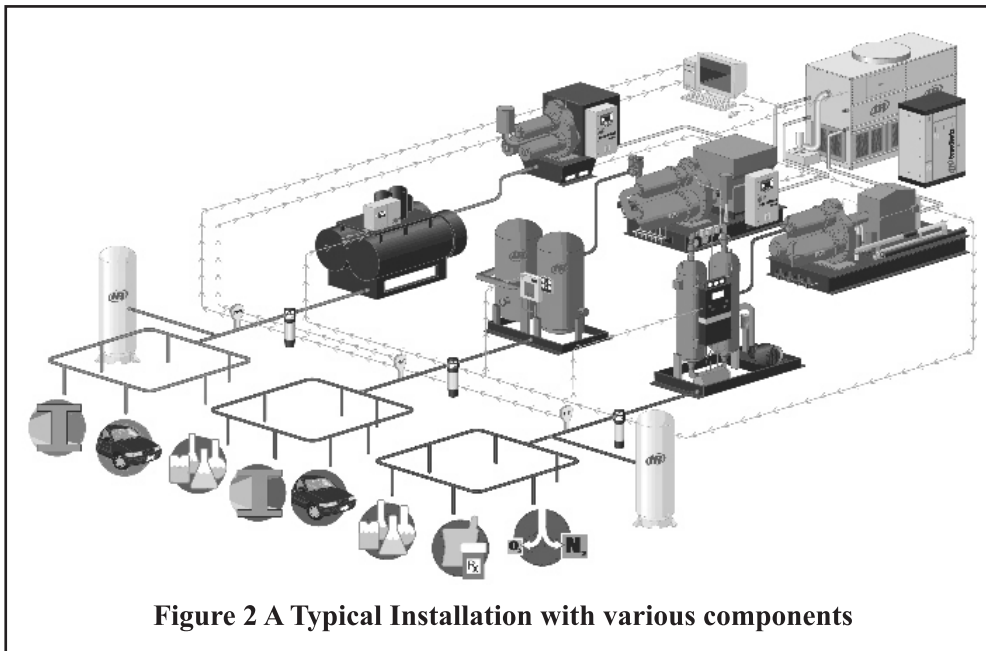
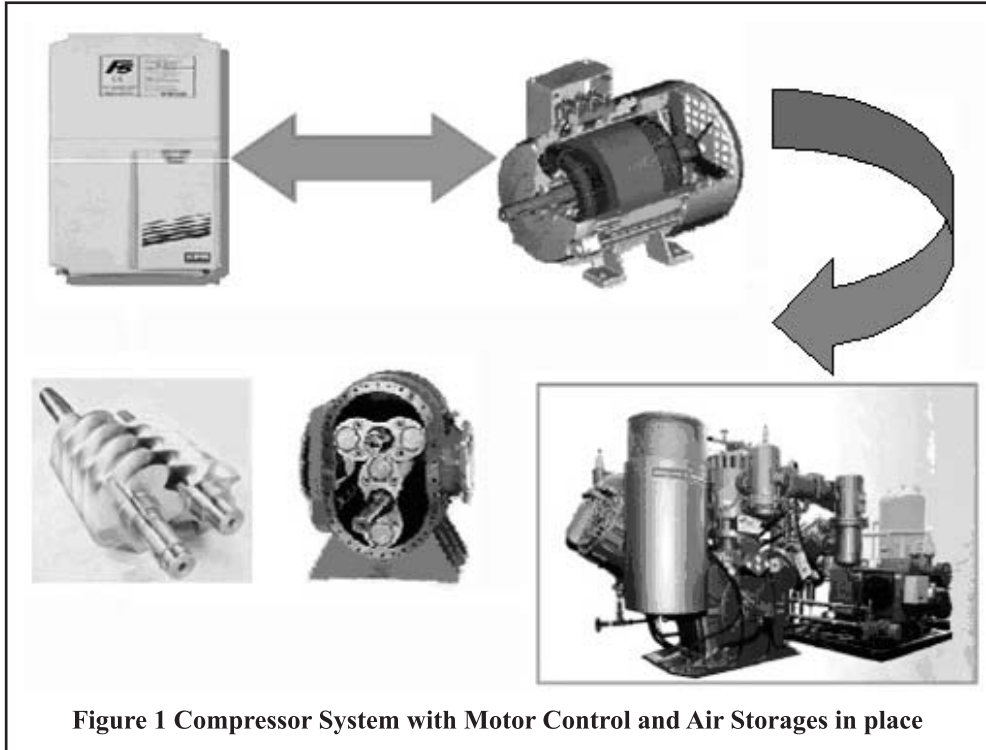
ENERGY STORY

ENERGY EFFICIENCY – THE FIFTH FUEL - PART 10

EFFICIENT ELECTRICAL ENERGY UTILIZATION

Electrical Energy Utilization and Motor Driven Systems:

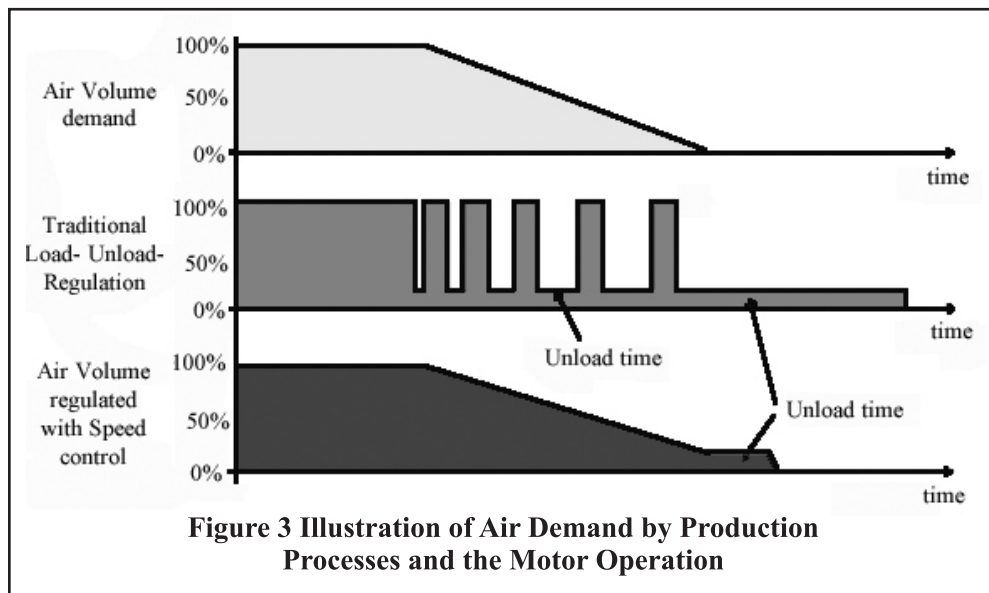
Electric Motor Driven Compressors are one of the important applications in Industries and let us look at Energy saving potential through the integrated approach of Drive, Driven and the Controls.



The demand for Compressed Air from the Production Process keeps varying depending on the actual steps of processes involved and the supply of compressed Air at required Pressure is regulated through Receivers **and**

Depending on the system requirements, one or more air receivers are generally provided to reduce output pulsations and pressure variations.

Figure below shows Graphs of Demand of Air and the Motor Loading patterns to meet the Load Demands with out and with Speed control of Motors. Varying Load on the Motor due to varying Air Demand is a reality in case of Compressors Application. As seen below, in the traditional Method, Motors Load and Un Load periodically and the Elimination of loading un loading Cycle and smoothening of output matching the requirement, with VFD is also shown.

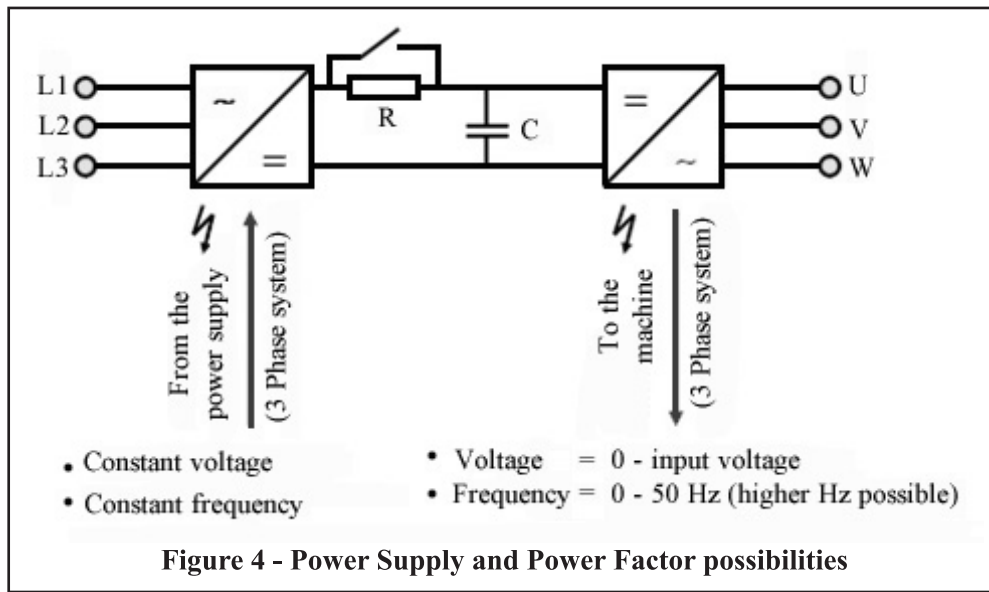


Let us now see how this helps Energy Conservation.

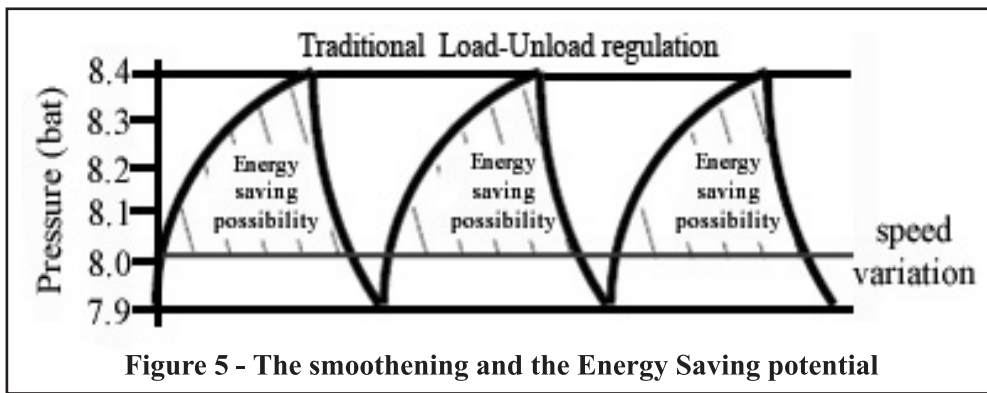
Speed Variations through Frequency Inverter.

With the Variable speed system the Motor speed is controlled through an inverter. This helps in regulating Air volume as per demand.

With this a direct relationship between air production and energy consumption is established resulting in energy consumption without wastage, smooth compressor performance at optimum efficiency of the System. The inverter and the system is designed to operate at near Unity Power Factor resulting in lower peak demand.



The figure below will bring out the Energy Saving potentials through smoothening of the Motor loading in place of traditional Loading un loading Cycles.



A simple comparative case study as follows will illustrate the actual savings achieved.

Screw compressor

Rating: 149CFM / 100PSI

Motor Rating: 30kw / 50 Hz

The target Pressure set is 5.5 bar

Load pressure =5.5 bar

Unload pressure =5.9 bar

Consumption Pattern: 47% loading

Energy Consumption without VFD 18 KWh

Energy Consumption with VFD 14 KWh

NET SAVING IN ENERGY: 22%

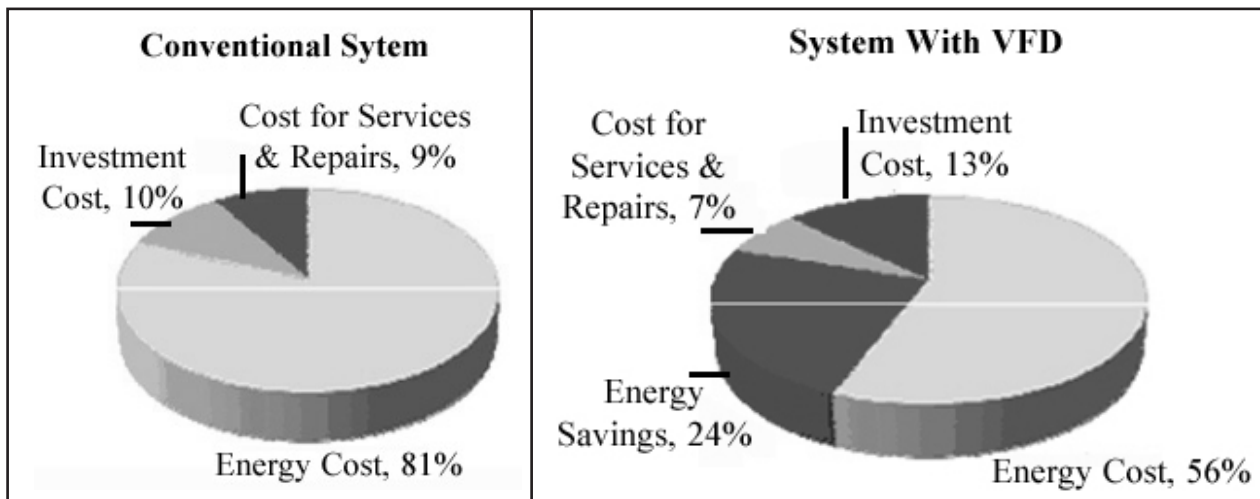


Figure 6 - Comparison of cost between System without and with VFD

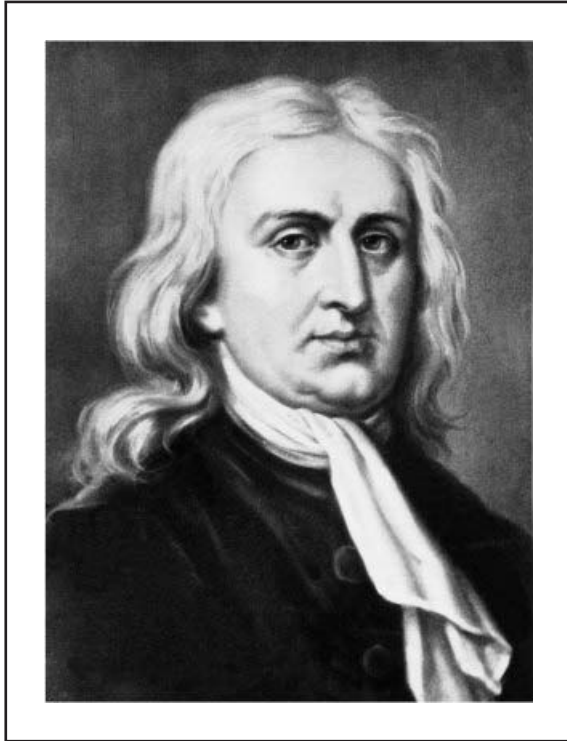
Typical saving in the electrical bill with VFD retrofit, depending on loading

| Unload % | Energy Saving % |
|----------|-----------------|
| 10 | 11 |
| 15 | 13 |
| 20 | 16 |
| 25 | 18 |
| 30 | 21 |
| 35 | 23 |
| 40 | 26 |

(To be continued)
 S. Mahadevan, B.E., F.I.E., M.B.A., Consultant,
 Energy and Energy Efficiency, Mobile: 98401 55209

ISAAC NEWTON (1642-1727)

Isaac Newton was born (according to the Julian calendar in use in England at the time) on Christmas Day, 25 December 1642, (NS 4 January 1643 at Woolsthorpe Manor in Woolsthorpe-by-Colsterworth, a hamlet in the county of Lincolnshire.



From the age of about twelve until he was seventeen, Newton was educated at The King's School, Grantham. He was removed from school. Master at the King's School, persuaded his mother to send him back to school so that he might complete his education. Motivated partly by a desire for revenge against a schoolyard bully, he became the top-ranked student. The Cambridge psychologist Simon Baron-Cohen considers it "fairly certain" that Newton had Asperger syndrome.

In June 1661, he was admitted to Trinity College, Cambridge as a sizar – a sort of work-study role. At that time, the college's teachings were based on those of Aristotle, whom Newton supplemented with modern philosophers, such as Descartes, and astronomers

such as Copernicus, Galileo, and Kepler. In 1665, he discovered the generalised binomial theorem and began to develop a mathematical theory that later became infinitesimal calculus. Soon after Newton had obtained his degree in August 1665, the university temporarily closed as a precaution against the Great Plague. Although he had been undistinguished as a Cambridge student, Newton's private studies at his home in Woolsthorpe over the subsequent two years saw the development of his theories on calculus, optics and the law of gravitation. In 1667, he returned to Cambridge as a fellow of Trinity. Fellows were required to become ordained priests, something Newton desired to avoid due to his unorthodox views. Luckily for Newton, there was no specific deadline for ordination, and it could be postponed indefinitely. The problem became more severe later when Newton was elected for the prestigious Lucasian Chair. For such a significant appointment, ordaining normally could not be dodged. Nevertheless, Newton managed to avoid it by means of a special permission from Charles II

Middle years

Mathematics

Newton's work has been said "to distinctly advance every branch of mathematics then studied". His work on the subject usually referred to as fluxions or calculus, seen in a manuscript of October 1666, is now published among Newton's mathematical papers. The *Principia* has been called "a book dense with the theory and application of the infinitesimal calculus" in modern times and "lequel est presque tout de ce calcul" ('nearly all of it is of this calculus') in Newton's time. His use

of methods involving "one or more orders of the infinitesimally small" is present in his *De motu corporum in gyrum* of 1684 and in his papers on motion "during the two decades preceding 1684".

Newton is generally credited with the generalised binomial theorem, valid for any exponent. He discovered Newton's identities, Newton's method, classified cubic plane curves (polynomials of degree three in two variables), made substantial contributions to the theory of finite differences, and was the first to use fractional indices and to employ coordinate geometry to derive solutions

FAMOUS ISAAC NEWTON QUOTES

- "Plato is my friend - Aristotle is my friend - but my greatest friend is truth."
- "If I have seen further it is only by standing on the shoulders of Giants."
- "I can calculate the motions of the heavenly bodies, but not the madness of people."
- "I do not know what I may appear to the world, but to myself I seem to have been only like a boy playing on the sea-shore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me."
- "Truth is ever to be found in simplicity, and not in the multiplicity and confusion of things."

to Diophantine equations. He approximated partial sums of the harmonic series by logarithms (a precursor to Euler's summation formula), and was the first to use power series with confidence and to revert power series. Newton's work on infinite series was inspired by Simon Stevin's decimals. He was appointed Lucasian Professor of Mathematics in 1669 on Barrow's recommendation.

Optics

In 1666, Newton observed that the spectrum of colours exiting a prism is oblong, even when the light ray entering the prism is circular, which is to say, the prism refracts different colours by different angles. This led him to conclude that colour is a property intrinsic to light—a point which had been debated. From 1670 to 1672, Newton lectured on optics. During this period he investigated the refraction of light, demonstrating that the multicoloured spectrum produced by a prism could be recomposed into white light by a lens and a second prism. Modern scholarship has revealed that Newton's analysis and resynthesis of white light owes a debt to corpuscular alchemy. He also showed that the coloured light does not change its properties by separating out a coloured beam and shining it on various objects. Newton noted that regardless of whether it was reflected or scattered or transmitted, it stayed the same colour. Thus, he observed that colour is the result of objects interacting with already-coloured light rather than objects generating the colour themselves. This is known as Newton's theory of colour.

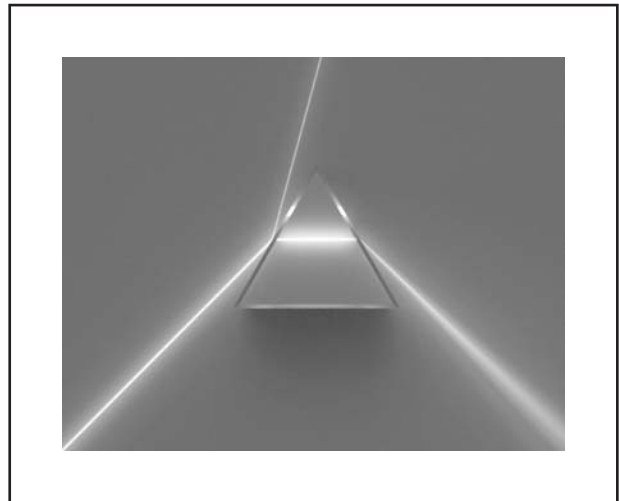


From this work, he concluded that the lens of any refracting telescope would suffer from the dispersion of light into colours (chromatic aberration). As a proof of the concept, he constructed a telescope using a mirror as the objective to bypass that problem. Building the design, the first known functional reflecting telescope, today known as a Newtonian telescope, involved solving the problem of a suitable mirror material and shaping

technique. Newton ground his own mirrors out of a custom composition of highly reflective speculum metal, using Newton's rings to judge the quality of the optics for his telescopes. In late 1668 he was able to produce this first *reflecting telescope*. In 1671, the Royal Society asked for a demonstration of his reflecting telescope. Their interest encouraged him to publish his notes *On Colour*, which he later expanded into his *Opticks*.

Newton's understanding of light.

In his *Hypothesis of Light* of 1675, Newton posited the existence of the ether to transmit forces between particles. He replaced the ether with occult forces based on Hermetic ideas of attraction and repulsion between particles. John Maynard Keynes, who acquired many of Newton's writings on alchemy, stated that "Newton was not the first of the age of reason: He was the last of the magicians". Newton's interest in alchemy cannot be isolated from his contributions to science. This was at a time when there was no clear distinction between alchemy and science. Had he not relied on the occult idea of action at a distance, across a vacuum, he might not have developed his theory of gravity. (See also Isaac Newton's occult studies). In 1704, Newton published *Opticks*, in which he expounded his corpuscular theory of light. He considered light to be made up of extremely subtle corpuscles, that ordinary matter was made of grosser corpuscles and speculated that through a kind of alchemical transmutation "Are not gross Bodies and Light convertible into one another, ...and may not Bodies receive much of their Activity from the Particles of Light which enter their Composition?" Newton also constructed a primitive form of a frictional electrostatic generator, using a glass globe (*Opticks*, 8th Query).



In an article entitled "Newton, prisms, and the 'opticks' of tunable lasers" it is indicated that Newton in his book *Opticks* was the first to show a diagram using a prism as a beam expander. In the same book he describes, via diagrams, the use of multiple-prism arrays.

Mechanics and gravitation

Further information: Writing of *Principia Mathematica*
In 1679, Newton returned to his work on (celestial) mechanics, i.e., gravitation and its effect on the orbits of planets, with reference to Kepler's laws of planetary motion. Newton worked out a proof that the elliptical form of planetary orbits would result from a centripetal force inversely proportional to the square of the radius vector (see Newton's law of universal gravitation – History and *De motu corporum in gyrum*). Newton communicated his results to Edmond Halley and to the Royal Society in *De motu corporum in gyrum*, a tract written on about 9 sheets which was copied into the Royal Society's Register Book in December 1684.

This tract contained the nucleus that Newton developed and expanded to form the *Principia*.

The *Principia* was published on 5 July 1687 with encouragement and financial help from Edmond Halley. In this work, Newton stated the three universal laws of motion that enabled many of the advances of the Industrial Revolution which soon followed and were not to be improved upon for more than 200 years, and are still the underpinnings of the non-relativistic technologies of the modern world. He used the Latin word *gravitas* (weight) for the effect that would become known as gravity, and defined the law of universal gravitation.

In the same work, Newton presented a calculus-like method of geometrical analysis by 'first and last ratios', gave the first analytical determination (based on Boyle's law) of the speed of sound in air, inferred the oblateness of the spheroidal figure of the Earth, accounted for the precession of the equinoxes as a result of the Moon's gravitational attraction on the Earth's oblateness, initiated the gravitational study of the irregularities in the motion of the moon, provided a theory for the determination of the orbits of comets, and much more. In the second edition of the *Principia* (1713), Newton firmly rejected such criticisms in a concluding General Scholium, writing that it was enough that the phenomena implied a gravitational attraction, as they did; but they did not so far indicate its cause, and it was both unnecessary and improper to frame hypotheses of things that were not implied by the phenomena. (Here Newton used what became his famous expression "*hypotheses non fingo*"). With the *Principia*, Newton became internationally recognised.

Classification of cubics

Newton's classification of cubic curves in the Euclidean plane in the late 1600s. He divided them into four types, satisfying different equations, and in 1717 Stirling, probably with Newton's help, proved that every cubic was one of these four. Newton also claimed that the four types could be obtained by plane projection from one of them, and this was proved in 1731.

Later Life

In the 1690s, Newton wrote a number of religious tracts dealing with the literal interpretation of the Bible. Henry More's belief in the Universe and rejection of Cartesian dualism may have influenced Newton's religious ideas. Newton was also a member of the Parliament of England for Cambridge University in 1689–90 and 1701–2. As Master of the Mint in 1717 in the "Law of Queen Anne" Newton moved the Pound Sterling *de facto* from the silver standard to the gold standard by setting the bimetallic relationship between gold coins and the silver penny in favour of gold. This caused silver sterling coin to be melted and shipped out of Britain. Newton was made President of the Royal Society in 1703 and an associate of the French Académie des Sciences. Newton was the second scientist to be knighted, after Sir Francis Bacon.

Death

Newton died in his sleep in London on 20 March 1727 (OS 20 March 1726; NS 31 March 1727) and was buried in Westminster Abbey. Voltaire was present at his funeral and praised the British for honouring a scientist of heretical religious beliefs with burial there.

Fame

The mathematician Joseph-Louis Lagrange often said that Newton was the greatest genius who ever lived, and once added that Newton was also "the most fortunate, for we cannot find more than once a system of the world to establish." Newton himself had been rather more modest of his own achievements, famously writing in a letter to Robert Hooke in February 1676: If I have seen further it is by standing on the shoulders of giants.

In 1816 a tooth said to have belonged to Isaac Newton was sold for £730 (us\$3,633) in London to an aristocrat who passed to have it set in a ring. The *Guinness World Records 2002* classified it as the most valuable tooth, which would value approximately £25,000 (us\$35,700) in late 2001's terms. Who has bought it and to whom it currently pertains are mysteries. Albert Einstein kept a picture of Newton on his study wall alongside ones of Michael Faraday and James Clerk Maxwell.

Commemorations

Newton's monument (1731) can be seen in Westminster Abbey, at the north of the entrance to the choir against the choir screen, near his tomb. From 1978 until 1988, an image of Newton designed by Harry Ecclestone appeared on Series D £1 banknotes issued by the Bank of England (the last £1 notes to be issued by the Bank of England). Newton was shown on the reverse of the notes holding a book and accompanied by a telescope, a prism and a map of the Solar System. A statue of Isaac Newton, looking at an apple at his feet, can be seen at the Oxford University Museum of Natural History. A large bronze statue, *Newton*, after William Blake, by Eduardo Paolozzi, dated 1995 and inspired

by Blake's etching, dominates the piazza of the British Library in London.



Personal life

Newton never married. Although born into an Anglican family, by his thirties Newton held a Christian faith that, had it been made public, would not have been considered orthodox by mainstream Christianity; in recent times he has been described as a heretic.

Although the laws of motion and universal gravitation became Newton's best-known discoveries, he warned against using them to view the Universe as a mere machine, as if a kin to a great clock. He said, "Gravity explains the motions of the planets, but it cannot explain who set the planets in motion. God governs all things and knows all that is or can be done."

Along with his scientific fame, Newton's studies of the Bible and of the early Church Fathers were also noteworthy.

In the *Principia*, Newton gives the famous three laws of motion, stated here in modern form.

Newton's First Law (also known as the Law of Inertia) states that an object at rest tends to stay at rest and that an object in uniform motion tends to stay in uniform motion unless acted upon by a net external force. The meaning of this law is the existence of reference frames

(called inertial frames) where objects not acted upon by forces move in uniform motion (in particular, they may be at rest).

Newton's Second Law states that an applied force, **F**, on an object equals the rate of change of its momentum, **p**, with time. Mathematically, this is expressed as

$$\mathbf{F} = \frac{d\mathbf{p}}{dt} = \frac{d(m\mathbf{v})}{dt}$$

Since the law applies only to systems of constant mass, *m* can be brought out of the derivative operator. By substitution using the definition of acceleration, the equation can be written in the iconic form

$$\mathbf{F} = m\mathbf{a}.$$

The first and second laws represent a break with the physics of Aristotle, in which it was believed that a force was necessary in order to maintain motion. They state that a force is only needed in order to *change* an object's state of motion. The SI unit of force is the newton, named in Newton's honour.

Newton's Third Law states that for every action there is an equal and opposite reaction. This means that any force exerted onto an object has a counterpart force that is exerted in the opposite direction back onto the first object. A common example is of two ice skaters pushing against each other and sliding apart in opposite directions. Another example is the recoil of a firearm, in which the force propelling the bullet is exerted equally back onto the gun and is felt by the shooter. Since the objects in question do not necessarily have the same mass, the resulting acceleration of the two objects can be different (as in the case of firearm recoil). Unlike Aristotle's, Newton's physics is meant to be universal. For example, the second law applies both to a planet and to a falling stone.

Apple incident

Reputed descendants of Newton's apple tree, (from top to bottom) at Trinity College, Cambridge, the Cambridge University Botanic Garden, and the Instituto Balseiro library garden. Newton himself often told the story that he was inspired to formulate his theory of gravitation by watching the fall of an apple from a tree. Although it has been said that the apple story is a myth and that he did not arrive at his theory of gravity in any single moment, acquaintances of Newton (such as William Stukeley, whose manuscript account of 1752 has been made available by the Royal Society) do in fact confirm the incident. The reason is, that the earth draws it. there must be a drawing power in matter & the sum of the drawing power in the matter of the earth must be in the earths centre, not in any side of the earth. therefore dos this apple fall perpendicularly, or toward the centre. if matter thus draws matter; it must be in proportion of its quantity. therefore the apple draws the earth, as well as the earth draws the apple.

To every action there is always opposed an equal reaction. – ISAAC NEWTON

VOICE CARE TIPS

The following are some helpful hints for the care of the voice.

I. Hydration



The vocal folds need to be lubricated with a thin layer of mucus in order to vibrate efficiently. The best lubrication can be achieved by drinking plenty of water. A good rule

of thumb (if you have normal kidneys and heart function) is to drink at least two quarts of water daily. Dr. Van Lawrence, world renowned Laryngologist, often said, “**Drink until you pee pale**”.

Caffeine and alcohol pull water out of your system and deplete the vocal folds of needed lubrication. Caffeinated drinks include coffee, tea, and soft drinks. Small amounts of these beverages are acceptable but must be counterbalanced by drinking more water. Another factor that can affect lubrication is a dry air environment. The cause can be from gas furnaces, air conditioners, and climates with a low amount of moisture in the air. Using a humidifier at night can compensate for the dryness. The air in airplanes is extremely dry. It is recommended that you avoid alcoholic, caffeinated beverages and drink at least 8 ounces of water per hour while flying.

Dr. Lawrence often recommended a favourite gargle recipe: 1/2 tsp. of salt, 1/2 tsp. of baking soda, 1/2 tsp. of clear corn syrup, and 6 oz. of warmed, distilled water. Gargle quietly and gently for two long, boring minutes. Do not rinse and use as often as necessary to help your dry, irritated throat.

In addition, Entertainer’s Secret (800 308-7452) throat spray is an effective way to help moisturize the vocal folds (follow the directions on the label).

II. Throat Clearing & Harsh Coughing

Throat clearing and harsh coughing are traumatic to the vocal cords and should be reduced as much as possible. One of the most frequent causes for throat clearing and coughing is thick mucus (due to dry vocal folds) or too much mucus (as with a cold) on or below the vocal folds. The safest and most efficient way to clear mucus is by using a gentle, breathy productive cough where there is high airflow with little sound. This can be achieved by using the following strategy: take in as deep a breath as possible, momentarily hold your breath, and produce a sharp, silent “H” sound while you expel the air.

III. Drugs

Antihistamines: Antihistamines are sometimes

prescribed to treat allergies and are present in some over-the-counter cold medications. Antihistamines should rarely be used because they tend to cause dryness. Prescription nasal steroid sprays such as Nasacort (Phone-Poulenc Rorer), Nasonex (Schering), Flonase (Allen & Hansburys), etc. will often relieve the symptoms of nasal allergy without the drying side effects of antihistamines.

Analgesics: Aspirin products and non-steroidal anti-inflammatory drugs (ibuprofen) should be used with caution as they cause platelet dysfunction and this may predispose to bleeding. Tylenol (McNeil Consumer Products) is the best substitute for pain relief.

Mucolytic Agents: The most common expectorant is a preparation of long-acting guaifenesin to help liquefy viscous mucus and increase the output of thin respiratory tract secretions. Drugs, such as Mucinex, may be helpful for singers who complain of thick secretions, frequent throat clearing, or postnasal drip. Awareness of postnasal drip is often caused by secretions that are too thick rather than too plentiful. Mucolytic agents need to be used with a lot of water through the day, to be effective.

Local Anesthetics: Avoid the use of over-the-counter local anesthetic preparations for the throat. Singing under their influence is like trying to play the piano with gloves on.

Progesterone: Question the use of progesterone-dominant birth control pills. They may cause virilization of the female larynx and a loss in the upper vocal range. There may be no other alternative for your individual situation, however, so consult your gynecologist.

IV. Laryngopharyngeal Reflux Disease and Recommendations to Prevent Acid Reflux

What is Reflux?

When we eat something, the food reaches the stomach by travelling down a muscular tube called the esophagus. Once food reaches the stomach, the stomach adds acid and pepsin (a digestive enzyme) so that the food can be digested. The esophagus has two sphincters (bands of muscle fibers that close off the tube) to help keep the contents of the stomach where they belong. One sphincter is at the top of the esophagus (at the junction with the upper throat) and one is at the bottom of the esophagus (at the junction with the stomach). The term REFLUX means “a backward or return flow,” and refers to the backward flow of stomach contents up through the sphincters and into the esophagus or throat.

What are GERD and LPRD?

Some people have an abnormal amount of reflux of stomach acid that goes up through the lower sphincter and into the esophagus. This is referred to as GERD or Gastroesophageal Reflux Disease. If the reflux makes it all the way up through the upper sphincter and into the back of the throat, it is called LPRD or

Laryngopharyngeal Reflux Disease. The structures in the throat (pharynx, larynx, vocal folds and the lungs) are extremely sensitive to stomach acid, so smaller amounts of reflux into these areas can result in much more damage.

Why Don't I have Heartburn or Stomach Problems?

This is a question that is often asked by patients with LPRD. The fact is that very few patients with LPRD experience significant heartburn. Heartburn occurs when the tissue in the esophagus become irritated. Most of the reflux events that can damage the throat happen without the patient ever knowing that they are occurring.

Common Symptoms of LPRD:

Hoarseness, chronic (ongoing) cough, frequent throat clearing, pain or sensation in throat, feeling of lump in throat, problems while swallowing, bad/bitter taste in mouth (especially in the morning), asthma-like symptoms, referred ear pain, post-nasal drip, singing difficulties (especially with high notes).

Medications for LPRD:

The most effective treatment for LPRD may be drugs in the class known as proton pump inhibitors. Included in this group are Prilosec, Prevacid, Protonix, Aciphex, or the new medication known as Nexium. Ask your physician which may be appropriate for you.

V. Self-Destructive Behaviours

Avoid smoking cigarettes. They are bad for the heart, lungs, and vocal tract. Also, avoid other irritant inhalant substances and mind-altering drugs. Tobacco and marijuana are irritants to the vocal tract. When you sing you must be in control of all body systems: physical, spiritual, and mental. Smoking is disastrous for the speaking and singing voice.

What happens when the vocal cords are inflamed?

Fungus and bacteria can affect **the vocal cords** in several different ways.

When the tissue is inflamed, the vocal cords swell making them stiffer. The vocal pitch becomes deeper from the swelling and if the vocal cords become stiff enough, they may stop vibrating and the person loses their voice. (laryngitis). This is primarily from the inflammatory response of the body against the offending virus, fungus or bacteria. Some types of viruses, fungus and bacteria can physically grow on the surface of the vocal cord and then they act like a tumor. The growth can act as a weight on a vocal cord, which stiffens the vibrating surface of the vocal cords or creates an irregularity on a vocal cord. (A possible polyp or node). Treatment may involve medication or at times a surgical procedure. Obviously, you want to avoid this at all cost. This can be prevented by protecting the voice from straining, yelling and smoking.

VI. Requirements For A Healthy Voice

Try your best to maintain good general health. Get adequate rest to minimize fatigue. If you do become ill, avoid "talking over your laryngitis" - see your physician and rest your voice.

- Exercise regularly.
- Eat a balanced diet, including vegetables, fruit and whole grains.
- Maintain body hydration; drink two quarts of water daily.
- Avoid dry, artificial interior climates and breathing smoggy, polluted air.
- Limit the use of your voice in high-ceilinged restaurants, noisy parties, cars and planes.
- Avoid throat clearing and voiced coughing.
- Stop yelling – avoid calling from room to room.
- Avoid hard vocal attacks on initial vowel words.
- Use the pitch level in the same range where you say, "Umm-hmm?"
- Speak in phrases rather than in paragraphs, and breath slightly before each phrase.
- Reduce demands on your voice – don't do all the talking!
- Learn to breathe silently to activate your breath support muscles and reduce neck tension.
- Take full advantage of the two free elements of vocal fold healing: water and air.
- Vocal athletes must treat their musculoskeletal system as do other types of athletes; therefore, vocal warm-ups should always be used prior to singing. Vocal cool-downs are also essential to keep the singing voice healthy.

Some additional suggestions for good vocal care are

- If you need to get someone's attention, use non-vocal sounds such as clapping, bells or whistling.
- Move closer to those with whom you are speaking.
- Face the person(s) with whom you are speaking.
- Use amplification, as needed, if possible.
- Reduce your speaking time in noisy environments, such as in automobiles and airplanes

Optimal Speaking Techniques

- Use good abdominal/diaphragmatic breathing and support.
- Learn to use your voice with as little unnecessary effort and tension as possible.
- Take frequent breaths when speaking long sentences.
- Maintain a smooth legato speech pattern with clear articulation.
- Allow the neck, jaw, and face to be relaxed.
- "Place" or "Focus" the voice appropriately.
- Speak at a normal rate of speed.
- Use good vocal inflection.

Courtesy: <http://www.texasvoicecenter.com/advice.html>

HEMA ANNAMALAI

Hema Annamalai. She is the founder and CEO of Ampere Vehicles (P) Limited, that designs and manufactures Electric Vehicles (EV) including E-scooters, E-cycles, E-trolleys for carrying load, and special purpose vehicles for the differently abled.



Hema Annamalai — Photo: K. Ananthan

“My vehicles don’t drink, don’t smoke, and don’t shout,” says Hema Annamalai. She is the founder and CEO of Ampere Vehicles (P) Limited, that designs and manufactures Electric Vehicles (EV) including E-scooters, E-cycles, E-trolleys for carrying load, and special purpose vehicles for the differently abled.

Dressed in a light blue shirt and dark blue pants, like the rest of her co-workers, Hema takes us around the manufacturing and assembly line facility at Sulur, near Coimbatore. Ampere, which had a small beginning in 2007, is today a leader in R&D in the south in E-vehicles. “Our persevering R&D team is geared up to conceptualise any product requirement. That is our core strength. It’s been a great learning process through trial and error,” says Hema looking back at the journey. Ampere, she says, was born out of an urge to make a difference that positively impacted lives and the environment.

“While attending a conference in Japan, the CTO of a company made a statement that the era of internal combustion engines would soon end. That statement set me thinking and here I am making E-vehicles. We chose Coimbatore for its entrepreneurial spirit and also because our focus is primarily on tier II, III and IV cities.”

People were not impressed with the idea of E-vehicles. But she persevered and built up a team that believed in her. “We wanted to groom people who understood our ideas and communicated our goals to the grassroots. We wanted to revolutionise rural markets with our low cost mobility solutions, just like the way mobile phones and computing have swept that segment. Optimum cost and indigenous technology are our key words.” Hema’s husband P. Bala, chief technology officer of Ampere, calls E-vehicles a ‘disruptive innovation’ that is waiting to sweep the market in a matter of time.

In 2009, Ampere supplied battery-operated three-wheelers to the Tamil Nadu Government. In Karnataka, the Red Cross bought three wheelers for use in South Mandya.

The Kerala market has also opened up for the E-cycles. “We have been on a constant awareness drive. It is a record that in the last five years our batteries have never failed. Our corporate customers, the State Commission for the Disabled, Suguna Poultry, and textile mills are happy with us. Overall, we have supplied over 10,000 E-vehicles,” she says with pride.

Key area

Indigenising key components such as the motor, controller and charger is a key area. “Along with the battery, these products cover 70 per cent of the bike cost. Once you charge batteries, like you would mobile phones, there is no stopping you. Our Research team has come up with an ‘intelligent battery’ that retains more power during long drives. We want to cut down on imports. Conceiving a product is similar to having a baby. You have to see it through till adulthood. What we need is a talent pool of engineers with passion. One of our engineers has conceptualised an indigenous ‘switch reluctance motor’ and we are patenting it,” she says. That will add up to their existing list of over 10 patents that are pending.

“Give until it hurts is the dictum I try and follow. We conceptualised Ampere Boho, a three-wheeler for the physically challenged. It comes with reverse option, horn, crutch stand, hand brake and parking brake. We have designed vehicles for people without legs too. It’s been a constant struggle to create a product, an innovation that serves a purpose. But once you make a start, the ecosystem catches up with you,” she says.

There are three wheelers that will soon be used for garbage collection at Karudapalayam Panchayat near Madukkarai.

They come with a red and a green compartment to segregate waste into non-degradable and bio-degradable. “Such projects create job opportunities (500 villagers are trained to use the vehicle), bring

*“India shaped my mind, anchored my identity, influenced my beliefs, and made me who I am....
India matters to me and I would like to matter to India.” - SHASHI THAROOR*

dignity to the profession, and contributes to the environment. In Karnataka, we have a tie-up to supply 18 mobile marts, a dignified option for roadside vegetable vendors. One of the vendors asked us if he can make an omelette on the mobile mart. We are working on putting a gas burner on the vehicle. We listen to our customers and take their suggestions seriously. Our three-wheelers have made a big impact on the lives of people with special needs and people who run small businesses in Tier II and III cities,” explains Hema.

Another noteworthy innovation is the Ampere Trisul that offers low cost mobility for textile mill workers. “Textile workers cover a distance of 12 to 13 km every day within the factory with ease now. In the Sundarbans, people use our vehicles to transport goods for their livelihood. The focus is functionality; not aesthetics,” she stresses

Favourable Government policies, tax structure benefits, better import-export schemes, and a buzzing talent pool will work wonders for the electric vehicle segment, says Hema. “Low speed E-vehicles run at a speed of 25 to

30 km/hour. Anyone can ride it as you don’t require a driving licence. We are not looking at converting petrol customers. Our focus is on first-time users, working mothers, school children, and senior citizens. Poor awareness, perception, and lack of easy finance options are the deterrents.”

To keep herself fit, Hema begins her day at 4.30 a.m. with a game of shuttle followed by yoga, and meditation. “You need to give that 20 minutes to your body to manage the 18 hours of your day. I also ensure that I give personal time to my 100 kids (my team),” she smiles.

Ampere will soon launch Ampere Asva in the high-speed category of 45 km/hour. “Currently, our focus is on Karnataka, Kerala and Tamil Nadu. We have a network of 80 dealers. We want to innovate and help the Government embrace E-vehicles in all streams. In 2015, China will move on to e-buses that can carry more than 50 people. That’s the kind of vision we need to have to save our environment.”

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HUMOUR

Where Is God?

A couple had two little boys who were always getting into trouble. Their parents knew that if any mischief occurred in their village, their sons were probably involved.

The boys’ mother heard that an elder in town had been successful in disciplining children, so she asked if he would speak with her sons. The elder agreed, but asked to see them separately.

So, the mother sent her youngest son first, in the morning. The elder, a huge man with a booming voice, sat the boy down and asked him sternly, “Where is God?” The boy’s mouth dropped open, but he made no response. So the elder repeated the question in an even sterner tone, “Where is God!?” Again the wide-eyed boy made no attempt to answer.

The elder raised his voice and bellowed, “WHERE IS GOD!?” The boy screamed and bolted from the room, ran directly home and dove into a closet, slamming the door behind him.

When his older brother found him hiding, he asked, “What happened?”

The younger brother, gasping for breath, replied, “We are in BIG trouble this time. God is missing, and they think WE did it!”

We have it

The Prime Minister of China called President Bush to console him after the attack on the Pentagon: “I’m sorry to hear about the attack. It is a very big tragedy. But in case you are missing any documents from the Pentagon, we have copies of everything.”

Is it a Duck?



Five doctors went to on a duck hunt: a GP, a pediatrician, a psychiatrist, a surgeon, and a pathologist.

After a while a bird came winging overhead, the GP raised his shogun but didn’t shoot because he wasn’t sure if it was a duck or not. The pediatrician also raised his gun, but then he wasn’t sure if it was a male or female duck, so he didn’t shoot. The psychiatrist raised his gun and then thought, I know that’s a duck, but does the duck know it’s a duck?”

The surgeon was the only one who shot. Boom!! He blew it away.

Then he turned to the pathologist and said, “Go see if that was a duck.”

SUBRAMANIYA SIVA

Subramaniya Siva (4 October 1884 - 23 July 1925) was an Indian freedom fighter and prolific writer. He was arrested many times between 1908 and 1922 for his anti-imperialist activities. While serving his last prison term, he was afflicted by leprosy to which he succumbed in 1925.



Life

Subramaniya Siva (Oct 4, 1884 - July 23, 1925) was born in Vathalagundu in Dindigul district of the then Madras province. He was born to Rajam Iyer. Little is known about his early life, except for the fact that he was already a married man when he commenced his

political activities. He plunged into the freedom movement in 1908 after which he was jailed many a time.

In 1908, while serving a prison term, he was afflicted by leprosy and was ordered to be shifted to Salem jail. Since leprosy was regarded as a contagious disease, the British authorities forbade him to travel by rail. As a result of this, Subramaniya Siva traversed the whole length of Madras province on foot though his whole body was covered with sores. Fearful of displeasing the British authorities, not many people provided help. However, this did not deter Siva. He continued to fight for independence and suffered numerous prison terms. He eventually succumbed to the disease on 23 July 1925.

Subramanya Siva was a firebrand revolutionary independence fighter from Tamil Nadu. He closely worked with V.O. Chidambaram Pillai and Subramanya Bharathy and inspired many young men to join the freedom movement. Siva was the first political prisoner in the Madras Presidency. Siva had described his jail experience in a small book "Jail Life". He The Freedom Movement made him an orator and the jail life made him an author. He published "Gnana Bhanu", a collection of poems. He was an admirer of Swami Vivekananda and his religious master Sri Ramakrishna Paramhansa. Siva disagreed many things with Gandhian Philosophy. He believed in violence for violent methods would arise when constitutional methods had failed. Subramanya Siva died on Jul 23, 1925. At the time of his death he was survived by his son Sabhapathi Sharma.

To honour this great person, Dindugal district collector office is named after him: Thiagi Subramania Siva Malihai. The Tamil word *Thiagi* means martyr. Vathalagundu Bus stand also is named after him. A memorial for him will be established in Papparapatti of Pennagaram taluk in Dharmapuri.

RIGHT ATTITUDE - A REAL STORY

When Aditya Birla was heading Hindalco, one of his senior executive made a blunder that incurred cost to the company approximately Rs.10 crores.

Several top executives thought Aditya Birla would come down heavily on this guy and probably fire him from job. But he did not.

Before he called the man in, he sat down, took a notepad and wrote across the top of it: 'Points in favour of this man'. There he listed the man's strengths, including how he had once helped the company make the right decision and earn them millions of dollars.

One of the senior executives who witnessed this AB's philosophy, later said, 'Whenever I am tempted to rip into someone, I force myself to sit down and compile a

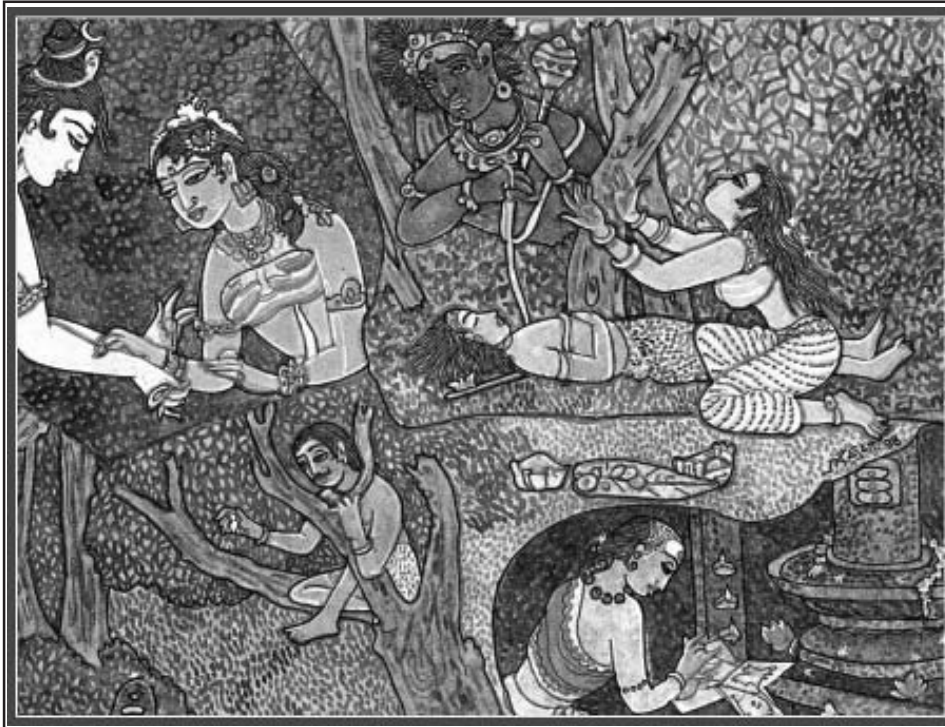
list of the good qualities they have. By the time I have finished, I have the right perspective. And best of all, my anger is under control. I cannot tell you how many times this habit has prevented me from committing one of life's costliest mistakes - losing my temper. I recommend it to anyone who deals with people regularly.'

So before you jump to conclusions about someone, stop and ask God (or your Guru) for wisdom, sit down and make a list of person's best qualities. If you do, you may come to a different conclusion. One thing is for sure, you will approach the person with the right attitude and may be won't say things you will later regret.

Courtesy: Ieema Journal, November 2013

HOME FESTIVALS - 2

Masi (February/March)



Above, this is the month of Mahasivaratri, Siva's great night. In the above painting four stories associated with the festival are told. At lower left a hunter

has been cornered in a tree-top by wild beasts, where he must spend the night. To avoid sleep he plucks leaves from the bilva tree, sacred to Lord Siva, and drops them upon a sivalinga below—a traditional form of worship. Many undertake fasts and stay awake the whole night, praying to Lord Siva both at home and in temples (lower right). The home observance of Karadainombu (upper right) derives from the story of Savitri and her husband, Satyavan. They enter a forest, where he dies. When Lord Yama, the God of Death, comes to take his life, Savitri persuades Yama to let him live. The intent of the observance is that wives not be separated from their husbands. Another explanation of this festival (upper left) is that on this day Lord Siva tied a thread to parvati's right hand after their marriage as a sign of protection and fidelity. *To be continued...*

WHAT IS THE DIFFERENCE?

Between AIMS and OBJECTIVES

Aims are actually **GOALS**, which you set for yourself in your life to achieve while **Objectives** are the measures, which you take to achieve your **aim**.

Between CONTRACT and AGREEMENT

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

Between ACT and ORDINANCE

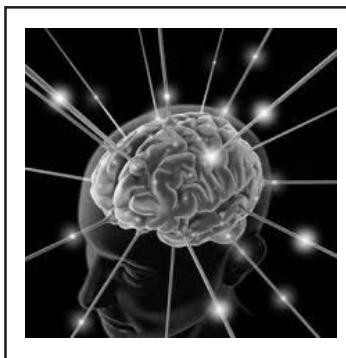
An "Act" is procedurally adopted and duly assented by the head of the state/nation and is placed on the statute as a permanent law.

Ordinance is a temporary law, promulgated by the President or Governor, when the legislature is not in session, It has to be ratified by the legislature within six months.

POWER YOUR MIND

HAVE A VISION

Eyes are good but sight is bad
 Nothing to worry
 Be happy and glad.
 Eyes are good but vision is bad
 Something to worry
 You must feel sad.
 Sight is bad but vision is clear
 Success is guaranteed
 Nothing to fear.
 Eyes are open but the mind is shut
 Shut pretenders are Near to death.

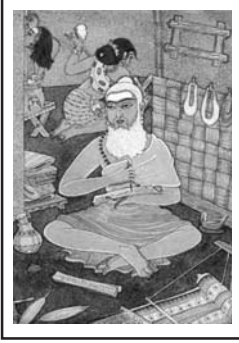


Courtesy: Swami Srikantananda

IAM THAT

Neither happiness nor suffering
 Can affect you.
 Neither sin nor merit
 Can disturb you,
 Neither praise nor blame
 Can perturb you
 Neither birth nor death
 Can frighten you.
 If you dare to say
 'Iam that, Iam that'
 Soham, Soham.

TIRUKKURAL AND MANAGEMENT IN A 'NUTSHELL' 9



Human Resources Development is an important and challenging area today in Management. It has always been so as it is a tough process to match the requirement and the person for it and to pick up one with commitment and character. Organizations have the tasks to ensure continuous training and motivating and monitoring.

Tiruvalluvar has dealt with HRD concepts in various places and in various dimensions with simple dos and don'ts and simple cautions. All or many of these taken care, there is bound to be success for the organizations. Some Kurals chosen below illustrate points made above.

*Seivanai Nadi Vinainadik kalaththodu
Eitha Unarndu seyal Kural 516*

செய்வாணை நாடி வினைநாடிக் காலத்தோடு
எய்த உணர்ந்து செயல் குறள் 516

“Choose the Person and give him the work for which he is fit; see that the time is ripe for performance and then get him to begin it.”

*Arinthuatri Seikirparkku allal Vinaithan
Siranthanenu Evarppart ranru Kural 515*

அறிந்துஆற்றிச் செய்கிற்பாற்கு அல்லால்
வினைதான்

சிறந்தான் என்று ஏவற்பாற் றன்று குறள் 515

“Work should be entrusted to men in consideration of their expert knowledge and capacity for patient exertion, and not of their love towards thy person.”

*Ithanai Ithanal Ivanmudikkum Endruaindu
Athanai Avankan Vidal Kural 517*

இதனை இதனால் இவன்முடிக்கும் என்றுஆய்ந்து
அதனை அவன்கண் விடல் குறள் 517

“Determine first the capacity of the person and the work which he is fit; and then leave him in responsible charge of the same.”

வெங்காயத்தின் மகிமை



வெங்காயத்தின் காரத் தன்மைக்குக் காரணம் அதில் உள்ள அலைல் புரோப்பைல் டை சல்பைடு என்ற எண்ணெய். இதுவே வெங்காயத்தின் நெடிக்கும், நமது கண்களில் கண்ணீர் வருவதற்கும் காரணமாக அமைகிறது. வெங்காயத்தின் புரதச் சத்துக்கள், தாது உப்புக்கள், வைட்டமின்கள் ஆகியவை உள்ளன.

வெங்காயம் ஒரு நல்ல மருந்துப் பொருள். இதை இதயத்தின் தோழன் என்றும் சொல்லலாம். இதிலுள்ள கூட்டுப் பொருட்கள் ரத்தத்தில் கொழுப்பு சேர்வதை இயல்பாகவே கரைத்து, உடலெங்கும் ரத்தத்தை கொழுப்பு இல்லாமல் ஓட வைக்க உதவி செய்கிறது.

குளவியோ, தேனீயோ கொட்டிவிட்டால் பயப்பட வேண்டாம். அவை கடித்த இடத்தில் வெங்காயத்தை எடுத்துத் தேய்த்தாலே போதும். வெங்காயத்தில் உள்ள ஒரு வகை என்சைம், கொட்டியதால் ஏற்படும் உடலின் வலிமையும், அழற் சியையும் உண்டாக்குகின்ற ப்ராஸ்டாகிளாண்டின்ஸ் என்ற கூட்டுப் பொருளை சிதைத்து விடுகிறது. விஷத்தையும் முறித்து விடுகிறது.

சிறுநீர் அடக்கிவைக்கும் பழக்கம் ஆண்களை விட பெண்களிடம் அதிகம் உண்டு. அவ்வாறு சிறுநீரை அடக்குவதால் அதில் நுண்ணுயிரிகளின் உற்பத்தி அதிகமாகி, நோய் உண்டாக்கும் வாய்ப்பு அதிகரிக்கும். இந்த பழக்கத்தை தொடர்பவர்களுக்கு சிறுநீர்த்தாரைத் தொற்று வரும். இவர்கள், வெங்காயத்தை உணவில் அதிகமாகச் சேர்த்துக் கொண்டால் போதும். வெங்காயம் கழிவுப் பொருட்களை கரைத்து, அழற்சியைக் குறைத்து கழிவுகளை வெளியே தள்ளிவிடும். இதனால் சிறுநீர்த்தாரைத் தொற்றும் குறையும்.

யூரிக் அமிலம் அதிகமாக சிறுநீர்ப் பையில் சேர்ந்தால் கற்கள் தோன்றும். வெங்காயத்தை அடிக்கடி சாப்பிட்டால் அந்த கற்கள் கரைந்துவிடும். முதுமையில் வரும் மூட்டு அழற்சியை கட்டுப்படுத்தும் ஆற்றல் வெங்காயத்திற்கு உண்டு. இதற்கு வெங்காயத்தையும், கடுகு எண்ணெயையும் சேர்த்து மூட்டு வலி உள்ள இடத்தில் தடவினால் போதும் வலி குறைந்துவிடும்.

Courtesy: PESOT, November 2013

RASHTRAPATI BHAVAN

The splendour of the Rashtrapati Bhavan is multi-dimensional. It is a vast mansion and its architecture is breathtaking. More than these, it has a hallowed existence in the annals of democracy for being the residence of the President of the largest democracy in the world. Few official residential premises of the Head of the State in the world will match the Rashtrapati Bhavan in terms of its size, vastness and its magnificence.

The present day Rashtrapati Bhavan was the erstwhile residence of the British Viceroy. Its architect was Edwin Landseer Lutyens. The decision to build a residence in New Delhi for the British Viceroy was taken after it was decided in the Delhi Durbar of 1911 that the capital of India would be shifted from Calcutta to Delhi in the same year. It was constructed to affirm the permanence of British rule in India.

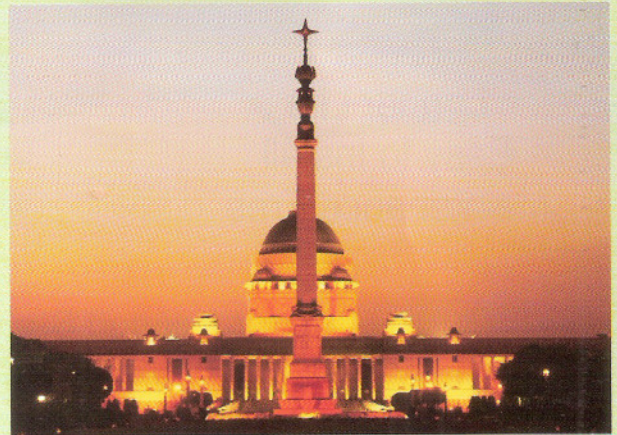
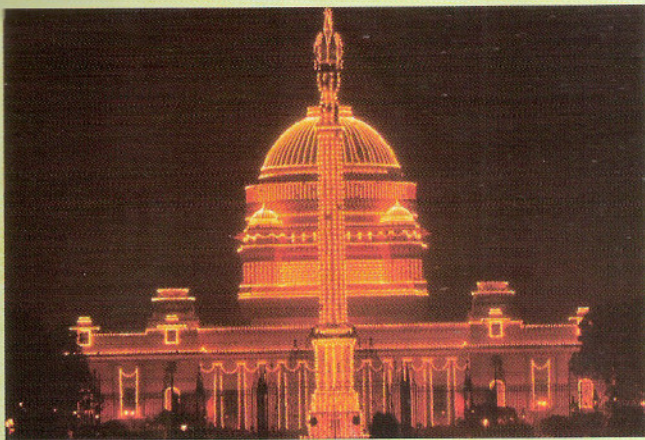
The sanctioned amount for the building was earmarked at 400,000 pounds. However the long span of seventeen years required for the construction of the building raised its cost to 877,136 pounds (then Rs. 12.8 million). The actual amount incurred in not only the construction of the building but also the Mughal Garden and the staff quarters amounted to Rs. 14 million.

It is interesting to note that the building which was scheduled to be completed in four years took seventeen years and on the eighteenth year of its completion India became independent.

This vast mansion has got four floors and 340 rooms. With a floor area of 200, 000 square feet it is built by using 700 million bricks and three million cubic feet of stone. Hardly any steel has gone into the construction of the building.

When Chakravarty Rajagopalachari assumed the office as the first Governor General of India and became the occupant of this building he preferred to stay in a few rooms which is now the family wing of the President and converted the then Viceroy's apartments to be the Guest Wing where the Heads of State of other countries stay during their visit to India.

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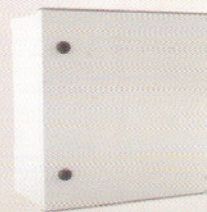
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