ELECTRICAL INSTALLATION ENGINEER NEWS LETTER

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

Dear Members, Fellow Professionals and Friends,

Seasons Greetings and Best Wishes!!

One of the Historical Republic Day Celebrations with Great Pomp and Gaiety and with the participation of President of USA as the Special Guest of Honor was just over on January 26th. It gives us lot of Pride as we are certainly one of the large and Stable Democratic Countries of the World and we are getting recognition from all corners of the World covering various Developed Countries as well as Developing Countries. Some of the recent initiatives by the Government for, ensuring a Clean India, increasing the Manufacturing Activities, strengthening the emotions of One India and a Strong India, initiating and speeding up the Interlinking of Rivers Project, getting people into ensuring for themselves a Bank Account for receiving credits directly and more like these are all very welcome and encouraging signs, which can make us attain the Right Progress. We can feel proud that we are Marching Forward to become a truly Rich Country both by way of both Economy and Values. Cultural "Greats" like Swamy Vivekananda and Great Founding Fathers like Mahathma Gandhi keep reminding us of our Great Heritage and keep guiding us in the Right Direction.

The Country will be celebrating **"National Science Day"** this month on the **28th.** Some thoughts on Science and Engineering and Technology and the challenges and priorities ahead would be apt at this point of time. In our of realm of Electrical Engineering, historically speaking, when we adopted AC in a big way in the early and mid 20th Century, with very large usage of Induction Equipments, Power Factor problems that crept in were considered serious, which are quite easily manageable now, with technical advancements. With the advent of more and more Electronics, in the current and past two decades, contributing sizably to both Efficiencies and easy controls and Management, Power Quality and Harmonics are posing as serious problems and many advancements and solutions are being evolved to address and solve these problems.

We will soon be celebrating World Water Day next month. Here again Science and Engineering and Technologies concerning Energy, Storage and Distribution of Water, Effective and Economical uses of Water for Agriculture and so on require immediate and continuous attention, as basically Science seeks to understand the Natural World and investigates and provides findings and results helping both engineering and technology to find solutions, products and processes to meet societal needs and solve the Problems. Wastes Management and Pollution Controls are also some of the ongoing issues which require attention.

February is also the Budget Month and it is heartening to hear that additional taxation is expected to be very minimum or nil. As we all know, the need of the hour for the Government is to ensure Efficient Tax Collection and Management, and curb tax evasions.

We thank all those members who have helped us by participating in the advertisements appearing for the issue January 2015 – Cape Electric Pvt. Ltd., Electrotherm (India) Ltd., KELCON Biennale, Power Links, Universal Earthing Systems Pvt. Ltd., Supreme Power Equipment Pvt. Ltd., Abirami Electricals, Max Electric Co., Heat Craft Engineers Pvt Ltd., Flir Systems India Pvt Ltd., Velohar Infra Pvt Ltd., Vie Soleil, Faith Power Solutions, Pentagon Switchgear Pvt. Ltd., Galaxy Earthing Electrodes Pvt. Ltd., Wilson Power and Distribution Technologies Pvt. Ltd., Energe Electricals Pvt Ltd., Visewham Electricals, Elmeasure India Pvt. Ltd., Ashlok Safe Earthing Electrode Ltd., Emaar Electricals. ***EDITOR***

Scientists discover the World that exists; Engineers create the World that never was.
– THEODORE VON KARMAN

ELECTRICAL INSTALLATION ENGINEER

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EVENTS

Events Profile: The Independent Power Producers Association of India (IPPAI) is organizing the 5th in the series of its flagship events on energy security. This is a Track II diplomacy Initiative, where Government and Industry Leaders, Regulators, Policymakers, Academicians and think tanks from across Asia discuss and debate issues relating to the entire energy spectrum, particularly the emerging issues and challenges in the Energy landscape of Asia.

Date: 2nd – 4th March 2015

Venue: Kathmandu, Nepal

Website: http://asiaenergysecurity.com/

Events Profile: The exhibition provides an unrivalled opportunity for technology manufacturers and system integrators to build relationships with industry influencers and key decision makers within the solar market in the GCC and wider Middle East.

Date: 2nd – 4th March 2015

Venue: Dubai United Arab Emirates

Website: http://www.solarmiddleeast.ae/

Events Profile: The 11th International Exhibition of Transmission & Distribution and Electrical Engineering for the **EPRE 2015.** The trade Exhibition and Conference is an ideal platform for manufacturers, producers and distributors for the electrical & electronic industry to meet, discuss and converge in business networking.

Date: 25th – 27th March 2015

Venue: Kuala Lumpur Convention Center, Malaysia

Website: http://www.epremalaysia.com

Events Profile: The 14th annual POWER-GEN India & Central Asia and 2nd edition of DistribuTECH India exhibition and conference returns to New Delhi in 2015. Together, the two events will create the complete energy package with representation from leading international power industry companies from across the entire power generation, renewable, hydro, distribution and transmission sectors.

Date: 14th – 16th May 2015

Venue: Pragati Maidan, New Delhi, India

Website: http://www.indiapowerevents.com/index.html#leftinheritedtop_tabs_2

Events Profile: POWER-GEN Africa and its sister event DistribuTECH Africa, will once again provide comprehensive coverage of the power needs, resources and issues facing the electricity generation industries across sub-Saharan Africa.

Date: 15th – 17th July 2015

Venue: Cape Town International Convention Centre, Republic of South Africa

Website: http://www.powergenafrica.com/index.html#pgaf_3

KNOW THY POWER NETWORK - 89

"Wish you all a Very Happy and Prosperous NEW YEAR".

Let us gear up for further journey. For a change, let me start with a question. What is the defining difference between a "Traveller" and a "Tourist"?

By now you would have got the answer. If not, kindly read further.

A tourist is one who normally travels/moves under the guidance of a Tourist Operator. Like a "Caged Bird", he has no "free options". He can not see anything beyond the list of items provided for his guided tour / charted trip. In comparison, a Traveller is a "Free Bird"; he has no "compulsions / restrictions". He can do what ever he likes. The common adage that "anything that becomes 'common place' or frequently visited, loses its charm" is well known to him. So he seeks out new places and new experiences. Put simply, he wants to tread the roads less traveled or desires to select the routes which have not been thought of by others. By this volition, he encounters the unexpected, meets new people, reads new books, tastes new food items, enjoys good music, experiences new cultures and finally enjoys his trip in full to his "heart –content". His greatness lies in the fact, that he can explore any unchartered territory with hope and great ambition. The tourists can never imagine or nor think of such tension-free, free-lance trips. He has to keep in steps with his guide always. You may feel elated to find that our long journey across the Power Network falls under the category of Travellers. This has been reflected in the fact that we are always be on the move to explore new areas / topics, glean new information, witness many smart items and enjoy novel experiences. Is it n't true?

Now let us make further moves to the Smart world and smart grid. An engrossing advertisement published in an English daily recently catches our attention first. It invites "Smart Partners" for making "Smart Business"; it furnishes the profile of the required smart partners and explains how people can join together and make smart earnings. Any one who is smart enough to read this advertisement can join this new club of smart entrepreneurs. Are you one among them? If not, don't bother. This is the way our life cycle moves in the modern world; no one can deny the fact that we always work for or opt for smart living only. The present moot point is how are we going to achieve this? High definitions and smart living are synonymous with this moving life cycle. We try to do our best to achieve the set objective.

Among the means we adopt are the use of global brands of equipment and devices, smart interior design of the houses, home automation and application of high definition colour paints for the exterior and interiors of the houses. All these form part of or extension to the smart life cycle mentioned above. All will agree that the present smart technology normally caters to the needs of the healthy people. But at times, it can also pay attention to handicapped / diseased persons. Hence one need not surprise when I inform that new smart, shake-free spoons are introduced / devised for the beneficial use of the elderly people who suffer from movement disorders likes Parkinson's disease and essential tremors. These patients can not eat anything without

Did you know?

With 395 Articles and eight Schedules, the Indian Constitution is the largest written constitution in the world.

India is one of the oldest civilizations in the world, spanning a period of more than 4000 years, and witnessing the fusion of several customs and traditions, which are reflective of the rich culture and heritage of the Country.

The history of the nation gives a glimpse into the magnanimity of its evolution - from a Country reeling under colonialism, to one of the leading economies in the global scenario within a span of fifty years. More than anything, the nationalistic fervour of the people is the contributing force behind the culmination of such a development. This transformation of the nation instills a sense of national pride in the heart of every Indian within the Country and abroad, and this section is a modest attempt at keeping its flame alive.

spilling due to their diseased nerves. With a view to help them to eat their food on their own, humble, smart spoons that prevents the spilling of food items to the maximum possible extent have now been introduced . No doubt this spoon is a bit more costly than our basic utensil as it uses hundreds of algorithms. These life ware spoons can make any adjustment and reduce the shaking of the eating bowls by an average of 70-80 percent. Among the other note worthy adaptive devices developed are "rocker knives and pen grips". Now comes another "smart news". You know very well that we are living in a software defined world. In the new next a few years, super intelligent computers which are smarter than human beings, are expected to hit the road and compete with their creators (human beings) in many fronts. Such computers could become a reality as a result of the great advancements made in the field of Artificial Intelligence. Hitherto, machines were designed to support human. Whenever he faces physical limitations. This picture has totally changed, dramatic changes are expected to happen. Now self aware, artificial, intelligent based computers, which have exponentially rising computing powers, are going to replace human beings in many sectors and thereby reverse the roles so far played in our " life dramas". They will become our masters and treat us (human beings) the way we handle the animals today. *Do you afraid to face such horrific scenes in your life?* Ergo you can not avoid it; the "genie has now out of the bottle and can not be put back in. Be ready to witness the real life scenes which will be more terrifying than Hollywood sci-fi movies when enacted. *In this context kindly note that all these situations are made possible only by the collective, combined scientific minds and efforts of many human creators that surpass the intelligence / intellect of one or two individual creators.*

One more piece of smart information! As a part of the experiment on smart living, M/s. Panasonic, the consumer electronics giant, have created the world's first smart colony at the outskirts of the bustling Tokyo Town in Japan. The entire town has been geared to achieve the main goals of water and energy conservation. It is expected that there will be a reduction of 70% of CO_2, 30% in the use of water and another 30% in energy consumption.

SMART GRID

Till now, we have seen the threats faced in the smart grid structures both physical and cyber grids and also the special features of various smart devices in our modern software-defined, digital world. The measures that are required to guard against the said-threats in the smart grid now call our immediate attention. Presently an "Integrated Security System" or "Layered Security (Defence in depth)" is adopted at each layer of the security system and it reduces or moderates the unauthorized entry / access of any item brought by the failure of any single security technology. This system contains several layers / tiers of security which help to minimize disruptions when electrical control systems are connected to the internet, all layers of the system as outlined below are exposed to possible attacks.

Computing Layers

Personnel, Networks, Operating Systems, Data Bases and Applications

Security features are to be employed at each layer and it include examination, detection prevention and encryption. Well established information security practices are to be adopted for the protection of control systems. Additional defence mechanisms like the use of deceptions are also to be provided. Among the deception techniques employed are dissimulation (hiding the real) and simulation (showing the false as real).

In addition to the above, rapid containment, restoration and recovery strategies are also adopted for times, when systems have to be compromised as a tactical measure. Further software patching or the ability to identify and isolate the exploited systems rapidly are also to be arranged to reduce the down time.

It's time for me to sign-off.

Till we meet again "Good Bye".

(To be continued…)

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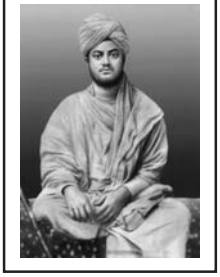

"Civilizations have arisen in other parts of the world. In ancient and modern times, wonderful ideas have been carried forward from one race to another...But mark you, my friends, it has been always with the blast of war trumpets and the march of embattled cohorts. Each idea had to be soaked in a deluge of blood..... Each word of power had to be followed by the groans of millions, by the wails of orphans, by the tears of widows. This, many other nations have taught; but India for thousands of years peacefully existed. Here activity prevailed when even Greece did not exist... Even earlier, when history has no record, and tradition dares not peer into the gloom of that intense past, even from until now, ideas after ideas have marched out from her, but every word has been spoken with a blessing behind it and peace before it. We, of all nations of the world, have never been a conquering race, and that blessing is on our head, and therefore we live....!"

– SWAMI VIVEKANANDA (Indian Philosopher)

THE MYTH OF NET-ZERO EMISSIONS

The emissions from burning coal, oil, and gas are heating up our planet at such a rapid rate that increasingly volatile and dangerous climate conditions seem almost inevitable. Clearly, we have to reduce emissions fast, while developing alternative energy sources that allow us to leave fossil fuels in the ground.

This imperative is almost shockingly straightforward. Yet climate change has been subject to so much political inertia, false information, and wishful thinking for the last few decades that we continue to see ineffective or impossible solutions, rather than an effort to address root causes. Often these "solutions" are based on non-existent or risky new technologies.

This approach is highly expedient, for it threatens neither business as usual nor socioeconomic orthodoxy. But climate models that depend on elusive technologies weaken the imperative to enact the deep structural changes that are needed to avoid climate catastrophe.

The latest such "solution" to emerge is "net-zero emissions," which depends on so-called "carbon capture and storage." Though the technology still faces more than a few shortcomings, Intergovernmental Panel on Climate Change (IPCC) Chairman Rajendar Pachauri issued a deeply problematic statement last month, saying that, "With CCS it is entirely possible for fossil fuels to continue to be used on a large scale."

To be fair, the IPCC's latest assessment report highlights the imperative of cutting CO_2 emissions drastically to avoid exceeding the world's small – and still risky – carbon budget. But to shift from clear-cut goals like "zero emissions," "full decarbonization," and "100% renewable energy" to the far hazier objective of net-zero emissions is to adopt a dangerous stance.

Indeed, the net-zero idea implies that the world can continue to produce emissions, as long as there is a way to "offset" them. So, instead of embarking immediately on a radical emissions-reduction trajectory, we can continue to emit massive amounts of CO_2 – and even establish new coal plants – while claiming to be taking climate action by "supporting" the development of CCS technology. It is apparently irrelevant that such technology might not work, is riddled with practical challenges, and carries the risk of future leakage, which would have major social and environmental consequences.

Bioenergy with Carbon Capture and Storage is the poster child for the new "overshoot approach" of net-zero emissions. BECCS entails planting a huge amount of grass and trees, burning the biomass to generate electricity, capturing the CO_2 that is emitted, and pumping it into geological reservoirs underground.

Related News & Opinion

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Climate chaos 'needn't happen – IF…'

China and US boost search for CCS solution

BECCS would have enormous development implications, provoking large-scale land grabs, most likely from relatively poor people. This is not some farfetched scenario; rising demand for biofuels has spurred devastating land grabs in developing countries for many years.

It would take a lot more land to offset a substantial share of CO_2 emissions. Indeed, an estimated 218-990 million hectares would have to be converted to switchgrass to sequester one billion tons of carbon using BECCS. That is 14-65 times the amount of land the United States uses to grow corn for ethanol.

Nitrous-oxide emissions from the vast amount of fertilizer that would be required to grow the switchgrass could be enough to exacerbate climate change. Then there are the CO_2 emissions from producing synthetic fertilizers; clearing trees, shrubs, and grass from hundreds of millions of hectares of land; destroying large reservoirs of soil carbon; and transporting and processing the switchgrass.

Even more problematic is the revelation that CCS and BECCS would most likely be used for "enhanced oil recovery," with compressed CO_2 pumped into old oil wells for storage, thereby creating a financial incentive to recover more oil. The US Department of Energy estimates that such methods could make 67 billion barrels of oil – three times the volume of proven US oil reserves – economically recoverable. Indeed, given the money at stake, enhanced oil recovery could actually be one of the motives behind the push for CCS.

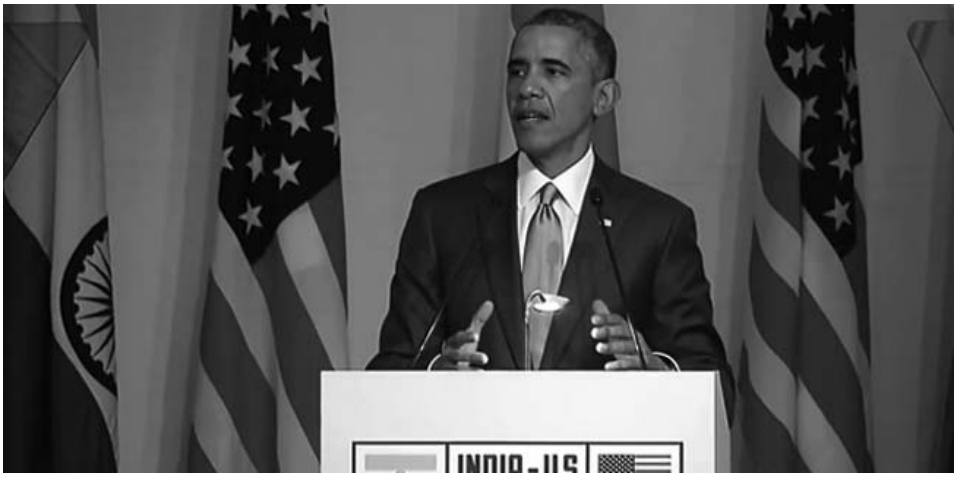
In any case, no form of CCS advances the goal of a structural shift toward full decarbonization, which is what social movements, academics, ordinary citizens, and even some politicians are increasingly demanding. They are prepared to accept the inconveniences and sacrifices that will arise during the transition; indeed, they view the challenge of creating a zero-carbon economy as an opportunity to renew and improve their societies and communities. Dangerous, elusive, and pie-in-the-sky technologies have no place in such an effort.

A clear understanding of the climate crisis expands the range of potential solutions considerably. For example, by banning new coal plants and shifting fossil-fuel subsidies toward the financing of renewable energy through feed-in tariffs, sustainable energy could be brought to billions of people worldwide, while reducing fossil-fuel dependency.

While such innovative and practical solutions are prevented from being scaled up, billions of dollars are pumped into subsidies that reinforce the *status quo*. The only way to reform the system and make real progress toward mitigating climate change is to work to eliminate fossil fuels completely. Vague goals based on nebulous technologies simply will not work.

Lili Fuhr heads the Ecology and Sustainable Development Department at the Heinrich Böll Foundation in Berlin, Germany. Niclas Hällström is Director of the What Next Forum in Uppsala, Sweden.

PRESIDENT OBAMA HIGHLIGHTS USTDA'S COMMITMENT TO RENEWABLE ENERGY IN INDIA



During his remarks at the **U.S.-India** Business Council Summit, President Obama announced "a series of U.S. initiatives that will generate more than $4 billion in trade and investment with India and support thousands of jobs in both of our countries." These initiatives include the U.S. Trade and Development Agency's efforts to catalyze nearly $2 billion in capital for priority renewable energy projects in India.

As part of those efforts, USTDA Director Leocadia I. Zak signed a grant agreement with IL&FS Energy Development Company to partner on the development of innovative Wind Integrated Solar Photovoltaic Energy Storage (WISES) projects. IL&FS Energy, one of the largest wind independent power producers in India, is evaluating the development of integrated wind and solar photovoltaic (PV) projects with energy storage, to enable the supply of dispatchable utility-scale renewable energy to meet the Indian grid system's needs. As India continues to place greater emphasis on renewable energy utilization from the climate change and energy security perspectives, this timely project will demonstrate how its grid can absorb large penetration of variable wind and solar PV generation.

President Obama also announced that "on this visit, we've paved the way to mobilize American expertise and investment" in three of the smart cities that India is planning to develop. Indeed, Director Zak signed agreements with three Indian state governments to mobilize U.S. industry expertise and technologies to modernize the cities of Ajmer (Rajasthan), Allahabad (Uttar Pradesh) and Vishakhapatnam (Andhra Pradesh). Under these Memoranda of Understanding, USTDA plans to sponsor activities such as feasibility studies, pilot projects and reverse trade missions that will help each state develop its smart cities.

For example, the Agency intends to invite state and central government officials to the United States for a Smart Solutions for Smart Cities reverse trade mission in 2015. The visit will introduce the delegates to U.S. technologies, solutions and best practices that can support the development of safe, efficient and integrated energy, transportation and communications infrastructure.

USTDA has long been committed to helping deploy smart energy solutions in cities across India. In fact, the Agency's investments are currently promoting lower-carbon growth in four of India's seven largest cities by introducing "smart grid" technologies and solutions that can improve the quality and supply of power for millions of Indian customers. As part of these efforts—and in connection with India's Smart Grid Week—USTDA will host a Smart Grid Workshop in Bangalore, India on March 2, 2015. Building upon a prior workshop in the United States last December, the event will bring together U.S. and Indian companies, utilities and regulators to discuss innovative solutions to India's energy challenges.

USTDA's grant to IL&FS Energy will provide technical assistance to assess the technical, financial and commercial viability of renewable energy storage technologies for the WISES projects. The opportunity to conduct the USTDA-funded technical assistance will be competed through Federal Business Opportunities (FBO). A link to the FBO announcement will be posted to USTDA's website at www.ustda.gov. Interested U.S. firms should submit proposals according to the instructions in the FBO announcement.

Courtesy : EQ International

Engineering is a great Profession. There is the satisfaction of watching a figment of the imagination emerge through the aid of science to a plan on paper. Then it moves to realisation in stone or metal or energy. Then it brings homes to men or women. Then it elevates the standard of living and adds to the comforts of life. This is the engineer's high privilege. ***– HERBERT HOOVER***

ENERGY CONSERVATION DAY CELEBRATION
23.12.2014 - CHENNAI

Left to Right:

Thiru. Pradeep Kumar,
Director, Alliance to Save Energy

Er. S. Appavoo, B.E.,
Chief Electrical Inspector to Government

Thiru. Natham R. Viswanathan,
Hon'ble Minister for Electricity,
Prohibition & Excise

Thiru. P. Annadurai,
Director (Distribution), TANGEDCO, Chennai

Er. R.V. Sundararaman, MD,
TANTRANSCO

Lighting Kuthu Vilakku by **Thiru. Natham R. Viswanathan**
Hon'ble Minister for Electricity, Prohibition & Excise

Lighting Kuthu Vilakku by **Er. S. Appavoo,** B.E.,
Chief Electrical Inspector to Government

Er. P. Manohar, B.E. *Senior Electrical Inspector*
honouring **Thiru. Natham R. Viswanathan,**
Hon'ble Minister for Electricity, Prohibition & Excise

Er. D. Selvaraj, B.E. Electrical Inspector-Sriperumbudur
honouring **Er. S. Appavoo,** B.E.,
Chief Electrical Inspector to Government

Er. N. Hema, B.E., Electrical Inspector-Chengalpattu honouring
Thiru. Pradeep Kumar, Director, Alliance to Save Energy

Er. G. Joseph Arockiadoss, B.E., MBA, Electrical Inspector, Ponneri
honouring **Er. R.V. Sundararaman,** MD, TANTRANSCO

Er. G. Sathes Kumar, B.E. Asst. Electrical Inspector honouring
Thiru. P. Annadurai, Director (Distribution), TANGEDCO, Chennai

Welcome address by **Er. S. Appavoo,** B.E.,
Chief Electrical Inspector to Government

Er. M. Sadasivan, B.E., Electrical Inspector-Chennai honouring
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Thiru. P. Annadurai, Director (Distribution), TANGEDCO, Chennai

Er. T.A.L. Thenappan, B.E., Electrical Inspector-Ambattur honouring
Thiru. Natham R. Viswanathan,
Hon'ble Minister for Electricity, Prohibition & Excise

Thiru. U. Baskaran, President, TNEIEA honouring
Thiru. Natham R. Viswanathan,
Hon'ble Minister for Electricity, Prohibition & Excise

Thiru. K. Kannan, Secretary, TNEIEA honouring
Thiru. Natham R. Viswanathan,
Hon'ble Minister for Electricity, Prohibition & Excise

Inaugural address by Thiru. Natham R. Viswanathan,
Hon'ble Minister for Electricity, Prohibition & Excise

Er. K. Selvam, M.E., MBA, Electrical Inspector-Chennai North
honouring **Thiru. Natham R. Viswanathan,**
Hon'ble Minister for Electricity, Prohibition & Excise

Gathering

Vote of Thanks by **Er. P. Manohar,** B.E.
Senior Electrical Inspector

NEW YEAR MEET

Mr. K. KANNAN, *Secretary;*
Mr. P. SUYAMBU, *Treasurer;* and
Mr. M. BALAMURUGAN, *Committee Member*
honouring **Er. S. APPAVOO,** CEIG

Mr. K. KANNAN, *Secretary;*
honouring **Er. P. MANOHAR, B.E.**
Senior Electrical Inspector

NON CONVENTIONAL ENERGY SOURCES AND ITS CONVERSION TO PRACTICAL USE

The Sun - the source of our earth's energy

The energy present in this world of ours, in whatever form, be it in the form of fossil fuel, wind, tide or geothermal, is the radiated energy from the **SUN**.

The surface temperature of the sun is around 5800 K and the radiation corresponding to this temperature can be roughly divided into high frequency, visible and low frequency, as shown in the Table: 1

Frequency	Radiation Type	Wavelength* µm	Fraction of energy
High Frequency	Ultra - violet	0.2 - 0.4	9%
Visible Frequency	Light	0.4 - 0.7	41%
Low Frequency	Infra-red	0.7 - 3	50%

* Wavelengths of light expressed in micro meters (or microns) (µm) i.e., 10^{-6} m.

Energy is continuously released from the sun by a fusion reaction which produces 3.94 X 10^{23} kW of power. And the energy radiated from the sun takes about 9⅓ min to reach the earth, covering a distance of 149 million kilo meters. The earth receives only a small fraction of the total energy emitted by the sun, i.e. an average of 1.73X 10^{14} kW or 340W/m^2 over the whole earth's surface.

Thus, the earth gets a continuous power input of 1.73 X 10^{14} kW from the sun - an annual energy 'income' of 1.5 X 10^{18} kWh (1.9 X 1014 t. c. e.). This is a huge figure to which we are not accustomed that it is difficult to appreciate its significance; about ten thousand times larger than the annual world energy consumption. We think that a lot of solar energy is there and also, it is free. The fact is, it is spread over such a large area that the real power density is only 1 kW/Sq.m at the earth's surface at noon at the tropics. Power density also varies considerably with latitude, season and, of course, time of day. Solar power is a boon to the developing countries, since most of these lie in the latitudes 35°N and 35°S which receive the most solar energy with 3000 to 4000 hours of sunlight per year, with little seasonal variation. In fact 80% of the world's population lives in this region. In energy terms this is around 2000 kWh/m^2 year (0.25 t. c. e./m^2 year).

The average intensity or power / unit area falling on a surface of unit area placed at the earth's outer atmosphere and at right angles to the incident radiation is called the solar constant. In SI units the solar constant is 1.36 kW/m^2.

But, the question is, how much of this energy can be harnessed and put to use?

Effect of the earth's atmosphere

Some of the incident radiation is directly reflected by the earth's atmosphere. At 88 km the X-rays and some of the ultra-violet have been absorbed. Between 18 and 15 km the greater part of the ultra-violet has been removed., in the earth's surface, gas molecules in the air cause scattering, particularly at the shorter wavelength end of the spectrum. This effect gives rise to the blue sky, and the red appearance of the sun. The latter is particularly pronounced at sunset and sunrise owing to the increased path length through the air. Clouds and dust also cause scattering and absorption.

But, even this balance energy cannot be fully converted for actual use. The conversion efficiency of the various methods by which the world has stored energy is extremely low; the various manifestation of the solar energy like wind, tide, Geothermal etc., can be converted for use; the incident solar energy can also be directly converted to electrical energy or heat energy.

Applications of direct solar energy

Solar heat

Broadly the solar energy can be divided into two components:

1. Direct radiation
2. Scattered or diffuse radiation

To collect maximum energy from radiation, the collector should be at right angles to the sun's direct radiation; must be moved (tracked) to receive $\pi/2$ times more energy than the fixed collector; in practice this figure is somewhat less, around 1.5.

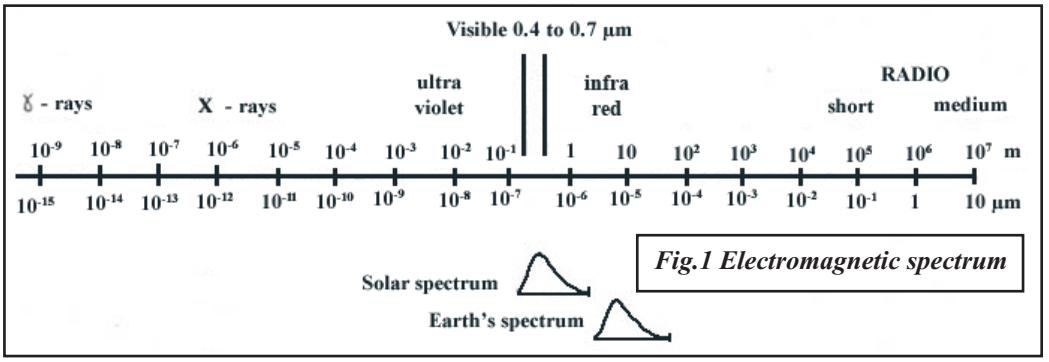


Fig.1 Electromagnetic spectrum

Sun light contains wavelengths over a continuous spectrum with maximum energy lying between 0.3 μm and 1.5 μm, see Fig 1.

For most applications only the total amount of energy available matters but for certain application, the wavelength is important. For example, In photosynthesis it is the blue and red wavelength is important. Similarly, with photovoltaic cells wavelengths greater than a critical value cannot be used.

Mainly the solar radiation is used:

1. As a source of low temperature heat, particularly for domestic hot water or crop drying.
2. In the form of relatively high temperature heat to power heat engines.
3. As high temperature heat to power refrigerators and air conditioners.
4. To operate photovoltaic cells for direct electricity production.

Solar collectors

Flat plate collectors:

The simplest way to collect and make use of solar energy is in the form of low temperature heat. When a surface, preferably blackened so that it will absorb most of the incoming solar radiation, is placed in the sun it will get hot. If the heat is not removed continuously, the temperature will rise and the heat will be lost to the atmosphere. The heat can be removed by passing a fluid through pipes soldered to it.

Concentrating mirrors

By silvering the rear surface of the evacuated tubes it is possible to achieve a measure of concentration. Since the absorber is now an isolated tube, the losses from the back of the absorber are eliminated. Alternatively the mirrors can be used without the evacuated space. as shown in Fig. 2.

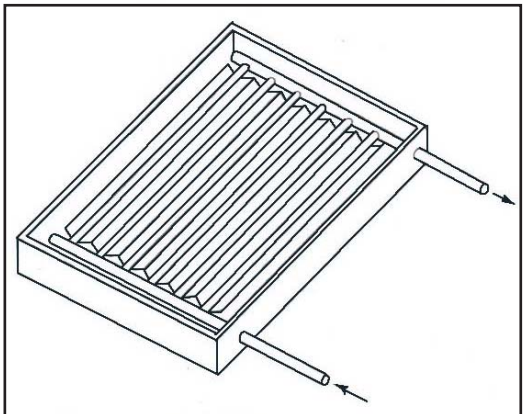


Fig.2 Collector with concentrating mirrors

Heat pipes for heat removal

The heat pipe has a very high effective thermal conductivity, typically 500 times that of a copper bar of similar dimensions therefore enables heat to be removed from the collector plate with very little drop in temperature; it can be designed to transfer heat only in one direction, and prevent the flow of heat from the heat load back to the collector plate if radiation is reduced due to clouds etc.,

Desalination of water:

Sea water contains an average 3.5% of dissolved salts (by weight), but vary widely for example, the Baltic Sea is as low as 0.7% whereas the Dead Sea has a value of 27.5%. Good drinking water contains up to 0.05% of dissolved salts and up to 0.15% can be tolerated. Water from deep bore holes often contains unacceptably high amounts of dissolved salts, and this 'brackish' water has a salt content of typically 0.2 to 0.5%.

Solar energy can be used as an alternative to fossil fuel to provide desalinated water and small scale solar stills of the type shown in Fig.3 can be used for providing water for families or small communities. The saline water is situated in a shallow tray and is heated by the sun to cause evaporation, the water vapour condenses on the glass cover plate and is collected by a container as shown.

The solar still consists of a shallow pit which is made water tight by means of a plastic or rubberized sheet, or concrete having a bitumen coating. The cover can be glass or plastic; the former is preferred since, if properly cleaned, the water will condense as a film (that is it will wet the surface). Such a film will allow most of the radiation to pass through to be absorbed by the bottom of the pool. A disadvantage of some plastics is that water does not wet the surface but instead forms small droplets which reflect the incoming radiation.

One of the largest stills of this type was built about 100 years ago at Las Salinas, Chile, to provide water for a mining camp. The still had area of 4700 m^2 and gave an average of 23 m^3/day of distilled water. There are numerous other solar stills in Australia, Spain, Tunisia, Greece and else where.

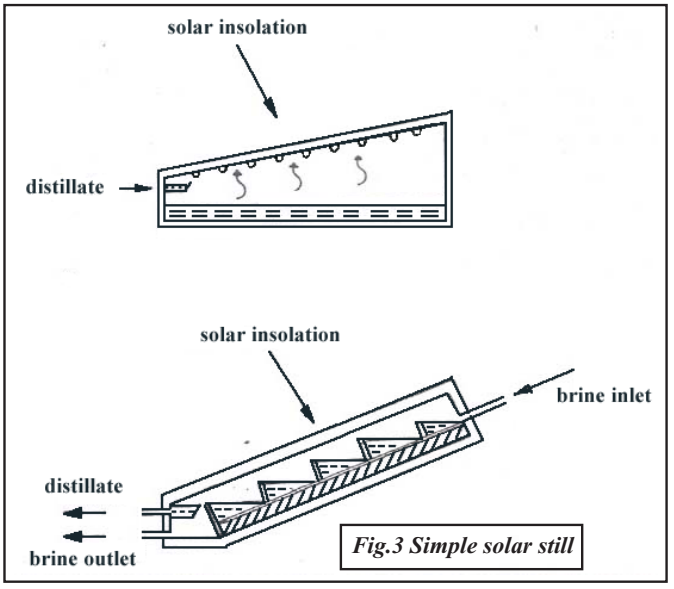


Fig.3 Simple solar still

Solar refrigeration

Compression types are not very efficient as the solar energy has to be converted first in to mechanical energy and then used; absorption refrigerators are very effective. Exell has developed an intermittent absorption solar refrigerator. The source of energy is a 1.4 m^2 flat plate collector and the refrigerator, when operated near Bangkok, produced 6 kg of ice per day. See fig. 4.

The solar collector contains a solution of ammonia in water from which ammonia is distilled, by solar heating, with valve A open and valves B and C closed. The solution heats up in the morning and ammonia begins to distill appreciably by midday. The ammonia vapour is condensed in the collector which is immersed in a tank of cold water to assist condensation. In late afternoon valve A is closed and air allowed into the solar collector casing to cool the solution. At night valves B and C are opened and a refrigerating effect is produced by evaporation of ammonia in the evaporator. The resulting ammonia vapour is allowed into the bottom of the collector where it is absorbed into the solution and the heat of absorption escapes from the collector surface. The system can also be used to maintain a cold store at a temperature 10° C for storage of food and agricultural produce.

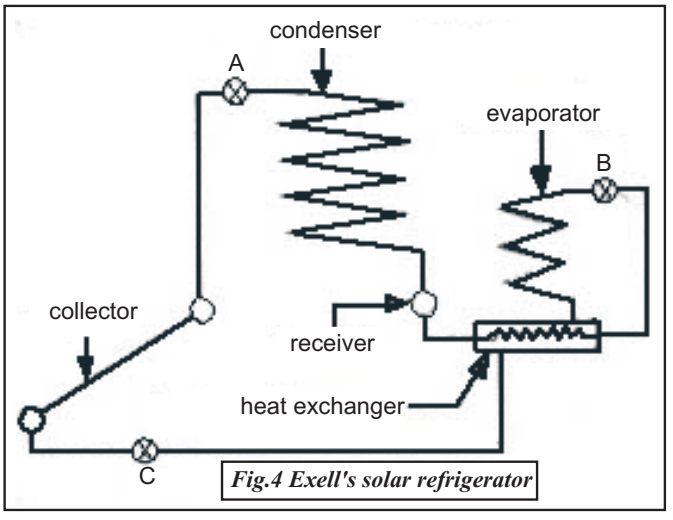


Fig.4 Exell's solar refrigerator

Direct generation of electricity - photovoltaic conversion

Metals, Semiconductors and insulators

In metals, the atoms forming the material readily lose one or more of their electrons. We can regard a metal as a rigid lattice of positively charged ions immersed in a sea of free electrons. If a voltage is applied to the metal these electrons will move freely in the electric field due to the voltage, thus giving rise to an electric current. Since the resistance to electric current flow in metals is very small, they are good conductors of electricity.

In insulators the atoms share their outer electrons with adjacent atoms, and these electrons are fixed and are unable to move in an electric field. The effect of temperature increase is to dislodge a few electrons so that in practice a very small current will flow in the presence of an electric field. Table 2 shows the very large difference in electrical conductivity between metals and insulators.

Table 2. Electrical conductivity (at 300 k)

Material	Conductivity	
Silver	6.3×10^7	
Copper	5.85×10^7 } Metals	
Aluminium	3.5×10^7	
Steel	1.07×10^7	
Germanium	2.2	
Silicon	$5X10^{-4}$ } Semiconductors	
Window glass	10^{-12} - 10^{-13}	
Mica	$10\text{-}11\text{-}10^{-15}$	
Polythene	$10\text{-}15\text{-}10^{-17}$ } Insulators	

There are some materials having a structure which is the same as that on insulators but where the outer electrons are much more easily dislodged than are the electrons in the former. At normal temperatures the vibrations of the ions in the lattice are sufficiently strong to dislodge some of these electrons leading to an electrical conductivity which lies between that of the metals and the insulators, Table 2. Such materials are called semiconductors.

In the photovoltaic generator, or solar cell, the photon energy is converted into electrical energy.

Photovoltaic effect

A photon of energy greater than the energy gap can raise an electron from the bound to the free state away from its parent atom, and this increase in electrical conductivity of a semiconductor is called the photo conductive effect. If the effect of the incident photons is simply to free the electrons it will only increase the electrical conductivity of the material; what is needed to achieve in the semiconductor is some way of removing the electron before it falls down through the energy gap and allowing it to return to the semiconductor only after it has lost its extra energy by performing work in an external load. In order to achieve this it is necessary to modify the pure 'intrinsic' semiconductor.

Silicon photovoltaic cells are usually made by taking a flat wafer of n - type silicon and then diffusing boron into the top surface layer to produce a p - type material, ref. Fig. 5.

Silicon cells have now been developed to a high standard of reliability. They have been used extensively as power sources for space vehicles and are beginning to find terrestrial applications. The goals for development are:

1. Higher conversion efficiency
2. Reduced cost

The highest efficiency reported is 19% and the upper theoretical limit is about 25%. The achievement of reduced cost is the major objective in silicon photovoltaic cell development.

Theoretical maximum efficiency of photo voltaic conversion for different materials:

Si : silicon, Eg = 1.12 eV

CdS: Cadmium sulphide, Eg = 1.2 eV

Gas As: gallium arsenide, Eg = 1.35 eV

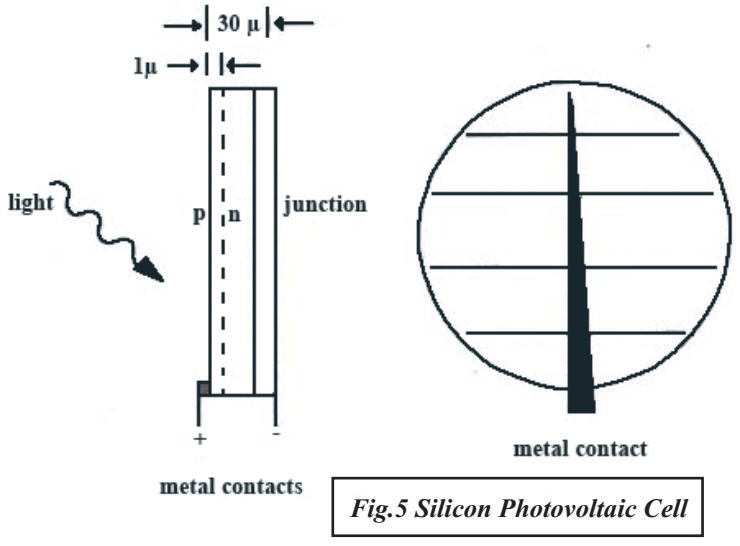


Fig.5 Silicon Photovoltaic Cell

Wind energy

Wind power characteristics

Advantages	Disadvantages
Free	Diffuse – low power density
Widely available	Variable in amount – requiring storage
Inexhaustible	Random in direction (generally but not at all sites)
Non – polluting	Unreliable Site specific

The principal problem which arises in using wind power is its variability and, in general, some form of storage is necessary, for example by the provision of a water tank for a wind pump or an electric battery for small electricity generator. In the case of large scale electricity the problem is overcome by grid connection, but only at the cost of additional standby plant.

Biomass energy - Photosynthesis

Nature harnesses solar energy by means of photosynthesis in plants. In the photosynthetic process solar energy is trapped by chlorophyll in the plant and the energy used to convert carbon dioxide and water into organic material. Biomass, as a fuel is very important for the developing countries like ours. Though only about 0.1% of the solar radiation arriving at the earth's land surface is used in photosynthesis it is a very large amount of energy as it is roughly ten times present world energy use. But, a greater fraction of biomass returns its energy to the atmosphere, partly by respiration of the living plant and by oxidation of the carbon when the plant dies and rots. A very small fraction of the carbon fixed by photosynthesis is used to form fossil sediments which eventually transform to the fossil fuels.

The other indirect forms of solar energy are wind energy, waves, which themselves are due to the interaction between the wind and the surface of the oceans, and hydropower. There are also other forms of indirect solar energy, such as ocean temperature gradients, which might prove useful in the long term.

Apart form the energy income in the form of indirect and direct solar power, and the stored energy capital, there are several other important energy sources; these are nuclear fuels, geothermal power and tidal power.

Geothermal energy

Geothermal energy is principally due to the decay of radioactive elements in the earth's core and appears in the form of hot water or steam. Very large amounts of energy of this type exist, but so far exploitation has been confined to a few areas of the world; a number of programmes are now in hand to assess its more general use.

Tidal energy:

The tidal energy, which arises from the potential and kinetic energy of the earth moon system and is of interest only in a few special geographic situations.

Nuclear fuels:

There are two principal sources of nuclear energy;

1 from the splitting of the nuclei of heavy atoms, that is nuclear fission, and
2 from the joining together or fusion of the nuclei of light atoms, nuclear fusion.

The current generation of nuclear power stations are based on nuclear fission and use the lighter isotope of uranium. U235, as their fuel; these reactors are known as nuclear burners. The later generation of reactors will convert the heavy isotope of uranium, U238, to a fissile fuel and are known as breeders. Fission power is now available and many countries have considerable programmes for building power stations.

The sun itself is a fusion reactor!

Conclusion:

Mother Nature took 3 million years to convert solar energy in to the stored energy, that is fossil fuel, and when we use fossil fuel we are in effect drawing on our energy capital, which is fast depleting; at the present rate of demand may not be able to sustain for more than a few decades. In this process, we are also polluting the atmosphere. It is high time we look for non conventional energy sources for our energy requirements and leave our earth as it is, ***that is an wonderful place to live.***

(Most of the technical information presented in this article were collected from various papers, technical literature on this subject; like lEE energy series, 2, presented by P. D. Dunn) .

Presented by Thiru K.R. Govindan, Kavoori Consultants, Chennai

TOP FIRMS' GREENHOUSE GAS EMISSIONS RISE, DESPITE CALL FOR CUTS

Greenhouse gas emissions by the world's top 500 companies rose 3.1 per cent from 2010 to 2013, far off the cuts urged by the United Nations to limit global warming, a study showed on Monday.

The top 500 firms by capitalization accounted for 13.8 per cent of world greenhouse gas emissions and 28 per cent of gross domestic product in 2013, according to the report, drawn up by the information provider Thomson Reuters and BSD Consulting, a global sustainability consultancy.

"Almost all of us use products from these companies," said Tim Nixon, Director of Sustainability at Thomson Reuters. "This is about transparency. We hope companies will look at the report and engage with their stakeholders to reduce emissions."

A path set out last month by the UN Environment Programme, intended to limit global temperature rises to 2 degrees Celsius (3.6 Fahrenheit) above pre-industrial times, implied a 4.2 per cent fall in world emissions between 2010 and 2013.

Almost 200 nations have set 2 degrees C as a ceiling to limit the extra droughts, floods, heatwaves and rising sea levels that scientists see as the consequence of global warming.

Governments will try to work out a UN climate deal in late 2015 at a summit in Paris to limit emissions of greenhouse gases, which trap the sun's heat.

The top corporate greenhouse gas emitters in 2013 were PetroChina Co Ltd, ChinaPetroleum and Chemical Corp. and steel maker ArcelorMittal, the report said.

Big companies with a more than 10 percent decline in emissions between 2010 and 2013 were led by ConocoPhillips, Valero Energy Corp and Dominion Resources Inc.

Large firms whose emissions rose more than 10 per cent in the period were led by the metals and mining group Glencore, Russia's Surgutneftegas and Exelon Corp. The data came from businesses themselves and estimates from Thomson Reuters Asset4.

John Moorhead, executive manager of BSD, noted that many of the top 500 companies, especially in finance, information technology or telecoms, had relatively low emissions.

But he said they could have a huge influence on emissions beyond their company's borders in their choice of suppliers.

REMARKS BY PRESIDENT OBAMA AT U.S.-INDIA BUSINESS COUNCIL SUMMIT

Place: Taj Palace Hotel, New Delhi, India

PRESIDENT OBAMA: Good evening. Thank you so much, Madam Minister for not only the introduction, but for the work that you're doing every day to bring our two countries closer together. Thank you all for the very warm welcome. I was proud to speak to the U.S.-India Business Council in Mumbai on my last visit to India. And it's good to be with you again. I thank you, the CII, FICCI, and the government of India for hosting us.

I'm pleased to be joined on this visit by leaders from my administration who are dedicated to expanding the trade and investment between our two countries, and I just want to mention them briefly: Our Secretary of Commerce, Penny Pritzker; the Administrator of the U.S. Agency for International Development, Raj Shah; the President and CEO of our Overseas Private Investment Corporation, Elizabeth Littlefield; and the Director of the U.S. Trade and Development Agency, Lee Zak.

Prime Minister Modi, I want to thank you again — both for your invitation to join you on this incredible Republic Day and the wonderful hospitality that you've shown me over the past two days. Today's ceremonies and parade were truly spectacular. It was a moving tribute to India's founding, its democracy, its progress. After all those hours in the reviewing stand together, I figured that the Prime Minister might be tired of me by now. But what's another speech between friends. (Laughter and applause) I will not, by the way, ride a motorcycle today — (laughter) — after watching those incredible acrobats.

As I said yesterday, even as this visit is rich with symbolism, it's also a visit of great substance. We're advancing the vision that I laid out on my last visit — India and the United States as true global partners. And a core element of this vision is greater trade, investment and economic partnership. Our two business communities — all of you — have been some of the strongest champions for a closer relationship, and I want to thank you for your commitment. You understand better than anybody that in our globalized world, the fortunes of the United States and the fortunes of India are inextricably linked. We can grow and we can prosper together, and establish

a set of global norms in terms of how business is done that will benefit not just our two countries, but people around the world. And when I spoke to you on my last visit, I pledged to broaden and deepen our economic ties — and that's what we've done.

In the last few years, we've increased trade between our countries by some 60 percent. Today, it's nearly $100 billion a year — which is a record high. And this is a win-win. It's a win for America and our workers because U.S. exports to India are up nearly 35 percent, and those exports support about 170,000 well-paying American jobs. At the same time, Indian investment in our country is growing, as well. And those Indian investments are supporting jobs across America. We've got high-tech jobs in upstate New York, manufacturing jobs in North Carolina, engineering jobs in places like Michigan and Ohio.

And our growing trade is a win for India, because increased U.S. exports and investment here mean more American-made planes flying passengers on India's airlines all over the world, more American-made turbines generating the energy India needs to continue with its growth, more American-made machinery upgrading India's infrastructure. And because we've made it easier for foreign companies to sell and invest in America, India's exports to the United States are also increasing — and that means more jobs and opportunities here in India. In the end, that's the purpose of trade and investment — to deliver a better life for our people. And both Indian and American workers are and can benefit even more in the future from close ties between our two countries.

So we're moving in the right direction. I want to thank everybody here for the progress that we've achieved together. That said, we all know that the U.S.-India economic relationship is also defined by so much untapped potential. Of all America's imports from the world, about 2 percent come from India. Of all of America's exports to the world, just over 1 percent go to India — 1 percent to over a billion people. We do about $100 billion a year in trade with India, which is a great improvement since I took office. But we do about $560 billion a year with China. That gives you some sense of the potential both for the kind of growth that India might unleash, and the potential for greater trade between our two countries. So I think everybody here will agree, we've got to do better. I know Prime Minister Modi agrees, and he just shared his expansive vision on this issue with you.

As we announced yesterday, we've taken a number of concrete steps forward on this visit. New breakthroughs will help us overcome some key issues and move us toward fully implementing our civil-nuclear agreement. We've taken another big step forward in our defense cooperation with a new technology and trade initiative so that Indian and American companies can jointly develop and produce new defense technologies. We've agreed to resume discussions that would move us toward a bilateral investment treaty that would facilitate Indian businesses making more investments in the United States, and U.S. businesses making more investments here in India.

And we've agreed to step up our efforts with a new high-level U.S.-India Strategic and Commercial Dialogue to make sure we're taking concrete steps that build on our progress so that when two leaders share a vision and make agreements, we know that our agencies, our bureaucracies will follow through aggressively and we can hold them accountable. Prime Minister Modi, I want to thank you for your personal commitment to helping us advance all of these efforts.

Today, I'm proud to announce additional steps — a series of U.S. initiatives that will generate more than $4 billion in trade and investment with India and support thousands of jobs in both of our countries. Specifically, over the next two years, our Export-Import Bank will commit up to $1 billion in financing to support "Made-in-America" exports to India. (Applause) And OPIC will support lending to small and medium businesses across India that we anticipate will ultimately result in more than $1 billion in loans in underserved rural and urban markets. And our U.S. Trade and Development Agency will aim to leverage nearly $2 billion in investments in renewable energy in India. (Applause)

So we're moving forward. There's new momentum, there's new energy, new hope that we can finally begin to realize the full potential of our economic relationship. And I want to close by suggesting several specific areas where we need to focus.

First, we have to keep working to make it easier to do business together in both our countries. For the past two years, business leaders like you voted America as the best place in the world to invest. I'm pretty happy about that. We're going to keep working through what we've called Select USA, an initiative to cut red tape, streamline regulations so that even more companies like yours — from India and around the world — come and set up shop in America.

Now, here in India, as the Prime Minister just discussed, there are still too many barriers — hoops to jump through, bureaucratic restrictions — that make it hard to start a business, or to export, to import, to close a deal, deliver on a deal. We hear this consistently from business leaders like you. And right before coming out here, the Prime Minister and I joined some of you in a roundtable where you described some of the challenges that you face.

Prime Minister Modi has initiated reforms that will help overcome some of these barriers, including a new government committee dedicated to fast-tracking American investments. And we enthusiastically support these efforts. We need to be incentivizing trade and investment, not stifling it. (Applause) We need to be fostering a business environment that's more transparent and more consistent, and more predictable. In knowledge-based economies, entrepreneurs and innovators need to feel confident that their hard work and, in particular, their intellectual property will be protected.

Second, we can work together to develop new technologies that help India leap forward. And I know I speak for the American companies represented here when they say they're ready to partner with Indian firms to build next-generation trains that run on cleaner energy and to lay the new railways India needs for the future. They're ready to help upgrade roads and ports and airports to make it easier for Indians to connect with each other and with the world. They're ready to install broadband connections to give communities reliable access to the Internet and to help build the smart cities that Prime Minister Modi has called for. And on this visit, we've paved the way to mobilize American expertise and investment in three of these cities. And we'll send two trade missions to India this year focused specifically on upgrading India's infrastructure.

And finally — and I know this is something that is of great concern to Prime Minister Modi and is of great concern to me and the United States — we need to make sure that economic growth in both our countries is inclusive and sustained. India's astonishing growth in recent decades has lifted countless millions out of poverty and created one of the world's largest middle classes. There's an important lesson in that. Growth cannot just be measured by the aggregate. It can't just be measured by GDP. It can't just be measured by the bottom line on a balance sheet. Growth, in the end, has to make people's lives better in real, tangible and lasting ways.

Prime Minister Modi has laid out an ambitious vision for the future that lifts up India and its people. And I know that the Prime Minister has even taken to sweeping the street himself — (applause) — and that CEOs are following his lead. We might have to try that in the United States. (Laughter) The United States is ready to work with you to help every home and business in India have reliable access to electricity so more families can share in India's progress.

And as we announced yesterday, we want to support India's goal of expanding solar energy, help improve air quality in Indian cities, and expand access to clean water. There's good business sense, by the way, in being environmentally sound. And one of the great potentials for India and one of the great necessities for the world is that we find ways to lift people out of poverty and provide them power in ways that are sustainable and allow you to leap-frog over some of the dirty development strategies of the past directly into the clean strategies of the future.

As you work to give every Indian household a bank account, American companies are ready to help to make sure these accounts can help Indians in their day-to-day lives, by digitalizing retail transactions. As we grow, we have to do it responsibly, and stay true to our values and uphold basic standards and rule of law. We have to keep striving to protect the rights of our workers; to make sure that our supply chains are sourced responsibly.

Today, I'm also proud to announce a new public-private partnership to help millions of proud Indian-Americans directly invest in India's future. Our new Indian Diaspora Investment Initiative will allow folks back home to generate a new stream of financing for Indian businesses that are investing in non-traditional, and too often overlooked, markets — whether it's providing health care to rural communities, or improving water and sanitation, to opening up some of those new bank accounts.

And this can be another spark in India's economic engine. I know from talking with so many Indian-Americans that they are very excited about this opportunity. They're ready to do even more to help unleash India's success. And it's just one more example of how much we can achieve, how much more good we can do if we keep working together — as governments and as business and as citizens.

Let's make it possible for a young woman in a rural village to start a business with a partner in America that will change both their lives. (Applause) Let's encourage young scientists at American universities to collaborate with partners in India to develop new technologies that will reduce our dependence on fossil fuels and protect our planet. Let's make it easier for Indians and Americans to work together across the board — to buy from one another, to invest in one another, to create with one another — and in so doing, lift the fortunes of all of us. That's the future I believe in for our countries. And that's the future I know we can achieve, if we're willing to work for it together.

I know the Prime Minister has expressed his commitment. You have the commitment of the President of the United States and my administration. I'm looking forward to working with all of you. The next time I come to India, I expect we will have made more progress.

Thank you very much. (Applause)

ENERGY CONSERVATION DAY CELEBRATION

13.12.2014 - MADURAI (Continuation)

Lighting Kuthu Vilakku by **Mr. U. Baskaran**, President, TNEIEA

Lighting Kuthu Vilakku by **Er. P. Palani,** B.E., EI, Dindigul

Lighting Kuthu Vilakku by **Er. T. Elambooranan,** B.E.
Electrical Inspector, Trichy

Lighting Kuthu Vilakku by **Er. S. Balamurugan**, B.E.,
Electrical Inspector, Thirunelveli

Mr. R. Ramachandran, Member honouring
Er. S. Appavoo, CEIG

Mr. J. John, Vice President honouring
Er. N. Mohanasundaram,Chief Engineer, TANGEDCO, Madurai

Mr. S. Manivannan, Vice President honouring
Er. S. Appavoo, CEIG

Mr. A. Radhakrishnan, Member honouring
Er. N. Mohanasundaram, Chief Engineer, TANGEDCO, Madurai

Mini Drama by **Er. J. Jayaseelan,** Executive Engineer, Batlagundu, TANGEDGO & Team of Engineers

Mr. U. Baskaran, President honouring ***Rajalakshmi Traders, Havell's Authorised Dealer,*** Madurai

Mr. K. Kannan, Secretary honouring ***Meena Agencies,*** Madurai

Mr. K. Kannan, Secretary honouring ***Valli Engineering Company,*** Madurai

Mr. P. Suyambu, Treasurer honouring ***Arumuga Traders,*** Madurai

Mr. P. Suyambu, Treasurer honouring ***Salem Trading,*** Namakkal

Mr. P. Suyambu, Treasurer honouring ***Luv-Kush Electrical,*** Madurai

GATHERING

DIESEL GENERATING SETS

OPERATING TIPS FOR FUEL AND LUBE EFFICIENCY

Factors which are responsible for excessive fuel consumption and operational measures that can be taken in conserving both fuel and lubeoils are be summarized below:

1. Select proper fuel. If injection system can be modified to use more viscous fuels like LDO, furnace fuel oil or other residual fuels like LSHS or HPS, higher viscosity fuels can be used with advantage, as they help in importing lesser Diesel fuel and saving the precious foreign exchange.
2. Ensure proper storage and handling of fuel. Dirt and contamination will make the fuel off specification.
3. Leakage, even though they may be of minor nature, should be avoided scrupulously, as they are largely responsible for higher fuel and lube consumption.
4. Try to load the set judiciously above 60% rating for small and above 50% rating for big sets.
5. Ensure proper fuel injection: correct viscosity and temperature, timing, proper mechanical condition of components and prevention of contaminants will greatly improve the efficiency.
6. Select correct lubricant. Monitor lubricant condition through regular sampling and analysis of used oil. Maintain proper cooling and consumption.
7. Normally, engine oils of SAE 40 grades are used in D.G. Sets, unless otherwise recommended by the manufactures. Use of multigrade and higher performance level oil with high detergency and alkalinity reserve and anti-wear properties help in both lube and fuel conservation in addition to improving engine mechanical efficiency.
8. Check compression pressure regularly where provision is there. Attend to struck piston rings, leaky valves, clogged ports, excessive liner & ring wear etc. promptly.
9. Ensure proper air supply - clean cool and dry air for in-take. Clean air filters and provide proper ventilation. Externally clean the air in-take frequently.
10. Insulate exhaust piping to reduce air temperature inside the generator room.
11. Avoid exhaust gas temperature above 450˚C by preventing over loading and restricting air supply. This will improve fuel efficiency.
12. Avoid over lubrication to prevent deposits in the engine and on the turbo-charger blades.
13. Meet, as far as possible, the manufacturers norms like cooling water temperature, back pressure, flow rate etc.
14. Adopt preventive or preferably predictive maintenance programmes. Scrupulously stick to general engine cleanliness norms as recommended by manufactures.
15. Ensure cleanliness in the generator room.
16. If feasible, try to recover waste heat if can be utilized profitably.
17. Use proper quality and grade of lubricant. Generally Mil -L- 2104 B and C level lubricants would be adequate. For engines run on residual fuel, it may be desirable to use Marine grade, high TBN oils.

TIPS FOR DIESEL ENGINE OIL CONSERVATION

1. Improve air filtration.
2. Reduce fuel dilution by
   A. ensuring proper atomization.
   B. having correct engine temperature
   C. having proper air fuel ratio.
   D. ensuring proper crankcase venting
   E. eliminating worn out rings and cylinders liners.
3. Check insoluble build up by using proper air, oil and fuel filters.
4. Reduce oil loss by proper air, oil and fuel filters
5. Reduce loss past piston by
   A. reducing carbon deposits on top land
   B. avoiding bore polishing and glazing
   C. attending to ring wear
6 Provide by pass purification system or remove insolubles by centrifuging.
7 Use long drain oils with improved air and oil filters.

8 Monitor TBN values more closely where high sulphur diesel is used. Typical sulphur contents of diesel is used. Typical sulphur contents of diesel fuels are Haldia 1%, Madras 0.95% Cochin 0.75%, HPC Vi zag 0.79%, HPC Bombay 0.75%, Mathura 0.52% TBN limits (lower) for MIL -B oils 2, for series 3 oils -3 for MIL -C oils 4.

9 Switch on to multigrade oils for oil as well as fuel economy.

10 Check for leaks in the lubrication system and attend to them promptly.

11 Change oil on condition basis and not on the thumb rule recommended by oil companies or engine builders. Field oil testing systems are readily available.

12 Oil never deteriorates. It goes off specs temporarily. The drained oil can be re-refined and brought to proper level by appropriate re-refining and reclamation techniques. For further details on refining, consult PCRA booklet titled 'How to conserve Lubes' through recycling. For any further information on this, please contact PCRA, New Delhi.

MAINTENANCE PRACTICES FOR OVERALL EFFICIENCY

1 **Fuel Injector**: Check injectors once in three weeks for leakage's and spray pattern. Check diameter.

2 **Exhaust Valves**: Frequency of overhaul depends on exhaust gas temperature and impurities in air and fuel. Clean, valve check spindle and its clearance to prevent excess oil consumption by manifold depression.

3 **Relief Valves**: Check regularly for shut off at correct pressures and leak proof operation.

4 **Starting valves**: Ensure proper closing after start. Drain the starting air tank regularly to prevent corrosion and leakage of starting valve seat.

5 **Pistons**: Ensure proper cooling and lubrication. Replace rings in time. Avoid using thicker lubricating oil for preventing blow by/wear. Clean carbon deposits regularly, Clean lube oil passages.

6 **Piston Rings**: Inspect regularly, Clean their Seats.

7 **Water and Lube Systems**: Check regularly for proper function.

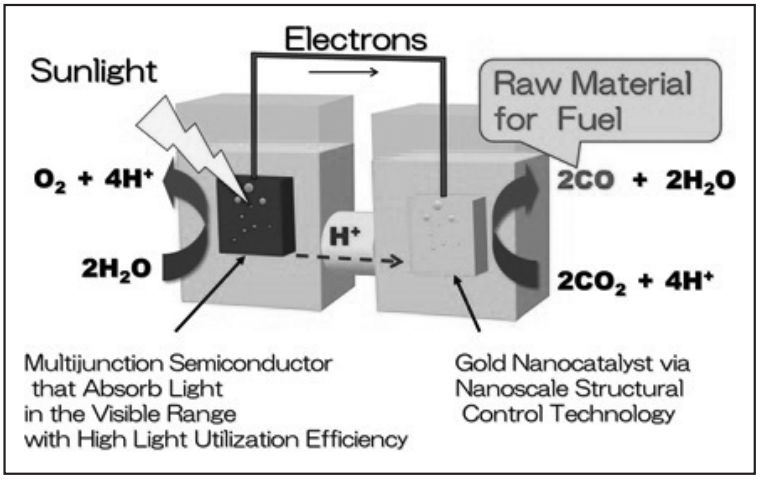
8 **Fuel system**: Centrifuge diesel initially & renew filters regularly.

9 **Heat Exchangers**: Clean once in 500 hours operation if hard water is in use. Water pH should be 7.8

10 **Turbo charger**: Breather should be cleaned externally once in an hour operation and internal surface once in 100 hours operation. Avoid high temperature, salt water contamination of fuel and dirt and dust ion fuel and air to prevent deposits.

TOSHIBA DEVELOPS WORLD'S HIGHEST EFFICIENCY ARTIFICIAL PHOTOSYNTHESIS TECHNOLOGY FOR GENERATION OF FUEL AND FEEDSTOCK FROM CARBONDIOXIDE

Tokyo, Japan Toshiba Corporation (TOKYO:6502) has announced the development of a new technology that uses solar energy, the power of the sun, to generate carbon compounds from carbon dioxide and water, and to deliver a viable chemical feedstock or fuel with potential for use in industry. Toshiba introduced the technology at the 2014 International Conference on Artificial Photosynthesis (ICARP2014) on 26 November, at the Awaji Yumebutai International Conference Center in Japan.



Atmospheric concentrations of carbon dioxide, widely understood to be a major cause of global warming*, continue to increase. There are also concerns about the exhaustion of fossil fuels, which are spurring interest in adoption of renewable energy sources**. Artificial photosynthesis technologies that use solar energy to generate carbon compounds from carbon dioxide and water are seen as promising means to resolve both issues.

Toshiba has developed an artificial photosynthesis technology that converts energy into carbon compounds from carbon dioxide at an efficiency of 1.5%, the highest level yet recorded***. Sunlight converts the carbon dioxide and water into carbon monoxide, a source for production of methanol, which can be used as a substitute for gasoline and as a feedstock in the manufacture of diverse products, including adhesives, medicines and PET bottles.

Other artificial photosynthesis technologies use materials that absorb UV light from sunlight to reach the high reaction energy required to convert carbon dioxide into a fuel. However, their low level of light utilization efficiency drags down the energy conversion efficiency, and practical application requires increased efficiency.

Toshiba's technology uses a gold nanocatalyst via nanoscale structural control technology applied to a multijunction semiconductor that absorbs light in the visible range with high light utilization efficiency. The company's research work centered on investigating manufacturing conditions for the nanometer-order gold nanocatalyst, in order to increase the number of active sites that convert carbon dioxide into carbon monoxide, and the development of an efficient electrolyte.

The long-term goal of the research work is to develop a technology compatible with carbon dioxide capture systems installed at facilities such as thermal power stations and factories, utilizing carbon dioxide to provide stockable and trailerable energy. Towards this, Toshiba will further improve the conversion efficiency by increasing catalytic activity, with the aim of securing practical implementation in the 2020s.

* IPCC Fourth Assessment Report (Synthesis Report), Ministry of the Environment.

** Renewable Energy, Agency of Natural Resources and Energy. The reaction rate can be accelerated by increasing catalytic activity, thus improving the conversion efficiency.

*** The efficiency at which the energy of sunlight is used to convert carbon dioxide and water into carbon compounds that are viable as a chemical feedstock or fuel.

About Toshiba

Toshiba Corporation, a Fortune Global 500 company, channels world-class capabilities in advanced electronic and electrical product and systems into five strategic business domains: Energy & Infrastructure, Community Solutions, Healthcare Systems & Services, Electronic Devices & Components, and Lifestyles Products & Services. Guided by the principles of The Basic Commitment of the Toshiba Group, "**Committed to People, Committed to the Future**", Toshiba promotes global operations towards securing "**Growth Through Creativity and Innovation**", and is contributing to the achievement of a world in which **people everywhere live safe, secure and fulfilled lives**.

Founded in Tokyo in 1875, today's Toshiba is at the heart of a global network of over 590 consolidated companies employing over 200,000 people worldwide, with annual sales surpassing 6.5 trillion yen (US$63 billion). To find out more about Toshiba, visit www.toshiba.co.jp/index.htm

THE SOLAR CLOTH COMPANY – AN INSIGHT

The Solar Cloth Company offers substantial economic and environmental benefits to businesses. Commercial properties in the UK, excluding factories, account for 13% of the UK's energy consumption, while at the same time contributing 19% of the UK's CO_2 output.

There are an estimated 834 million square metres of non-load bearing roofing and 353 million square metres of car parking. Both represent potential markets for our lightweight, flexible solar panels worth in the region of £167 billion and £71 billion respectively. What's more, the vast majority of the UK's supermarkets and warehouses are covered by non-load bearing roofing that can only support lightweight, flexible solar panels.

Like all markets, cost and ROI will heavily influence demand for our lightweight, flexible solar panels. The future cost of electricity is a major concern in the UK. By 2020, the wholesale price of electricity is predicted to rise as high as 14p/kWh6, whereas our lightweight, flexible solar panels are estimated to have a Levelised Cost of Energy (LCOE) as low as 8p/kWh over the same period.

The other great driver of growth is government regulation, and The Solar Cloth Company is ideally positioned to benefit from UK and EU Government changes. Both Governments favour BIPV (Building Integrated Photovoltaics) over ground-mounted photovoltaics as BIPV do not occupy precious greenbelt areas and have minimal impact on the local environment. In addition, the UK Government has recently changed its Feed in Tariffs scheme (FiTs) by ending subsidies for large solar farms. Our strategy to target non-load bearing roofing and car parking with our lightweight, flexible solar panels is aligned to the UK Government's policy to, "incentivise the uptake and deployment of small scale renewable technologies".

How are we different?

At The Solar Cloth Company, we have a range of innovative solar powered products that integrate into new and existing buildings. Our solutions offer an aesthetic as well as financial benefit, while helping businesses comply with corporate social responsibility and increasingly stringent government legislation. Where our lightweight, flexible solar panels are unique is in their ability to be installed at low cost onto any roof, thanks to their low-load and flexible polymer backing meaning solar solutions can be built into any type of building.

How do our solar panels work?

Our lightweight, flexible solar panels are made using thin film photovoltaics (TFPV), which are state-of-the-art solar cells that weigh less than 3.3kg/m2 - a tenth of the weight of traditional solar panels. They can be laid over almost all low-load bearing structures, and bonded to most structural fabrics to allow application in tensile structures, stadia and agricultural land covers.

TFPV are lighter and as powerful as current existing silicon panels. Given the 20-year lifetime of our lightweight, flexible solar panels, thousands of additional kWh of energy could be produced and fed into the National Grid. Under the current Government subsidies known as Feed in Tariffs scheme (FiTs), companies can create substantial new revenues from our products.

What have we achieved?

The Solar Cloth Company has installed the world's first lightweight, flexible TFPV carport. We are in negotiations with major retailers, carpark operators and constructors to roll out these structures nationwide.

We are a growing company, with turnover doubling every 12 months. We have sales of over £380,000 for this financial year and a strong pipeline for the coming year ahead. We have built a robust and commercially exclusive supply chain for lightweight, flexible TFPV. We are working with leading manufacturers and constructors in order to develop breakthrough new products for the BIPV, car parking and agricultural sectors among many others.

In addition, we are collaborating with the University of Cambridge and other leading European Universities for multimillion-pound projects to create ultra-low cost TFPV. Our achievements have been recognised by the RBS Innovation Awards, having been short-listed for a top award. Courtesy: http://www.thesolarclothcompany.com/about-us/

உடம்பில் ஒளிந்திருக்கும் ஆச்சரியங்கள்

இயற்கையின் படைப்புகள் ஒவ்வொன்றிலும் பல ஆச்சரியங்கள் பொதிந்துள்ளன. அதிலும் மனித உடலோ அதிசயங்கள் நிரம்பிய ஒன்று. கடுமையாக உழைக்கும் இதயம் முதல், நம்பவே முடியாத மூளை வரை நமது உடலைப் பற்றி வியக்க வைக்கும் தகவல்கள்

2 வயதில் அதிக மூளை

உலகிலேயே, ஏன் பிரபஞ்சத்தில் உள்ள உயிரினங்களிலேயே மனித மூளைதான் மிகவும் புத்திக்கூர்மை கொண்டது. மனிதர்களின் வாழ்க்கையில் 2 வயதில்தான் மூளை செல்கள் அதிகபட்சமாக இருக்கின்றன. அதேநேரம், மனித மூளை முதிர்ச்சி அடைய 20 ஆண்டுகள் தேவைப்படுகின்றன.

தாயைத் தெரியும்

கருவறையில் வளரும் குழந்தையின் மூளையில் ஒவ்வொரு விநாடியும் 8,000 புதிய மூளைச் செல்கள் வளர்கின்றன. பிறந்த சில மணி நேரத்திலேயே தாயின் முகத்தைக் கண்டுணர்ந்துகொள்ளும் திறன், பிறக்கும் குழந்தைகளுக்கு உண்டு.

70,000 எண்ணங்கள்

நமது மூளை எல்லா நேரமும் வேலை செய்துகொண்டே இருக்கிறது. ஒரு மனித மூளைக்குள் ஒரு நாளில் சராசரியாக 70,000 எண்ணங்கள் ஓடுகின்றன. உண்மையில் தூங்கும்போதுதான் மூளை அதிகமாக வேலை செய்கிறதாம். கனவும் அதன் ஒரு பகுதிதான்.

மூளையால் எரியும் பல்பு

மனித மூளையில் 60 சதவீதம் கொழுப்பு இருக்கிறது என்றாலும், அது கடுமையாக வேலை செய்கிறது. மூளை 25 வாட்ஸ் மின்சாரத்தை உற்பத்தி செய்கிறது. இதன் மூலம் ஒரு பல்பையே எரிக்க முடியும்.

மூளைக்கு வலி தெரியாது

மனித மூளை என்ற உறுப்புக்கு, நேரடியாக வலியை அறியும் உணர்வு இல்லை. அதனால், ஒரு மனிதர் விழித்திருக்கும்போதே அவரது மூளையில் அறுவை சிகிச்சை செய்ய முடியும்.

லாரி ஓட்டும் இதயம்

மனித உடலில் உள்ள உறுப்புகளிலேயே கடுமையாக உழைக்கும் தசை இதயம்தான். ஒரு லாரி 30 கி.மீ. ஓடத் தேவையான சக்தியை ஒரு நாளில் அது உருவாக்குகிறது. நமது வாழ்நாளில் அது உருவாக்கும் சக்தியைக் கொண்டு நிலாவுக்குச் சென்றுவிட்டுத் திரும்பிவிடலாமாம்.

9 மீட்டர் உயரம்

ஒருவரது சராசரி வாழ்நாளில் இதயம் பம்ப் செய்யும் ரத்தத்தின் அளவு 15 லட்சம் பேரல் (1 பேரல் என்பது 120 லிட்டர்). அத்துடன் மனித இதயத்தை வெளியே எடுத்து வைத்தால், அது ரத்தத்தைப் பீய்ச்சி அடிக்கும் உயரம் 9 மீட்டர்.

50,000 மணம்

நமக்கு உள்ள உணர்வுகளிலேயே பழமையானது முகர்ந்து பார்க்கும் உணர்வு. பார்த்தல், கேட்டல், தொடுதல் ஆகிய உணர்வுகளுக்கு முன்னதாகவே தங்களைச் சுற்றியுள்ள வாசம், வேதிப்பொருட்களின் மணங்களுக்கு ஏற்பவே உயிரினங்கள் செயல்படுகின்றன. மூளையால் 50,000 மாறுபட்ட மணங்களை நினைவு வைத்துக்கொள்ள முடியும்.

தும்மலும் புலியும்

நமது ஒற்றை தும்மலின் வேகம் எவ்வளவு தெரியுமா? மணிக்கு 64 கி.மீ. அதாவது, ஒரு புலி ஓடும் வேகம்.

10,000 சுவை மொட்டு

நமது நாக்கில் 10,000 சுவை உணரும் மொட்டுகள் உள்ளன. நாக்கில் சின்னச் சின்ன மேடாக இருப்பவைதான் இந்த மொட்டுகள். சுவையை அறிய முகர்ந்து பார்க்கும் திறனும் அவசியம். மூக்கு அடைத்திருக்கும்போது சாப்பிடும் உணவின் சுவை எப்படி இருக்கிறது என்று யோசித்துப் பாருங்கள்.

தொட்டுப் பார்க்கும் கண்

தொடுதல், கேட்டலுக்கு ஏற்ப எதிர்வினை ஆற்றும் வகையில் பார்வையற்றவர்களின் கண் மேலுறை மாறிவிடுகிறது. இதனால்தான், பார்வையற்றவர்கள் குச்சிகளைக் கொண்டும், தொட்டுப் பார்த்தும் பயணிக்க முடிகிறது.

வயசான முடி

நம் தலையில் உள்ள ஒவ்வொரு முடியும் ஒவ்வொரு மாதத்துக்கும் 6 மி.மீ. அதாவது அரை சென்டிமீட்டரைவிட கொஞ்சம் அதிகமாக வளரும். இப்படியே 6 ஆண்டுகள் வளர்ந்த பின் அதற்கு வயதாகிவிடும். அதனால் அந்த முடி விழுந்துவிட்டு அதே இடத்தில் புதிய முடி முளைக்க ஆரம்பிக்கும்.

லட்சம் கி.மீ. ரத்தக் குழாய்

ஒரு நபரின் தமனி, சிரை, ரத்தத் தந்துகிகள் ஆகியவற்றை அடுத்தடுத்து ஒட்ட வைத்தால், அது மட்டுமே 1,00,000 (லட்சம்) கி.மீ. நீளத்துக்கு வரும். இதைக்கொண்டு பூமியைச் சுற்றினால் இரண்டரை சுற்று சுற்றலாம். அவ்வளவு நீளம்.

காணாமல் போகும் எலும்பு

நாம் பிறக்கும்போது 300 எலும்புகளுடன் பிறக்கிறோம். ஆனால், மனிதனாக வளர்ந்த பிறகு 206 எலும்புகளே இருக்கின்றன. இதற்குக் காரணம் என்னவென்றால், சில எலும்புகள் ஒன்று சேர்ந்துவிடுவதுதான்.

உடலின் பெரிய உறுப்பு

நாம் நினைப்பதற்கு மாறாக, தோல்தான் நம் உடலில் உள்ள மிகப் பெரிய உறுப்பு, தொடர்ச்சியாக வளர்ந்து கொண்டிருக்கும் உறுப்பும்கூட. நமது தோல் ஒரு நிமிடத்துக்கு 50,000 செல்களை இழக்கிறது. நமது வாழ்நாளில் வளரும் மொத்தத் தோலின் எடை 18 கிலோ.

Courtesy: ***தி இந்து, 03.12.2014***

How Emotions Harm You - Most of the things you worry about Never Happen!

Anger : Weakens the Liver
Worry : Weakens the Stomach
Fear : Weakens the Kidney
Grief : Weakens the Lung
Stress : Weakens the Heart & Brain

வந்து பாருங்கள் - வாலிநோக்கம்

நல்ல தண்ணீர்த் தீவு

ராமாயணத்தில் வாலி வந்த இடம் என்பதால் வாலிநோக்கம் என்று பெயர் உண்டானது. வாலிநோக்கம் மூன்று புறமும் கடல் சூழ அமைந்துள்ள எழில்மிகு கடலோர கிராமம்.

ராமநாதபுரத்தில் இருந்து 45 கிலோ மீட்டர் தொலைவிலும், தூத்துக்குடியில் இருந்து 90 கி.மீ. தொலைவிலும் அமைந்துள்ளது வாலிநோக்கம். வாலிநோக்கத்தில் கோடிமுனை கடற்கரை, பெரியமலை, காட்டுப் பள்ளி வாசல், தரை தட்டி நிற்கும் பழைய கப்பல் ஆகியன இங்கு சுற்றலா பயணிகளைக் கவர்கின்றன. கடற்கரையிலிருந்து மூன்று நாட்டிகல் மைல் தொலைவில் கடலுக்குள் நல்ல தண்ணீர்த் தீவும் அமைந்துள்ளது.

இங்கு நந்தா, கன்னத்தில் முத்தமிட்டால், இயற்கை ஆகிய படங்களின் ஷூட்டிங் தொடர்ச்சியாக நடந்ததைத் தொடர்ந்து, வாலிநோக்கம் கடற்கரை சுற்றுலாப் பயணிகளிடம் பிரபலம் அடையத் தொடங்கியது.

25 ஆண்டுகளுக்கு முன்பு வரை கப்பல் உடைக்கும் தளமாக இருந்தது வாலிநோக்கம். அப்போது உடைக்கப்படாத ஒரு கப்பல், இன்னும் கடற்கரையிலேயே நிற்கிறது. இங்குள்ள பெரிய மலையிலிருந்து திருப்புல்லாணி கோயில், உத்திரகோசமங்கை மங்களநாத சுவாமி கோயில் உள்ளிட்ட பல கோயில்கள் கட்டக் கல் எடுத்துச் சென்றதாக உள்ளூர் மக்கள் கூறுகின்றனர். இங்குள்ள காட்டுப் பள்ளிவாசல் திராவிடக் கட்டடக் கலைபாணியில் அமைந்துள்ளது. கோடிமுனை கடற்கரை அறியப்படாத கடற்கரையாக இருப்பதால் மாசடையாமல் இருப்பது சிறப்பம்சம். வாலிநோக்கம் மீனவர்களால் அதிகமாகப் பிடிக்கப்படும் சீலா மீனை (நெய் மீன்) சுற்றுலாப் பயணிகள் வாங்கிக் செல்லத் தவறுவது இல்லை. நல்ல தண்ணீத் தீவுக்குப் படகு வசதி, கடற்கரைப் பூங்கா, நல்ல சாலை வசதி ஆகியன இருந்தால் சுற்றுலாப் பயணிகளை வாலிநோக்கம் இன்னும் அதிகமாக ஈர்க்கும்.

Courtesy: தி இந்து, ஜய வருட மலர் 2014

20 MOST PEACEFUL COUNTRIES IN THE WORLD - 3

SINGAPORE

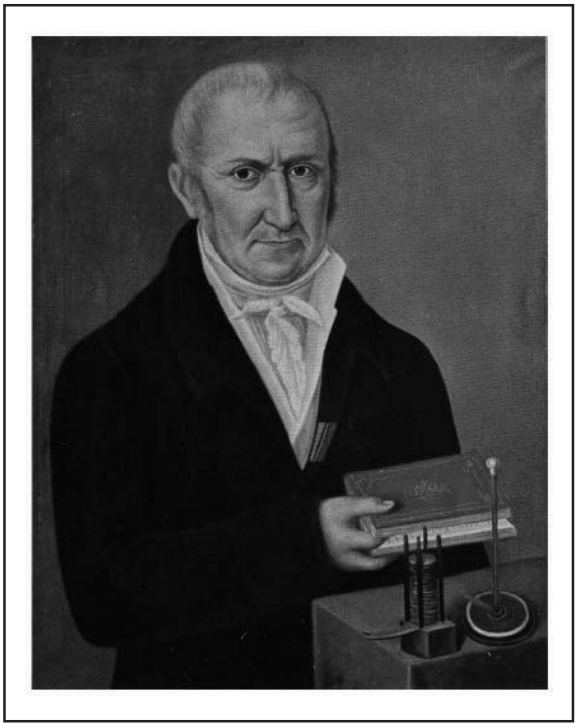
As an active member of the international community and, overall, a small nation, Singapore can never take its right to exist and security for granted. Since achieving its independence in 1965 as a sovereign Republic, Singapore has always concentrated on being a great neighbour, through establishing social, peaceful, economic, cordial political relations with all countries.

The country has worked with the United Nations and its supporting agencies on a great variety of efforts. It also participates in various global, unilateral and multilateral organizations to promote international cooperation, including WTO (World Trade Organization). Singapore is among the most peaceful countries in the world as well as one of the world's wealthiest countries. The homicide and violent crime rates are lower than the criminal rates. ***(To be continued)***

Courtesy: Amerikanki

ALESSANDRO VOLTA (1745 - 1827)

Volta was born in Como, a town in present-day northern Italy (near the Swiss border) on February 18, 1745. In 1774, he became a professor of Physics at the Royal School in Como. A year later, he improved and popularized the electrophorus, a device that produced static electricity. His promotion of it was so extensive that he is often credited with its invention, even though a machine operating on the same principle was described in 1762 by the Swedish experimenter Johan Wilcke.



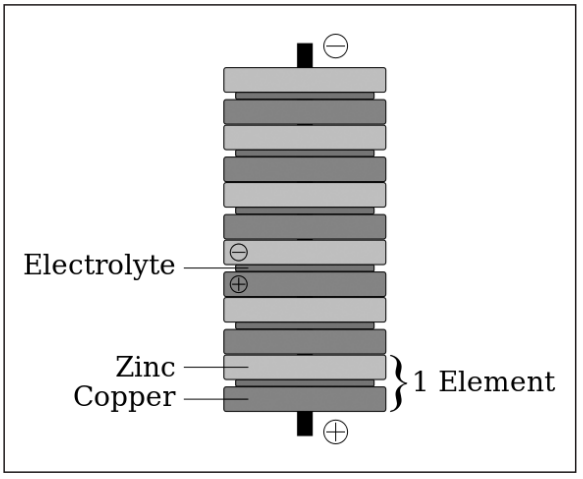
In the years between 1776–78, Volta studied the chemistry of gases. He discovered methane after reading a paper by Benjamin Franklin of America on "flammable air", and Volta searched for it carefully in Italy. In November, 1776, he found methane at Lake Maggiore, and by 1778 he managed to isolate methane. He devised experiments such as the ignition of methane by an electric spark in a closed vessel. Volta also studied what we now call electrical capacitance, developing separate means to study both electrical potential (V) and charge (Q), and discovering that for a given object, they are proportional. This may be called Volta's Law of capacitance, and it is likely that for this work the unit of electrical potential has been named the volt.

In 1779 he became a professor of experimental physics at the University of Pavia, a chair that he occupied for almost 25 years. In 1794, Volta married an aristocratic lady also from Como, Teresa Peregrini, with whom he raised three sons: Giovanni, Flaminio and Zanino.

Volta and Galvani

Luigi Galvani discovered something he named "animal electricity" when two different metals were connected in series with the frog's leg and to one another. Volta realized that the frog's leg served as both a conductor of electricity (what we would now call an electrolyte) and as a detector of electricity. He replaced the frog's leg with brine-soaked paper, and detected the flow of electricity by other means familiar to him from his previous studies. In this way he discovered the electrochemical series, and the law that the electromotive force (emf) of a galvanic cell, consisting of a pair of metal electrodes separated by electrolyte, is the difference between their two electrode potentials (thus, two identical electrodes and a common electrolyte give zero net emf). This may be called Volta's Law of the electrochemical series. In 1800 as the result of a professional disagreement over the galvanic response advocated by Galvani, he invented the voltaic pile, an early electric battery, which produced a steady electric current. Volta had determined that the most effective pair of dissimilar metals to produce electricity was zinc and silver. Initially he experimented with individual cells in series, each cell being a wine goblet filled with brine into which the two dissimilar electrodes were dipped. The voltaic pile replaced the goblets with cardboard soaked in brine.

First battery



In announcing his discovery of his voltaic pile, Volta paid tribute to the influences of William Nicholson, Tiberius Cavallo, and Abraham Bennet. The battery made by Volta is credited as the first electrochemical cell. It consists of two electrodes: one made of zinc, the other of copper. The electrolyte is either sulfuric acid mixed with water or a form of saltwater brine. The electrolyte exists in the form $2H^+$ and SO_4^{2-}. The zinc, which is higher than both copper and hydrogen in the electrochemical series, reacts with the negatively charged sulfate (SO_4^{2-}). The positively charged hydrogen ions (protons) capture electrons from the copper, forming bubbles of hydrogen gas, H_2. This makes the zinc rod the negative electrode and the copper rod the positive electrode.

Thus, there are two terminals, and an electric current will flow if they are connected. The chemical reactions in this voltaic cell are as follows:

zinc $Zn \longrightarrow Zn^{2+} + 2e^-$

sulfuric acid $2H^+ + 2e^- \longrightarrow H_2$

The copper does not react, but rather it functions as an electrode for the electric current.

However, this cell also has some disadvantages. It is unsafe to handle, since sulfuric acid, even if dilute, is dangerous to human beings. Also, the power of the cell diminishes over time because the hydrogen gas is not released. Instead, it accumulates on the surface of the zinc electrode and forms a barrier between the metal and the electrolyte solution.

Last years and retirement

In honor of his work, Volta was made a count by Napoleon Bonaparte in 1801. Furthermore, his image was depicted upon the Italian 10,000 lira note (no longer in circulation, since the lira has been replaced by the euro) along with a sketch of his well-known voltaic pile. Volta retired in 1819 to his estate in Camnago,a frazione of Como, Italy, now named "Camnago Volta" in his honor. He died there on March 5, 1827. Volta's remains were also buried in Camnago Volta. Volta's legacy is celebrated by the Tempio Voltiano memorial located in the public gardens by the lake. There is also a museum which has been built in his honor, and it exhibits some of the original equipment that Volta used to conduct experiments. Not far away stands the Villa Olmo, which houses the Voltian Foundation, an organization promoting scientific activities. Volta carried out his experimental studies and produced his first inventions near Como.

Religious beliefs

Volta was raised as a Christian and for all of his life continued to maintain a strong faith and to attend church.

Publications

De vi attractiva ignis electrici (1769) (*On the attractive force of electric fire*)

HUMOUR

Job Application...

Two young engineers applied for a single position at a computer company. They both had the same qualifications. In order to determine which individual to hire, the applicants were asked to take a test by the department manager.

Upon completion of the test, both men had each missed only one of the questions. The manager went to the first applicant and said, "thank you for your interest, but we've decided to give the job to the other applicant".

"And why would you be doing that? We both got nine questions correct," asked the rejected applicant.

"We have based our decision not on the correct answers, but on the question you missed," said the department manager.

"And just how would one incorrect answer be better than the other"? the rejected applicants inquired.

"Simple", said the department manager, "Your fellow applicant put down on question..5, 'I don't know.' You put down, 'Neither do I'".

Didn't you...?

A cop pulls a young guy over:

"Hello officer" said the smart aleck kid.

"Young man did you see that stop sign?" asked the cop.

"Yup, but I didn't see you!".

Why didn't you..?

Little Anil's kindergarten class was on a field trip to their local police station where they saw pictures tacked to a bulletin board of the 10 most wanted criminals. One of the youngsters pointed to a picture and asked if it really was the photo of a wanted person. 'Yes,' said the policeman. 'The detectives want very badly to capture him'.

Little Johnny asked, 'Why didn't you keep him when you took his picture?'

Where am I from...?

"Dad, where did I come from?" asks this 10-years-old. The father was shocked that a 10 year old would be asking a question like that.

He was hoping to wait a few more years before he would have to explain the facts of life, but he figured it was better a few years early than a few days too late, so, for the next two hours he explained everything to his son.

When he got finished, he asked his son what prompted his question to which his son replied, "I was talking to the new kid across the street and he said he came from Kolkata, so I was just wondering where I came from."

Heights of stupidity...

Two roofers, Larry and Joe were on the roof laying tile, when a sudden wind gust came and knocked down their ladder.

"I have an idea" said Larry.

"We'll throw you down, and then you can pick up the ladder."

"What, do you think, I'm stupid?"

"I have an idea" said Joe.

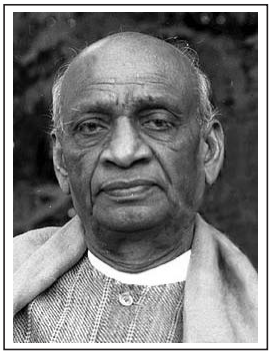
"I'll shine my flashlight, and you can climb down on the beam of light."

"What, do you think I'm stupid?"

"You'll just turn **off the flashlight when I'm halfway there."**

VALLABHBHAI PATEL - 2

Cabinet mission and partition



When the British mission proposed two plans for transfer of power, there was considerable opposition within the Congress to both. The plan of 16 May 1946 proposed a loose federation with extensive provincial autonomy, and the "grouping" of provinces based on religious-majority. The plan of 16 June 1946 proposed the partition of India on religious lines, with over 600 princely states free to choose between independence or accession to either dominion. The League approved both plans, while the Congress flatly rejected the proposal of 16 June. Gandhi criticised the 16 May proposal as being inherently divisive, but Patel, realising that rejecting the proposal would mean that only the League would be invited to form a government, lobbied the Congress Working Committee hard to give its assent to the 16 May proposal. Patel engaged the British envoys Sir Stafford Cripps and Lord Pethick-Lawrence and obtained an assurance that the "grouping" clause would not be given practical force, Patel converted Jawaharlal Nehru, Rajendra Prasad and Rajagopalachari to accept the plan. When the League retracted its approval of the 16 May plan, the viceroy Lord Wavell invited the Congress to form the government. Under Nehru, who was styled the "Vice President of the Viceroy's Executive Council," Patel took charge of the departments of home affairs and information and broadcasting. He moved into a government house on 1, Aurangzeb Road in Delhi—this would be his home till his death in 1950.

Vallabhbhai Patel was one of the first Congress leaders to accept the partition of India as a solution to the rising Muslim separatist movement led by Muhammad Ali Jinnah. He had been outraged by Jinnah's Direct Action campaign, which had provoked communal violence across India and by the viceroy's vetoes of his home department's plans to stop the violence on the grounds of constitutionality. Patel severely criticised the viceroy's induction of League ministers into the government, and the revalidation of the grouping scheme by the British without Congress approval. Although further outraged at the League's boycott of the assembly and non-acceptance of the plan of 16 May despite entering government, he was also aware that Jinnah did enjoy popular support amongst Muslims, and that an open conflict between him and the nationalists could degenerate into a Hindu-Muslim civil war of disastrous consequences. The continuation of a divided and weak central government would in Patel's mind, result in the wider fragmentation of India by encouraging more than 600 princely states towards independence. Between the months of December 1946 and January 1947, Patel worked with civil servant V.P. Menon on the latter's suggestion for a separate dominion of Pakistan created out of Muslim-majority provinces. Communal violence in Bengal and Punjab in January and March 1947 further convinced Patel of the soundness of partition. Patel, a fierce critic of Jinnah's demand that the Hindu-majority areas of Punjab and Bengal be included in a Muslim state, obtained the partition of those provinces, thus blocking any possibility of their inclusion in Pakistan. Patel's decisiveness on the partition of Punjab and Bengal had won him many supporters and admirers amongst the Indian public, which had tired of the League's tactics, but he was criticised by Gandhi, Nehru, secular Muslims and socialists for a perceived eagerness to do so. When Lord Louis Mountbatten formally proposed the plan on 3 June 1947, Patel gave his approval and lobbied Nehru and other Congress leaders to accept the proposal. Knowing Gandhi's deep anguish regarding proposals of partition, Patel engaged him in frank discussion in private meetings over the perceived practical unworkability of any Congress-League coalition, the rising violence and the threat of civil war. At the All India Congress Committee meeting called to vote on the proposal, Patel said:

"I fully appreciate the fears of our brothers from [the Muslim-majority areas]. Nobody likes the division of India and my heart is heavy. But the choice is between one division and many divisions. We must face facts. We cannot give way to emotionalism and sentimentality. The Working Committee has not acted out of fear. But I am afraid of one thing, that all our toil and hard work of these many years might go waste or prove unfruitful. My nine months in office has completely disillusioned me regarding the supposed merits of the Cabinet Mission Plan. Except for a few honourable exceptions, Muslim officials from the top down to the chaprasis (peons or servants) are working for the League. The communal veto given to the League in the Mission Plan would have blocked India's progress at every stage. Whether we like it or not, de facto Pakistan already exists in the Punjab and Bengal. Under the circumstances I would prefer a de jure Pakistan, which may make the League more responsible. Freedom is coming. We have 75 to 80 percent of India, which we can make strong with our own genius. The League can develop the rest of the country."

Following Gandhi's and Congress' approval of the plan, Patel represented India on the Partition Council, where he oversaw the division of public assets, and selected the Indian council of ministers with Nehru. However, neither he nor any other Indian leader had foreseen the intense violence and population transfer that would take

place with partition. Patel would take the lead in organising relief and emergency supplies, establishing refugee camps and visiting the border areas with Pakistani leaders to encourage peace. Despite these efforts, the death toll is estimated at between 500,000 to 1 million people. The estimated number of refugees in both countries exceeds 15 million. Understanding that Delhi and Punjab policemen, accused of organising attacks on Muslims, were personally affected by the tragedies of partition, Patel called out the Indian Army with South Indian regiments to restore order, imposing strict curfews and shoot-at-sight orders. Visiting the Nizamuddin Auliya Dargah area in Delhi, where thousands of Delhi Muslims feared attacks, he prayed at the shrine, visited the people and reinforced the presence of police. He suppressed from the press reports of atrocities in Pakistan against Hindus and Sikhs to prevent retaliatory violence. Establishing the Delhi Emergency Committee to restore order and organising relief efforts for refugees in the capital, Patel publicly warned officials against partiality and neglect. When reports reached Patel that large groups of Sikhs were preparing to attack Muslim convoys heading for Pakistan, Patel hurried to Amritsar and met Sikh and Hindu leaders. Arguing that attacking helpless people was cowardly and dishonourable, Patel emphasised that Sikh actions would result in further attacks against Hindus and Sikhs in Pakistan. He assured the community leaders that if they worked to establish peace and order and guarantee the safety of Muslims, the Indian government would react forcefully to any failures of Pakistan to do the same. Additionally, Patel addressed a massive crowd of approximately 200,000 refugees who had surrounded his car after the meetings:

"Here, in this same city, the blood of Hindus, Sikhs and Muslims mingled in the bloodbath of Jallianwala Bagh. I am grieved to think that things have come to such a pass that no Muslim can go about in Amritsar and no Hindu or Sikh can even think of living in Lahore. The butchery of innocent and defenceless men, women and children does not behove brave men... I am quite certain that India's interest lies in getting all her men and women across the border and sending out all Muslims from East Punjab. I have come to you with a specific appeal. Pledge the safety of Muslim refugees crossing the city. Any obstacles or hindrances will only worsen the plight of our refugees who are already performing prodigious feats of endurance. If we have to fight, we must fight clean. Such a fight must await an appropriate time and conditions and you must be watchful in choosing your ground. To fight against the refugees is no fight at all. No laws of humanity or war among honourable men permit the murder of people who have sought shelter and protection. Let there be truce for three months in which both sides can exchange their refugees. This sort of truce is permitted even by laws of war. Let us take the initiative in breaking this vicious circle of attacks and counter-attacks. Hold your hands for a week and see what happens. Make way for the refugees with your own force of volunteers and let them deliver the refugees safely at our frontier."

Following his dialogue with community leaders and his speech, no further attacks occurred against Muslim refugees, and a wider peace and order was re-established soon over the entire area. However, Patel was criticised by Nehru, secular Muslims and taxed by Gandhi over his alleged wish to see Muslims from other parts of India depart. While Patel vehemently denied such allegations, the acrimony with Maulana Azad and other secular Muslim leaders increased when Patel refused to dismiss Delhi's Sikh police commissioner, who was accused of discrimination. Hindu and Sikh leaders also accused Patel and other leaders of not taking Pakistan sufficiently to task over the attacks on their communities there, and Muslim leaders further criticised him for allegedly neglecting the needs of Muslims leaving for Pakistan, and concentrating resources for incoming Hindu and Sikh refugees. Patel clashed with Nehru and Azad over the allocation of houses in Delhi vacated by Muslims leaving for Pakistan—Nehru and Azad desired to allocate them for displaced Muslims, while Patel argued that no government professing secularism must make such exclusions. However, Patel was publicly defended by Gandhi and received widespread admiration and support for speaking frankly on communal issues and acting decisively and resourcefully to quell disorder and violence.

Political integration of India

This event formed the cornerstone of Patel's popularity in post-independence era and even today, he is remembered as the man who united India. He is, in this regard, compared to Otto von Bismarck of Germany, who did the same thing in 1860s. Under the plan of 3 June, more than 562 princely states were given the option of joining either India or Pakistan, or choosing independence. Indian nationalists and large segments of the public feared that if these states did not accede, most of the people and territory would be fragmented. The Congress as well as senior British officials considered Patel the best man for the task of achieving unification of the princely states with the Indian dominion. Gandhi had said to Patel *"the problem of the States is so difficult that you alone can solve it"*. He was considered a statesman of integrity with the practical acumen and resolve to accomplish a monumental task. Patel asked V.P. Menon, a senior civil servant with whom he had worked over the partition of India, to become his right-hand as chief secretary of the States Ministry. On 6 May 1947, Patel began lobbying the princes, attempting to make them receptive towards dialogue with the future Government and trying

to forestall potential conflicts. Patel used social meetings and unofficial surroundings to engage most monarchs, inviting them to lunch and tea at his home in Delhi. At these meetings, Patel stated that there was no inherent conflict between the Congress and the princely order. Nonetheless, he stressed that the princes would need to accede to India in good faith by 15 August 1947. Patel invoked the patriotism of India's monarchs, asking them to join in the freedom of their nation and act as responsible rulers who cared about the future of their people. He persuaded the princes of 565 states of the impossibility of independence from the Indian republic, especially in the presence of growing opposition from their subjects. He proposed favourable terms for the merger, including creation of *privy purses* for the descendants of the rulers. While encouraging the rulers to act with patriotism, Patel did not rule out force, setting a deadline of 15 August 1947 for them to sign the instrument of accession document. All but three of the states willingly merged into the Indian union—only Jammu and Kashmir, Junagadh, and Hyderabad did not fall into his basket.

Junagadh was especially important to Patel, since it was in his home state of Gujarat and also because this Kathiawar district had the ultra-rich Somnath temple which had been plundered 17 times by Mahmud of Ghazni who broke the temple and its idols to rob it of its riches, emeralds, diamonds and gold. The Nawab had under pressure from Sir Shah Nawaz Bhutto acceded to Pakistan. It was however, quite far from Pakistan and 80% of its population was Hindu. Patel combined diplomacy with force, demanding that Pakistan annul the accession, and that the Nawab accede to India. He sent the Army to occupy three principalities of Junagadh to show his resolve. Following widespread protests and the formation of a civil government, or *Aarzi Hukumat*, both Bhutto and the Nawab fled to Karachi, and under Patel's orders, Indian Army and police units marched into the state. A plebiscite later organised produced a 99.5% vote for merger with India. In a speech at the Bahauddin College in Junagadh following the latter's take-over, Patel emphasised his feeling of urgency on Hyderabad, which he felt was more vital to India than Kashmir:

If Hyderabad does not see the writing on the wall, it goes the way Junagadh has gone. Pakistan attempted to set off Kashmir against Junagadh. When we raised the question of settlement in a democratic way, they (Pakistan) at once told us that they would consider it if we applied that policy to Kashmir. Our reply was that we would agree to Kashmir if they agreed to Hyderabad.

Hyderabad was the largest of the princely states, and included parts of present-dayAndhra Pradesh, Karnataka, and Maharashtra states. Its ruler, the Nizam Osman Ali Khan was a Muslim, although over 80% of its people were Hindu. The Nizam sought independence or accession with Pakistan. Muslim forces loyal to Nizam, called the Razakars, under Qasim Razvi pressed the Nizam to hold out against India, while organising attacks on people on Indian soil. Even though a Standstill Agreement was signed due to the desperate efforts of Lord Mountbatten to avoid a war, the Nizam rejected deals and changed his positions. In September 1948, Patel emphasised in Cabinet meetings that India should talk no more, and reconciled Nehru and the Governor-General, Chakravarti Rajgopalachari to military action. Following preparations, Patel ordered the Indian Army to integrate Hyderabad (in his capacity as Acting Prime Minister) when Nehru was touring Europe. The action was termed Operation Polo, in which thousands of Razakar forces had been killed, but Hyderabad was comfortably secured into the Indian Union. The main aim of Mountbatten and Nehru in avoiding a forced annexation was to prevent an outbreak of Hindu-Muslim violence. Patel insisted that if Hyderabad was allowed to continue with its antics, the prestige of the Government would fall and then neither Hindus nor Muslims would feel secure in its realm. After defeating Nizam, Patel retained him as the ceremonial chief of state, and held talks with him.

Leading India

Governor General Chakravarti Rajagopalachari, Nehru and Patel formed the *triumvirate* which ruled India from 1948 to 1950. Prime Minister Nehru was intensely popular with the masses, but Patel enjoyed the loyalty and the faith of rank and file Congressmen, state leaders and India's civil services. Patel was a senior leader in the Constituent Assembly of India and was responsible in a large measure for shaping India's constitution. He is also known as the "Bismarck of India". Patel was a key force behind the appointment of Dr. Bhimrao Ramji Ambedkar as the chairman of the drafting committee, and the inclusion of leaders from a diverse political spectrum in the process of writing the constitution.

Patel was the chairman of the committees responsible for minorities, tribal and excluded areas, fundamental rights and provincial constitutions. Patel piloted a model constitution for the provinces in the Assembly, which contained limited powers for the state governor, who would defer to the President—he clarified it was not the intention to let the governor exercise power which could impede an elected government. He worked closely with Muslim leaders to end separate electorates and the more potent demand for reservation of seats for minorities. Patel would hold personal dialogues with leaders of other minorities on the question, and was responsible for the measure that allows the President to appoint Anglo-Indians to Parliament. His intervention was key to the passage of two articles that protected civil servants from political involvement and guaranteed their terms and privileges. He was also instrumental in the founding the Indian Administrative Service and the Indian Police Service, and for his defence of Indian civil servants from political attack, he is known as the

"patron saint" of India's services. When a delegation of Gujarati farmers came to him citing their inability to send their milk production to the markets without being fleeced by intermediaries, Patel exhorted them to organise the processing and sale of milk by themselves, and guided them to create the Kaira District Co-operative Milk Producers' Union Limited, which preceded the Amul milk products brand. Patel also pledged the reconstruction of the ancient but dilapidated Somnath Temple in Saurashtra—he oversaw the creation of a public trust and restoration work, and pledged to dedicate the temple upon the completion of work (the work was completed after Patel's death, and the temple was inaugurated by the first President of India, Dr. Rajendra Prasad).

When the Pakistani invasion of Kashmir began in September 1947, Patel immediately wanted to send troops into Kashmir. But agreeing with Nehru and Mountbatten, he waited till Kashmir's monarch had acceded to India. Patel then oversaw India's military operations to secure Srinagar, the Baramulla Pass and the forces retrieved much territory from the invaders. Patel, along with Defence Minister Baldev Singh administered the entire military effort, arranging for troops from different parts of India to be rushed to Kashmir and for a major military road connecting Srinagar to Pathankot be built in 6 months. Patel strongly advised Nehru against going for arbitration to the United Nations, insisting that Pakistan had been wrong to support the invasion and the accession to India was valid. He did not want foreign interference in a bilateral affair. Patel opposed the release of Rs. 550 million to the Government of Pakistan, convinced that the money would go to finance the war against India in Kashmir. The Cabinet had approved his point but it was reversed when Gandhi, who feared an intensifying rivalry and further communal violence, went on a fast-unto-death to obtain the release. Patel, though not estranged from Gandhi, was deeply hurt at the rejection of his counsel and a Cabinet decision.

In 1949, a crisis arose when the number of Hindu refugees entering West Bengal, Assam and Tripura from East Pakistan climbed over 800,000. The refugees in many cases were being forcibly evicted by Pakistani authorities, and were victims of intimidation and violence. Nehru invited Liaquat Ali Khan, Prime Minister of Pakistan to find a peaceful solution. Despite his aversion, Patel reluctantly met Khan and discussed the matters. Patel strongly criticised, however, Nehru's intention to sign a pact that would create minority commissions in both countries and pledge both India and Pakistan to a commitment to protect each other's minorities. Syama Prasad Mookerjee and K.C. Neogy, two Bengali ministers resigned and Nehru was intensely criticised in West Bengal for allegedly appeasing Pakistan. The pact was immediately in jeopardy. Patel however, publicly came out to Nehru's aid. He gave emotional speeches to members of Parliament, and the people of West Bengal, and spoke with scores of delegations of Congressmen, Hindus, Muslims and other public interest groups, persuading them to give peace a final effort.

Gandhi's death and relations with Nehru

Patel was intensely loyal to Gandhi and both he and Nehru looked to him to arbitrate disputes. However, Nehru and Patel sparred over national issues. When Nehru asserted control over Kashmir policy, Patel objected to Nehru's sidelining his home ministry's officials. Nehru was offended by Patel's decision-making regarding the states' integration, having neither consulted him nor the cabinet. Patel asked Gandhi to relieve him of his obligation to serve, believing that an open political battle would hurt India. After much personal deliberation and contrary to Patel's prediction, Gandhi on 30 January 1948 told Patel not to leave the government. A free India, according to Gandhi, needed both Patel and Nehru. Patel was the last man to privately talk with Gandhi, who was assassinated just minutes after Patel's departure. At Gandhi's wake, Nehru and Patel embraced each other and addressed the nation together. Patel gave solace to many associates and friends and immediately moved to forestall any possible violence. Within two months of Gandhi's death, Patel suffered a major heart attack; the timely action of his daughter, his secretary and nurse saved Patel's life. Speaking later, Patel attributed the attack to the "grief bottled up" due to Gandhi's death.

Criticism arose from the media and other politicians that Patel's home ministry had failed to protect Gandhi. Emotionally exhausted, Patel tendered a letter of resignation, offering to leave the government. Patel's secretary persuaded him to withhold the letter, seeing it as fodder for Patel's political enemies and political conflict in India. However, Nehru sent Patel a letter dismissing any question of personal differences and his desire for Patel's ouster. He reminded Patel of their 30-year partnership in the freedom struggle and asserted that after Gandhi's death, it was especially wrong for them to quarrel. Nehru, Rajagopalachari and other Congressmen publicly defended Patel. Moved, Patel publicly endorsed Nehru's leadership and refuted any suggestion of discord. Patel publicly dispelled any notion that he sought to be prime minister. Though the two committed themselves to joint leadership and non-interference in Congress party affairs, they would criticise each other in matters of policy, clashing on the issues of Hyderabad's integration and UN mediation in Kashmir. Nehru declined Patel's counsel on sending assistance to Tibet after its 1950 invasion by the People's Republic of China and ejecting the Portuguese from Goa by military force.

When Nehru pressured Dr. Rajendra Prasad to decline a nomination to become the first President of India in 1950 in favour of Rajagopalachari, he thus angered the

party, which felt Nehru was attempting to impose his will. Nehru sought Patel's help in winning the party over, but Patel declined and Prasad was duly elected. Nehru opposed the 1950 Congress presidential candidate Purushottam Das Tandon, a conservative Hindu leader, endorsing Jivatram Kripalani instead and threatening to resign if Tandon was elected. Patel rejected Nehru's views and endorsed Tandon in Gujarat, where Kripalani received not one vote despite hailing from that state himself. Patel believed Nehru had to understand that his will was not law with the Congress, but he personally discouraged Nehru from resigning after the latter felt that the party had no confidence in him.

On 29 March 1949, authorities lost radio contact with a plane carrying Patel, his daughter Maniben and the Maharaja of Patiala. Engine failure caused the pilot to make an emergency landing in a desert area in Rajasthan. With all passengers safe, Patel and others tracked down a nearby village and local officials. When Patel returned to Delhi, thousands of Congressmen gave him a resounding welcome. In Parliament, MPs gave a long, standing ovation to Patel, stopping proceedings for half an hour. In his twilight years, Patel was honoured by members of Parliament and awarded **honorary doctorates of law** by the Punjab University and Osmania University.

Death

Patel's health declined rapidly through the summer of 1950. He later began coughing blood, whereupon Maniben began limiting his meetings and working hours and arranged for a personalised medical staff to begin attending to Patel. The Chief Minister of West Bengal and doctor Bidhan Roy heard Patel make jokes about his impending end, and in a private meeting Patel frankly admitted to his ministerial colleague N.V. Gadgil that he was not going to live much longer. Patel's health worsened after 2 November, when he began losing consciousness frequently and was confined to his bed. He was flown to Mumbai on 12 December on advice from Dr Roy, to recuperate as his condition deemed critical. Nehru, Rajagopalchari, Rajendra Prasad and Menon all came to see him off at the airport in Delhi. Patel was extremely weak and had to be carried onto the aircraft in a chair. In Bombay, large crowds gathered at Santacruz Airport to greet him, to spare him from this stress, the aircraft landed at Juhu Aerodrome, where Chief Minister B.G. Kher and Morarji Desai were present to receive him with a car belonging to the Governor of Bombay, that took Vallabhbhai to Birla House. After suffering a massive heart attack (his second), he died on 15 December 1950 at Birla House in Bombay. In an unprecedented and unrepeated gesture, on the day after his death more than 1,500 officers of India's civil and police services congregated to mourn at Patel's residence in Delhi and pledged **"complete loyalty and unremitting zeal"** in India's service. His cremation was planned at Girgaum Chowpatty, however this was changed to Sonapur (Now Marine Lines) when his daughter conveyed that it was his wish to be cremated like a common man in the same place as his wife and brother were earlier cremated. His cremation in Sonapur in Bombay, was attended by a 1 million strong crowd including Prime Minister Nehru, Rajagopalachari, and President Rajendra Prasad.

Criticism

During his lifetime, Vallabhbhai Patel received criticism of an alleged bias against Muslims during the time of partition. He was criticised by Maulana Azad and others for readily plumping for partition. Guha says that Nehru wanted the government to make the Muslims stay back and feel secure in India, during the Partition, while Patel was inclined to place that responsibility on the individuals themselves. Patel also told Nehru that the minority also had to remove the doubts that were entertained about their loyalty based on their past association with the demand of Pakistan. However Patel successfully prevented attacks upon a train of Muslim refugees leaving India. In September 1947 he was said to have had ten thousand Muslims sheltered safely in the Red Fort and had free kitchens opened for them during the communal violence. Patel was also said to be more forgiving of Indian Nationalism and harsher on Pakistan. He exposed a riot plot, confiscated a large haul of weapons from the Delhi Jumma Masjid and had a few plotters killed by the police, but his approach was said to be harsh.

Patel was also criticised by supporters of Subhas Chandra Bose for acting coercively to put down politicians not supportive of Gandhi. Socialist politicians such as Jaya Prakash Narayan and Asoka Mehta criticised him for his personal proximity to Indian industrialists such as the Birla and Sarabhai families. It is said that Patel was friendly towards capitalists while Nehru believed in the state controlling the economy. Also Patel was more inclined to support the West in the emerging Cold War.

Some historians and admirers of Patel such as Rajendra Prasad and industrialist J.R.D. Tata have expressed opinions that Patel would have made a better prime minister for India than Nehru. Nehru's critics and Patel's admirers cite Nehru's belated embrace of Patel's advice regarding the UN and Kashmir and the integration of Goa by military action and Nehru's ignoring of Patel's advice on China. Proponents of free enterprise cite the failings of Nehru's socialist policies as opposed to Patel's defence of property rights and his mentorship of what was to be later known as the Amul co-operative project.

Legacy

Patel is credited for being almost single-handedly responsible for unifying India on the eve of independence.Till date, he is regarded as the most successful Home Minister. He won the admiration of many Indians for speaking frankly on the issues of

Hindu-Muslim relations and not shying from using military force to integrate India. His skills of leadership and practical judgement were hailed by British statesmen—his opponents in the freedom struggle—such as Lord Wavell, Cripps, Pethick-Lawrence and Mountbatten. Some historians have criticised Patel's actions on the integration of princely states as undermining the right of self-determination for those states.

Among Patel's surviving family, Maniben Patel lived in a flat in Mumbai for the rest of her life following her father's death; she often led the work of the Sardar Patel Memorial Trust—which organises the prestigious annual Sardar Patel Memorial Lectures—and other charitable organisations. Dahyabhai Patel was a businessman who eventually was elected to serve in the Lok Sabha (the lower house of the Indian Parliament) as an MP in the 1960s.

For many decades after his death, there was a perceived lack of effort from the Government of India, the national media and the Congress party regarding the commemoration of Patel's life and work. However, Patel is lionised as a hero in Gujarat and his family home in Karamsad is still preserved in his memory. Patel was officially awarded the Bharat Ratna, India's highest civilian honour posthumously in 1991. Patel's birthday, 31 October, is celebrated nationally in India as ***National Unity Day*** or ***Bhartiya Ekta Diwas***. The Sardar Patel National Memorial was established in 1980 at the Moti Shahi Mahal in Ahmedabad. It comprises a museum, a gallery of portraits and historical pictures and a library, which stores important documents and books associated with Patel and his life. Amongst the exhibits are many of Patel's personal effects and relics from various periods of his personal and political life. He appeared on the cover page of TIME Magazine in its January 1947 publication.

Patel is the namesake of many public institutions in India. A major initiative to build dams, canals and hydroelectric power plants on the Narmada river valley to provide a tri-state area with drinking water, electricity and increase agricultural production was named the ***Sardar Sarovar***. Patel is also the namesake of the **Sardar Vallabhbhai National Institute of Technology** in Surat, the **Sardar Patel University, Sardar Patel High School** and the **Sardar Patel Vidyalaya**, which are among the nation's premier institutions. India's national police training academy is also named after him.

Ahmedabad

- The international airport of Ahmedabad is named after him.
- Also the international cricket stadium of Ahmedabad (although popularly called the Motera Stadium) is named after him.
- A national cricket stadium in Navrangpura, Ahmedabad used for national matches and events, is also named after him.
- The chief outer ring road encircling Ahmedabad is named S P Ring Road.
- Gujarat government's institution for training government functionaries is named Sardar Patel Institute osyf Public Administration.
- Narendra Modi the prime minister of India honoured a marathon in his honour and is planning on building the largest statue, 182 metres high, in the world depicting Sardar Vallabhbhai Patel.

POWER YOUR MIND

WHO IS LUNATIC?

This world of God
Is wonderful magic
Everyone is running
Like a merry lunatic.
Some are running with a bat
Some are running with a ball
Some are running after heroes
Some are running after fans
This is the craze of
The modern young man.
Some are running after voters
Some are running after leaders
Some are running after members
To increase their number
What is this race? If you ask them
Their answer is:
'It is a political game.'

Some are running after money
Some are running after sex
Some are running after power
Some are running after name
Why this running? If you ask them
Their answer is 'We are
The modern men'.

Courtesy: Swami Srikantananda

Some are leading a pure life
Some are searching for truth
Some spend their time
In the company of a saint
Some read holy books,
Visit holy places
Those who are doing such things
Worldly people call them
Rank lunatics.
God is real;
This world is but a dream
All religions teach almost
The same theme
Think and act
If you want the cream
Live in this world,
But learn how to swim.

TIRUKKURAL AND MANAGEMENT IN A 'NUTSHELL' - 22

In Business and Marketing, Services Business is identified as a special kind of a Business requiring special kind of Strategies. One of the fundamental focus that is brought out for Services Business or Services Marketing is "People". In this connection, what is advocated is that there should be enough and more number of people, fully trained and motivated and adequately compensated, equipped with best of tools and facilities and provided with a Leader to direct and help them.

Tiruvalluvar deals with this concept in a number of Kurals, some of which are dealt below. As it is well understood and appreciated, Business and Marketing are like 'Warfare' and many lessons are drawn from War Strategies.

Sirumaiyum Sellath Thuniyum Varumaiyum
Illayin Vellum Padai ***Kural 769***

சிறுமையும் செல்லாத் துனியும் வறுமையும்
இல்லாயின் வெல்லும் படை குறள் 769

"The Army will always win provided that it is not inferior in numbers, hath no implacable jealousies and hatreds, and is not let to starve without adequate pay."

Adalthagaiyum Atralum Illeninum Thaanai
Padaiththagaiyal Padu Perum ***Kural 768***

அடல்தகையும் ஆற்றலும் இல்எனினும் தானை
படைத்தகையால் பாடு பெறும் குறள் 768

Superiority of armaments may bring victory eventhough the army is lacking in dash or steadiness"

Nilaimakkal Sala udaithueninum Thaanai
Thalai Makkal Ilvazhi Il ***Kural 770***

நிலைமக்கள் சால உடைத்துஎனினும் தானை
தலைமக்கள் இல்வழி இல் குறள் 770

Even if there is no lack of troops of the line, *there is no army when there is no chief to lead"*

HOME FESTIVALS - 3

பங்குனி – Panguni (March/April)

This month brings the popular nine-day festival of Ram Navami, celebrating the birthday of Lord Rama, an incarnation of Lord Vishnu. When the full moon rises, Vishnu in the form of Satyanarayana is worshiped before a decorated kumbha pot with a branch of mango leaves placed in its mouth and a coconut on top. Rice is spread on banana leaves and the sacred vessel is completed with a tray of fruits, flowers an betel leaves and nuts. This month is also known for Sita's marriage to Rama. King Janaka, Dasaratha and priests surround the sacred fire, as Sita garlands Rama in Janaka's royal palace.

(To be continued)

Hinduism does not advocate conversion. We believe that if a person faithfully follows the teachings of his religion, he will obtain salvation. Which is the goal pointed out by all religions. There is, therefore, no need for extolling one religion or decrying another. Wisdom lies in developing the spirit of tolerance.

– H.H. SHRI PARAMACHARYA

THE MARINA BAY SANDS HOTEL

The Marina Bay Sands hotel has three 55-storey towers with 2,561 luxury rooms and suites, and is capped by the Sands SkyPark, which offers 360-degree views of Singapore's skyline. The SkyPark is home to restaurants, gardens, a 150-metre vanishing edge pool, manufactured by Natare Corporation in Indianapolis, Indiana, and the world's largest public cantilever housing an observation deck. The building stands at a height of 200 metres and boasts 12,400 square metres. Dining options at the Skypark include restaurant Sky on 57 (by local celebrity chef Justin Quek), restaurant and nightclub KU DÉ TA, and executive club lounge The Club at Marina Bay Sands.

To help the Skypark withstand the natural motion of the towers caused by wind, engineers designed and constructed four movement joints beneath the main pools, each possessing a unique range of motion. The total range of motion is 500 millimetres (19.68 inches). In addition to wind, the hotel towers are also subject to settlement in the earth over time, hence custom jack legs were built and installed to allow for future adjustment at more than 500 points beneath the pool system. This jacking system is important primarily to ensure the infinity edge of the pool continues to function properly.

Connected to the hotel towers are the Sands Expo and Convention Centre, Marina Bay Sands Casino and The Shoppes at Marina Bay Sands.

The Sands Expo and Convention Centre has more than 120,000 square metres or 1.3 million square feet of meeting space, making it one of the largest and most flexible locations in Asia. It is also the biggest MICE (Meeting, Incentives, Conference and Exhibitions) facility in Singapore, and the ballroom is the largest in Southeast Asia, capable of hosting up to 11,000 delegates. The Sands Expo and Convention Centre has five floors of exhibition and convention space, with up to 2,000 exhibition booths and 250 meeting rooms. It has hosted events ranging from banquets, theater-style conventions, to exhibitions and roadshows.

Located near the Sands Expo and Convention Centre is the Marina Bay Sands Casino. Spanning 15,000 square metres over four levels of gaming, the casino features over 600 gaming tables and 1,500 slot machines along with two noodle bars, The Nest and Tong Dim, and local Chinese eatery, Fatt Choi Express.

Another attraction found at Marina Bay Sands is The Shoppes at Marina Bay Sands. With close to 800,000 square feet of retail and restaurant space, The Shoppes at Marina Bay Sands is Singapore's first large-scale luxury shopping mall in the Central Business District with boutiques such as Ralph Lauren, Chanel, Cartier and Prada. Other luxury stores include Salon by Surrender, Gucci, Hermès, Emporio Armani, Chopard, REDValentino, Dior, Dunhill, Vertu, Miu Miu, Saint Laurent Paris, Salvatore Ferragamo, Montblanc, Blancpain, and anHermès Watch Boutique. Also housed within the Shoppes are the five of the six Celebrity Chef Restaurants – Cut (by Wolfgang Puck), Waku Ghin (by Tetsuya Wakuda), Pizzeria and OsteriaMozza (by Mario Batali), Guy Savoy (by Guy Savoy), and DB Bistro Moderne (by Daniel Boulud).

Other attractions within The Shoppes at Marina Bay Sands include a canal which runs through the length of the Shoppes, in the same style as the Venetian in Las Vegas, two Crystal Pavilions, one housing renowned nightclubs – Avalon and Pangaea and the other the world's largest Louis Vuitton boutique. An indoor skating rink (synthetic ice) measuring 6,500 square feet (600 m^2) as well as the MasterCard Theatres, compromising of the Sands Theatre and Grand Theatre which seat 1,680 people and 2,155 people respectively can also be found at The Shoppes at Marina Bay Sands.

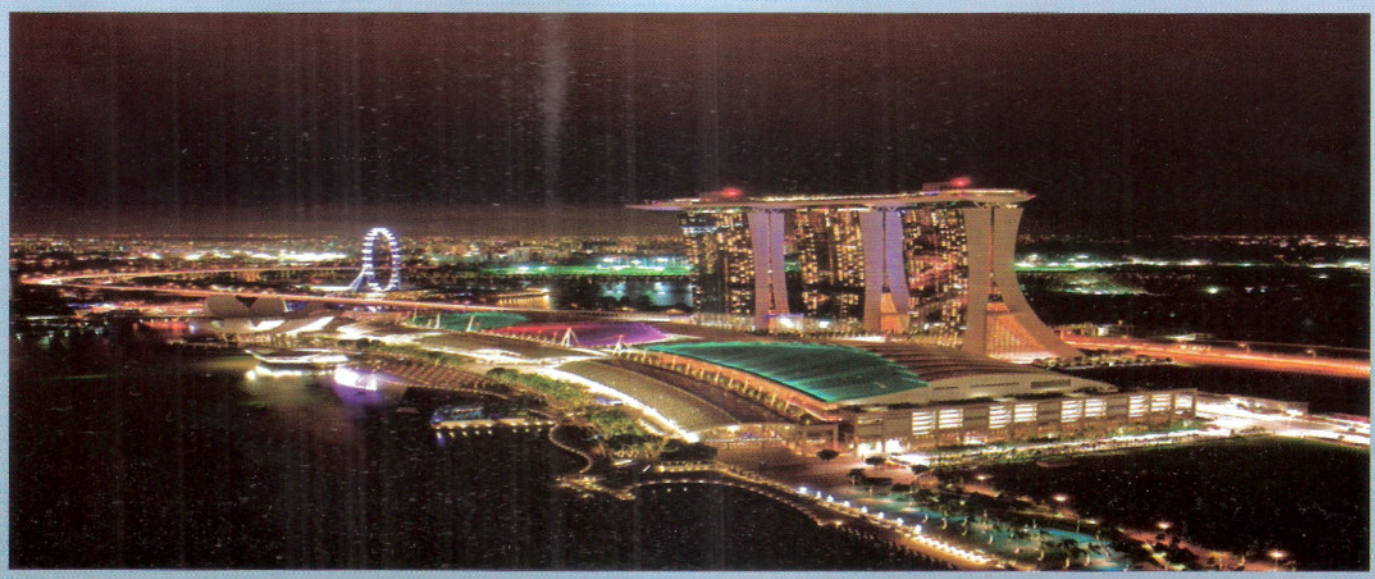
The MasterCard Theatres has played host to many international acts and plays since its opening, with Broadway smash musicals like The Lion King, Wicked, Annie, The Phantom of the Opera, Starlight Express and My Fair Lady. Other acts such as Cirque Éloize and A. R. Rahman's Jai Ho, located in the latter during their world tours. Additionally, Marina Bay Sands has played host to Fide Fashion Weeks for 3 consecutive years since its inception in 2011.

Visitors to the Event Plaza at The Shoppes can enjoy the nightly Wonder Full show, a 13-minute light and water show featuring lasers, lights, water movements and graphics, set against the backdrop of Marina Bay Sands.

Marina Bay Sands is also home to the ArtScience Museum, With a form reminiscent of the lotus, the ArtScience Museum has been called "The Welcoming Hand of Singapore". It features an adjustable roof waterfall which uses rainwater collected when the roof is sealed in the day.

The resort also features an Art Path designed by Moshe Safdie, incorporating 11 installations by five artists including ZhengChongbin, Antony Gormley, and Sol LeWitt. The 11 art installations were commissioned to integrate seamlessly with Moshe Safdie's iconic architecture. These art installations form the largest art commissions ever completed as part of an integrated architectural process.

THE MARINA BAY SANDS HOTEL



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