



ELECTRICAL INSTALLATION ENGINEER

NEWS LETTER

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

Old No.82 / New No. 123, Lloyds Enclave, Avvai Shanmugam Road, Royapettah, Chennai - 600 014.

Phone : 2811 1300 Email : tngrade@gmail.com Website : www.teiea.com

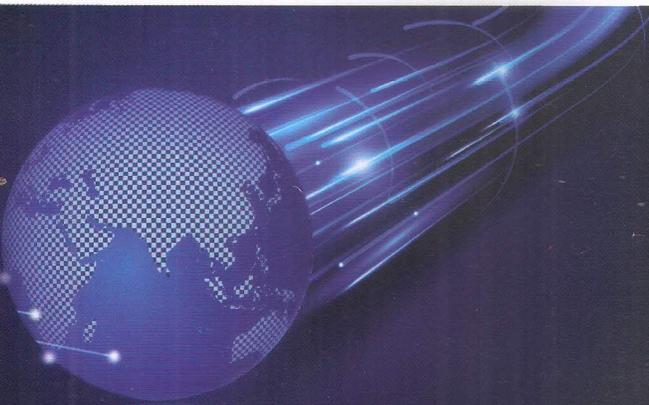
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MARCH 2017



GLOBAL IN MERIT
INDIAN IN SPIRIT



- ★ India's most comprehensive UPS range, Falcon: 1 - 800 kVA in single module. Paralleling upto 8 units
- ★ Falcon UPS for international markets launched at Hannover Messe 2015 in Germany
- ★ India's #1 Solar Inverter: Sunbird, the preferred choice of System Integrator's
- ★ India's Premier Active Harmonic Filter – IORA: Solving Harmonic problems across industries
- ★ Designed for harsh environments by a world class R&D team at our DSIR approved R&D facility
- ★ Identified by ET Now and Forbes India as the emerging industry leader
- ★ Pan India service network spread across 75 locations



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- Static Transfer Switches
- Industrial Systems
- Active Harmonic Filters
- Servo Stabilizers
- Solar Inverters

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EVENTS



7-8 April 2017
Hitex, Hyderabad

RenewX
A UBM Event

Events Profile: The Expo will provide an excellent platform for organizations to capitalize & penetrate into the lucrative south Indian renewable energy market and will bring together professionals from the renewable energy industry in the region & will help set a growth agenda for the future.

Date: 7th – 8th April 2017

Venue: Hitex Exhibition Centre, Trade Fair Office Building, Hyderabad

Website: <http://www.hitex.co.in/>



Events Profile: Equipment for Generation, Transmission, Distribution, Protection and Utilisation of Electrical Power such as Generators, Alternators, Motors & Motor winding Equipment, Transformers, Switch gears and Control gear equipment (like Circuit breakers, Isolators and Relays), Capacitors, Instrument transformers, transmission line towers, cables, conductors, insulators, Winding Wires etc.

Date: 12th – 14th April 2017

Venue: Bombay Exhibition Centre - NSE Complex, Goregaon (E), Mumbai

Website: <http://tradeshows.tradeindia.com/elasia-expo/>



INTERNATIONAL
CONFERENCE &
EXHIBITION | 25 - 27 APRIL 2017
THE ASHOK,
NEW DELHI

Events Profile: WINDERGY INDIA 2017 International Conference & Exhibition will be the largest wind power event in India, and is an unparalleled networking opportunity for members of the wind industry. The event will bring together key government authorities, international and national players, service providers.

Date: 25th – 27th April 2017

Venue: The Ashok, New Delhi

Website: <http://www.windergy.in/event.html>

One Mega Event

Smarter Solutions for a Better Tomorrow

Events Profile: Over 300 million people still have no access to electricity, which is why solar power is being seen as a viable, long-term source of clean energy. Solar energy, a clean renewable resource with zero emissions, has tremendous potential of energy to be harnessed using a variety of devices. India is on course to emerge as a solar power hub, and will become one of the largest green energy producers in the world. This can be clearly seen from the fact that India has become the second-biggest solar-energy installer in the world in just two years. Also, according to estimates, Indian solar-energy capacity will get increased by 300 percent this year and next.

As part of its blueprint for energy security, government plans to float five funds of \$5 billion each, targeted at promoting green energy sources.

Prime Minister Modi's target is to achieve 100 GW of solar power capacity by 2022 with an estimated investment of around US\$ 100 billion.

Realising the immense potential and emerging opportunities existing in solar industry. Exhibitions India Group is organising the 2nd edition of Solar India 2017 expo which will be held at Pragati Maidan, New Delhi from 10-12 May 2017. The theme of the exhibition and conference is "Solar Energy for a Sustainable Future."

Date: 10th – 12th May 2017

Venue: Pragati Maidan, New Delhi

Website: <http://www.smartcitiesindia.com/media-coverage.aspx>

EDITORIAL

Dear Members, Fellow Professionals and Friends,

Seasons Greetings To One And All!

Happy (Financial) Year Ending And Best Wishes For The Coming Year!!

The '**Demonetization**' problems seem to have ended, with Government reporting normalcy and reporting that the rate of growth of Agriculture and Industrial productions are normal and the businesses have also returned to normalcy. The important fact to be realized is that the co operation of the common public and businesses in putting up with lot of inconveniences have helped tide over the situation successfully in spite of lot of turbulences' created by mischievous 'hoarders' and some financial institutions. Both the Government and the people hoped for sizable unearthing of hoarding of cash and unaccounted money etc and as we understand, further and continuous efforts are initiated to investigate, collect and confiscate depending on each of the cases. **We have no doubt that better order will be in place in course of time.**

There are two hot issues being challenged and protested in Tamilnadu now and both of them concern "Energy". '**Hydro Carbon**' is a part of 'Non renewable Energy' and '**Velikkaruvai**' is a part of 'Renewable Energy'. As Technical Fraternity, we are attempting to project another point of view about the Issues without taking any side, as ultimate decisions have to be taken by the Government taking all sides and dimensions into consideration. **Carbon** (Coal) and **Hydro Carbon** (Gas and Oil) form the bulk of our Energy sources presently and in the light of Energy Security and Energy Freedom dimensions, our own available resources must be explored with technologies which will not affect our environment and safety. These must be examined minutely by experts and decisions must be arrived with due education to people and in consultation with them.

Velikkaruvai can actually be termed as an Energy Crop which has proliferated in Tamilnadu, probably beyond acceptable scales. If properly regulated and harvested it can actually provide large quantum of both Carbon and Hydro Carbon with the latest of Technologies developed and used in many parts of the World. It will make an excellent source of Renewable Energy and in course of time, with scaling up; can actually help replace 'Fossil Fuel' in a sizable manner. This can be in addition to other 'Waste to Energy' efforts focused to various other Bio Wastes from other sources like Agriculture, Plantations, Industries and others. In many parts of Tamilnadu, thousands of acres of barren lands are being explored for Solar Energy Farms, but considering the fact that Solar Energy can actually help store around 13 times of Energy in the Bioenergy form and Velikkaruvai can probably help in that direction, there can be a review about the whole issue in all its dimensions.

It is significant that **National Water day** and **Water Week** are being observed from **17th to 23rd March** and India has a huge potential and a lot to do in tapping all available Waters and ensuring equitable distribution which can help leaping '**Growth**'.

We thank all those members who have helped us by participating in the advertisement appearing for the issue February 2017 – Dehn India Pvt. Ltd., Ashlok Safe Earthing Electrode Ltd., Fomra & Fomra, OBO Bettermann India Pvt. Ltd., Supreme Power Equipment Pvt. Ltd., Universal Earthing Systems Pvt. Ltd., Consul Neowatt Power Solutions Pvt. Ltd., Power Cable Corporation, Elmetlerr, SPS Transformers Pvt. Ltd., Wilson Power and Distribution Technologies Pvt. Ltd., Safvolt Switchgears Pvt Ltd., Flir India Pvt. Ltd., Galaxy Earthing Electrodes (P) Ltd.

EDITOR

Man are Mortal. So are ideas. An idea needs propagation as much as a plant needs watering. Otherwise, both will wither & die. - DR. BR AMBEDKAR

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MEMBERS DETAILS

S.No.	Company Name	District	Contact No.	License No.
211.	DVR Power Engineering	Cuddalore	04142-255113, 99658 91113	EA 2981
212.	Shree Paadali Electricals	Cuddalore	04142-289885, 94432 36015	EA 2034
213.	A. Dhanapal	Dharmapuri	04342-293443, 94432 63443	EA 2390
214.	Sarayu Contractors and Consultants	Dindigul	0451-2461369, 99944 57569	EA 1554
215.	Nataraja Electricals	Erode	98427 53230, 98427 53232	EA 2659
216.	Premier Power Line	Erode	98427 73035, 94425 51181	EA 2502
217.	Sri Sakthi Electrical Controls	Erode	98430 32614, 94865 20050	EA 2040
218.	Vinpower Engineers & Associates	Erode	0424-2269392, 93608 37370	EA 2100
219.	Seshasayee Papers & Boards Ltd.	Erode	04288-240221, 94433 40221	EA 1132
220.	Malar Electricals	Hosur	04344-240789, 94432 40213	ESA 322
221.	Suma Electricals	Hosur	94432 67940, 99449 38745	EA 2921
222.	Power & Services	Hosur	04344-266778, 93442 21203	EA 2305
223.	Menaka Electricals	Kanchipuram	98423 06110, 98423 28111	EA 2341
224.	Saravanan Control System	Kanchipuram	95000 32101, 95000 49103	EA 2613
225.	Welwin Electricals	Kanchipuram	044-27162310, 98421 55520	EA 2792

KNOW THY POWER NETWORK - 114

Let us continue further. Today we are living in a smart or digital world. We hear the word “Smart, Smart” everywhere – from Smart Cars to Smart Meters to Smart Wearables. From a philosophical view point this kind of smart world will always bring risks in its wings. As per universal law or natural law, you cannot gain anything without pain or sacrifice / give something to get something. So when you enjoy the benefit of smart world you have to meet some of the threats and risks associated with it. Disruptions and digitisation are the buss words.

Thus there is a clarion call that we all should be careful in this Digital World i.e. Think twice before entering this modern world. Please note that the journey through the cyber world is full of risks, threats and dangers. We may face attacks on bull ying in the cyber highway at any time. In simple words that will be forced to live in a “Connected World” with all kinds of surveillance. It can also viewed that the cyber space is more or less a ‘**quick sand terrain**’ the comb of Artificial Intelligence and Internet, have brought this Situation. In this context my humble question is, will you be happy with this “Slave” position? If not, think of the possible measures that would safe guard you against various threats while living in this world.

More about this digital world before we revert to our ‘Micro Grid’ “topic”. Now steps on a foot to introduce digitisation on a wider scale in all fields especially in the manufacturing sector. As outlined, several measures need to be taken, especially on the skilling front, before it starts taking its toll. Among the effects of digital manufacturing that would impact us are,

- i. Future work environment in the manufacturing centres will be different from the one prevailing now or those of earlier generations.
- ii. Work places will be totally changed as there will be no demarcation between the white and blue collar workers. The present separation will not exist any longer.
- iii. Customers of today are not satisfied with the present status of manufacturing; they will demand / seek agile and flexible solutions and the industry needs to be smart enough to

meet this requirement i.e. it should be prepared to meet this volatility that would shape / draw contours / outlines of the future “**Digital Manufacturing**” methods.

- iv. Demands will appear more for shorter products life cycles, doing things faster and greater competitiveness and the need for leveraging the technology to reach higher scale of businesses.
- v. Manufacturing cannot do things independently i.e. it needs the aid of Artificial Intelligence and other Digital Tools.
- vi. The ability to communicate with the workstations will be enhanced and it will be in real time.
- vii. Bring efficiency in the use of energy and resources.

Now let us learn what will be the status or role of Electricity Distribution Network in this (21st) century? No doubt, distribution grid become an energy platform that supports multiple parties offering distributed energy resource options i.e. many agencies / parties will come forward to supply electrical energy to the consumers. Among these agencies will be solar power producers wind electric generators Bio- mass power producers, natural gas based private power producers and public utilities.

Micro grid or Autonomous grid is a very small grid or network micro in size when compared to the larger, centralised electricity grid. It mimics the normal utility grid. On combing these two, a new term Micro grid is formed. This new grid will play a key role in the future electricity distribution.

You may be wondering to note that the first micro grid was formed in the year 1892, when Thomas Edison opened his Pearl Street Electricity Station in USA. His station met with all the requirements of a normal micro grid. It was small with a localised generation and distribution network. It had batteries for energy storage. It produced direct current. Kindly recall the significance of DC power as out lined in my last article in this context. Once treated as out moded, suddenly DC gained more significance and respect today owing to its advantages. Direct current micro grid is a much sought, hot topic today. Edison’s model station supplied heat and power to the buildings located nearer to it. It is equal to the present day function of combined heat and power plants (co-generation plants). While discussing the issues of micro grid, it is not incorrect to note the critical issues as brought by present day AC mega grids. Owing to their very large size and complexity, we are facing many complex issues. To many of the present issues micro grid will bring the solution. It is of simplex construction improves reliability, reduce outages and entrance the friendly relationships with the environment (nature). Harmful pollution’s brought by thermal power station will be totally reduce.

CIGRE classification of micro grid applications are as follows

- i. Off-grid:** A micro grid that is not connected to a local utility network. It works in an island mode.
- ii. Campus:** A micro grid that is fully inter connected with the local grid but still can maintain some level of service in isolation from the grid. (e.g) a University or a Corporation campus.
- iii. Community:** A micro grid that is integrated into the utility network and serves a cluster of customers.
- iv. Nano Grid:** The smallest micro grid network with the capability of operating independently, such as a single building.

Let me sign off here.

(To be continued...)



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

When the whole World is silent, even one voice becomes powerful.

- MALALA YOUSAFZAI

AES' HAWAIIAN PROJECT PAIRS FIVE-HOUR 20MW BATTERY WITH 28MW OF SOLAR PV



Kaua'i Island Utility Cooperative serves around 33,000 customers. The AES DE project would constitute around 11% of their electricity supply. Image: wikimedia user: Grace808.

The latest step in Hawaii's clean energy evolution will be the deployment of a 20MW, 5-hour duration battery energy storage system paired with 28MW of solar in Kaua'i, to match peak demand with generation.

The US state with the highest levels of solar penetration on its grid, Hawaii's main electricity provider HECO (Hawaiian Electric Companies) recently revealed that it may be able to hit 100% renewable energy by 2040, five years ahead of schedule. Other projects on the islands to unite solar and storage in this endeavour include SolarCity-Tesla's dispatchable 52MWh energy storage system at a 12MW solar farm and a 4-hour duration large-scale flywheel pilot/demonstration.

For the latest project, which remains subject to local and state regulatory approvals, local energy provider Kaua'i Island Utility Cooperative (KIUC) has signed a power purchase agreement (PPA) with a subsidiary of AES Corporation, AES Distributed Energy (AES DE). Parent company AES has executed several large-scale energy storage project worldwide for utilities on its Advancion lithium-ion battery platform in countries including the UK and the Netherlands.

Located on the south shore of Kaua'i, KIUC's president and chief executive officer was quoted as saying energy from the project would be priced at US\$0.11 per kWh and would provide 11% of Kaua'i's electric generation. It could also reduce the island's fossil fuel consumption by more than 3.7 million gallons annually.

“The project delivers power to the island's electrical grid at significantly less than the current cost of oil-fired power and should help stabilize and even reduce electric rates to KIUC's members,” David Bissell said.

“It is remarkable that we are able to obtain fixed pricing for dispatchable solar-based renewable energy, backed by a significant battery system, at about half the cost of what a basic direct-to-grid solar project cost a few years ago.”

AES DE will be the owner and operator of the plant, which if it gains regulatory approval will be online by late 2018. AES signed a multi-year agreement for Korean battery supplier LG Chem to provide the storage developer with 1GWh of lithium-ion battery capacity configured for the Advancion platform in late 2015, which one analyst estimated could be worth US\$300 million.

The AES Corporation (NYSE: AES) is a Fortune 200 global power company. We provide affordable, sustainable energy to 17 countries through our diverse portfolio of distribution businesses as well as thermal and renewable generation facilities. Our workforce of 21,000 people is committed to operational excellence and meeting the world's changing power needs. Our 2015 revenues were \$15 billion and we own and manage \$37 billion in total assets.

We are dedicated to improving the lives of our customers by leveraging our energy solutions that encompass a broad range of technologies and fuel types, including coal, diesel, gas, oil, pet coke and renewables. Our people share a passion to help meet the world's current and increasing energy needs, while providing communities and countries the opportunity for economic growth due to the availability of reliable, affordable electric power.

BIOFUEL MATCHMAKER: FINDING THE PERFECT ALGAE FOR RENEWABLE ENERGY

A dozen glass cylinders containing a potential payload of bright green algae are exposed to hundreds of multi-coloured lights, which provide all of sunlight's natural hues. The tiny LEDs brighten and dim to mimic the outdoors' constantly changing conditions. To further simulate a virtual cloud passing overhead, chillers kick in and nudge the algae a little cooler.

A new, approximately \$6-million collaborative project is using this unique climate-simulating laboratory system as part of a new streamlined process to quickly pare down heaps of algae species into just a few that hold the most promise for renewable fuels.

Discovering which algae species is best suited to make biofuel is no small task. Researchers have tried to evaluate algae in test tubes, but often find lab results don't always mirror what happens when green goo is grown in outdoor ponds.

The Algae DISCOVER Project — short for Development of Integrated Screening, Cultivar Optimization and Validation Research — is trying out a new approach that could reduce the cost and the time needed to move promising algal strains from the laboratory and into production. At the end of the three-year pilot project, scientists hope to identify four promising strains from at least 30 initial candidates.

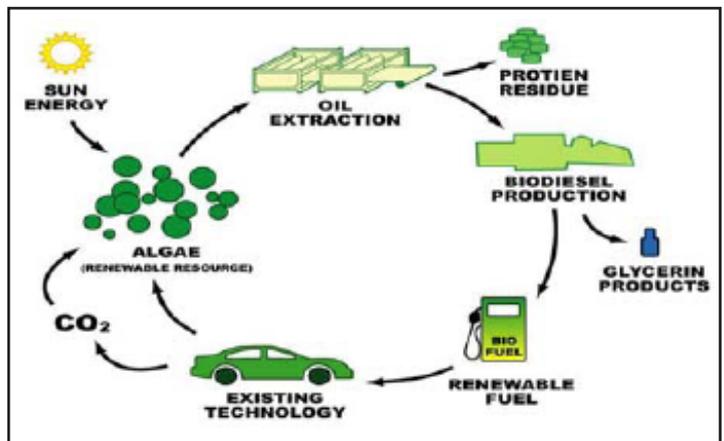
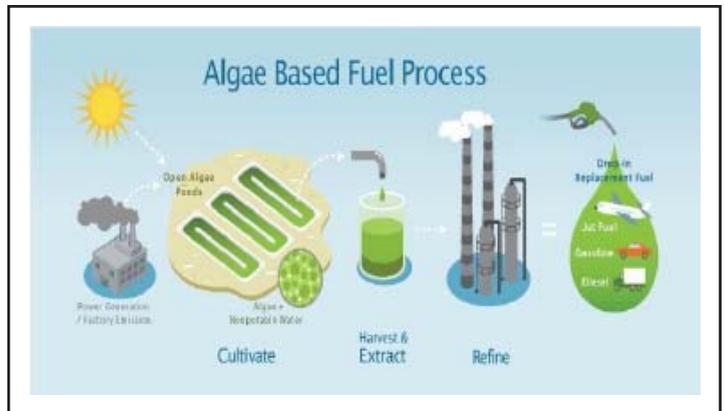
“Algae biofuel is a promising clean energy technology, but the current production methods are costly and limit its use,” said the project's lead researcher, **Michael Huesemann** of the Department of Energy's **Pacific Northwest National Laboratory**. “The price of biofuel is largely tied to growth rates. Our method could help developers find the most productive algae strains more quickly and efficiently.”

The project started this fall and is led by PNNL, out of its **Marine Sciences Laboratory** in Sequim, Washington. The project team includes three other DOE labs — **Los Alamos National Laboratory**, **National Renewable Energy Laboratory** and **Sandia National Laboratories** — as well as Arizona State University's **Arizona Center for Algae Technology and Innovation**.

Step By Step

The project's early work relies on PNNL's Laboratory Environmental Algae Pond Simulator mini-photobioreactors, also known as LEAPS. The system mimics the frequently shifting water temperatures and lighting conditions that occur in outdoor ponds at any given place on earth. The system consists of glass column photobioreactors that act like small ponds and are placed in rows to allow scientists to simultaneously grow multiple different types of algae strains. Each row of LEAPS mini-photobioreactors is exposed to unique temperature and lighting regimens thanks to heaters, chillers and heat exchangers, as well as coloured lights simulating the sunlight spectrum — all of which can be changed every second.

The first phase of the team's multi-step screening process uses PNNL's photobioreactors to cultivate all 30 strains under consideration and evaluate their growth rates. Algae strains with suitable growth will be studied further to measure their oil, protein and carbohydrate content, all of which could be used to make biofuels. The algae will also be tested for valuable co-products such as the food dye phycocyanin, which could make algae biofuel production more cost-effective. The first phase will also involve evaluating how resistant strains are to harmful bacteria and predators that can kill algae.



Next, the team will look for strains that produce 20 percent more biomass, or organic matter used to make biofuel, than two well-studied algae strains. The top-performing strains will then be sorted to find individual cells best suited for biofuel production, such as those that contain more oil. Those strains will also be exposed to various stresses to encourage rapid evolution so they can, for example, survive in the higher temperatures outdoor ponds experience in the summer.

Outside The Box

After passing those tests, the remaining strains will be grown in large outdoor ponds in Arizona. Researchers will examine how algae growth in the outdoor ponds compares with the algal biomass output predicted in earlier steps. Biomass will also be harvested from outdoor-grown algae for future studies.

Finally, the team will further study the final algae strains that fare best outdoors to understand how fast they grow in different lighting and temperature conditions. That data will then be entered into PNNL's Biomass Assessment Tool, which uses detailed data from weather stations and other sources to identify the best possible locations to grow algae. The tool will crunch numbers to help the team generate maps that illustrate the expected biomass productivity of each algae species grown in outdoor ponds at any location in the U.S.

Data and strains will be made public in the hopes that algae companies and other researchers will consider growing the most productive strains identified by the project.

This project is supported by DOE's **Office of Energy Efficiency and Renewable Energy**.

Potential future work not included in the current project could include converting harvested algae into biofuels, examining operational changes such as crop rotation to further increase biomass growth, and assessing the technical feasibility and economic costs of making biofuel from algae selected through this process.

Article and video originally published by the U.S. Department of Energy's Pacific Northwest National Laboratory.

SIEMENS LTD LAUNCHES THE MOST ENERGY EFFICIENT IE3 RANGE OF LOW VOLTAGE MOTORS

Global range of SIMOTICS motors now locally manufactured in India. IE3 efficiency values higher than the existing standards.

Siemens Ltd announces the launch of its new range of **Energy Efficient Motor SIMOTICS 1LE7**. The new SIMOTICS 1LE7 range of motors is the newest entrant in the existing range of motors offered worldwide from Siemens.

Siemens Ltd was the first company in India to launch the locally – manufactured IE2 and IE3 efficiency class energy efficient industrial motors; IE3 is currently the highest efficiency class as recognized by Indian Standards. These motors are capable of offering an average monetary savings of up to 8 – 20% depending on the frame size.

As of now, 1 out of 2 energy efficient low voltages IE motor sold in India is from Siemens. These IE efficiency class motors have been introduced to help energy intensive industries like cement, metals, mining, power, textiles, pulp and paper etc., achieve significant reduction in energy consumption and thus reduce their carbon footprint.

Siemens India has also won the Super – Efficient Equipment Appliance Deployment (SEAD) Global Efficiency Medal for its 1LA2 series of Low Voltage IE3 induction motors, verified by testing of 3.7kW and 11kW models. The SEAD Global Efficiency Medal helps in identifying the world's most efficient products and enhances buyers' ability to differentiate and choose among products on the basis of their energy efficiency.

Siemens is a pioneer in technology solutions for energy efficiency in India. Energy – efficient products for the Indian market are a major part of Siemens sustainability initiative. Apart from generating savings, the SIMOTICS 1LE7 range of motors will assist customers to reduce lifecycle costs, and meet environmental regulations.

Bhaskar Mandal, Executive Vice President and Country Division Lead, Process Industries & Drives Division, Siemens India, said "Siemens began the manufacturing of motors in India since 1966 and has been recognized as a pioneer in manufacturing state of the art motors for diverse sectors, applications and power classes. Taking this legacy forward, **SIMOTICS 1LE7 will prove to be a reliable and efficient innovation which will boost the performance of energy intensive industries.**"



ABB WINS INDIAN POWER TRANSMISSION LINK DEAL

ABB (ABB \$22.78) has teamed up with India's national electricity grid operator Power Grid Corporation of India Limited (POWERGRID.BO) (POWERGRID) in a mega project worth over \$640 million for ABB to deliver a transmission link that will have the capacity to bring reliable electricity to more than 80 million people. The Raigarh-Pugalur 800 kilovolt (kV) ultra-high-voltage direct current (UHVDC) system will connect Raigarh in Central India to Pugalur in the southern state of Tamil Nadu.

The 1,830 kilometer (km) link will be among the longest in the world. With a capacity of 6,000 megawatts – the equivalent of more than six large power plants – it will be enough to meet the electricity needs of over 80 million people in India. The two-way link will integrate thermal and wind

energy for transmission of power to high consumption centers located thousands of kilometers away, supporting electricity demands in the south, when wind strength is low, and transmitting clean energy to the north, when there is excess wind power.

“ABB is honored to partner with POWER GRID for this smart long distance transmission project,” said ABB CEO Ulrich Spiesshofer. *“Delivering reliable electricity to India’s energy demand centers is a top priority for the Indian government to support the country’s impressive growth momentum. ABB is strongly committed to India for more than a century and with this new long distance transmission link we are delivering the benefits from the Energy Revolution to the country, building on the strength of our strong local manufacturing footprint. With our state-of-the-art UHVDC technology, we enable the balancing of renewable and conventional electricity supply over long distances in a smart and reliable way.”*

ABB is the global market leader and partner of choice for stronger, smarter and greener grids around the world as it supports utilities and grid operators to take advantage of the Energy and Fourth Industrial Revolutions. ABB’s Power Grids division, which will deliver the mega project, is number one in the world in the segment.

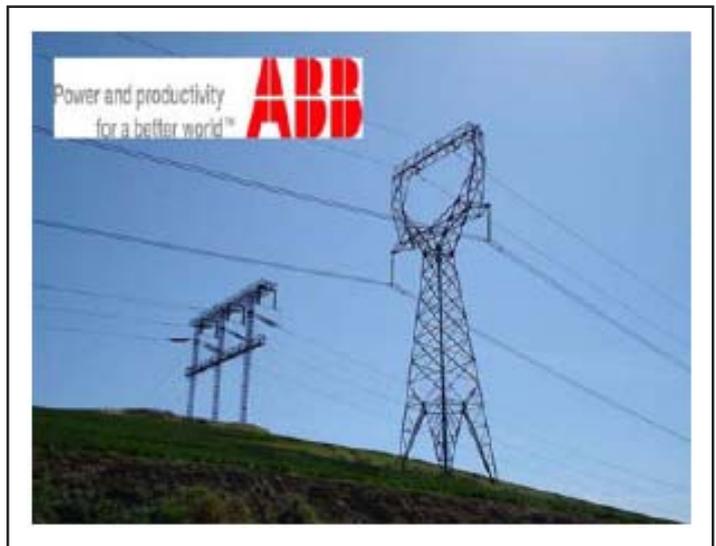
“As part of our Next Level Strategy, we are committed to delivering cutting-edge technologies like HVDC to integrate renewables and transmit power reliably and efficiently, providing vital access to electricity and making a real difference to people’s lives,” said Claudio Facchin, President of ABB’s Power Grids division. “We will leverage our extensive local manufacturing and engineering base in India and proven partnership with our consortium partner BHEL for the execution of this prestigious project”.

ABB has an impressive HVDC track record in India, where it introduced the technology over 25 years ago with the Vindhyachal project in 1989. Raigarh-Pugalur is ABB’s sixth HVDC project in India and the second UHVDC installation, following the multi-terminal North-East Agra link, which has been already partially energized and is in the final phase of completion. The turnkey project encompasses design, engineering, supply, installation and commissioning and major equipment supplies include the complete UHVDC stations, including transformers, converter valves, cooling systems, as well as control and protection technology.

UHVDC transmission is a development of HVDC, a technology pioneered by ABB more than 60 years ago. ABB has been awarded about 110 HVDC projects, which represents a total installed capacity of more than 120,000 MW and accounts for around half the global installed base.

HVDC transmission links help to conserve land as they occupy only one third of the space compared to the alternative. In this case that amounts to a saving of approximately 244 square kilometers of space – around one third the area of Bangalore or the entire city of Kuala Lumpur. The mega project will also feature technologies selected to minimize the footprint of the transmission stations.

The total project value is worth more than \$840 million and the balance will be executed by ABB’s consortium partner BHEL (Bharat Heavy Electricals Limited), a leading Indian public sector company. The order was booked in the fourth quarter of 2016.



A NOVEL LIQUID BATTERY COULD HOLD POTENTIAL FOR UNLIMITED ENERGY STORAGE

Executives with Boston-based, Vionx Energy have announced an ecosystem of companies to launch and commercialize a groundbreaking storage technology poised to transform how modern grids are managed and optimized. The unique relationship brings together six global companies— United Technologies Corp. (UTC), Starwood Energy Group, Siemens, 3M, Vantage Point Capital Partners and Jabil—to license, finance, manufacture and deploy the energy storage system.

“Recent changes to the energy system are creating completely new challenges for distribution grids”

The company’s unique technology, a breakthrough vanadium flow storage system, was developed and engineered by researchers at UTC and is designed to make a long-duration, long-life grid-scale battery practical, resilient and cost efficient.

“At Vionx Energy we’re dedicated to providing grid storage solutions for the long run,” said David Vieau, Vionx Energy’s President and Chief Executive Officer and former Chief Executive Officer of lithium ion battery maker A123 Systems. “Through our innovative flow battery solution incorporating technology developed by United Technologies, we are confident our technology has an important role to play in the future of grid energy storage. Our unique eco-system of companies, including UTC, Siemens, and Starwood Energy, bring us the expertise and support to make Vionx Energy a leading grid storage supplier globally.”

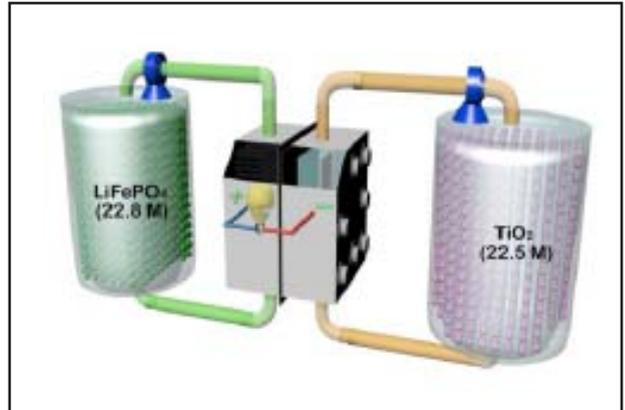
“With the support of an Advanced Research Projects Agency-Energy (ARPA-E*) award, UTRC has developed a differentiated flow battery that enables cost-effective and reliable energy storage solutions,” said Dr. David Parekh, vice president, Research, and director, United Technologies Research Center. “We are excited to be part of this ecosystem of companies. Along with licensing this R&D 100 award-winning technology exclusively to Vionx Energy, we will continue to provide R&D support to Vionx as they further develop and commercialize this game-changing solution.”

Vionx will market, sell and service the technology, which is targeted to utility scale applications in transmission and distribution, microgrid and island markets. Vionx’s storage design boasts an in-situ process that maintains full storage capacity over a 20-year period – unlike other grid storage solutions such as lithium ion or lead acid. The result is a safe, long-running, affordable and flexible grid storage solution that provides utilities with added infrastructure resiliency and defers aging asset replacement costs.

“Recent changes to the energy system are creating completely new challenges for distribution grids,” said Dan Wishnick, Siemens Energy’s Sales and Business Development Manager. “The modern grid requires robust energy storage solutions that can provide value to smart grid users multiple hours a day year-after-year. As the engineering, procurement and construction provider to Vionx Energy, we believe the company’s flow battery technology can and will provide valuable long duration energy storage solutions for creating a balanced and resilient electrical grid. The collection of unique and prominent companies working with Vionx Energy is a testament to what Vionx’s technology can accomplish, and we’re excited to play a role in this new venture.”

The group is backed by a variety of energy finance heavyweights including Starwood Energy, and VantagePoint Capital Partners, among others. According to Brad Nordholm, Chief Executive Officer and Managing Director, Starwood Energy Group: “as an infrastructure investments specialist, we know the important role energy storage will continue to play in grid modernization globally and in meeting tomorrow’s energy demands in existing and emerging markets. We’re pleased to be an important part of Vionx and its impressive team.”

“The flow-battery system from Vionx reflects many years of concentrated design, testing and manufacturing expertise, as evidenced by the unique and highly qualified partners working with the company,” said Lee Burrows, Managing Director at VantagePoint Capital Partners, an early investor in Vionx Energy. “We are very pleased to be investors in Vionx and to witness the company emerging as an important leader in this critical and large-growth market.”



“Vionx’s energy storage system represents a significant advance in flow battery technology, and 3M is pleased to have the opportunity to draw upon our broad fuel cell, membrane and electrode assembly expertise to enable lower cost and longer life electrode assemblies for flow batteries. We view this technology as a key enabler for improved grid resiliency and the continued deployment of sustainable, renewable generation,” said Jeffrey Hohn, 3M’s Vice President of Renewable Energy.

“Business disruption across the energy sector is accelerating at record pace. At Jabil we focus on helping customers, like Vionx Energy with the world’s leading global manufacturing and design services,” said John Dargan, Jabil’s Senior Vice President of Corporate Development. “Vionx’s new flow battery technology will represent a leap forward for grid storage technology. As the exclusive manufacturer for Vionx’s storage system, we are proud to be part of the unique and influential group coming together to support Vionx energy and flow battery technology.”

Vionx Energy has recently delivered a large-scale storage system to the U.S. Army at Fort Devens in Massachusetts and is poised to announce additional projects in the coming weeks.

*ARPA-E is a United States government agency tasked with promoting and funding research and development of advanced energy technologies. The information, data, or work presented herein was funded in part by the Advanced Research Projects Agency – Energy (ARPA-E), U.S. Department of Energy, under Award Number DE-AR0000149.

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ABOUT VIONX

Woburn based Vionx Energy is a leading supplier of long-duration grid-scale flow batteries. Vionx’s vanadium redox energy storage system brings together an 8-10 hour runtime with maintained capacity over a 20-year lifespan and delivers the most flexible fully integrated, long duration energy storage solution that meets the needs of the power industry.

Vionx Energy provides a fully integrated system comprised of energy storage, power conditioning, system control and thermal management subsystems packaged into turn-key building blocks placed wherever needed for instantaneous dispatch. Vionx is meeting a critical need in today’s energy storage marketplace: making grid-scale energy storage practical, resilient and economical across a twenty-year time horizon at the lowest lifetime cost of ownership of any grid-scale storage system.

For more information, please visit <http://vionxenergy.com>

GOLDSTONE TO MAKE ELECTRIC BUSES

Hyderabad City-based silicon rubber insulator manufacturer **Goldstone Infratech** is in talks with **Chinese automobiles** and rechargeable batteries maker, **BYD Company** to make electric buses in India to meet the growing demand in the domestic market.

The partners would be exploring several locations for the unit, including Telangana. India is a growing market for electric buses with annual demand to touch 20,000 vehicles from 2020 onwards.

Goldstone Infratech Electric Bus- *CEO P K Srivastava* told *Telangana Today*, “Almost 20,000 buses are used in 140 countries worldwide. BYD has mastered in the battery management system in electric buses. Such buses are in high demand in India. The country is seeing demand in 9 and 12 metre buses, which cost about Rs 1.8 crore and Rs 2.8 crore per bus, respectively.”

The unit that will be set up by the partners in India could also be supplying the buses to South East Asian markets.

Goldstone has signed an agreement with BYD in December 2015 to manufacture and supply electric buses in five southern States and Himachal Pradesh. For the first time in India, Brihan Mumbai Electric Supply and Transport (BEST) came out with a tender to supply six buses.

Goldstone and BYD jointly are in the process of supplying the buses, having bagging the order in November last year for a deal value of Rs 10 crore. Of the six buses, the first bus is expected to be delivered in March this year.



Since BYD is seeing a healthy market opportunity in India, the idea is to have a local player as a partner, manufacturing the bus parts and building the whole bus. As the electric buses market keeps growing in India, and till the time the joint venture unit is in place, BYD will supply chassis to Goldstone, and the remaining parts and the bus body building will happen with the help of a contract manufacturer in Bengaluru, KMS. The BEST order is catered through this arrangement. By 2020, BYD and Goldstone aim to make full buses in India.

Several States in India are keen to go for electric buses. Himachal Pradesh is planning to procure 25 electric buses and Goldstone has emerged as the lowest bidder (L1). This is the first time any electric bus has been used at that altitude of over 13,000 ft covering a round trip distance of 110 kms and that too at such steep gradient anywhere in the world.

Bengaluru Metropolitan Transport Corporation (BMTC) wants to procure 150 electric buses and has sent a proposal to the Central government. Pune Municipal Corporation is looking for 100 electric buses and an expression of interest (EOI) in this direction has already been floated.

Indore Municipal Corporation plans to procure 50 buses while Chandigarh Transport Undertaking intends to get 10 buses.

The State transport bodies are seeking Centre's support as Faster Adoption and Manufacturing of Hybrid and Electric vehicles (FAME) scheme entitles certain benefits. The Department of Heavy Industries gives subsidies for procurements of electric vehicles.

Goldstone has concluded trials in New Delhi, Rajkot and Manali-Rohtang pass. Similar trials will be conducted in Hyderabad next week, the company said.

BYD is also planning to introduce its Mono Rail. Liu Xueliang, Chairman of BYD India & General Manager of BYD Group Asia-Pacific said that they have already partnered with Goldstone to assemble and market electric buses in India.

"BYD understands the need to set up manufacturing facility close to the customers to reduce time for order fulfillment as well as to make any changes as per local needs and to make it more economical. BYD is closely watching the market growth as well as government policies and based upon that BYD will decide to invest further in manufacturing in India," he said.

Considering that electric vehicles are new to India, BYD has offered to assist in setting up a training school in India to train engineers and technicians of electric vehicle technology, its manufacturing as well as maintenance in partnership with Goldstone.

BYD's electric vehicles have been sold to 200 cities across 48 countries and regions in 6 continents around the world. Till date, BYD has supplied more than 20,000 electric buses all over the world.

Warren Buffet invested BYD has also attracted investment from Samsung in July last year to a tune of \$450 million.

TESLA ON COURSE TO HIT 35GWH OF BATTERIES BY 2018 AS GIGAFACTORY STARTS PRODUCING CELLS

The Nevada Gigafactory, which Tesla says is so far only 30% of the final size it could reach by 2020.

Tesla and Panasonic's Gigafactory in the Nevada desert has now started making high performance cylindrical battery cells of the type used in its stationary storage and forthcoming Model 3.

Ahead of the availability of the Model 3, the 200 mile+ charge 'affordable' car expected later this year with a claimed 400,000 pre-orders, the factory – which will have the largest footprint of any building anywhere when completed – began producing the cells yesterday. It had already been producing battery packs for Tesla's Powerwall 2 residential storage and Powerpack 3 commercial and industrial scale storage solutions, but has now also added the capability to mass produce the so-called 2170 cells, which go in the battery packs and which it has been making in a "qualification" phase since December.

Tesla did point out however that while the cells will go straight into Powerwall 2 and Powerpack 2 systems, they will not be ready for the US \$35,000 Model 3 until the second quarter of this year. The company said that by 2018 the Gigafactory will be producing 35GWh of battery packs a year. Future expansions should take the facility up to 50GWh a year by 2020, according to the original plans announced in 2014. This would equate to 500,000 car battery packs. Research firm Baird Equity Research said in a note that it appeared Tesla was therefore also on track to achieve a more than 30% reduction in battery cell production costs as the factory ramps up into 2018, through better design, leveraging consolidation of supply chains and the vertical integration the Gigafactory enabled.

The 2170 lithium-ion cell has been jointly engineered by Tesla and Japan's Panasonic, which also makes its own stationary storage products for markets including Australia. Panasonic is thought to be making a US \$1.6 billion investment in the Gigafactory, which Tesla CEO Elon Musk has claimed could help Tesla rake in US \$20 million a year in revenues and US \$5 a year profit from Model 3 sales.

Following the approval of a plan to buy out US solar leasing company SolarCity, the solar, energy storage, EV - and with the launch of the Tesla-SolarCity solar roofing shingles – construction industries await to see how the merged entity will utilise what analysts called a "powerful position" as a complete energy solution provider to markets in the US and beyond.



How the factory could look in 2020. Image: Tesla

"There is nothing so useless as being efficiently that which should not be done at all".

- PETER F. DRUCKER

GEOHERMAL ENERGY

Geothermal energy—the heat of the Earth—is a clean, renewable resource that provides energy in the U.S. and around the world. The U.S. has been using commercial, large-scale geothermal power plants at deep resource temperatures (between 200°F and 700°F) since the 1960s. Geothermal energy development and production is a thriving international market.

What is geothermal energy?

Heat has been radiating from the center of the Earth for some 4.5 billion years. At 6437.4 km (4,000 miles) deep, the center of the Earth hovers around the same temperatures as the sun's surface, 9932°F (5,500°C). Scientists estimate that 42 million megawatts (MW) of power flow from the Earth's interior, primarily by conduction.

Geothermal energy is a renewable resource. One of its biggest advantages is that it is constantly available. The constant flow of heat from the Earth ensures an inexhaustible and essentially limitless supply of energy for billions of years to come.

The uses of geothermal for heat and other purposes were indigenous practices across a variety of world cultures: The Maoris in New Zealand and Native Americans used water from hot springs for cooking and medicinal purposes for thousands of years. Ancient Greeks and Romans had geothermal heated spas. The people of Pompeii, living too close to Mount Vesuvius, tapped hot water from the earth to heat their buildings. Romans used geothermal waters for treating eye and skin disease. The Japanese have enjoyed geothermal spas for centuries.”

A viable geothermal system requires heat, permeability, and water. Developers explore a geothermal reservoir to test its potential for development by drilling and testing temperatures and flow rates.

Rainwater and snowmelt feed underground thermal aquifers. When hot water or steam is trapped in cracks and pores under a layer of impermeable rock, it forms a geothermal reservoir.

What is a baseload power source? What is a dispatchable power source?

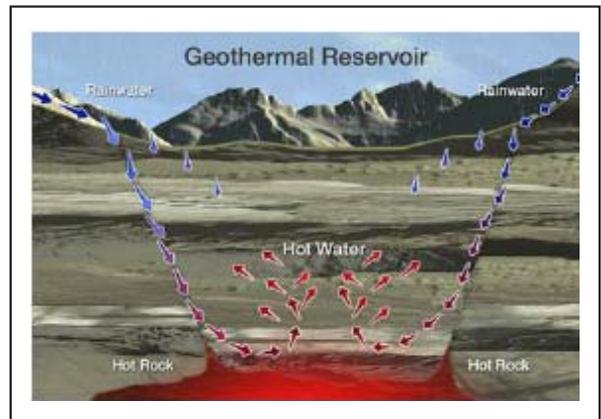
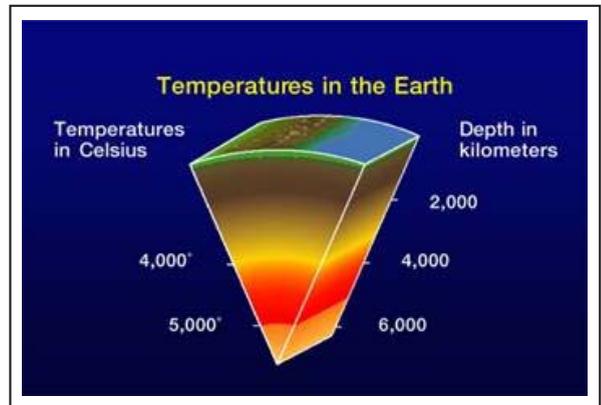
A baseload power plant produces energy at a constant rate. In addition to geothermal, nuclear and coal-fired plants are also baseload. Because the energy is constant, its power output can remain consistent nearly 24 hours a day, giving geothermal energy a higher capacity factor than solar or wind power, which must wait for the sun to shine or the wind to blow, respectively. This means a geothermal plant with a smaller capacity than a solar or wind plant can provide more actual, delivered electricity.

“Capacity” and “capacity factor” essentially refer to the distinction between megawatts (MW) and megawatt-hours (MWh). MW is a unit of power or the rate of doing work, whereas MWh is a unit of energy or the amount of work done. One MWh is equal to 1 MW (1 million watts) applied over the period of an hour. In geothermal development, one megawatt is roughly equivalent to the electricity used by 1,000 homes.

A geothermal plant can also be engineered to be firm, flexible, or load following, and otherwise support the needs of the grid. Most geothermal plants being built now have adjustable dispatching capabilities. In addition to geothermal, natural gas is dispatchable. This means a geothermal plant can meet fluctuating needs, such as those caused by the intermittency of solar and wind power.

How does a conventional geothermal power plant work?

After careful exploration and analysis, wells are drilled to bring geothermal energy to the surface, where it is converted into electricity. The USGS has defined moderate-temperature resources as those between 90°C and 150°C (194 to 302°F), and high-temperature geothermal systems as those greater than 150°C.



Figures depict the three commercial types of conventional geothermal power plants: flash, dry steam, and binary.

In a geothermal flash power plant, high pressure separates steam from water in a “steam separator” as the water rises and as pressure drops. The steam is delivered to the turbine, and the turbine then powers a generator. The liquid is reinjected into the reservoir.

In a geothermal dry steam power plant, steam alone is produced directly from the geothermal reservoir and is used to run the turbines that power the generator. Because there is no water, the steam separator used in a flash plant is not necessary. Dry-steam power plants account for approximately 50% of installed geothermal capacity in the U.S. and are located in California.

Binary plants use an Organic Rankine Cycle system, which uses geothermal water to heat a second liquid that boils at a lower temperature than water, such as isobutane or pentafluoropropane. This is called a working fluid (or “motive fluid”). A heat exchanger separates the water from the working fluid while transferring the heat energy. When the working fluid vapourizes, the force of the expanding vapour, like steam, turns the turbines that power the generators. The geothermal water is then reinjected in a closed loop, separating it from groundwater sources and lowering emission rates further. Most new geothermal plants under development in the U.S. are binary.

How do geothermal heat pumps work?

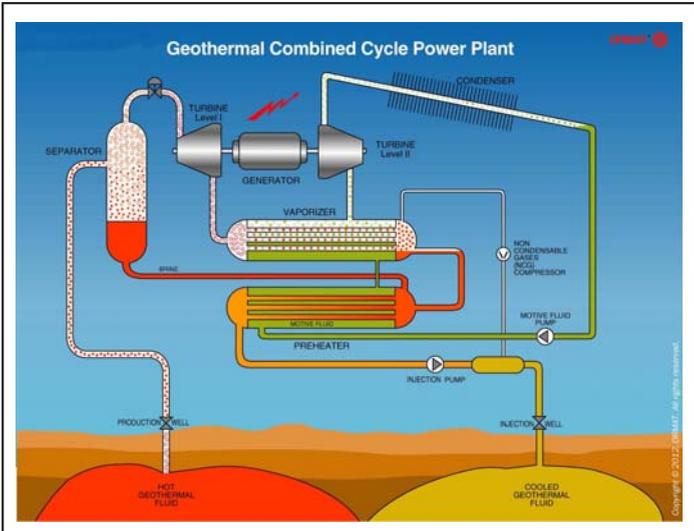
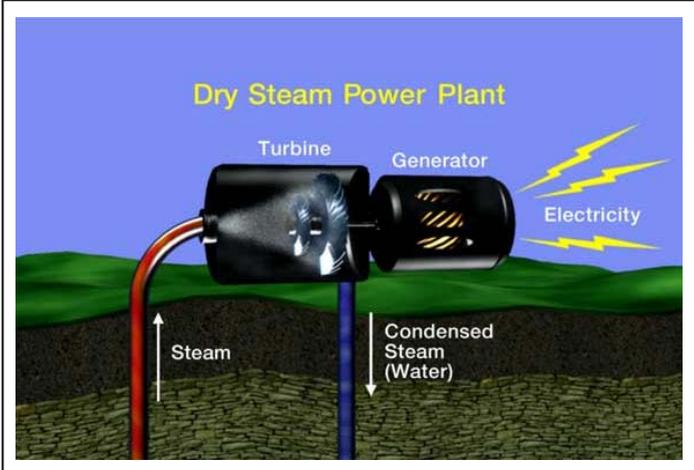
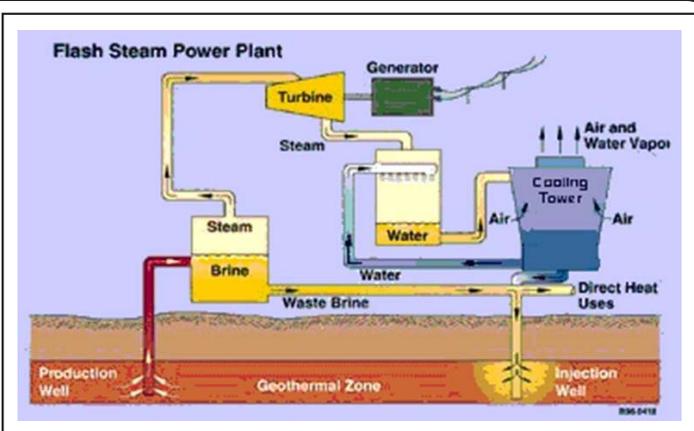
Animals burrow underground for warmth in the winter and to escape the heat of the summer. The same basic principle of constant, moderate temperature in the subsurface is applied to geothermal heat pumps (GHPs). GHPs utilize average ground temperatures between 40° and 70°F. In 1948, a professor at Ohio State University developed the first GHP for use at his residence. A groundwater heat pump came into commercial use in Oregon around the same time.

How do direct use applications work?

Geothermal heat is used directly, without a power plant or a heat pump, for applications such as space heating and cooling, food preparation, hot spring bathing and spas (balneology), agriculture, aquaculture, greenhouses, snowmelting, and industrial processes. Geothermal direct uses are applied at aquifer temperatures between 90°F and 200°F.

Examples of direct use applications exist all across the U.S. Boise, Idaho’s Capitol Building uses geothermal for direct heating and cooling. President Franklin D. Roosevelt frequented Georgia’s healing hot springs and founded the Roosevelt Warm Springs Institute for polio treatment in 1927. And the City of Klamath Falls, Oregon began piping hot spring water to homes as early as 1900.

In a typical geothermal direct use configuration, geothermal water or steam is accessed and brought to a plate heat exchanger. New direct use projects in numerous states, including some on Indian reservations, are encouraged by the provisions of the Geothermal Steam Act Amendments passed by Congress in 2005.



TECHNICAL SEMINAR – 30.01.2017

A Technical Seminar was arranged by our Association on 30th Jan 2017, Monday - 5 PM at Hotel Green Park, Vadapalani, Chennai – 600 026. The Main sponsor of the event was **M/s. Consul Neowatt Power Solutions Pvt. Ltd. & R.R Isphat** (A Unit of Godawari Power and Ispat Limited).

The Programme started with Lighting of Kuthuvilakku, followed by the welcome address by **Er. S.D. Poongundran**, *President, TNEIEA 'A' Grade*. Followed by Excellent Technical Seminar by **Mr. Sriram Ramakrishnan**, *MD & CEO M/s. Consul Neowatt Power Solutions Pvt. Ltd & Mr. Dinesh Agarwal*, *Director, M/s. R.R Isphat (A Unit of Godawari Power and Isphat)*.

Both the Seminars are *highly informative and knowledge imparting* about electrical equipments, developments, about the products of our sponsors dealing with.

The Seminar was concluded with Vote of Thanks by **Er. S. Gopalakrishnan**, *Secretary, TNEIEA 'A' Grade* followed by Dinner.

CONSUL NEOWATT POWER SOLUTIONS PVT. LTD. POWER MANAGEMENT AND HARMONIC MITIGATION TECHNIQUES

Sriram Ramakrishnan

Sriram Ramakrishnan, MD & CEO, Consul Neowatt Power Solutions spoke to members of the Tamil Nadu Installation Engineers Association on the topic of Power Management and Harmonic Mitigation Techniques along with the solutions offered by Consul Neowatt to address the different power quality problems.

Sriram highlighted the fact that power quality issues are caused by disturbances in different parts of the power system starting from the grid side - Generation, Transmission, Distribution and also within the customer facility and due to the different loads in a customer facility. These power quality issues can be broadly classified in seven common problem areas – power failure, under voltage, over voltage, line noise, switching transients, frequency variation and harmonic distortion. He then spoke in depth about the power electronic solutions offered by Consul Neowatt to address these power quality issues.

Consul Neowatt has been in business for 35 years starting as a stabilizer company based in Chennai to now become the fastest growing UPS company in India over the last 4 years to become the No.1 Indian UPS Company today. Sriram also spoke about Consul Neowatt's commitment to not only **Make in India** but also **Design in India for India** and the global markets. All Consul Neowatt products are designed in India at its DSIR approved R&D centre and products are manufactured in its modern ISO 9001, 14001 and OHSAS 18001 certified manufacturing facilities in Chennai and Pune. Consul Neowatt has strong R&D credentials with a number of 1st achieved by the R&D team, its products comply to relevant standards like IEC and BIS.

Consul Neowatt offers a comprehensive range of industry leading UPS systems with IGBT based, SCR based and Industrial UPS with in-built transformers and transformer free options in a range from 1 to 600 kva. Key installation with more than 1MW of Consul Neowatt UPS in each site at Komatsu, Foxconn and BASF manufacturing facilities were among the many case studies presented and to highlight the features of the Falcon UPS family. The benefits of Modular construction, internal redundancy, ability to handle regenerative loads were discussed. Sriram also showcased a Consul Neowatt innovation- Pelican Industrial Bi-directional Inverter which provides industry leading 98% energy efficient UPS backup for Lighting, CCTV, Security systems applications and also for 7x24 process industries. This is a Green Alternative to UPS or DG Sets and case studies of Pelican application in textile mills and for a Plastic Extruder plant was shared and highlighting the electricity bill savings.

Sriram then went on to highlight the sources of harmonics which are multiplying due to increasing automation and use of VFD drives for Motors and compressor applications and use of energy efficient

products like LED, CFL lamps in lighting. The problems due to harmonics was discussed in depth apart from regulations to meet the IEEE 519, CEA and TANGEDCO standards. Harmonics should be seen as Electrical pollution and industries causing this pollution must implement solutions to contain the harmonics within their facility so that it does not affect the Grid and other consumers connected to the same feeder. Case studies of India's No. 1 Active Harmonic Filter – IORA was also shared highlighting how harmonic levels can be reduced and also power factor can be improved.

The talk concluded with an overview of Hornbill Static Transfer Switch, Sunbird solar inverter preferred choice of solar system integrators in India and an insight into Hybrid solar inverters that power library of Hyderabad Central University and finally on Consul Neowatt's SCVS, which is the No 1 SCVS brand in India, that now comes with an industry leading 5 Year warranty.

RR ISPAT - HIRA GROUP (CONSOUL IS LICENSED TRADE MARK)

EQUIPMENT OF TRANSMISSION & DISTRIBUTION SYSTEM

Connecting Energy

“Equipments of Transmission and Distribution System” Presented by RR ISPAT during the Technical Seminar organized by TamilNadu Electrical Installation Engineers Association “A” Grade on 30th January 2017 at Green Park Hotel, Chennai – 600 026.

RR ISPAT (a unit of GPIL) is a HIRA GROUP company situated at RAIPUR in CHHATTISGARH with a current turnover of INR 300 crores. RR ISPAT (a unit of GPIL) is well known for its competency in field of Manufacturing and Engineering.

CONSOUL is licensed trade mark of its products. The products are well accepted in the market. RR ISPAT is expanding its production facilities and entering in new markets to enhance the turnover to INR 500 crores by 2020.

RR ISPAT has a wide range of galvanized products. We manufacture all types of structures for 11/33 KV power distribution & 132 KV to 320 KV power transmission structure. Our products have been approved by U.P, Bihar, M.P, Orissa and Chhattisgarh electricity boards. We are also approved vendor of “CORE”, for the supply of Railway electrification systems. Our products have been well accepted by leading industry users like Vindhya Telelinks, Gopikrishna construction, NCC, Gupta Power Infrastructure etc. Our Galvanising plant is of 6 M and 12 M length. Tata Power solar is our esteemed customer for all solar structures and we are proud to be a part of green energy & green revolution by catering to the farmers (by providing steel structures for their solar power driven pumps).

RR Ispat (a unit of GPIL) is an authorized franchise of LARSEN & TOUBRO for manufacturing of Ti design MCC, PCC, VFD Panels in accordance with IEC 61439 of low voltage assemblies which is a fully type tested assembly.

RR Ispat (a unit of GPIL) is an Integrated Solution Provider (ISP) for Indoor/Outdoor type MV panels upto 33 KV in accordance with IEC 62271-100.

RR Ispat (a unit of GPIL) is accredited with ISO 9001:2008, 18001:2007 quality certifications.

CONSOUL brand products are appreciated by each and every core industry. It meets almost every need of electricians of every industry supplying MCC, PCC, PDB, VFD, AMF Panel, CRP, Synchronizing Panel, LDB, LCP, Control Desk, Cable Trays, Earthing Materials etc.

CONSOUL brand is trusted by all of its customers for its world class fabrication and Galvanizing facilities. CONSOUL is on get-set-go mode for upcoming challenges of massive electrification projects of railways and Transmission – Distribution line. We have done state of the art Fabrication set-up and 13.25 meter long zinc Kettle as the back bone (being able to feed 4000 MT in a month).

The Group offers to supply Substation Structure, Transmission Line Towers, Wind Mill Towers, Railway Electrification Structure, Rural Electrification Structure, Solar Structure, Earthing Stripes, Earthing Pipes, Gratings etc.

RR ISPAT with its advanced engineering, fabrication set up can meet the industry requirements.

SEMINAR PHOTOS CAPTIONS (30.01.2017)



Registration



Left to Right: **Er. S. Gopalakrishnan**, Secretary, TNEIEA; **Mr. Prakash**, CEO, R.R. Ispat (A Unit of Godawari Power and Ispat Ltd.); **Er. S.D. Poongundran**, President, TNEIEA; **Mr. Sriram Ramakrishnan**, MD & CEO, Consul Neowatt Power Solutions Pvt. Ltd.; **Er. M. Balamurugan**, Treasurer, TNEIEA



Lighting the Kuthuvilakku by **Er. S.D. Poongundran**, President, TNEIEA



Lighting the Kuthuvilakku by **Mr. Prakash**, CEO, R.R. Ispat (A Unit of Godawari Power and Ispat Ltd.)



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Lighting the Kuthuvilakku by **Er. M. Balamurugan**, Treasurer, TNEIEA



Lighting the Kuthuvilakku by
Er. S. Gopalakrishnan, Secretary, TNEIEA



Welcome address by
Er. S.D. Poongundran, President, TNEIEA



Address by **Mr. K. Buththan, Chennai VP**



Presenting Technical Papers by
Mr. K.G Deenathayalan, Vice President South,
Consul Neowatt Power Solutions Pvt. Ltd.



Presenting Technical Papers by
Mr. Sriram Ramakrishnan, MD & CEO,
Consul Neowatt Power Solutions Pvt. Ltd.



Presenting Technical Papers by
Mr. Prakash, CEO, R.R. Ispat
(A Unit of Godawari Power and Ispat Ltd.)



Delegates at the Meeting



Delegates at the Meeting



Presenting Technical Papers by (Left to Right)
Mr. R.C. Dwivedi, *G.M. Works (TLT Division),*
Mr. Pradeep Yadhav, *General Manager (E&I)*
R.R. Ispat (A Unit of Godawari Power and Ispat Ltd.)



Mr. K. Buththan, *Vice President Chennai, TNEIEA*
honouring **Mr. Sriram Ramakrishnan**, *MD & CEO,*
Consul Neowatt Power Solutions Pvt. Ltd.



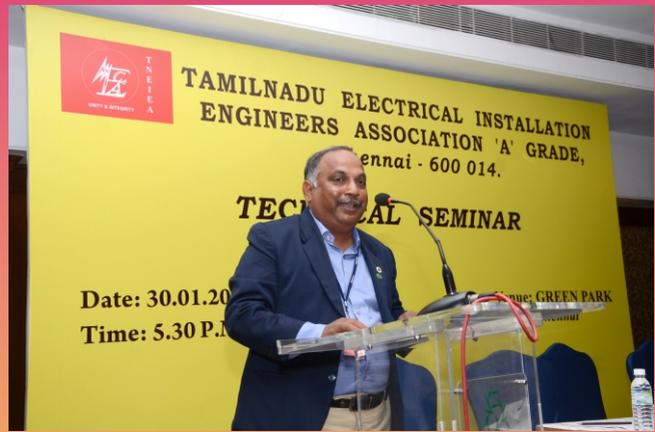
Mr. D. Chandran, *Committee Member, TNEIEA*
honouring **Mr. K. Laxman Das**, *Senior GM (Business*
Development) R.R. Ispat
(A Unit of Godawari Power and Ispat Ltd.)



Mr. N. Vasu, *Vice President Vellore, TNEIEA*
honouring **Mr. R. Pandurangan**, *MD,*
E Power Engineering



Mr. S. Manivannan, Vice President Salem, TNEIA
honouring
Mr. Anirudha Basu, General Manager Marketing,
Infinite Electrotech Pvt. Ltd



Vote of Thanks by
Er. S. Gopalakrishnan, Secretary, TNEIA



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INDIA ATTAINS POWERFUL 4TH RANK IN GLOBAL WIND POWER INSTALLED CAPACITY

India has been ranked fourth in the Global Wind Power Installed Capacity index with the Government undertaking the largest renewable capacity expansion programme to augment generation of wind energy from various sources to meet country's growing demands.

The Government is aiming to increase share of clean energy through massive thrust in renewables. Core drivers for development and deployment of new and renewable energy in India have been Energy security, Electricity shortages, Energy access and Climate change among others.

A capacity addition of 14.30 GW of renewable energy has been reported during the last two and half years under Grid Connected Renewable Power, which include 5.8 GW from Solar Power, 7.04 GW from Wind Power, 0.53 from Small Hydro Power and 0.93 from Bio-power.

The Government of India in its submission to the United Nations Frame Work Convention on Climate Change has stated that India will achieve 40 per cent cumulative Electric power capacity from non-fossil fuel based energy resources by 2030 with the help of transfer of technology and low cost International Finance including from Green Climate Fund.

As on October 31, 2016, Solar Energy Projects with an aggregate capacity of over 8727.62 MW have been installed in the country. The Government is playing an active role in promoting the adoption of renewable energy resources by offering various incentives, such as generation-based incentives (GBIs), capital and interest subsidies, viability gap funding, concessional finance, fiscal incentives among others.

The National Solar Mission aims to promote the development and use of solar energy for power generation and other uses, with the ultimate objective of making solar energy compete with fossil-based energy options.

The objective of the National Solar Mission is to reduce the cost of solar power generation in the country through long-term policy, large scale deployment goals, aggressive R&D and the domestic production of critical raw materials, components and products. Renewable energy is becoming increasingly cost-competitive as compared to fossil fuel-based generation.

In order to achieve the renewable energy target of 175 GW by the year 2022, the major programmes/schemes on implementation of Solar Park, Solar Defence Scheme, Solar scheme for CPUs Solar PV power plants on Canal Bank and Canal Tops, Solar Pump, Solar Rooftop etc have been launched during the last two years.

Various measures have been initiated and special steps taken in addition to providing financial support to various schemes being implemented by the Ministry of New and Renewable Energy for achieving the target of renewable energy capacity to 175 GW by the year 2022.

These include suitable amendments to the Electricity Act and Tariff Policy for strong enforcement of Renewable Purchase Obligation (RPO) and for providing Renewable Generation Obligation (RGO); setting up of exclusive solar parks; development of power transmission network through Green Energy Corridor project; identification of large Government complexes/buildings for rooftop projects among others. Other steps are provision of roof top solar and 10 per cent renewable energy as mandatory under Mission Statement and Guidelines for development of smart cities; amendments in building bye-laws for mandatory provision of roof top solar for new construction or higher Floor Area Ratio; infrastructure status for solar projects among others.

Some other measures include raising tax free solar bonds; providing long tenor loans; making roof top solar as a part of housing loan by banks/NHB; incorporating measures in Integrated Power Development Scheme (IPDS) for encouraging distribution companies and making net-metering compulsory and raising funds from bilateral and international donors as also the Green Climate Fund to achieve the target.

The increased use of indigenous renewable resources is expected to reduce India's dependence on expensive imported fossil fuels. India has an estimated renewable energy potential of about 900 GW from commercially exploitable sources like Wind 102 GW (at 80 meter mast height); Small Hydro 20 GW; Bio-energy 25 GW; and 750 GW solar power.

The Government of India has set a target of 175 GW renewable power installed capacity by the end of 2022. This includes 60 GW from wind power, 100 GW from solar power, 10 GW from biomass power and 5 GW from small hydro power. A target of 16660 MW grid renewable power (wind 4000 MW, solar 12000 MW, small hydro power 250 MW, bio-power 400 MW and waste to power 10 MW), has been set for 2016-17.

Besides, under off-grid renewable system, targets of 15 MW equivalent waste to energy, 60 MW equivalent biomass non-bagasse cogeneration, 10 MW equivalent biomass gasifiers, 1.0 MW eq. small wind/hybrid systems, 100 MW equivalent solar photovoltaic systems, 1.0 MW equivalent micro hydel and 100,000 nos. family size biogas plants have been set for 2016-17.

Several schemes namely Defence scheme, Central Public Sector Undertakings scheme, Bundling scheme, Canal Bank/Canal Top scheme, VGF Scheme, Solar Park scheme, Solar rooftops, have been initiated/launched by the Ministry under National Solar Mission which are under implementation. Under Defence scheme against a target of 300 MW, 347 MW has been sanctioned, under Central Public Sector Undertakings scheme against a target of 1000 MW, all capacity sanctioned, under 3000 MW Bundling scheme, Tranch-I: 3000 MW has been tendered, under 100 MW Canal Bank/Canal Top scheme, all capacity sanctioned, under 2000 MW & 5000 MW VGF Scheme, tenders issued for 4785 MW, and under 20,000 MW Solar Park scheme, 34 Solar parks have been approved in 21 States with an aggregate capacity of 20,000 MW.

A target of 40 GW grid connected solar rooftops to be achieved by 2022 has been set. So far, about 500 MW have been installed and about 3,000 MW has been sanctioned which is under installation. All major sectors i.e. Railways, Airports, Hospitals, Educational Institutions, Government Buildings of Central/State/PSUs are being targeted besides, the private sector.

A massive Grid Connected Solar Rooftop Programme has been launched with 40 GW target. State Electricity Regulatory Commissions of 30 States/UTs notified regulations for net-metering/feed-in-tariff mechanism. Rs.5000 crore approved for solar rooftops. About 500 MW solar rooftop capacity installed till September 30.

During the year 2015-16, wind power capacity addition of 3.42 GW was made, which is highest ever wind power capacity addition in the country during a single year. The present wind power installed capacity in the country is around 28.28 GW. Now, in terms of wind power installed capacity India is globally placed at fourth position after China, US and Germany.

India has a strong manufacturing base of wind power equipment in the country. Presently, there are 20 approved manufacturers with 53 models of wind turbines in the country up to a capacity of 3.00 MW single turbines. Wind turbines being manufactured in India are of international quality standards and cost-wise amongst the lowest in the world being exported to Europe, USA and other countries. India has a long coastline where there is a good possibility for developing offshore wind power projects.

The National Offshore Wind Energy Policy has been cleared and the same has been notified on October 6, 2015. Some of the guidelines are—Comprehensive Guidelines for Development of On-shore Wind Power Projects in the country have been formulated and issued on October 22. Guidelines for implementation of “Scheme for Setting up of 1000 MW Inter-State Transmission System (ISTS) – connected Wind Power Projects” issued on October 22 this year.

A capacity addition of 14.30 GW of renewable energy has been reported during the last two and half years under Grid Connected Renewable Power, 0.53 GW from Small Hydro Power. Biomass power includes installations from biomass combustion, biomass gasification and bagasse co-generation. During 2016-17, against a target of 400 MW, 51 MW installations of biomass power plants has been achieved making a cumulative achievement to 4882.33 MW.

Family Size Biogas Plants mainly for rural and semi-urban households are set up under the National Biogas and Manure Management Programme (NBMMP). During 2016-17, against a target of 1.00 lakh biogas plants, 0.26 lakh biogas plants installations has been achieved making a cumulative achievement to 49.35 lakh biogas plants.

A special programme for 1,00,000 solar pumps launched of which 31,472 Solar Pumps installed in 2015-16, higher than total number of pumps installed during last 24 years i.e. since beginning of the programme in 1991. A solar Power Plant of capacity exceeding 200 MW is being set up at the Central State Farm at Jetsar, Rajasthan to generate clean energy for the nation. Rs.38,000 crore Green Energy Corridor is being set up to ensure evacuation of Renewable Energy. Power Grid Corporation of India Limited has sought a loan assistance of 1,000 million dollars from the Asian Development Bank (ADB) comprising of Sovereign guaranteed loan of 500 million dollars and Non-Sovereign loan of US 500 million dollars.

The Loan would be utilized for funding of the following transmission projects including a project under Green Energy Corridor projects in next three-four years. Solar tariffs have fallen to an unprecedented low of Rs 4.34/kWh through reverse auction for one of six projects of 70 MW each to be put up in Rajasthan under the National Solar Mission. NTPC on January 18, 2016 conducted the reverse bidding for 420 MW solar power projects.

However, the tariff had further fallen to Rs 3 per unit, which was quoted by Amplus Energy Solutions in an auction for rooftop solar power conducted by Solar Energy Corporation of India (SECI). The Power Minister Piyush Goyal has launched "Surya Mitra" mobile App on Rooftop Solar Power. The GPS based mobile app is a high end technology platform which can handle thousands of calls simultaneously and can efficiently monitor all visits of Suryamitra's. Surya Mitra Scheme has been launched for creating 50,000 trained solar photovoltaic technicians by march 2020. A total number of 5492 Surya Mitra's have been trained as on September 30, 2016 and more than 3000 are undergoing training. A network of over 150 Institutions, spread all over the country, have been created for implementing the Surya Mitra scheme.

In addition, short term training programmes for small hydro, entrepreneurship development, operation & maintenance of solar energy devices and boiler operations in co-generation plants, have been organised. About 7800 persons have been trained through these short term training programmes during the last two years. Some other initiatives are—International Solar Alliance was launched as a special platform for mutual cooperation among 121 solar resource rich countries lying fully or partially between Tropic of Cancer and Tropic of Capricorn at COP21 in Paris on November 30, 2015 to develop and promote solar energy, with its headquarters in India. Bank loans up to a limit of Rs.15 crores will be given to borrowers for purposes like solar based power generators, biomass based power generators, wind power systems, micro-hydel plants and for renewable energy based public utilities like Street lighting systems, and remote village electrification. For individual households, the loan limit will be Rs.10 lakh per borrower.

Coal cess has been increased eight times from Rs 50 to Rs 400/ton in the last two years (2014-15) which will make available around Rs.40,000 crore/year for supporting and incentivizing development of Clean Energy projects in the country. Also, Foreign Direct Investment up to 100 per cent is permitted under the automatic route for renewable energy generation and distribution projects subject to provisions of The Electricity Act, 2003.

In order to achieve the targets, various initiatives have been taken by the Government which are amendments in the Tariff Policy for strong enforcement of Renewable Purchase Obligation (RPO) and for providing Renewable Generation Obligation; setting up of exclusive solar parks; development of power transmission network through Green Energy Corridor project; identification of large government complexes/ buildings for rooftop projects and provision of roof top solar and 10 percent renewable energy as mandatory under Mission Statement and Guidelines for development of smart cities among others. (UNI)

IOC TO TAP 1 MW OF ROOFTOP SOLAR POWER

To reduce its carbon footprint, Indian Oil Corporation Ltd. (IOCL) will add 1 MW of rooftop solar power in a phased manner.

The objective is to generate green energy for captive consumption at IOCL locations directly or through grid so as to reduce carbon footprint. Administrative buildings, refineries and even guest houses would get such installations," IOCL executive director U.V. Mannur told *The Hindu*.

"This is in line with our renewable energy policy as part of which rainwater harvesting is also being taken up. In fact, if we conduct large conferences we plant saplings to offset that power consumption," he says.

The oil major has a captive solar power project with a capacity of 4 MW at its Cauvery Basin Marketing Terminal in Muttam, in Nagapattinam district.

The clean energy unit, which was set up at a cost of Rs. 31 crore, generates close to 20,000 units every day and the power generated is being fed into the State's grid.

Retail outlets

Retail fuel outlets too are being encouraged to take up solar roof top installations. So far in the State nearly 300 of the 2000-odd have such facilities. "We are arranging loans for them through nationalised banks," Mr. Mannur added.

C. Mugilan, proprietor of Prema Service Station in MKB Nagar in north Chennai who had installed a roof top solar plant six months ago, said he was able to get a saving of Rs. 6,000 in his monthly power bill because of the solar facility. "I have smoother current supply too now. I have spent Rs. 4.95 lakh but I will be able to get returns in just three years, which means I will get free power after that," he said.

Courtesy: The Hindu, dt. 15.03.2017

ENERGY CONSERVATION THROUGH ENERGY EFFICIENCY – 24

EMDS – Electrical Motor Driven Systems, as we have been continuously examining, form the most important area of Energy Consumption and as deliberated already, in the Indian context, it forms almost 80+% of Electrical Energy use and almost 50% of the entire Energy Consumption with very large scope for improving on Efficiencies and achieving reduction in Energy Consumption. In the earlier parts we have also analysed some of the important EMDS pertaining to some of the large share of applications. In fact there is absolutely no scope for any action without the EMDS, Let us see some thoughts and ideas shared by international experts in this regard.

Electric motors are used in a wide range of industrial applications, but also in many types of applications in the commercial, residential, agricultural and transportation sectors. Typically electric motors are a component in a motor system, responsible for converting electrical power into mechanical power. Consumption of a motor system corresponds to electricity consumption of its motors plus a small additional quantity to power system controls.

There have been very few attempts earlier to estimate the overall electricity consumption of electric motors and attempt to produce global estimates. However, “back of the envelope” calculations have typically estimated that motors use over 40% of all electricity (in 2005, more than 6 000 TWh at the global level). In fact, electric motor driven systems appear to be the largest source of electricity use, far exceeding lighting, the next largest end use (about 19% of global electricity demand).

There have been only few concerted studies directed at quantifying the energy use of EMDS. Here we attempt to provide a sounder basis for these estimates, using both top down and bottom up analyses to provide the findings. It builds upon important regional studies such as the European Union’s Lot 11 studies for the Eco design Directive (De Almeida *et al.*, 2008a [motors]; Falkner, 2008a [pumps]; Falkner, 2008b [circulator pumps]; Radgen, 2008 [fans]), US Department of Energy sponsored investigations (DOE, 2002), other North American sources (Elliot, 2007; Boteler, 2007; NRCan, 2009), Japanese studies (JWG, 2007), Chinese studies (Zhao, 2007) and other regional data sources. Electric motors are found in the industrial, commercial, residential, agricultural and transportation sectors.

- In the **residential sector**, motors are used for compression (in refrigerators and air conditioners), ventilation (to power fans); pumping (to power central heating system circulation and hot and cold water pumps); cooking appliances (food mixers, whisks, oven fans, extractor hoods); laundry; cleaning; ICT (hard disks and fans) and garden appliances.
- Some less widespread residential applications (such as automatic gates and shutters) also use motors.
- In the **commercial building sector**, motors are used for heating, ventilating and air conditioning (HVAC); pumping; ICT (hard drives and fans); escalators; lifts (elevators) and hoists; laundry; cleaning and cooking.
- In the **agricultural sector**, motors are used for pumping and conveyance activities.
- In **transportation**, motors are used for motive power for electric trains, trucks, cars and motorbikes and related cooling; ventilation and auxiliary devices; fluid pumping in vehicles shipping and planes; HVAC applications; servo mechanisms in aviation and several other applications.

- Yet it is in **industry** that electric motors dominate and account for the largest amount of total electricity consumption. In industrial applications, motors are used for pumping; fans; air and liquid compression; conveyance; and other forms of mechanical handling and processing. Electric motor driven systems (EMDS) are by far the most important type of electric load in industry. In the European Union, for example, they are estimated to account for about 70% of all industrial electricity consumption.

In each of the applications mentioned above, the electric motor is only one part of the whole electromechanical system. The motor (together with the controller) is the only part that uses electricity, but the amount of electricity required to fulfil its function is determined by the amount of mechanical power required and the magnitude of the losses that occur in the delivery of that power. Those losses occur not only within the motor itself but also – and usually more significantly – in the mechanical system that distributes power from the motor to the final mechanical application. This report examines markets and use of electric motor driven systems and estimates their electricity consumption by sector, application and country as well as at a global level. It reviews the types of EMDS and analyses the different technologies in use and the potential to save energy through better design, configuration and operation. It presents estimates of potential energy savings and reduction of CO₂ emissions and explores cost efficiency issues associated with different motor system choices. It also examines barriers to the adoption and use of more efficient EMDS and the various standards that have been developed to measure and improve motor system electricity demand. It reviews existing and pending policy settings for motors and motor driven systems and makes recommendations for future policy settings. The findings of the report are consistent with and build upon the findings of earlier regional studies. By drawing attention to the wide variety of means to increase efficiency of EMDS, the study attempts to set out practicable pathways to increase energy savings and exploit opportunities more effectively than under current policy settings. It proposes policy measures to stimulate energy efficiency improvements in motor system components, core motor systems and dedicated motor system applications and future activities to build international capacity to identify and access significant savings in EMDS.

Motor system types and definitions

An electric motor is a device that converts electrical energy into mechanical energy. Motors come in output power ranging from a few watts up to many hundreds of kilowatts. In the recent EU study under the Directive on Eco design of Energy Using Products, the product group is described as electric motors in the output power range of 1 kW to 150 kW. However, the study considered a lower bound of 0.75 kW and an upper bound of 200 kW to take into account standard power sizes and the new proposed International Electrotechnical Commission (IEC) 60034 30 efficiency classification standard on motor efficiency. Almost all motors in this power range are of low voltage. Medium voltage motors are typically used in very high power applications of >500 kW; as they are of non standard design, they are sold in very small numbers and are not yet included in any targeted energy efficiency policies.

EMDS Applications

Motors are used in a myriad of applications, which are broadly categorised as follows:

- **Industrial applications:** pumps, fans, compressed air delivery, conveyors, motive power for other machinery, etc.

- **Building applications:** pumps, fans, conveyors, lifts, compressors in heating, ventilation and air conditioning systems, etc.
- **Appliance applications:** refrigerators, air conditioners, personal computer and laptop fans, hard drives, cooking appliances, oven fans, extractor fans, garden appliances, pool pumps, etc.

Electric motors		Pumps	Drinking Water	Water/refrigerant	Sewage	Oil
Rotating machines	Application	Closed loop	Closed water supply system	Heating, cooling and chilling system	Pressure sewage system	Hydraulic pumps
			Open pipe	Water supply system	Irrigation, cooling tower	Sewage system
		Fans	Air	Gas		
			Room air supply and exhaust, blowers	Natural gas systems		
		Compressors	Refrigerant	Air	Gas	
		Cooling machines for air conditioning and commercial freezers, refrigerators and freezers	Compressed-air storage and distribution system, pneumatic systems	Liquification systems		
		Rotating/mix/stir	Roller, rotors	Extruder	Textile handling	Mixers, stirring
		Solid	Metal, stone, plastics	Aluminium, plastics	Weaving, washing, drying	Food, colour, plastics
		Liquid				Food colour, plastics
		Transport	People	Goods	Vehicles	
		Vertical	Passenger elevator	Goods, elevator, cranes, hoists		
		Indined	Escalator	Conveyor	Cog wheel train, cable car, ropeway	
		Horizontal	Conveyor	Conveyor	Train, tram, trolley, cars, buses, electric cars, bikes and bicycles	
Linear motors			Open/close	Sort	Grab and place	
Back and forth movement			Valve		Robot	
Stepper motor			Open/close	Position		
Angular position			Value	Servo		

Motor Efficiency Classes in different Countries

Motor Efficiency class	International	United States	European Union (old system 1998 ¹)	European Union (new system 2009)	China	Australia
Premium	IE3	NEMA Premium	-	IE3	-	-
High	IE2	EP Act	Eff1	IE2	Grade 1 (under consideration)	AU2006 MEPS
Standard	IE1	-	Eff2	IE1	Grade 2	AU2002 MEPS
Below standard	IE0 (used only in this paper)	-	Eff3	-	Grade 3 (current minimum)	-

Abbreviations: EPAct – US Energy Policy Act, 1992; MEPS – minimum energy performance standard; NEMA – US National Electrical Manufacturers Association.

Source: A+B International, 2009.

Note: 1. With the backing of the European Commission, manufacturers representing 80% of the European production of standard motors, agreed to establish three efficiency bands or classes designated EFF1, EFF2 and EFF3 with EFF1 being the highest band.

Electric Motors Efficiency Classes, Testing Standards and Min Performance Standards

Efficiency Levels	Efficiency Classes	Testing Standard	Performance Standard
	IEC 60034-30	IEC 60034-2-1	Mandatory MEPS
	Global definition of motor efficiency classes, IEC, 2008	Including stray load losses 2007	Policy goal
Premium Efficiency ^R	IE3	Low uncertainty	United States 2001 Europe 2011
High Efficiency	IE2		United States
			Canada
			Mexico
			Australia
			New Zealand
			Korea Brazil
			China 2011 Switzerland 2011
Standard Efficiency	IE1	Medium Uncertainty	Europe 2011 with VSD
			China
			Brazil
			Costa Rica
			Israel Taiwan
Switzerland 2010			
Below Standard			

The United States and Canada are international leaders in terms of setting motor energy efficiency standards, as they introduced regulations for motors in the late 1990s. As early as 2002, China defined MEPS for electric motors. The European Union passed MEPS legislation for electric motors in 2009 as an implementing measure under the Eco-design Directive; these will replace the previous industrial voluntary agreement. Australia, Korea, Brazil, Mexico, Taiwan and some other countries with large electricity consumption from motors, such as India, Japan and Russia, have also adopted.



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

INDIA'S THERMAL POWER GENERATION TO REDUCE BY HALF IN NEXT FIVE YEARS

Coal-fired power generation is expected to grow 4.05 per cent during 2017-18, suggests Central Electricity Authority (CEA) in its latest estimates. Hydel on the other hand is expected to grow 5.52 per cent, while nuclear will grow only about 2.43 per cent during the same year. CEA has estimated that coal-fired power plants are likely to generate 9,58,444 million units of power in 2017-18. In contrast it had estimated a total generation of 9,21,129 million units of power in 2016-17. About 89 per cent of the estimated power generation from coal-fired power plants has already been achieved between April 1, 2016 and January 2017.

The estimate pegs growth of conventional power generation, which includes thermal, nuclear, hydel and import from Bhutan, at 4.35 per cent during 2017-18. Around 12,29,400 million units of power is likely to be generated from the conventional sources in 2017-18 against 11,78,000 million units in 2016-17.

Nevertheless, CEA has also estimated that all coal-based thermal power plants need to brace for drastic fall in capacity utilisation to as low as 48 per cent by 2022 as additional non-thermal electricity generation capacities come on stream.

CEA has predicted that by 2022 many plants may get partial or no schedule of generation at all – meaning many thermal power plants may have to be kept idle for lack of demand. According to CEA, installed capacity from different fuel types at the end of 2021-22 in base case works out to be 523 gigawatt including 50 GW of coal based capacity addition currently under construction and likely to yield benefits during 2017-22. “In order to accommodate high quantum of renewable energy into the grid, thermal plants are likely to run at low plant load factor (capacity utilisation) in future,” CEA predicted in its report.

In fact, it has suggested that a market mechanism through regulatory intervention needs to be evolved so that the owners of thermal plants are able to recoup the investment and at the same time, customers are not unnecessarily burdened with high tariff.

“Technical viability of plants goes for a toss if they run under 55 per cent capacity utilisation – a fact which is recognised by the Central Electricity Regulatory Commission. It is detrimental for the plant boilers and leads to drastic reduction in plant life,” said power sector experts. “These plants are designed to run at very high capacity utilisation – around 85 per cent. When they runs much below full load, it consumes more coal leading to under recovery of energy charges, as regulations does not provide for this.” “Plants without power purchase agreement for even a portion of their capacity are in for trouble. Reduction in capacity utilisation leads to decline in revenue income for the plant. At less than 60 per cent capacity utilisation the margin, which would otherwise provide for operating costs including interest cost, other than coal costs, would get wiped off. These plants are headed for trouble,” he said.

It is never too late to be what you might have been. - GEORGE ELIOT

GOLDWIND ANNOUNCES NEW GW3S SMART WIND TURBINE

For more than two decades Goldwind has been innovating for a brighter energy future. The Goldwind 3.0MW PMDD platform is part of that innovative future. While the design principles of the Goldwind 3.0MW and 2.5MW remain much the same, the new GW3S Smart Wind Turbine introduces best-in-class energy production, smarter controls and industry-leading reliability.

Scalable capacity. Through the scalable nature of the GW3S platform, the rated output of the turbine can be scaled from 3.0MW to 3.4MW and features an impressive increased rotor diameter size of up to 140 meters. As a result of the adaptive nature of the 3S platform for low and ultra-low wind speeds, the turbine can be extensively applied to projects with average wind speeds ranging from 5.5 to 8.5 m/s.

Scalable rated power and group control systems are two key elements for maximum energy production. With these two site-adaptive technologies combined, turbines synchronize closely with each other to compensate for any loss in total power output. The two technologies can also be utilized for decreasing noise emissions, to operate in special wind conditions, harsh terrain and extreme high/low temperatures.

Smart sensing. The GW3S platform's key components are monitored by multiple strategic sensors that enable predictive diagnostics and precision control.

Smart control. Based on Goldwind's big data analysis of tens of thousands of installed direct-drive turbines and more than 20 years of wind energy expertise, Goldwind has partnered with DNV-GL and ECN to develop the most advanced optimized control algorithms for maximum energy capture.

Structured design. In addition to Goldwind's overall optimized design features for unique operation conditions, the GW3S' modular approach features shared blade molds, a single blade erection method, and modular generator technology – all of which support efficiencies in logistics, installation, and operations and maintenance over the life of the turbine.

Double-circuit design. Goldwind's double-circuit design architecture for the GW3S PMDD generator enables continued limited operation in the event of a circuit failure until the time when a service technician is able to execute repairs. This partial power output approach results in more energy capture for the customer during periods in which the turbine would otherwise be out of service.

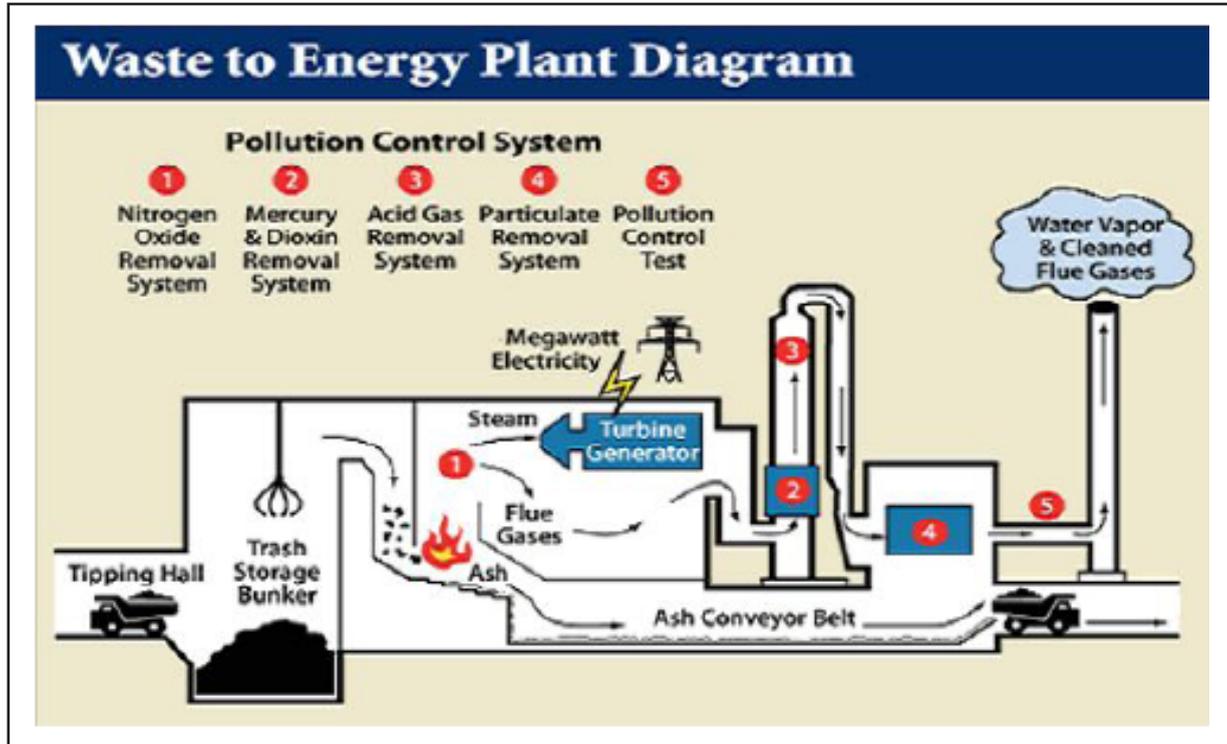
TECHNICAL SPECIFICATIONS

GW 3.0MW (S)

Item	Unit	Specifications
Model		GW 140/3000 (S) (onshore)
Parameters		
Rated Power	KW	3000-3400
Wind Class		IECIII A
Cut-in Wind Speed (Static)	m/s	2.5
Designed Service Life	Year	≥ 20
Operating Temperature Range	°C	-30°C - +40°C
Survival Temperature Range	°C	-40°C - +50°C
Rotor System		
Nominated Rotor Diameter	m	136 / 140

Rotor Swept Area	m ²	14712 / 15474		
Generator				
Generator Type		Permanent Magnet Synchronous Generator (PMSG)		
Rated Power	KW	3630 (Closed-type 3480)		
Rated Voltage	V	690		
Generator				
Converter Type		Full Power Conversion		
Power Factor Regulation Range	1/4 of rated power	Capacitive 0.95~inductive 0.95		
	2/4 of rated power			
	3/4 of rated power			
	Rated power			
Rated Frequency Change Range	Hz	50/60		
Rated Output Power	kW	3159~3579 (Apparent Power)		
Rated Output Voltage	V	690 (inverter Output Voltage)		
Brake System				
Aerodynamic Brake System		The blades can be feathered by pneumatic brake		
Mechanical Brake System		Generator Brake (for maintenance)		
Yaw System				
Type / Design		Motor Drive / Four Planetary Stages for Speed Reduction		
Yaw Brake		Four-point-contact Ball Bearing with Outer Ring		
Control System and Lightning Protection				
Type		PLC Control System		
Lightning Protection Standard		Complying with IEC 61400-24-2010 and IEC 62305-2006, and in conformance with GL Standards for the Certification of Wind Turbine		
Lightning Protection Measures		Electrical lightning protection, lightning protection at blade tips, etc. (in conformance with GL Standards for the Certification of Wind Turbines)		
Ground Resistance	Ω	≤ 4		
Tower				
Type		Conical Steel / Reinforced Concrete Tower		
Hub height	m	100/Conical Steel	120/Reinforced Concrete Tower	140 (under planning and design)
Weight				
Rotor	t	98		
Nacelle	t	40		
Generator	t	82		

WASTE-TO-ENERGY PLANT TO COME UP AT NELLORE



20 acres of land allotted to Hyderabad-based firm on outskirts of city

- Plant to become fully operational in next 18 months
- Government to purchase power from plant at Rs 7.50 per unit for a period of 25 years

Nellore: Waste being generated in the city will not be unproductive hereafter as the State government has planned to generate power from it. Towards this purpose, it has allocated 20 acres of land on the outskirts of the city at Venkatachalam for setting up a plant, to Hyderabad-based Enviro Care. The plant would be set up on a Public-private partnership (PPP) mode and would become operational in the next 18 months.

The State government had planned to produce 63 MW power from the waste being generated in the State and had proposed plants at Nellore, Visakhapatnam, Vizianagaram, Tadepalligudem, Guntur, Machilipatnam, Tirupati, Kurnool, Anantapur, and Kadapa districts for converting the waste to energy, under 'Swachh Andhra Corporation'. According to a senior official from Nellore Municipal Corporation, the Corporation had signed MoUs with Jindal, Essel, Envee Care and Nexus Nova groups to set up plants at Vizianagaram, Guntur, Tirupati, Nellore, Anantapur and Kadapa districts and Nellore has been entrusted to Enviro Care.

The department of Municipal Administration estimates that 53 urban local bodies across the State are generating more than 4,500 tonnes of waste on a daily basis and this could be utilised for power generation if plants were set up. Nellore Municipal Corporation has identified the land and while the lease agreement has been concluded, the site is yet to be handed over to Enviro Care.

Nellore City has an area of around 150 square kilometres in which 150-200 MT of solid waste is generated on a daily basis. This is being dumped at a transit point located at Bodigadithota which would be removed after the energy plant becomes fully operational. Each project across the State would be set up at an investment of Rs 300-400 crore and similar plants set up in Japan and China have been successful, according to officials.

As per the agreement, the State government would buy back power generated by these plants at Rs 7.50 per unit for 25 years. After expiry of the agreement, the companies will hand over the plant and the land to the civic bodies.

Attitude is a little thing that makes a big difference. - WINSTON CHURCHILL

BRIEF HISTORY OF LOTUS TEMPLE

It is also known as **bahai temple**. Lotus temple that it is **most visited monuments in India**. **Construction of bahai temple** is completed in year of 1986. You must be interested why it is named lotus temple. Many of people are saying that this temple looks like a lotus in shape and because of it is known as lotus temple. But this is half-truth. Lotus is a symbol of love and purity. It gives the message of immortality. And because of this bahai temple is designed like a **lotus flower** and it is known as lotus temple.

Architecture of Lotus Temple

The architect was an Iranian, who now lives in Canada, named Fariborz Sahba. He was approached in 1976 to design it and later oversaw its construction. The structural design was undertaken by the UK firm Flint and Neill over the course of 18 months, and the construction was done by ECC Construction Group of Larsen & Toubro Limited. Inspired by the lotus flower, the design for the House of Worship in New Delhi is composed of 27 free-standing marble-clad “petals” arranged in clusters of three to form nine sides. The nine doors of the Lotus Temple open onto a central hall slightly more than 40 metres tall that can seat 1,300 people and hold up to 2,500 in all. The surface of the House of Worship is made of white marble from Penteli mountain in Greece, the same marble from which many ancient monuments (including the Parthenon) and other Bahá’í Houses of Worship are built. Along with its nine surrounding ponds and the gardens, the Lotus Temple property comprises 26 acres (105,000 m²; 10.5 ha).

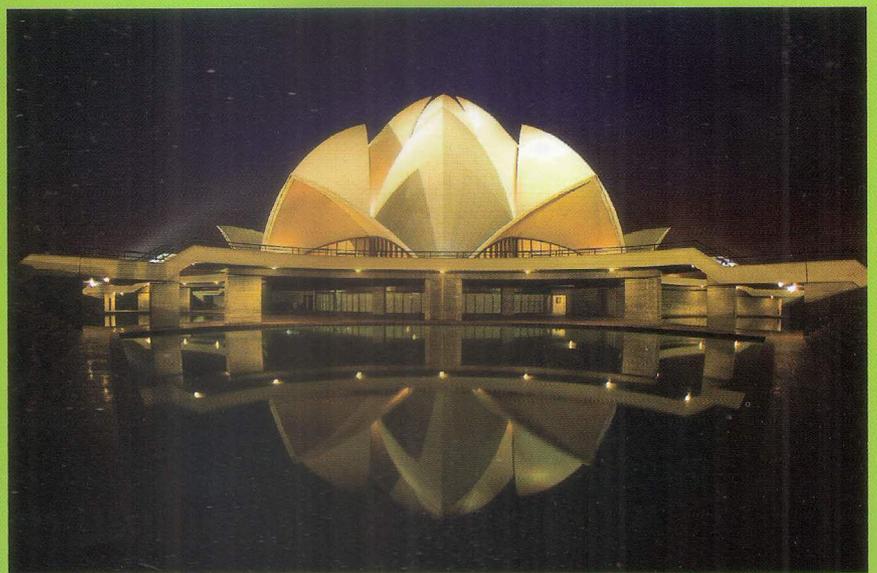
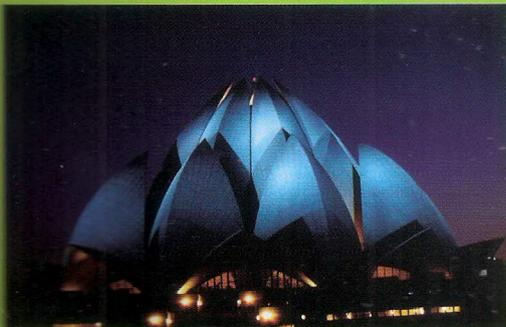
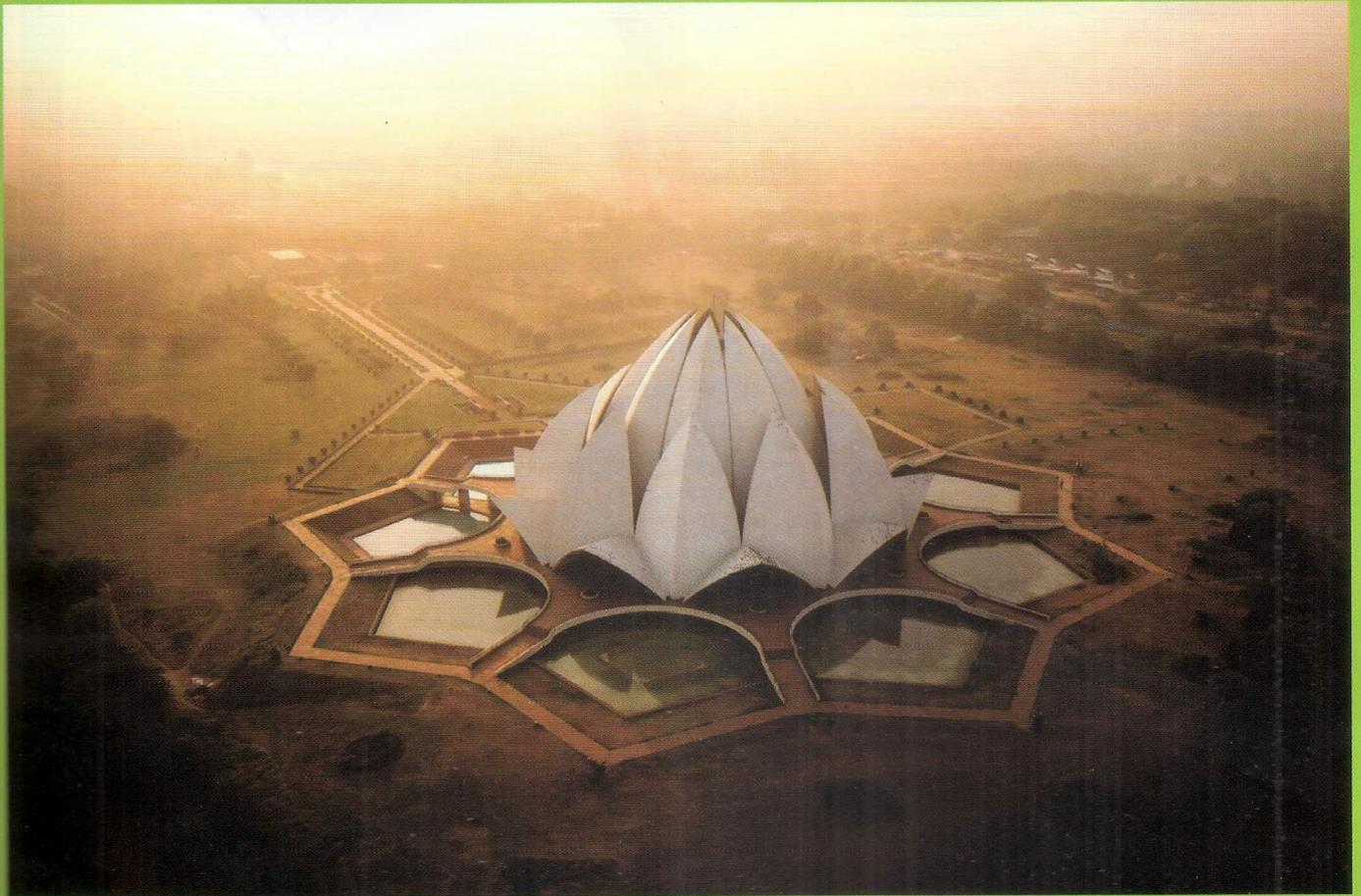
The Bahá’í House of Worship in Delhi was inaugurated to public worship in December 1986. By late 2001, it had attracted more than 70 million visitors, making it one of the most visited buildings in the world. According to the government of India, it had received over 100 million visitors by April 2014.

Of the temple’s total electricity use of 500 kilowatts (KW), 120KW is provided by solar power generated by the building. This saves the temple 120,000 rupees per month. It is the first temple in Delhi to use solar power.

Awards

- 1987, the architect of the Bahá’í House of Worship, Mr. Fariborz Sahba, was presented the award for excellence in religious art and architecture by the UK-based Institution of Structural Engineers for producing a building “so emulating the beauty of a flower and so striking in its visual impact”.
- 1987, the Interfaith Forum on Religion, Art and Architecture, Affiliate of the American Institute of Architects, Washington, D.C., gave their First Honour award for “Excellence in Religious Art and Architecture” 1987 to Mr. F. Sahba for the design of the Bahá’í House of Worship near New Delhi.
- 1988, the Illuminating Engineering Society of North America conferred the **Paul Waterbury Outdoor Lighting Design Award** - Special Citation for Exterior Lighting.
- 1989, the Temple received an award from the Maharashtra-India Chapter of the American Concrete Institute for “excellence in a concrete structure”.
- 1994 edition of Encyclopaedia Britannica, in its ‘Architecture’ section gives recognition to the Temple as an outstanding achievement of the time.

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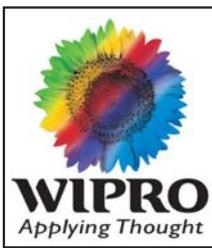
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With a net worth of nearly \$17 Billion, Azim Premji is the 3rd richest Indian, and the 41st richest person in the World.

Azim Premji, Chairman of Wipro Technologies is one of India's most respected business tycoon and philanthropist. Born on July 24, 1945 to an affluent Gujarati entrepreneur he inherited Wipro, a vegetable oil company at the age of 21 after the sudden demise of his father.

In 1975, Wipro began manufacturing hydraulic cylinders and truck tippers. In 1980 the company entered into IT sector. Under Premji's leadership Wipro embarked on an ambitious phase of expansion and diversification, resulting in Wipro being ranked among the world's top 100 technology companies. The company's **IT division became the world's first to win SEI CMM level 5 and PCMM Level 5 certification, the latest in quality standards.** As of 2012, the company had 140,000 employees in 54 countries.

In 2000, he was voted among the 20 most powerful men in the world by Asia week. He has twice been listed among the 100 most influential people by TIME Magazine. **He donated Rs 12000 crore worth Wipro shares to a trust for educational initiatives in India's largest-ever philanthropic contribution.** In 2001, he founded Azim Premji Foundation, a non-profit organization. This foundation "dedicates itself to the cause of Universalization of Elementary Education in India". In December 2010, he donated \$2 billion for improving school education in India. Premji has become the first Indian to sign up for the Giving Pledge, a campaign led by Warren Buffett and Bill Gates, to encourage the wealthiest people to make a commitment to give most of their wealth to philanthropic causes. Wipro, India's third-largest software exporter by sales, forecast revenue of \$1.58 billion to \$1.61 billion for its IT services business for the quarter ending June quarter. **In 2005 Premji was conferred the Padma Bhushan** by the Government of India. According to Forbes, he is currently the third wealthiest Indian, and the 41st richest in the world with a personal wealth of USD 16.8 billion. **In 2011, he was awarded Padma Vibhushan**, the second highest civilian award. On India Today's, 50 Power List 2013 High and Mighty he has been ranked No. 9.

HUMOUR - A FUNNY SITUATION AND A MORAL

Suddenly, a cockroach flew from somewhere and sat on a lady. I wondered if this was the cockroaches response to all the glory that was spoken about it!

She started screaming out of fear. With panic stricken face and trembling voice, she started jumping, with both her hands desperately trying to get rid of the cockroach. Her reaction was contagious, as everyone in her group got cranky to what was happening. The lady finally managed to push the cockroach to another lady in the group. Now, it was the turn of the other lady in the group to continue the drama.

The waiter rushed forward to their rescue. In the relay of throwing, the cockroach next fell upon the waiter. The waiter stood firm, composed himself and observed the behavior of the cockroach on his shirt. When he was confident enough, he grabbed and threw it out with his fingers.

Sipping my coffee and watching the amusement, the antenna of my mind picked up a few thoughts and

started wondering, was the cockroach responsible for their histrionic behavior?

If so, then why was the waiter not disturbed? He handled it near to perfection, without any chaos.

It is not the cockroach, but the inability of the ladies to handle the disturbance caused by the cockroach that disturbed the ladies.

I realised even in my case then, it is not the shouting of my father or my boss that disturbs me, but its my inability to handle the disturbances caused by their shouting that disturbs me. Its not the traffic jams on the road that disturbs me, but my inability to handle the disturbance caused by the traffic jam that disturbs me. More than the problem, its my reaction to the problem that hurts me.

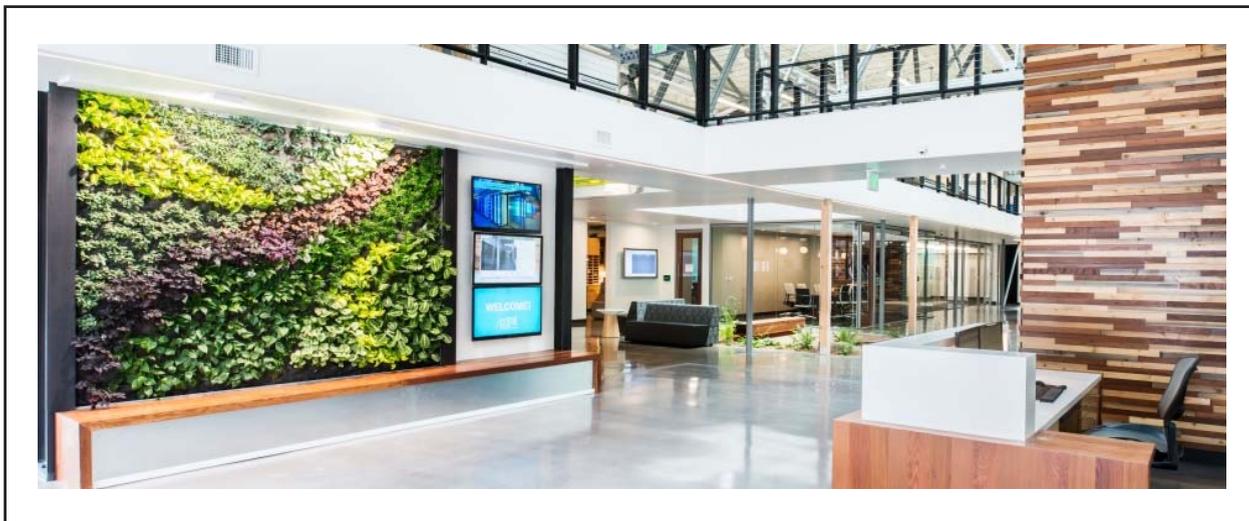
The Take-Away: The women reacted, whereas the waiter responded.

We should not react in life, we should always respond.

Reactions are always instinctive whereas responses are always intellectual

BIG, BEAUTIFUL AND SUSTAINABLE – 10 OF THE WORLD’S MOST ENERGY EFFICIENT OFFICES - 8

DPR, SAN FRANCISCO (USA)



DPR specialise in highly technical and sustainable projects, and their San Francisco office practices what they preach. The building produces more energy than it consumes. Home to three living walls and a living wine bar, it is aiming to achieve Net Zero Building Certification by the International Living Future Institute through its living build challenge program.

As well as its artistic living walls, the building houses many other systems to ensure its energy efficiency and sustainability. Its 118 kW photovoltaic system produces renewable energy and enough power to supply all the needs of the building’s offices. It also has a solar thermal water heating system that supplies the building’s bathrooms and utilities.

(To be continued...)

THE WORLDS TOP 10 MOST INNOVATIVE COMPANIES IN ENERGY - 8

AZURI TECHNOLOGIES

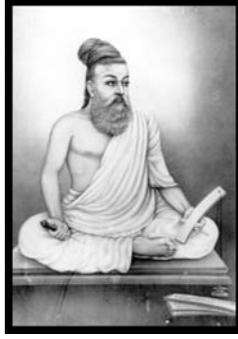


For applying the pay-as-you-go model to scale up solar in developing countries. The U.K.-based startup Azuri offers a pay-as-you-go deal that uses cell-phone financing as its model and thus circumvents the high up-front costs of solar installation. Customers in developing countries in Africa pay \$10 for solar panel installation on their roofs (or nearby) and then pay about \$1.50 a week for service. This provides enough electricity to light their homes and charge their phones, and after 18 months, they’ve paid off the cost of the solar panel. Thanks to an investment from Barclays, Azuri is scaling up quickly and hopes to deploy its offering to a quarter-million homes by the end of this year.

(To be continued...)

TIRUKKURAL AND MANAGEMENT IN A 'NUTSHELL' - 47

Management by Objectives MBO is an important development in the progress of Modern Management which has been in practice for decades called by various names and procedures, but the 'Key' being, analysis of Strengths, Weaknesses, Opportunities and Threats, assessment of resources, key areas requiring attention, urgencies, priorities and so on. Tiruvalluvar deals with all these and more in his Kurals, some of which are dealt below:



➤ Resources, means, action-plan, time, and place are the five factors which need to be considered and cleared, before embarking on action (675).

**Porulkaruvi Kaalam Vinaedanodu Ienthum
Irultheera Ennich Cheyal. Kural 675**

பொருள்கருவி காலம் வினைஇடனொடு ஐந்தும்
இருள்தீர எண்ணிச் செயல். குறள் 675

**“Five things should be carefully considered in doing
of all actions, namely the resources, the instrument,**

**the nature of the action itself, the proper time
and the proper place for its execution”**

➤ Before commencing any action, it is wise to consider in depth the objective, obstacles, and benefits or reactions upon completion (676).

**Mudivum Edaiyurum Mutriyaangu Eithum
Padupayanum Paarthuch Cheyal Kural 676**

முடிவும் இடையூறும் முற்றியாங்கு எய்தும்
படுபயனும் பார்த்துச் செயல் குறள் 676

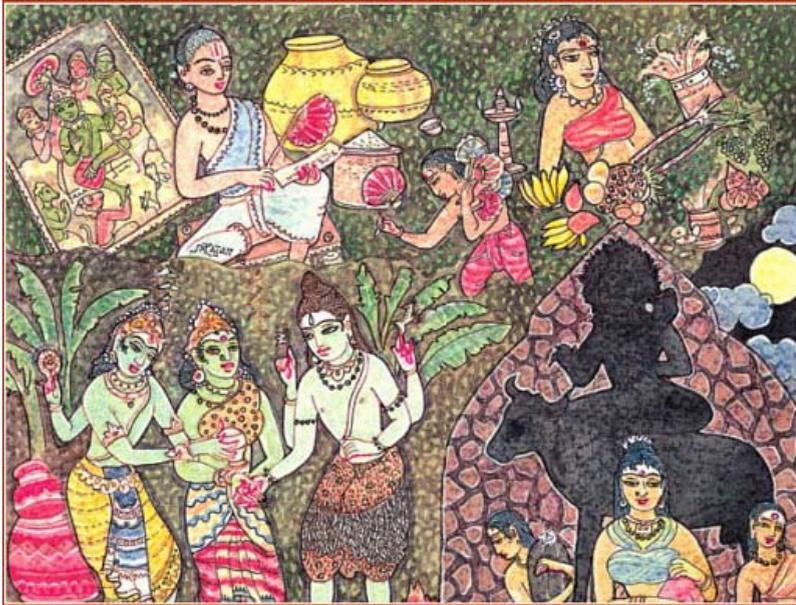
**“Determine first the exertion necessary, the
obstacles in the way, and the expected profit
and then take up execution.”**

➤ Whenever the way is clear, to act immediately is right where this is not so, it is better to deliberate and arrive at the best method for implementation (673).

➤ In order to decide how best a particular job may be done, it is wise to tap the expertise of a person who knows it inside out (677).

HOME FESTIVALS - 4

சித்திரை - Chitrai (April/May)



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

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

(To be continued)



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