ELECTRICAL INSTALLATION ENGINEER

NEWS LETTER

TAMILNADU ELECTRICAL INSTALLATION ENGINEERS' ASSOCIATION 'A' GRADE (Regn. No. 211/1992)
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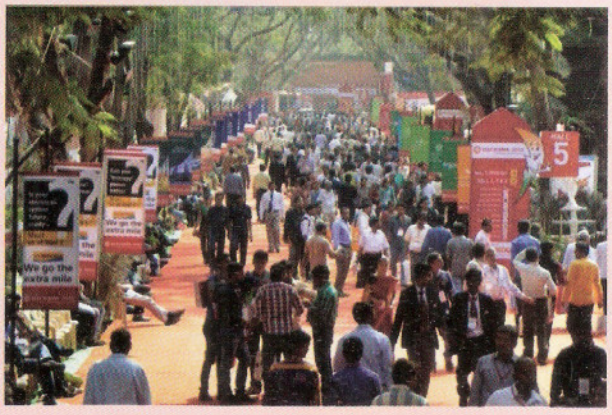
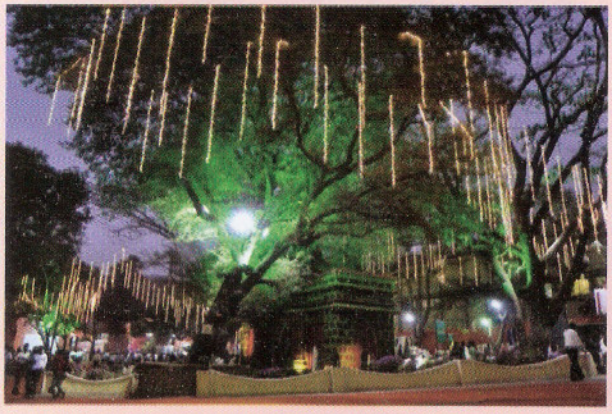
ELECRAMA - 2014 OVERVIEW





EDITORIAL

Dear Members, Fellow Professionals and Friends,

SEASONS GREETINGS AND BEST WISHES!!

The Country will be celebrating "National Science Day" this month on the 28th. Some thoughts on Science and Engineering and Technology and the challenges and priorities ahead would be apt. at this point of time.

Basically Science seeks to understand the Natural World and investigates and provides findings and results helping both engineering and technology to find solutions, products and processes to meet societal needs and problems. Society, in brief, is concerned about Values, Needs, Economy and Environment. Identifying some of the areas needing priority attention concerning Economy and Environment and focusing the Science and Engineering and Technology efforts towards them would be very meaningful.

What comes on top of our mind is Power or Energy in general. In Power, Thorium, which is available in our own country abundantly, is supposed to be a very clean Nuclear Fuel, but lot of research and developments are still needed to be carried out. With lot of activities with Uranium and its increasing availability from outside, we should not reduce allocation of sufficient resources and the Research and Development, is a concern expressed in some quarters. In Energy, alternative to Petroleum or alternative Petroleum is a major concern as our Economy is largely affected today due to Petroleum crude imports. Some work has been done here and elsewhere in conversion of Biomass to Bio Crude through Thermo Chemical Processes and this need to be taken up further with application of Engineering and Technology. Bio Crude would be suitable for refining and getting all products like Petrol, Diesel etc.

Another area of concern is stepping up food production, though presently we are self sufficient in food grain production for the present population levels. Looking ahead with the possible increases in population and more than that, looking at our extraordinary potential, with probability of our being able to supply food for many parts of the world, we should step up our Engineering and Technology efforts. What is simply seen as extraordinary potential is that the weather conditions in our Country is suitable for 'round the year cultivation in all cultivable lands, but we seem to be doing it in only about 25% of the lands, the rest of the lands being utilized for only about 3 to 5 months in a year. The main reason for this is the non equitable distribution of water available in plenty in our country and some of the Engineering solutions like "Formation of National Water Grid" etc require further attention.

National Elections are also due shortly in a few months time and it will be our wish that the New Government that will be formed will pay attention to some or all of these as they can contribute to helping Society at large.

We thank all those members who have helped us by participating in the advertisements appearing for the issue January 2014 – Hensel Electric India Pvt. Ltd., Easun Reyrolle Ltd., Shree Engineers, Power Links, Galaxy Earthing Electrodes Pvt. Ltd., Supreme & Co. Pvt. Ltd., Wilson Power and Distribution Technologies Pvt. Ltd., Power Cable Corporation, Ashlok Safe Earthing Electrode Ltd., Abirami Electricals, V-Guard Industries Ltd., Intrans Electro Components Pvt. Ltd., Universal Earthing Systems Pvt. Ltd., Pentagon Switchgear Pvt Ltd., Cape Electric Pvt. Ltd. ***EDITOR***

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

352. Arun Rohith & Co, (2012-14)
353. Turbo Electrical Engineers, (2011-14)
354. ABB India Ltd., (2010-14)
355. C.M.C. Hospital & College, (2012-13)
356. R.S. Windtech Engineers P. Ltd, (2010-14)
357. Hariharan Electricals, (2012-13)
358. Master Engineering, (2013-14) ***Non Member***
359. RRS Electricals Pvt. Ltd, (2013-14) ***New Member***
360. Mr. S. Krishnamoorthy, (2013-14) ***Non Member***
361. Ecube Projects, (2013-14) ***New Member***
362. Elco Engineering, (2011-14)
363. Eskay Enterprises, (2013-14)
364. Msc Enterprises, (2013-14)
365. Saravanan Control System, (2010-14)
366. Shastha Electricals, (2013-14)
367. Mr. R. Swaminathan, (2013-14) ***Non Member***
368. Shree Maha Vigneshwara Enterprises, (2012-14)
369. Mr. A.N. Murugadasan, (2013-14) ***Non Member***
370. Volts Trans Engineers, (2013-14)
371. Adithya Mechatroniks, (2013-14)
372. Premier Power Line, (2013-14)
373. Celestial Associates, (2013-14)

We request other members also to send their contribution for NEWSLETTER early.

(***Please help us to serve you better***)

OBITUARY

(24.04.1944 – 23.01.2014)

On behalf of The Tamilnadu Electrical Installation Engineers Association 'A' Grade extends **Heartfelt Condolences** for the demise of Our Member **Mr. D. RAJA DEVA DOSS**, Proprietor of Mr. D. RAJA DEVADOSS, 1/210A, Sonachalam Street, Rajiv Gandhi Salai, Navalur, Chennai–103. He is one of our active Members.

We pray the almighty to rest his Soul in Peace.

ELECTRICAL INSTALLATION ENGINEER

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MEMBERS DETAILS

S.No.	Company Name	License No.	Place	Contact No.
61	**Micro Tech Engineering Corporation**	EA 2466	Chennai	044-22680220, 94440 70453
62	**Moon Power Systems**	EA 2694	Chennai	044-43357272, 98403 94154
63	**MSC Enterprises**	EA 2651	Chennai	044-26543356, 99520 90490
64	**Murugan Electrical Traders**	ESA 341	Chennai	044-26423428, 98401 65659
65	**MV Power Consultants & Engrs P Ltd**	ESA 207	Chennai	044-43563610, 98410 44221
66	**P.V. Contracts & Electricals**	ESA 194	Chennai	044-25264011, 98400 64011
67	**Philson Electricals**	EA 1865	Chennai	044-43063274, 94443 83271
68	**Power Care**	EA 1854	Chennai	044-22350054, 98410 64849
69	**Power Care Enterprises**	EA 2723	Chennai	044-23820003, 94442 79290
70	**Power Electricals Services**	EA 2731	Chennai	044-24716075, 96000 09461
71	**Shri Siva Sakthi Engineers** *(Formerly Power Engineering Enterprises)*	ESA 395	Chennai	044-24765316, 98402 88748
72	**Power Trac Engineers (P) Ltd**	ESA 228	Chennai	044-24997384, 94444 15359
73	**Power System Design & Commissioning Services**	EA 2292	Chennai	044-26560999, 94440 48727
74	**Prayagaa Enterprises Pvt. Ltd**	EA 2448	Chennai	044-42074313, 99419 23975

EVENTS

TAMILNADU ELECTRICAL INSTALLATION ENGINEERS' ASSOCIATION 'A' GRADE

Conducting a Technical Seminar

&

Members Meet & Get together 6.00 pm

on *Saturday, 8th March 2014*
between 9.00 am and 3.00 pm

at **RAMYAS HOTELS,**
13-D/2, Williams Road, Cantonment,
Tiruchirappalli - 620 001.
(Opposite to Central Bus Stand)

NISS
North India Solar Summit

Event Profile: Welcome to the world of endless opportunities in one of the world's biggest solar market. An approximately 400 million population market, The North Indian energy sector is today at a crucial juncture of development. In the last many years, India has attained the status of the second fastest growing economy in the world and the concomitant demand for energy has been putting pressure on its supply sources. Increasing population, hectic economic activity and rising income levels are giving a further push to the demand for energy in North India.

Date: 11th - 13th March 2014

Venue: IIA Grounds, Lucknow, U.P., India

Website: http://www.niss.org.in/

PCRA

society of energy engineers and managers सीएसईम

On

"Energy Efficient Drives, Driven and Controls

An Integrated Approach to ENERGY SAVINGS"

Keynote Address

by

Dr. P. Dharmalingam, Ph.D.,

Director and Head AIP,

National Productivity Council

Addresses and Panel Discussions by EXPERTS

On Saturday, 8th March, 2014 9-30 AM

At

Institution of Engineers (I) Auditorium,
19, Swami Sivananda Salai
Chepauk, Chennai 600005

For Details, Brochure and Registration contact:
S. Mahadevan, Chairman, SEEM TN Chapter
'e'Mail mahadevan86@gmail.com
Mob. 9840155209

MATELEC EIBT CHINA 2014

MATELEC
EIBT China
EIBT China

Event Profile: MATELEC EIBT China 2013 has gained herself a strong market position for the future. Based on the enormous industry resources and professional international organization experience, MATELEC EIBT China 2014 will build the most efficient trading platform for 400 exhibitors and 12,000 visitors with 12,000 m^2 show space.

Date: 25th 27th March 2014

Venue: No.77, Xing Yi Road, INTEX, Shanghai

Website:
www.matelecchina.com

SUN TO OCCUPY CENTRE STAGE IN INDIA'S ENERGY MIX

Electricity-hungry **India** is flipping the switch on huge new solar energy projects to fuel its growing economy, using cheap — mainly Chinese — foreign technology to reduce once sky-high generation costs to competitive levels. Since 2010, **India** has hiked installed solar power capacity from a meagre 17.8 megawatts to more than 2,000MW, official figures show, as part of Prime Minister Manmohan Singh's aim to make "the sun occupy centre-stage" in the country's energy mix .Key to the progress has been a rapid fall in the cost per unit of solar electricity to close to what is known as "grid parity" — the cost of conventional electricity generated by carbon-gas emitting coal.

"The world is watching the ability of **India**n entrepreneurs to achieve grid parity for solar energy," **India**'s World Bank country director Onno Ruhl said recently. "**India** has the potential to be a world leader" and a showpiece for efforts to address climate change, he told an energy seminar in late December.The drive to harness the sun's power began in earnest with the 2010 creation of the Jawaharlal Nehru National Solar Mission by the current left-leaning government led by the Congress party. It set a target of generating 20,000MW of grid-connected solar power and 2,000MW of off-grid generation, such as roof panels, by 2022. That would still represent just one-eighth of **India**'s total installed power base, but the government believes the share will rise as prices for solar infrastructure keep falling.

Power from imported coal and domestically produced natural gas costs around 4.5 rupees a kilowatt-hour while solar energy costs are seven rupees — down sharply from 18 rupees in 2010, the Ministry of New and **Renewable Energy** says.

'World's largest plant'

The next stage of expansion will see **India** build the world's largest solar plant to generate 4,000MW on the shores of a saltwater lake in the northwestern desert state of Rajasthan, which should drive solar power costs even lower. Operators believe economies of scale from the 280-billion-rupee ($4.4 billion) Sambhar plant to be constructed over the next seven years will reduce prices to 5.0-5.5 rupees a kilowatt-hour.

"This is the first project of this scale anywhere in the world" and "is expected to set a trend for large-scale solar power developments," said Ashvini Kumar, director of Solar Energy Corp, one of five public utilities that will run the plant. The sprawling project makes it comparable with very large coal-fired power projects. Greater economies of scale, better technology and progressively cheaper panels and modules that turn sunshine into electricity have hammered down prices.

The price fall was also greased by the global financial crisis, which cut demand for equipment in developed nations, and vast Chinese expansion that created an equipment glut. All this wrought a transformation in the economics of solar power, making the infrastructure far more affordable, experts say.

India is also still significantly behind many nations in generating solar power. Germany, for instance, has 35,200MW of installed solar capacity, according to the regulatory German Federal Network Agency.

But trailing has proved a boon because it is significantly less costly to set up solar parks now than for the first-movers. Charanka, in the salt plains of the western state of Gujarat, is currently Asia's biggest solar plant, producing 214MW. Other projects are under way in a string of states from Andhra Pradesh to Madhya Pradesh, Chhattisgarh and Tamil Nadu.

"The seeds have been sown for a rapidly scalable and a very large solar energy sector in the near future," said Arvind Mahajan, infrastructure partner at consultancy KPMG.

A sunny state

What excites solar energy experts about **India**'s prospects is that it is geographically ideal to harness the sun's power because of its abundant sunshine. **India** boasts more than 300 sunny days a year in some parts along with large tracts of desert while a big chunk of the nation lies near the equator. Also, solar parks are far faster and easier to construct than nuclear plants. Charanka, for instance, took just 16 months to build.

With 40% of rural **India**n households without power there is a huge market. **India** also urgently needs to generate home-grown power with imports of oil, gas and coal contributing to a trade deficit that has alarmed international investors. "Solar power could help **India** address its acute power shortage," Ruhl from the WTO said. **India** runs a peak-hour electricity shortfall of around 12 %.

But even though the market is booming, **India**n solar-equipment companies have not been profiting. To build the solar plants **India** has been importing equipment, mainly from china, but also from the United States and Taiwan. **India**n companies say, however, that unless imports are curbed, the country will never develop an indigenous industry. The commerce ministry has launched a preliminary inquiry into allegations of dumping. This growth in solar power "should have been a heyday for **India**n manufacturers," said Rao S.Y.S. Chodagam, managing director of Titan Energy Systems. "Instead, there's bankruptcy, loan restructuring and pleas to the government for support against international competition," Chodagam added.

Source: Hindustan Times

KNOW THY POWER NETWORK – 77

Are you ready for our continuous sojourn in the Power Network? Our present stay is at 'Smart Grid'. Presently, we are facing Smart culture everywhere. We are being bombarded with the term "Smart" in our day-to-day life. *You all know that the term "Smart" has a general meaning of "Intelligent" with a connotation to an "evolving process." It progressively aims at some thing at higher levels; it never stops at one place. To quote our own example viz the Smart Grid, it continuously aims at higher levels of efficiency from the starting point (generation) to the end point (utilization) of electrical energy. In this context, please note that What is "Smart" today will become "Conventional" tomorrow and a new item will occupy its place for a short duration and this process goes on continuously.*

Just like Brooks it may sing, "that Men may come and Men may go but I go on evolving for ever." Thus Smart Grid is only an "ongoing process" to make the existing Power network more efficient and effacacious. The present day innovative information technology has made it happened. Thus it can be considered as a *"sophisticated two-way control and communication process" involving the supplier and the consumers as well."* It facilitates peak load management and demand-side management and also helps to mitigate unwanted technical and commercial losses. Through a Smart Grid, the Suppliers can visualize, in real time, the quantum of electricity consumed by the consumers and the health status of various components in their power delivery system. It gives a clear picture of the Electricity Grid's behaviour on a day-to-day basis and provides a platform for fast action to avert any grid disturbance. On the other side of the meters viz the consumers, it helps them to have a clear view of their energy consumption pattern and the areas that need attention for reduction in the consumption. Simply put, the consumers can fine tune their consumption/ requirement of electrical energy and can avail lower tariffs during 'off-peak times' of the day. Thus one can expect a closely flat, peak demand curve in the network. This reduces the need for arranging extra generation during the peak load hours. Among the countries that made rapid strides in Smart Grid Journey are China, Brazil, South Africa, Russia and U.S.A .

Now let us look at the different aspects of Smart Grid from "Generation to Utilization" that includes transmission and distribution of electrical energy.

Generation

At present the Non-Conventional energy sources like Wind and Solar find a significant place in the energy mix in a Power Grid. The problem that comes with the renewable energy sources lies in the fact that this energy stream is intermittent or seasonal. In addition, their locations are also wide-spread and it makes necessary to build additional networks to collect and transport this energy from various sources to the centralized power pool for further transmission and distribution. Such a cumbersome process affects its quality and reliability and also leads to higher consumption in the auxiliaries and the related supporting networks. Now with the advent of Smart Grid Technology, it is possible to make the renewable energy sources as a reliable one with minimum losses and also to maintain grid stability. Further it helps to have an effective power factor control and an intelligent resource deployment. Simply put, conventional and non-conventional sources can be easily managed with a better quality and reliability control.

Transmission

As far as Transmission segment concerned, the Smart Grid plays an important role in Grid Control and stability. Presently, the electricity grid faces transmission congestion with increased generation and demand and also higher reactive power losses. Such bottle necks result in higher I^2R losses in the transmission network. Smart Grid helps to adopt intelligent deployment of capacitor banks to offset reactive power losses and also helps to adopt other measures to mitigate grid congestions or bottlenecks in the flow of electrical energy and reduce line losses. The deployment of SCADA [Supervisory Control and Data Acquisition], Phasor measurement and other intelligent methods facilitates continuous monitoring of power flows, load balancing and grid management and predicts any major interruptions in the grid in advance.

Distribution

When we come to distribution, the issues that demand attention are higher I^2R losses, energy balancing and energy accounting. It is because the currents in this network are comparatively at higher level and the VAR compensation is low or at an inadequate level. Further there is no system discipline in this interface between the supplier and the consumer. The cooperation and coordination from the consumers is also significantly less or non-existent. Thus this segment of the power system, which is important from the view point of "energy conversion" into money flow, is always complex, complicated and problematic. Moreover, higher network losses, apart from many other challenges are to be faced in this part of the Power network. Among them are, higher unbalance in

the distribution of loads, voltage imbalance, higher commercial losses that include pilferage and theft of energy flow, congestions, outage management and absence or lack of energy management steps like energy balancing, energy accounting and energy audit. To meet all these, Smart grid technology can be used as an effective tool in this part of power network. It helps to have an interaction between the end users and the suppliers which is non existent at present. The consumers who have so far been denied the active participation and neglected can have a greater participatory role. They have a ring side view of all the issues related to the supply of electrical energy to their premises and also have a chance to feel the "pulse" of the network as a whole. All these are made possible by the installation of Smart electronic devices and Smart meters. They can have "TOD" meters and thereby avail the electric power supply at lower tariffs at off peak hours. They can plan their electrical energy usage in a way similar to the utilization of their hard earned money and can have a flat consumption or demand curve. Such a smooth curve will bring adequate energy savings.

Further Smart Grid can facilitate Asset Modernization programmes and tools for optimal Asset deployment. Effective visualization and better measurement of powerflows can identify and isolate chronic theft locations. Further it aids an automated Outage management which helps to reduce Outage durations. Geographical Information System can be easily used for this.

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

தலைமைச் செயலகம், எழிலகத்தில் ஆன்-லைன் சென்சார் மின் கருவிகள்: மின்சார சிக்கனத்துக்கு புதிய நடவடிக்கை

அனைத்து அரசு கட்டிடங்களிலும் மின்சாரத்தை சிக்கனமாக பயன்படுத்தும் வகையில், முதற்கட்டமாக தமிழக அரசின் தலைமைச் செயலகத்திலும், எழிலகம் கட்டிடத்திலும் ஆன் லைன் சென்சார் கருவிகளுடன் கூடிய மின் கருவிகள் பொருத்தப்பட உள்ளன. தமிழகத்தில் மின்சார தட்டுப்பாட்டைப் போக்கும் வகையில், மின் சிக்கனத்தைக் கடைபிடிக்கவும், சூரிய மின் சக்தி உள்ளிட்ட மரபுசாரா எரிசக்தி பயன்பாட்டை ஊக்குவிக்கவும், தமிழக அரசு பல்வேறு நடவடிக்கைகள் மேற்கொண்டு வருகிறது.

இந்நிலையில், தமிழகத்திலுள்ள அனைத்து அரசு கட்டிடங்களிலும் மின்சாரத்தை சிக்கனப்படுத்தும் நடவடிக்கைகளில், தமிழக மின் ஆய்வுத் துறை நடவடிக்கை எடுத்துள்ளது.

இதன்படி முதற்கட்டமாக, தலைமைச் செயலகத்தில் நவீன மின் சிக்கனக் கருவிகளை பொருத்த திட்டமிடப்பட்டுள்ளது. 10 மாடிகள் கொண்ட நாமக்கல் கவிஞர் மாளிகை மற்றும் எழிலகக் கட்டிடத்திலுள்ள அனைத்து தளங்களிலும், டி 5 ப்ளோரசண்ட் மற்றும் எல்.இ.டி., விளக்குகள் பொருத்தப்படும். மேலும், அனைத்து தளங்களிலும் மின் கசிவு ஏற்படாத வகையில் நவீன ஒயரிங் செய்யப்படும். மின்சாரம் அதிகம் செலவிடாத, அதிக திறன் கொண்ட நவீன மின் மோட்டார்களும் பயன்படுத்தப்படும்.

இதுமட்டுமின்றி, அனைத்து தளங்களிலும் உள்ள மின் கருவிகளை கண்காணிக்கும் வகையில் சென்சார் கருவிகளும் பொருத்தப்பட உள்ளன. இந்தக் கருவிகள் ஆன் லைனில் இணைக்கப்பட்டு, அனைத்து மின் கருவிகளின் செயல்பாடுகளை ஒருங்கிணைந்த மின் சிக்கன கட்டுப்பாட்டு அறைக்கு பதிவுகளை அனுப்பும்.

இதுகுறித்து, தமிழக மின் ஆய்வுத் துறை தலைமை ஆய்வாளர் எஸ். அப்பாவு 'தி இந்து' நிருபரிடம் கூறியதாவது:

நவீன கருவிகளின் செயல்பாடுகள் மற்றும் சென்சார் கருவிகளின் கண்காணிப்புகள் மூலம் சுமார் 40 சதவீதம்வரை, மின்சாரம் வீணாகாமலும், உபரியாகாமலும் சேமிக்க முடியும். சென்சார் கருவிகளின் கண்காணிப்பைப் பயன்படுத்தி, ஆளில்லாத அறைகளில் இயங்கிக் கொண்டிருக்கும் மின்சார கருவிகளைக் கட்டுப்படுத்துதல், பழுதான மின் கருவிகளின் செயல்பாடுகளைத்தடுத்தல் மற்றும் மின் கருவிகளின் சரியான செயல்பாடுகளை அறிவது போன்ற பல்வேறு பணிகளை மேற்கொள்ள முடியும். தமிழகம் முழுவதும் இதுபோன்று மின் சிக்கனத் திட்டத்தை அமல்படுத்தினால், பீக் அவர்ஸ் நேரத்தில், 250 மெகாவாட்டுக்கு மேல் மின் தேவையை குறைக்க முடியும்.

இவ்வாறு அப்பாவு கூறினார்.

இதேபோல் தமிழகம் முழுவதும் மின்சார சிக்கனத்தை, ஒவ்வொரு துறைகளிலும் எப்படி ஏற்படுத்துவது என்பது குறித்த, வழிகாட்டு நெறி முறைகள் விரைவில் கொண்டு வரப்பட உள்ளது.

Courtesy: தி இந்து, தேதி: 18.01.2014

Keep electrical stuff far away from water.
Most electrical accidents around the house happen when people use electricity near water.

CHINA PREPARES FOR BIOFUEL DEMONSTRATION FLIGHT

CHINA - China will be next to conduct a biofuel demonstration flight, with an Air China Boeing 747-700 expected to fly by the end of November on a blend of conventional and hydrotreated renewable jet fuel.

The flight will be conducted under the auspices of a U.S.-China energy cooperation program launched in 2009. A May 2010 agreement between Air China, PetroChina, Boeing and Honeywell company UOP covers the demonstration flight, using fuel derived from biomass grown in China, and evaluation of the potential for establishing a sustainable aviation biofuel industry in China reports *Aviation Week.*

PetroChina provided the biomass, which has been processed into biofuel by UOP and is now being blended with conventional jet fuel for the demonstration flight, Zheng Xingwu, a professor at the Civil Aviation University of China, told the International Civil Aviation Organisation's sustainable fuel workshop in Montreal last week.

Possible raw materials for aviation biofuels identified by the study include jatropha, which is grown in remote valleys and mountain areas in southern and southwest China, and shiny leaf yellowhorn, a native shrub grown in northern China.

Establishing a domestic biofuel supply chain would help meet China demand for jet fuel, which Zheng said is projected to increase to 23.7 million tons in 2015, from 15.3 million tons in 2010, and to 35.8 million tons in 2020. Biofuel would also help Chinese aviation meet its target of reducing CO_2 emissions by 3 per cent a year.

China's demonstration flight comes as several airlines conduct revenue-service trials using the limited supplies of hydro treated renewable jet fuel currently available.

In Mexico, Interjet has launched a year-long program of weekly biofuel flights between Mexico City and San Jose de Costa Rica, using an Airbus A320. The 52-flight campaign began on Sept. 27, 2013, using a blend of 25 per cent camelina-derived biofuel.

The Mexican government's "flight plan" for sustainable aviation biofuels is targeting meeting 1 per cent of national demand (40 million litres a year) by 2015 and 4 per cent (700 million litres a year) by 2020. Candidate feedstocks identified include jatropha, castor, salicornia, agave and algae.

In Brazil, having completed a test flight this year with camelina-derived biofuel, Embraer is now planning a flight in 2012 with a renewable jet fuel produced from sugar cane, using an advanced fermentation process developed by Amyris. The flight will involve an E-Jet operated by Brazilian airline, Azul.

Embraer will collaborate with Boeing and the São Paulo State Research Foundation (FAPESP) on development of a report, to be completed in late 2102, detailing a roadmap to creating a sustainable jet-fuel supply chain in Brazil. Airlines Azul, GOL, TAM and Trip will be advisers.

Work to approve jet fuels produced via the so-called "direct sugar to hydrocarbon" (DSHC) pathway, like the Amyris process, for use in aircraft has begun at standards organisation ASTM International.

DSHC is one of two new production pathways on which ASTM has begun work, aiming for approvals in 2013-15. The other is alcohol-to-jet (AJT), which allows biofuel to be produced from cellulosic feedstocks.

LanzaTech, meanwhile is working on a process to convert industrial CO_2 emissions to biofuel via the AJT pathway. The company has an agreement with Virgin Atlantic Airways, assisted by Boeing, to certify the fuel and conduct the first flights in two to three years.

Courtesy: The Bio Energy Site

ALSTOM TO SUPPLY COMPONENTS TO BHEL FOR NEYVELI NEW THERMAL POWER PROJECT

Alstom has been awarded a contract worth close to €125 million by BHEL to supply components and services for 2X500 MW Neyveli New Thermal Power Project (NNTPP) located at Neyveli in the state of Tamil Nadu in **India**.

Under the scope of the contract, Alstom will co-operate with BHEL in conceptualising, designing, engineering and supplying two tower boilers and the complete lignite milling and firing equipment, and critical components. It will be engineered and manufactured in Alstom's world class facilities in Stuttgart (Germany) as well as in Durgapur and Shahabad (**India**).

Andreas Lusch, Senior Vice President of Alstom's Steam business, said: "The Neyveli project will showcase the leading combustion technologies of Alstom with difficult fuels such as lignite, which we believe has an important part to play in the **India**n energy landscape. Our extensive local manufacturing footprint and resource capability will be mobilised along with BHEL teams to make the project a success."

The 1000 MW greenfield Neyveli New Thermal Power Project (NNTPP) being developed by Neyveli Lignite Corporation Limited, will be the first lignite –fired 2X500 MW power plant in the country and major source of power to the southern states.

Courtesy: Alstom

ANALYSIS OF TRANSFORMER INSULATION BY TAN DELTA TESTING METHOD

This Paper presents analysis of power transformer insulation by one fundamental insulation power factor test, also known as Tan Delta. It is a routine test conducted at site to know the healthiness of insulation in transformers. Out of 108 transformers tested for research work, case studies were chosen for analysis purpose. Experimental data shows our experience on the measurement of Tan Delta techniques of earthing systems and dryness of insulation in transformers. Result shows that the Tan Delta testing method is very efficient method.

1.0 INTRODUCTION

Electrical properties of the insulating system change due to age and continuous electrical street. The principal contributor to the unexpected breakdown of the high-voltage equipment is the insulation failure. Compared to the magnetic, conducting and insulating materials which form the basics of any electrical equipment, the insulating material is more prone to service stresses like thermal stress, electrical stress, mechanical stress, environment stress, etc.

By measuring the electrical properties such as capacitance and Tan Delta regularly on periodical basis, it is possible to ensure the operational unexpected breakdown. Dissipation factor (Tan Delta) is one of the most powerful offline nondestructive diagnostic tool, to monitor the condition of solid insulation of various high-voltage equipments.

Capacitance and Tan Delta values obtained on new insulation are treated as benchmark readings. Then, by measuring and comparing the periodical readings of the capacitance and Tan Delta of the insulating material with the benchmark readings, one can know the rate of deterioration of the health of the insulation [1].

In this paper, main aim of the author is to show that by knowing the rate of deterioration, we can:

a) predict the future unexpected breakdown of the insulation of HV equipment;

b) plan the maintenance schedule;

c) repair the insulation before actual flashover, saving high cost of replacement of material which will reduce the inventory well as delay in procurement at the last minute.

d) After repair, quality of insulation can be checked before returning the equipment to service.

e) We can find out if proper earthing of transformer and core is not established.

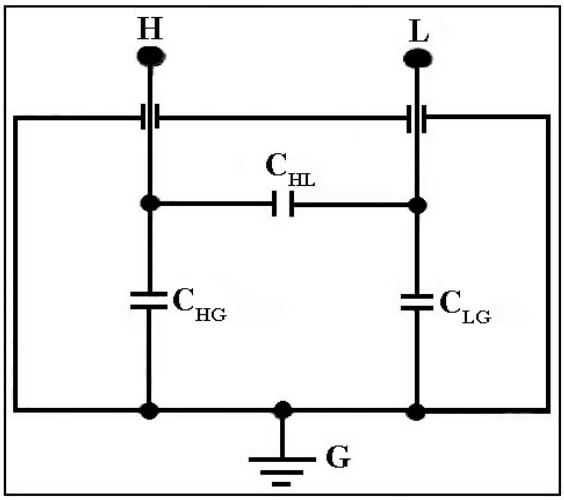


Fig.1: Basic Circuit diagram for three capacitance in transformers

2.0 Basic Theory

Tan Delta is the cotangent of the angle between the applied voltage and current [4], is directly obtained on capacitance-Tan Delta bridge (Figures 1 and 2). Tan Delta is a measure of insulation dielectric loss and not dielectric strength. Tan Delta of insulation depends on water content and impurities [3].

Hence, we can say that Dissipation Factor = tan δ = Ir/Ic

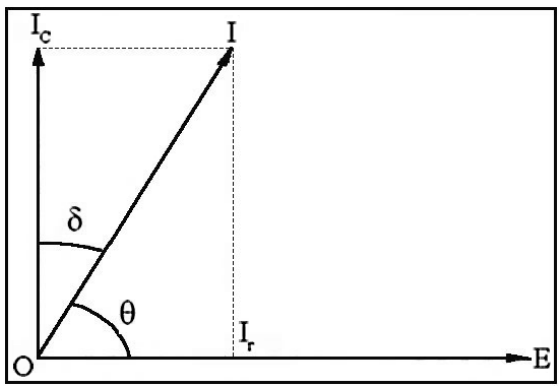


Fig.2: Vector Diagram

3.0 TYPE OF TEST KIT USED FOR RESEARCH WORK

For research work, 108 transformers were tested through Delta-3000 Megger-sweaden make test kit [9] below Figure 3 shows control unit for Delta-3000 Test kit.

Following test mode used for testing [2]: a) UST: Ungrounded Specimen Testing; b) GST: Grounded Specimen Testing c) Guard mode

4.0 EQUIVALENT CIRCUIT FOR POWER TRANSFORMER

The Tan Delta Dissipation factor test conducted according to the clause No. 10.10.3 in ANSI C 57 12.90. DF is very sensitive to temperature. DF (Tan Delta) values do not change with applied voltage. The reference temperature commonly used is 20° average oil temperature and ambient temperature are recorded while testing. In case of oil- filled transformers according IEEE-62 1995 [6] power factor between 0.5 % and 1.0 % may be acceptable; however, power factor >1.0 % should be investigated. Values of Correction Factor K are listed below in Table 1 [7].

Factors affecting measurements of Tan Delta are:

1. Oxidation, free water, wet particles, contaminations and material incompatible are all possible sources of high Tan Delta

2. Design characteristics of transformer main factors of high Tan Delta

3. Wrong connection and measurements

Tan Delta measurement should be regarded as a diagnostic tool to evaluate the condition of insulation. However, there are many factors contributing high Tan Delta. In most of cases, excessive moisture in insulation and dry out processes affecting Tan Delta. But attached case studies are mainly focusing on very important factor, i.e. earthing condition and insulation. It also includes loose earthing connection, open grounding and wrong grounding method [1].

Figure 4 shows equivalent circuit diagram for two phase winding transformers.

5.0 CASE STUDIES

Out of 108 transformers Tan Delta tested, completed five transformer case studies were chosen for analysis purpose.

5.1 Case Study 1

Transformer Rating: 20 MVA, 33/6.9 kV

Above transformer is tested on 21/12/2010 for Tan Delta test and Tan Delta value was found to be much higher of CHG mode for both 2 kV and 5 kV as given in Table 2, all other values, found satisfactory and within limit according to IEEE-62 1995.

Fig.3: DELTA 3000 Test kit megger

TABLE 1

CORRECTION FACTOR AS PER IEEE C57 12.90

Test Temperature(°C)	Correction Factor K
10	0.80
15	0.90
20	1.00
25	1.12
30	1.25
35	1.40
40	1.55
45	1.75
50	1.95
55	2.18
60	2.42
65	2.70
70	3.00

TABLE 2

TAN DELTA TEST RESULTS FOR CASE STUDY 1

Sl.No	Insulation Mode	Test voltage (kV)	%PF
1	CHL	2	0.32
2	CHL	5	0.33
3	CHG	2	0.91
4	CHG	5	0.94
5	CLG	2	0.42
6	CLG	3	0.41

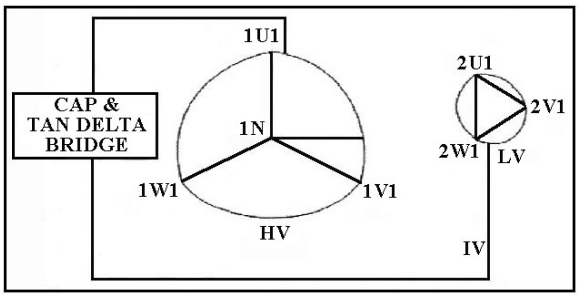


Fig.4: Equivalent Circuit

After that, it is required to test transformer drying out process to check whether transformer oil is contaminated or not. After necessary testing like oil test [8, 5], insulation resistance test with polarization index was conducted and found satisfactory according to IS: 1866-2005 [5]. Test results are shown in Table 3.

TABLE 3

OIL TEST AND IR-PI TEST FOR CASE STUDY 1	
BDV(kV)	70.2
Water content (PPM)	18
IFT(mN/m)	38
NN(mg KOH/g)	0.021
Resistivity (ohm-cm)	13.15
PF at 90°C	0.02
Flash point(°C)	156

Table 4 shows IR and PI test results, which also show healthiness of transformer.

TABLE 4

IR AND PI TEST RESULTS FOR CASE STUDY 1			
Top Oil temp		**39°C**	
Combination	60 Sec	600 Sec	PI
HV to LV	12.5 G-ohms	18.0 G-ohms	1.44
HV to earth	9.2 G-ohms	12.0 G-ohms	1.30
LV to earth	5.0 G-ohms	7.0 G-ohms	1.40

After that, it was decided to run this transformer normally and above transformer is retested on 15/11/2011, almost after one year and test value is found almost equal as compared with earlier results. Tan Delta test values are shown in below Table 5.

TABLE 5

RETESTED TAN DELTA TEST RESULTS FOR CASE STUDY 1			
Sl.No	**Insulation mode**	**Test voltage**	**%PF**
1	CHL	2	0.32
2	CHL	5	0.33
3	CHG	2	0.94
4	CHG	5	0.97
5	CLG	2	0.42
6	CLG	3	0.41

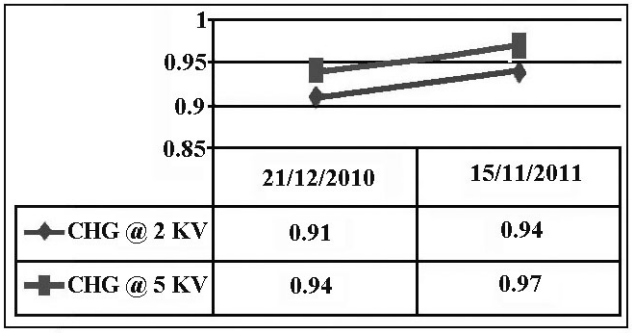


Fig.5: Tan delta value for CHG at 2 kV and 5 kV

Hence, basically Tan Delta is a comparison method, so here during one year of span, the rate of increase of Tan Delta is much lower as given in Figure 5. So this transformer may be run as normal and yearly Tan Delta value shall be investigated.

5.2 Case Study 2

Transformer Rating: 31.5 MVA, 110/11 kV

Above transformer was tested as a part of routine test. Capacitance and Tan Delta test were performed along with other low-voltage electrical tests and SFRA. SFRA and other electrical tests were indicative of normal condition of the transformer. While C and TD test data were not looking normal, decrement in capacitance and abnormal Tan Delta values (negative) were observed. Below Table 6 shows test results for case study 2.

This being a new transformer, it was expected that Tan Delta test values will be found below 0.5 %. However, Tan Delta values of high-voltage winding were at 1 % while that of a low-voltage winding was much higher at over 8 %. Inter-winding insulation exhibited negative Tan delta values.

Above transformer is opened at workshop and core earthing was found poor. The same was rectified and Tan Delta test was repeated and a comparison of the test data was made. Change in Tan Delta values of all the three winding configuration became normal and less than 0.5 %.

TABLE 6

TAN DELTA TEST RESULTS FOR CASE STUDY 2			
Sl.No	**Insulation mode**	**Test voltage kV**	**%PF**
1	CHL	5	-0.1
2	CHL	10	-0.12
3	CHG	5	1.09
4	CHG	10	1.09
5	CLG	2	8.51
6	CLG	6	8.52

Table 7 Shows Tan Delta values before rectification and after rectification.

Figure 6 shows graphical representation of results for before fault rectification.

Figure 7 shows core earthing assembly.

5.3 Case Study 3

Transformer Rating: 10 MVA, 66/11.5 kV

The transformer was scheduled for maintenance work, e.g. replacement of gaskets, arrest of oil leak and replacement of insulating oil, etc. Capacitance and Tan

Delta test as well as other electrical tests were performed prior to the maintenance work. Tan Delta was to be followed up after the repair work on the transformer. Tan Delta values found much higher than limit. Tan Delta test results were indicative of deteriorated condition of the dielectric given in Table 8.

TABLE 7

TAN DELTA TEST RESULTS FOR CASE STUDY-2 AFTER RECTIFICATION OF PROBLEM			
Insulation mode	**Test voltage kV**	**%PF before rectification**	**%PF after rectification**
CHL	5	-0.1	0.18
CHL	10	-0.12	0.18
CHG	5	1.09	0.88
CHG	10	1.09	0.88
CLG	2	8.51	0.84
CLG	6	8.52	0.83

TABLE 8

TAN DELTA TEST RESULTS FOR CASE STUDY 3			
Sl.No.	**Insulation mode**	**Test voltage kV**	**%PF**
1	CHL	5	2.22
2	CHL	10	2.22
3	CHG	5	3.94
4	CHG	10	3.94
5	CLG	2	3.69
6	CLG	6	3.69

TABLE 9

TAN DELTA TEST RESULTS FOR CASE STUDY 3 AFTER NECESSARY FILTRATION AND REPAIRING			
Insulation mode	**Test voltage kV**	**%PF before rectification**	**%PF after rectification**
CHL	5	2.22	0.95
CHL	10	2.22	0.95
CHG	5	3.94	1.27
CHG	10	3.94	1.27
CLG	2	3.69	0.81
CLG	6	3.69	0.81

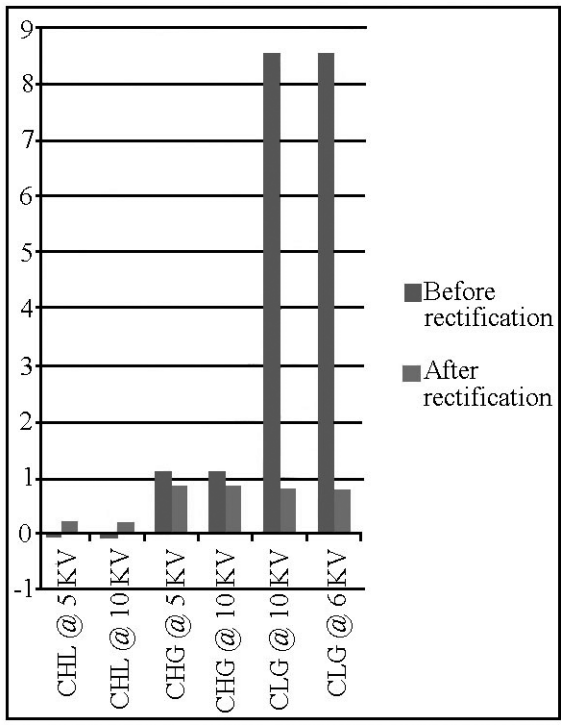


Fig.6: Tan delta values for before rectification and after rectification for case study 2

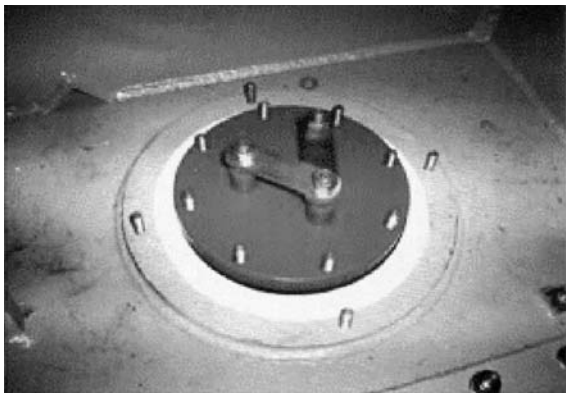


Fig.7: Poor core earthing for case study 2

Tan Delta value of high-voltage winding was at 2.22 %, while that of a low-voltage winding was, at over 3.69 %, and value of inter winding was also 3.94 %. The above Tan Delta values were measured before oil filtration.

Tan Delta test was repeated after repairing and oil filtration on the transformer. Visible improvement in Tan Delta values were seen in test results, as there was an improvement in the condition of dielectric.

Table 9 shows Tan Delta test values after necessary filtration and overhauling.

Figure 8 shows the graphical comparison for Tan Delta values before and after repairing and rectification.

5.4 Case Study 4

Transformer Rating: 42 MVA, 132/11 kV.

During testing above transformer, influence of external connection is observed.

Above transformer was tested as a part of routine test. Tan Delta test was performed along with other low-voltage electrical tests. This being a new transformer, it was expected that Tan Delta test values will be found below 0.5 %. Other electrical tests were indicative of comparable condition of the transformer. While Tan Delta values were marginally higher than factory value. Table 10 shows test results for case study-4.

TABLE 10

TAN DELTA TEST RESULTS FOR CASE STUDY 4			
Sl.No	**Insulation mode**	**Test voltage kV**	**%PF**
1	CHL	5	0.98
2	CHL	10	0.98
3	CHG	5	0.78
4	CHG	10	0.78
5	CLG	2	0.52
6	CLG	6	0.52

Tan Delta test was performed by disconnecting all the lead at bushings of primary and secondary windings. But disconnection at neutral lead was done near to the ground level, instead of at the terminal of neutral bushing. This way the additional capacitance of support insulators featured in overall measurement of the winding's capacitance. Figure 9 shows neutral connection at the end of transformer tank.

Lead at neutral was removed as shown in Figure 10 from the bushings terminal and the test was repeated. Test data exhibited decrement in the measured capacitance, as the support insulates were excluded from the measurement.

A major reduction in Tan Delta values was also seen in CH reading, as the support insulators with dirty surfaces were excluded from the measurements.

Table 11 shows comparison of Tan Delta value before and after rectification of problem.

Figure 11 shows graphical comparison for Tan Delta values before and after repairing and rectification.

5.5 Case Study 5

Transformer Rating: 4 MVA, 33/6.9 kV.

Above transformer is tested on 21/03/2011 for Tan Delta test and Tan Delta values were found much higher than CHL, CHG and CLG mode for both 2 kV and 5 kV as shown in Table 12.

Now, according IEEE-62 1995 power factor between 0.5 % and 1.0 % (20°C) may be acceptable; however, power factor> 1.0 % should be investigated.

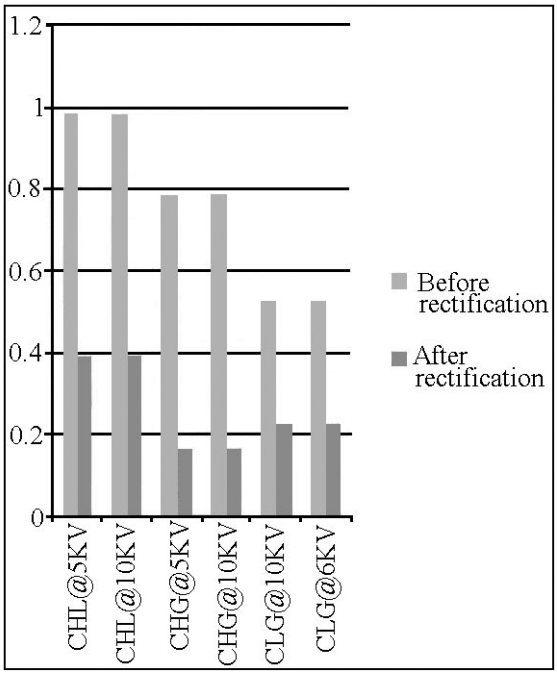


Fig.8: Graphical representation for case study 3

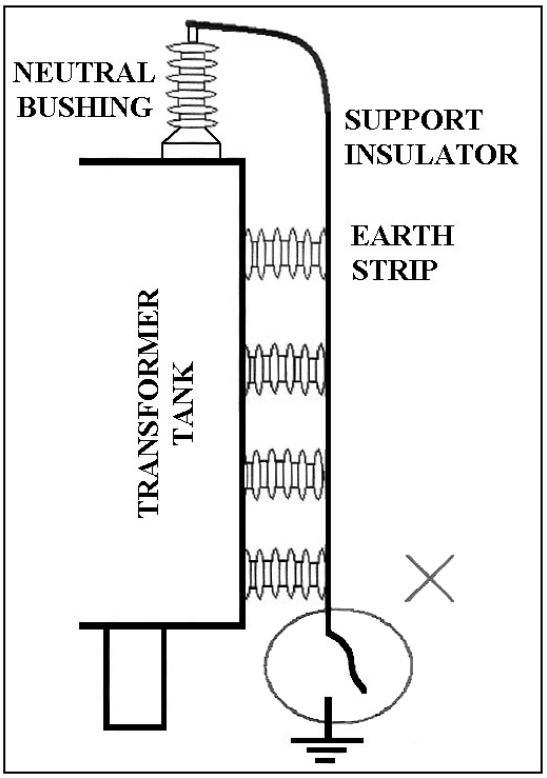


Fig.9: Neutral Connection removed at bottom of transformer tank

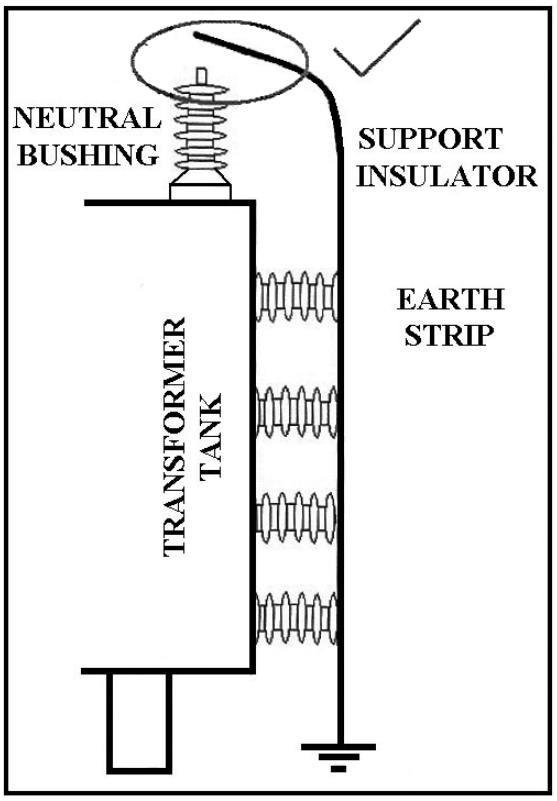


Fig.10: Neutral Connection removed at top of transformer tank

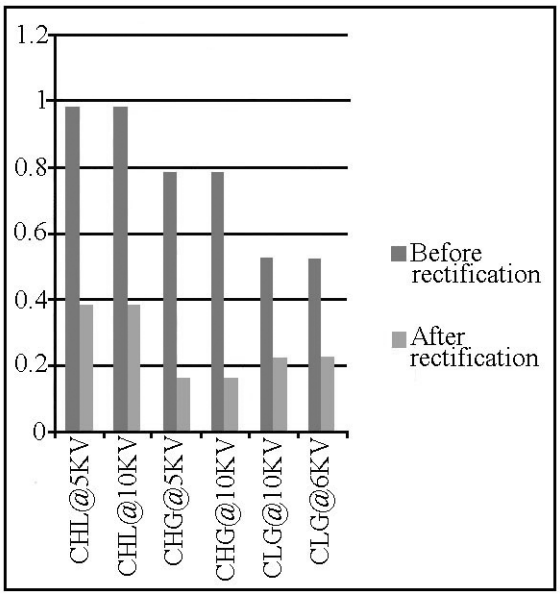


Fig.11: Graphical Representation for case study 4

TABLE 11

TAN DELTA TEST RESULTS FOR CASE STUDY 4 AFTER NECESSARY CORRECTION IN NEUTRAL CONNECTION			
Insulation	**Test voltage kV**	**%PF before rectification**	**%PF after rectification**
CHL	5	0.98	0.39
CHL	10	0.98	0.39
CHG	5	0.78	0.16
CHG	10	0.78	0.16
CLG	2	0.52	0.22
CLG	6	0.52	0.22

TABLE 12

TAN DELTA TEST RESULTS FOR CASE STUDY 5			
Sl.No	**Insulation mode**	**Test voltage kV**	**%PF**
1	CHL	2	3.2
2	CHL	5	4.02
3	CHG	2	31.1
4	CHG	5	51.1
5	CLG	2	68.7
6	CLG	3	78.9

After that, it is required to test transformer drying out process to check whether transformer oil is contaminated or not. After necessary testing like oil test, insulation resistance test with polarization index was conducted and found unsatisfactory according to IS: 1866-2005. Test results are shown in Table 13.

TABLE 13

OIL TEST AND IR-PI TEST FOR CASE STUDY 5	
BDV(kV)	15
Water content(PPM)	200
IFT(mN/m)	32
NN (mg KOH/g)	0.023
Resistivity (ohm-cm)	15.8
PF at 90°C	0.5
Flash point (°C)	164

The hardest part about being too strong is that nobody might care to ask if you hurt.

Table 14 shows IR and PI test results, which also shows healthiness of transformer.

TABLE 14

IR AND PI TEST RESULTS FOR CASE STUDY 1			
Top oil temp		**39°C**	
Combination	**60 Sec**	**600 Sec**	**PI**
HV to LV	140 M-ohms	125 M-ohms	0.89
HV to earth	85 M-ohms	69 M-ohms	0.81
LV to earth	22 M-ohms	15 M-ohms	0.68

From above Table 14 oil contamination test result and IR and PI test result it is observed that PI values and also other oil test results were found to be very poor.

Hence, this transformer was opened at our workshop and after physical verification of core assembly, heavy water and other contaminations were observed between HV and LV windings. After necessary cleaning and heating cycle in oven, moisture content and other particles were removed and again Tan Delta test and other test were performed and results were found to be satisfactory as per Table 15.

TABLE 15

RETESTED TAN DELTA TEST RESULTS FOR CASE STUDY 5			
Sl.No	**Insulation mode**	**Test voltage kV**	**%PF**
1	CHL	2	0.42
2	CHL	5	0.43
3	CHG	2	0.72
4	CHG	5	0.76
5	CLG	2	0.56
6	CLG	3	0.57

Figure 12 shows visual inspection of core assembly.

Fig.12: Visual inspection of core assembly

Figure 13 shows graphical comparison for Tan Delta value of case study 5.

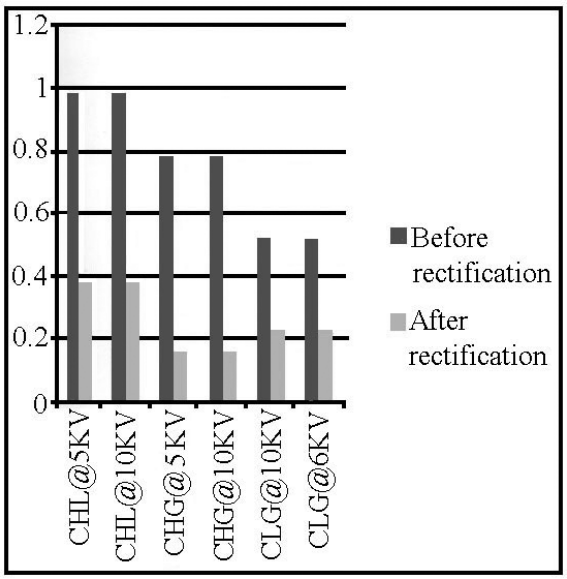


Fig.13: Graphical Representation for case study 4

6.0 CONCLUSIONS

Tan Delta testing of transformer is an integral part of condition assessment at factory and at site for routine testing. Tan delta testing is actually comparison method. From above all case studies, conclusion is derived that from Tan Delta testing we can analyze transformer insulation condition and condition of grounding connection of transformer.

By measuring the electrical properties such as capacitance and Tan Delta regularly on periodical basis, it is possible to ensure the operational unexpected breakdown. Dissipation factor (Tan Delta) is one of the most powerful offline nondestructive diagnostic tools to monitor the condition of solid insulation of various high-voltage equipment.

ACKNOWLEDGMENT

It is a matter of extreme honor and privilege for me to offer my grateful acknowledgment to my guide Prof. H.R. Jariwala for providing me a chance to work under their guidance and supervision, assisting with all kinds of support and inspiration and valuable suggestions. I am also thankful to Essar Corporate University for financial support for this research work.

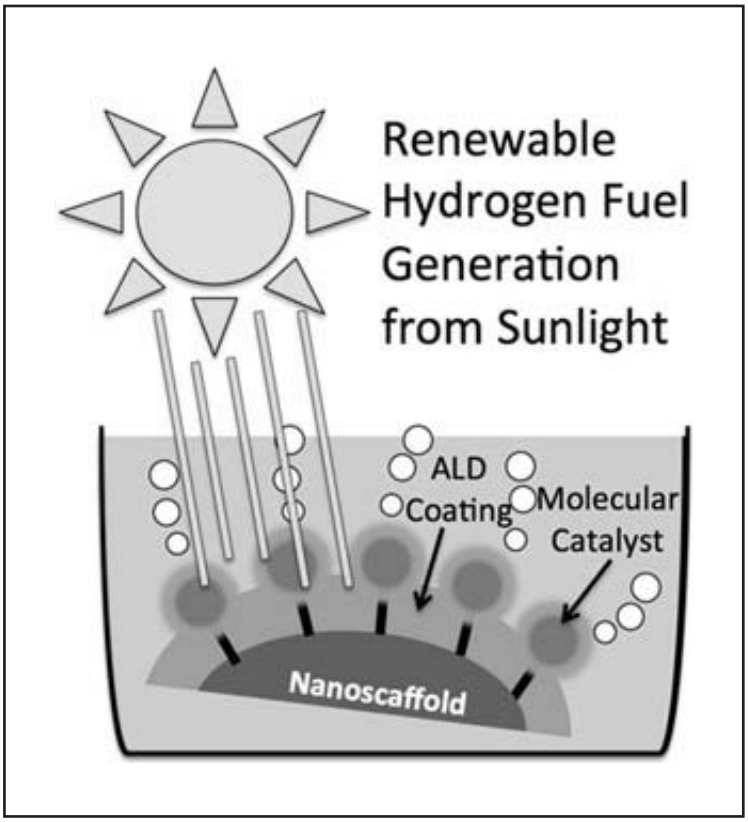
Courtesy: Dipak Mehta and Hitesh R Jariwala, CPRI Journal, March 2012

NANOSCALE COATINGS IMPROVE STABILITY AND EFFICIENCY OF DEVICES FOR RENEWABLE FUEL GENERATION

Splitting water into its components, two parts hydrogen and one part oxygen, is an important first step in achieving carbon-neutral fuels to power our transportation infrastructure – including automobiles and planes.

Now, North Carolina State University researchers and colleagues from the University of North Carolina at Chapel Hill have shown that a specialized coating technique can make certain water-splitting devices more stable and more efficient. Their results are published online this week in two separate papers in the *Proceedings of the National Academy of Sciences*.

Atomic layer deposition, or "ALD," coats three-dimensional structures with a precise, ultra-thin layer of material. "An ALD coating is sort of like the chocolate glaze on the outside of a Klondike bar – just much, much thinner," explains Dr Mark Losego, research assistant professor of chemical and biomolecular engineering at NC State and a co-author on the work. "In this case, the layers are less than one nanometer thick – or almost a million times thinner than a human hair."



A graphic representation of how atomic layer deposition can aid renewable hydrogen fuel generation. Two papers published in Proceedings of the National Academy of Sciences show how atomic layer deposition can make water-splitting devices more stable and more efficient.

Although extremely thin, these coatings improve the attachment and performance of surface-bound molecular catalysts used for water-splitting reactions in hydrogen-fuel-producing devices.

In the first paper, *Solar water splitting in a molecular photoelectrochemical cell*, the researchers used ALD coatings on nanostructured water-splitting cells to improve the efficiency of electrical current flow from the molecular catalyst to the device. The findings significantly improved the hydrogen generating capacity of these molecular-based solar water-splitting cells.

In the second paper, *Crossing the divide between homogeneous and heterogeneous catalysis in water oxidation*, the researchers used ALD to "glue" molecular catalysts to the surface of water-splitting electrodes in order to make them more impervious to detachment in non-acidic water solutions. This improved stability at high pH enabled a new chemical pathway to water splitting that is one million times faster than the route that had been previously identified in acidic, or low pH, environments. These findings could have implications in stabilizing a number of other molecular catalysts for other renewable energy pathways, including the conversion of carbon dioxide to hydrocarbon fuels.

"In these reports, we've shown that nanoscale coatings applied by ALD can serve multiple purposes in water-splitting technology, including increasing hydrogen production efficiency and extending device lifetimes," Dr Losego said. "In the future, we would like to build devices that integrate both of these advantages and move us toward other fuels of interest, including methanol production."

NC State's Gregory Parsons, Alcoa Professor of Chemical and Biomolecular Engineering, and Ph.D student Berc Kalanyan co-authored both papers with Dr Losego. Thomas J. Meyer, the Arey Distinguished Professor of Chemistry at UNC-Chapel Hill, is the corresponding author on both papers; UNC researchers Dr Aaron K. Vannucci and Dr Leila Alibabaei were leading authors. The research was funded by the US Department of Energy, the Research Triangle Solar Fuels Institute and the University of North Carolina Energy Frontier Research Center.

Courtesy: Bio Energy Site : http://www.thebioenergysite.com

RENEWABLE ENERGY DEVELOPMENT IN INDIA

Interview with IEEMA, Mr Ratan P Watal IAS, Secretary, Ministry of New and Renewable Energy, Govt. of India

In this interview with IEEMA, **Mr Ratan P Watal IAS, Secretary, Ministry of New and Renewable Energy, Govt. of India** talks about renewable energy development in India, initiatives taken by MNRE for R&D, objectives of National Solar Mission, Wind energy projects in India, etc.

Q. The wind energy sector deserves incentives. Sir, we would like to know your views on the same.

A. The Ministry of New and Renewable Energy Sources is targeting a capacity addition of 15000 MW from wind during the 12th Plan Period. Traditionally, to support wind sector, Government of India has been providing Accelerated Depreciation. This was continued till the end of 11th Plan Period. The Ministry introduced Generation Based Incentive (GBI) to attract IPPs invests in the wind sector. It is estimated that there would be a requirement of about Rs 800 crore to support the wind sector during 2013-14 for the liabilities created from the proposed GBI during 2013-14. Keeping in view the target for the 12th Plan and limited availability of financial resources, we are advocating availability of both Accelerated Depreciation and Generation Based Incentives.

Q. What is MNRE'S strategy for encouraging local manufacturing of solar power equipment? Do you think solar Power will suit Indian society? What is the potential of Solar Power in India? What is the capacity addition plan during 12th Plan?

A. India is a tropical country and most part of our country receives sunshine for over 300 days in a year. The average potential of generating power from solar energy is 30-50 MW per sq. km. We have estimated a solar power potential of over 100,000 MW. However, it could be much more depending upon availability of land area. We are targeting a capacity addition of 10,000 MW from solar energy during the 12th Plan Period. I strongly feel that solar power is quite suitable for our country and it can play a vital role specifically in remote areas and decentralized applications. The Ministry would continue to support local manufacturing of solar systems.

Q. What is the status and update on the National Mission on biomass? Sir, would you please brief about "green initiatives in SEZ"? What is the idea behind concept?

A. The Ministry is conceptualizing National Bio-energy Mission in lines with the Jawaharlal Nehru National Solar Mission to accelerate the pace of implementation for tapping available surplus biomass resources such as agro-waste, agro-industrial waste, forestry residues and wastes for meeting various energy needs. Raising of dedicated energy plantations linked with energy generation on degraded land, energy recovery from wastes, cogeneration will also be given thrust in the mission. The Bio-energy Mission is aiming to create a policy and regulatory environment to enable rapid and large-scale capital investment in biomass energy applications and encourages development of rural enterprises for project development and sustainable operation of rural energy systems.

Q. IREDA, Indian Renewable Energy Development Agency Limited, is playing a very significant role for the development and promotion of renewable Energy. Would you please highlight its achievements?

A. IREDA is a non-banking financial institution dedicated for supporting the renewable energy sector. It has been providing soft loans to various renewable energy projects. The credit of development of large scale commercial renewable energy projects can definitely be attributed to IREDA which has opened new road in almost all renewable energy technologies. As a result today a large number of banks and financial institutions are venturing into providing financial support to the renewable energy sector.

Q. What are the projects taking shape under Jawaharlal Nehru National Solar Mission? What are the main objectives and main aim of this mission? How it will help to develop and improve power sector in India? What is the current Status of National Solar Mission?

A. The Jawaharlal Nehru National Solar Mission, which is aiming at adding 20,000 MW solar power capacity in the country by 2022, is now under implementation. The Phase-I of the Mission is now complete and solar power capacities of 1686 MW have been installed in the country. One of the objectives of the Mission has been to reduce and bring the cost of solar power generation to grid parity levels. In the competitive solar tariff bidding held in November 2011, the tariffs quoted are about 50% less than they were at the onset of JNNSM in January

2010. The Phase II of JNNSM has now started from 1st April 2013. As part of this, we are targeting a capacity addition of 9000 MW from solar projects.

Q. Will you please brief about Institutional, Community, Night Soil Biogas Plant Programme of Ministry of Renewable Energy? What are the incentives and subsidies allotted to States in the Country? What is current status of Bio Mass Energy Programme?

A. Bio-energy is an important area and can meet energy requirements of our rural areas in a most effective manner. Rural areas are tuned to handle bio-materials and can very effectively utilization biomass for meeting their energy requirements. While on one side, the Ministry is encouraging industry to adopt co-generation strategy, it is also promoting energy and electricity generation in remote villages using biomass and biogas. Biomass gasification is proving to be an effective solution in villages for meeting their electrical requirements. We are aiming towards capacity addition of about 2000 MW from grid connected biomass power projects and almost the same quantum from off-grid biomass applications during the 12th Plan.

Q. According to you sir, which States are very active and progressive in Renewable Energy Sector?

A. Different States have strength in different renewable energy areas. The State of Tamilnadu has highest installed capacity in wind. Karnataka and Himachal Pradesh have strength in Small Hydro, Gujarat and Rajasthan are among the leading States in Solar Energy area. All these States have very promising policy environment to promote renewable energy.

Q. What are the programmes initiated for Human Resource Development in the area of solar energy by MNRE? Do you feel that sufficient skilled human resources are available for development of renewable energy sector?

A. The Ministry has dedicated programme for human resource development in the renewable energy sector as a whole and solar in particular. We support various academic institutions, IITs, ITIs and encourage them to have dedicated curriculum for renewable energy. Now a large number of engineering institutions provide specialized courses in energy and renewable energy. We have involved IITs in providing training on various aspects of solar energy. IIT Mumbai is specifically running courses on solar energy. IIT Roorkee is providing M.Tech Degree in small hydro. We are also now engaging various business schools including IIM Ahmadabad to run courses on entrepreneurship development in the renewable energy.

Q. MNRE is implementing a programme on energy recovery from urban and Industrial waste, what is a current status of the same and how much power can be generated by implementing the same?

A. Waste to energy is another important area where the Ministry is now making its efforts for a large scale deployment of such projects. In his budget speech of 2013-14, Hon'ble Finance Minister has specially mentioned about involving Municipal Corporations to set up waste to energy projects. While this is the mandate of Municipal Corporations, our Ministry would set up some pilot projects with innovative concepts. So far about 200MW capacity waste to energy projects in different industries have been set up in the country.

Q. Do you feel that renewable energy technology which is of specific nature, is available in India? What is your opinion on the capability of Indian Electrical and Power equipment manufacturers? Do you feel that Indian manufacturers can cater the need of equipments for MNRE programmes?

A. I agree that renewable energy requires specific technologies. I am happy to inform you that we have indigenously developed state-of-the-art technologies in almost all renewable energy areas. This has been achieved with industrial joint ventures and indigenous inputs. Our Indian equipments for wind, small hydro and biomass are State-of-the-art and are also exported. I see a very big role of Indian electrical and power equipment manufacturers in taking these technologies to the next level, as we are now on the threshold of breaking even with conventional power and now power from renewable energy is almost at par with conventional sources.

Q. What are the initiatives taken by MNRE for Research, Design and Technology Development?

A. The MNRE gives focused attention on research and development of various renewable energy technologies. The Ministry spends about 15% of its budget on R&D activity. Focus areas have been identified in each technology

and coordinated research projects are given to various national scientific and academic institutions. On solar energy, the main focus of research is on high efficiency single crystal solar cells, thin film solar cells and development of new materials. On wind energy the target is development of higher capacity wind turbines with higher hub heights. The Ministry is also supporting activities of developing low head small hydro turbines and velocity turbines for micro hydel projects. Simultaneously we are also working on new technologies like hydrogen energy, fuel cells and related areas.

Q. What are your views on Renewable Energy Development in India?

A. Renewable energy sector in India has already emerged as a significant player in the grid connected power generation and is an essential player for energy access. Renewable energy is supporting the government agenda of 'sustainable and inclusive growth' and is part of the solution to meet the nation's energy needs. The Ministry of New and Renewable Energy, Government of India is the nodal Ministry at Federal level to deal with all policy matters relating to Renewable Energy. It is aiming towards addressing issues for accelerated exploitation of renewable energy potential in the Country and actively participating in the National Action Plan on Climate Change.

There has been a visible impact of renewable energy in the Indian energy scenario during last 3-4 years. Apart from contributing about 12.5% in the national electric installed capacity, renewable energy based decentralized and distributed applications have benefited millions of people in Indian villages by meeting their cooking, lighting and other energy needs in an environment friendly manner. The social and economic benefits include reduction in drudgery among rural women and girls engaged in the collection of fuel wood from long distances, employment generation at village level and ultimately improvement in the standard of living and creation of opportunity for economic activities at village level.

Renewable energy has been witnessing over 20% growth in the last four years. From the total renewable power installed capacity of 14,400 at the beginning of the year 2009, it reached to a capacity of 26,670 MW at the end of 2012. Wind energy continues to dominate India's renewable energy industry, accounting for 70% of installed capacity (18,420 MW), followed by biomass power (3,584 MW), small hydropower (3,496 MW) and solar power (1,176 MW). In terms of electricity generation, the renewable power installed capacity is generating around 55 billion units per year corresponding to about 6.5% in the total electricity mix.

Renewable energy sector landscape in India has witnessed a sea-change during last 4 years through tremendous changes in the policy with accelerated and ambitious plans to increase the contribution of solar energy. For the first time perhaps, not only is there a perception that renewable energy can play a major role as also there is a confidence in the technologies and capacity to do so. The launching of the Jawaharlal Nehru National Solar Mission symbolizes both and indeed encapsulates the vision and ambition for the future. This transformational change is perhaps the highlight of the last 4 years of activities. In addition, the launching of Renewable Energy Certificate (REC) mechanism helps in the creation of a Pan-India renewable energy market. The other significant achievements are introduction of solar specific purchase obligations; launching of improved cook-stoves initiatives; initiating coordinated research and development activities in solar PV and thermal; second generation biofuels, hydrogen energy and fuel cells, etc.

India's renewable energy programme is driven primarily by significant private sector driven investment and business opportunities that now exceed US $4 billion per year. Indian companies have begun to explore foreign stock exchanges as a source of funds. The vibrancy in the renewable energy industry could, to a large extent, be attributed to conducive policies and continuous facilitation by the Government. A large domestic manufacturing base has been established in the country for renewable energy systems and products. Companies investing in these technologies are eligible for fiscal incentives, tax holidays and depreciation allowance apart from the remunerative returns for the power fed into the grid. Further, the Government is encouraging foreign investors to set up renewable power projects with 100 percent foreign direct investment.

Access to modern energy is one of the major areas of concern. Census of India 2011 indicates that access to electricity stands at only around 55 per cent of the rural households (92.8 million households out of 167.8 million rural households). Firewood, crop residue and dung cake continues to be the most important source of energy used for cooking in India, with around 86 per cent of the rural households' dependent upon it. In addition, 23.2 per cent of urban households still rely on traditional fuels to meet their cooking needs. India's action towards sustainable energy has so far been driven by national priorities. Almost the entire expenditure in energy access programmes has come from national resources. Lack of electricity access is a concern. Over the next few years, decentralised distributed renewable energy based initiatives of communities is likely to make a profound impact in some areas of the country, providing electricity to rural communities, contributing a substantial portion of such capacity.

Renewable energy has a central place in India's National Action Plan on Climate Change with National Solar Mission as one of the key mission. Further, with well-developed industrial, financing and business infrastructure,

India is perceived as an excellent country for developing Clean Development Mechanism (CDM) projects. Currently, with 789 projects out of 938 projects, renewable energy projects constitutes largest share in the registered CDM projects. The Indian Renewable Energy Programme has received wide recognition internationally in recent years. Many countries have evinced interest in cooperation with India for promotion of new and renewable energy. India has considerable expertise and experience in promoting renewable energy both grid interactive as well as off grid / standalone applications for meeting electrical energy needs. India has been interacting with several developed and developing countries for cooperation in new and renewable energy sector. Bilateral and multilateral cooperation frameworks have been established for cooperation with 22 countries.

Q. India has got huge Water resources, what initiatives are taken up by MNRE for Research and Development in SHP projects? What is a current status of small hydro power projects in India? How much power is generated through these projects? What is future planning for promoting small hydro power projects in India? Do you have any R&D on Tidal Power generation?

A. The Ministry is responsible for small hydro projects up to 25 MW station capacity. So far over 950 small hydro projects aggregating to 3600 MW have been set up in the country. A large part of these projects are being set up by the private sector. The Ministry is now making efforts to get developed SHP projects for ultra low head and also for using velocity of the river to generate power. The R&D in small hydro area is directed towards addressing these issues. Today it has reached about 300 MW of capacity addition per year. We are expecting this would touch 500 MW per year by the end of 12th Plan. For small hydro projects we are greatly dependent on the State Governments as water is State subject. However, we are regularly interacting with the States and insisting on regular monitoring the projects for faster implementation and providing clearances in a time bound manner.

Q. What is a current status of wind energy generation projects in India? What will be the focus of the R&D unit of C-WET (Center for Wind Energy Technology) on the innovations in development of components as well as subsystems of wind turbines in association with other R&D Institutions and Industry? What are the initiatives taken by MNRE to promote Wind Energy Generation in the Country?

A. Today the total installed capacity of wind in the country is over 19,000 MW. We are targeting a capacity addition of 15,000 MW from wind during the 12th Plan period through suitable policy interventions. R&D in wind energy sector is directed towards large size wind turbines with higher hub height and off shore wind generation. C-WET has been vested with the responsibility of vetting the design documents of large Wind turbines as part of its mandated activity to certify large Wind Turbines and to perform this activity the centre has acquired expertise both in design verification as well as conducting tests to validate the design analysis. This expertise is to a large extent usable in the areas of wind turbine design, erection and commissioning. C-WET has also become the Certifying body in India recognised by the Government of India. Significant R&D infrastructure has been built up by C-WET and the R&D Unit of C-WET co-ordinates Research and Development programmes through effective networking with Academic Institutions, Industry, experts and consultants working in the wide spectrum of disciplines for the benefit of wind energy sector.

Q. What will be the role of panel of experts appointed by MNRE for R&D Projects of your Ministry? Which are the new proposals suggested by panel?

A. Each technology area has a panel of experts advising the Ministry on identification of sub-areas of research in a particular technology. They identify areas, potential research groups and develop a co-ordination among the groups. They also help the Ministry in examining the proposals received for support for R&D activity. The expert panel monitors performance of each R&D project and help in developing future areas of research. They also advice our R&D centers for taking up some demonstration activities and co-ordination with industry.

Q. What is your advice to IEEMA and its Members? How IEEMA Members can help to promote Renewable Energy in the Country?

A. IEEMA should give encourage and give boost to Renewable Energy Equipment Sector. It is a positive step taken by IEEMA by introducing Renewable Energy Division. MNRE Dept, Govt. of India will help IEEMA for any information required.

IEEMA Journal and ELECRAMA are quality services of IEEMA for betterment of Indian Power Sector.

Interview by Mr Rajeev N Ketkar,
Courtesy: Ieema Journal, July 2013

ALGAE TO CRUDE OIL: MILLION-YEAR NATURAL PROCESS TAKES MINUTES IN THE LAB

Engineers have created a continuous chemical process that produces useful crude oil minutes after they pour in harvested algae.

The research by engineers at the Department of Energy's Pacific Northwest National Laboratory was reported recently in the journal Algal Research. A bio-fuel company, Utah-based Genifuel Corp., has licensed the technology and is working with an industrial partner to build a pilot plant using the technology.

In the PNNL process, a slurry of wet algae is pumped into the front end of a chemical reactor. Once the system is up and running, out comes crude oil in less than an hour, along with water and a byproduct stream of material containing phosphorus that can be recycled to grow more algae.

With additional conventional refining, the crude algae oil is converted into aviation fuel, gasoline or diesel fuel. And the waste water is processed further, yielding burnable gas and substances like potassium and nitrogen, which, along with the cleansed water, can also be recycled to grow more algae.

While algae has long been considered a potential source of bio-fuel, and several companies have produced algae-based fuels on a research scale, the fuel is projected to be expensive. The PNNL technology harnesses algae's energy potential efficiently and incorporates a number of methods to reduce the cost of producing algae fuel.

"Cost is the big roadblock for algae-based fuel," said Douglas Elliott, the laboratory fellow who led the PNNL team's research. "We believe that the process we've created will help make algae bio-fuels much more economical."

PNNL scientists and engineers simplified the production of crude oil from algae by combining several chemical steps into one continuous process. The most important cost-saving step is that the process works with wet algae. Most current processes require the algae to be dried – a process that takes a lot of energy and is expensive. The new process works with an algae slurry that contains as much as 80 to 90 per cent water.

"Not having to dry the algae is a big win in this process; that cuts the cost a great deal," said Mr Elliott. "Then there are bonuses, like being able to extract usable gas from the water and then recycle the remaining water and nutrients to help grow more algae, which further reduces costs."

While a few other groups have tested similar processes to create bio-fuel from wet algae, most of that work is done one batch at a time. The PNNL system runs continuously, processing about 1.5 liters of algae slurry in the research reactor per hour. While that doesn't seem like much, it's much closer to the type of continuous system required for large-scale commercial production.

The PNNL system also eliminates another step required in today's most common algae-processing method: the need for complex processing with solvents like hexane to extract the energy-rich oils from the rest of the algae. Instead, the PNNL team works with the whole algae, subjecting it to very hot water under high pressure to tear apart the substance, converting most of the biomass into liquid and gas fuels.

The system runs at around 350 degrees Celsius (662 degrees Fahrenheit) at a pressure of around 3,000 PSI, combining processes known as hydrothermal liquefaction and catalytic hydrothermal gasification. Mr. Elliott says such a high-pressure system is not easy or cheap to build, which is one drawback to the technology, though the cost savings on the back end more than makes up for the investment.

"It's a bit like using a pressure cooker, only the pressures and temperatures we use are much higher," said Mr. Elliott. "In a sense, we are duplicating the process in the Earth that converted algae into oil over the course of millions of years. We're just doing it much, much faster."

The products of the process are:

- Crude oil, which can be converted to aviation fuel, gasoline or diesel fuel. In the team's experiments, generally more than 50 per cent of the algae's carbon is converted to energy in crude oil – sometimes as much as 70 per cent.
- Clean water, which can be re-used to grow more algae.
- Fuel gas, which can be burned to make electricity or cleaned to make natural gas for vehicle fuel in the form of compressed natural gas.
- Nutrients such as nitrogen, phosphorus, and potassium – the key nutrients for growing algae.

Genifuel Corp. has worked closely with Mr. Elliott's team since 2008, licensing the technology and working initially with PNNL through DOE's Technology Assistance Program to assess the technology.

"This has really been a fruitful collaboration for both Genifuel and PNNL," said James Oyler, president of Genifuel. "The hydrothermal liquefaction process that PNNL developed for biomass makes the conversion of algae to bio-fuel much more economical. Genifuel has been a partner to improve the technology and make it feasible for use in a commercial system.

"It's a formidable challenge, to make a bio-fuel that is cost-competitive with established petroleum-based fuels," Mr. Oyler, President of Genifuel, added. "This is a huge step in the right direction."

Courtesy: Pacific Northwest National Lab

HYPERSOLAR MOVES CLOSER TO ACHIEVING LOW COST DIRECT SOLAR POWERED HYDROGEN PRODUCTION

Hyper Solar, Inc. the developer of a breakthrough technology to produce renewable hydrogen using sunlight and any source of water, recently announced that its artificial photosynthesis technology is now capable of producing 1.1 volt open circuit voltage for use in direct solar hydrogen production. This achievement represents a 10% increase over the previous 1.0 volt reached just 3 months ago.

It is well known that the theoretical voltage for splitting water into hydrogen and oxygen is 1.23 volts, and approximately 1.5 volts in real-world systems. Achieving 1.5 volts using inexpensive solar cells has eluded the world. For example, silicon solar cells are the most inexpensive and abundant, but their 0.7 volt open circuit voltage is not enough to split water. Commercially available high voltage solar cells are considered to be far too expensive for use in hydrogen production.

"Our cutting-edge research program at the University of California Santa Barbara, led by Dr. Syed Mubeen Hussaini, continues to make impressive progress," stated Tim Young, CEO of HyperSolar. "The 1.1 volt milestone is very exciting in that it provides us with a clear and encouraging roadmap to reach the 1.5 volts needed for water splitting. The semi-conductor materials used are very inexpensive, which gives us confidence that a low cost system is possible. The process to make this novel solar cell is equally exciting in that it is a simple solutions-based chemistry process. It does not require conventional expensive semiconductor processes and facilities and was literally made in a beaker."

"With the recent announcements of Hyundai, Honda, Toyota and other major auto manufacturers to begin shipping hydrogen fuel cell cars next year, there will be increased demand in the near future for clean hydrogen," continued Mr. Young. "We believe our technology can address two serious drawbacks impeding major adoption of hydrogen automobiles: First, the lack of hydrogen production infrastructure near the point of distribution or the fueling stations is addressed by our solar hydrogen production process. Second, hydrogen is currently produced from a fossil fuel — natural gas — in a process that releases substantial amounts of carbon dioxide into the atmosphere.

HyperSolar's research is centered on developing a low-cost and submersible hydrogen production particle that can split water molecules under the sun, emulating the core functions of photosynthesis. Each particle is a complete hydrogen generator that contains a novel high voltage solar cell bonded to chemical catalysts by a proprietary encapsulation coating. A video of an early proof-of-concept prototype can be viewed.

HyperSolar is developing a breakthrough, low cost technology to make renewable hydrogen using sunlight and any source of water, including seawater and wastewater. Unlike hydrocarbon fuels, such as oil, coal and natural gas, where carbon dioxide and other contaminants are released into the atmosphere when used, hydrogen fuel usage produces pure water as the only byproduct. By optimizing the science of water electrolysis at the nano-level, our low cost nanoparticles mimic photosynthesis to efficiently use sunlight to separate hydrogen from water, to produce environmentally friendly renewable hydrogen. Using our low cost method to produce renewable hydrogen, we intend to enable a world of distributed hydrogen production for renewable electricity and hydrogen fuel cell vehicle.

Courtesy: Hyper Solar

ELECRAMA - 2014 OVERVIEW

ELECRAMA-2014, the 11th edition of IEEMA's premier flagship event and the world's largest exposition of electrical transmission and distribution equipment, organised from 8th to 12th January 2014 at the Bangalore International Exhibition Centre (BIEC), was a resounding success beating all previous records.

As in the past, ELECRAMA-2014 proved yet again to be an unparalleled showcase of products and technology and more than delivered on its promise of being the greatest electrical equipment industry spectacle in the world.

Spread over six halls, having a gross area in excess of 70,000 Sqm, ELECRAMA-2014 hosted 805 exhibitors from India and 165 from 25 countries and provided globally comparable event experience and ambience at India's leading world-class BIEC exhibition centre in Bangalore.

As the world's largest confluence of the power transmission and distribution community, ELECRAMA-2014 showcased products and technology through the entire voltage spectrum, from 220 V to 1200 kV, conforming to global standards and specifications.

ELECRAMA-2014 received an overwhelming response and attracted record number of visitors from the global electrical industry fraternity, including key decision and policy makers, regulators, officials of power utilities, representatives of funding agencies, technical specialists and consultants, electrical equipment buyers, engineering project contractors and members of the academic community from India and abroad. The quality of visitors as per exhibitor feedback was also better.

ELECRAMA-2014 was supported by the Ministry of Power, Ministry of Heavy Industries & Public Enterprises and Ministry of Commerce & Industry, Government of India.

For the first time ELECRAMA received state level support. The Government of Karnataka agreed to be the Host State and extend unstinted support. Further BESCOM was the Distribution Utility Partner and KPTCL was the Transmission Utility Partner. KREDL the state renewable energy department also supported the Event.

This time around for ELECRAMA-2014 internationally renowned industry leaders agreed to be the Brand Ambassadors and included Mr. Gregoire Poux-Guillaume, President, Alstom Grid; Mr. Jean Pascal Tricoire, Chairman & CEO, Schneider Electric SA; Mr. Tony M. Gatt, President, Energy Division; and Mr. R N Nayak, CMD of Power grid Corporation of India.

ELECRAMA-2014 had a unique theme of 'Go Global' and the objective was to showcase to the world the strengths and capabilities of Indian manufacturers and the global competitiveness of electrical equipment manufactured in India "right technology at the right price". It provided a platform to promote the "Made-in-India" brand to a global audience.

Representatives of 50+ Indian Central and State power utilities, including over 45 chairmen, managing directors and directors, visited the exhibition and were exposed to the latest products and technology on display. Procurement officials of power utilities from across the world visited the exhibition to get a first-hand view of the wide array of electrical equipment manufactured in India.

Inauguration, 8th January 2014

ELECRAMA-2014 was inaugurated by Shri. Siddaramaiah, Hon'ble Chief Minister of Karnataka on 8th January 2014, Shri. D K Shiva Kumar, Energy Minister of Karnataka; Shri. Devendra Chaudhry, Additional Secretary, Ministry of Power, Government of India; amongst others were also present. In his inaugural address, Shri. Siddaramaiah, called on the Indian electrical equipment industry to play a vital role in improving the country's power infrastructure and asked the manufacturers to rapidly absorb new technologies to meet the evolving global standards for efficiency and sustainability.

Shri. Shiva Kumar conveyed the happiness of the State Government to partner with ELECRAMA-2014 as Karnataka continued to be in the forefront of the country's industrialisation. Shri. Chaudhry highlighted that India was on the threshold of a major power revolution and would add 100 GW of power generation capacity in the 12th Plan period, one of the biggest additions of power capacities in the world.

ELECRAMA also played host to a number of technical and commercial interactions through its finely planned portfolio of concurrent events and top notch quality of global technical conferences.

CEO Summit, 8th January 2014

On the evening of 8th January 2014, the third IEEMA CEO Summit was organised concurrently with ELECRAMA-2014, on the theme 'The Power Situation in Karnataka and the State's Plan to Support Industry with Power'.

Eminent Panelists for the event were Shri. D K Shiva Kumar, Energy Minister of Karnataka; and Shri. Kaushik Mukherjee, Chief Secretary of Karnataka.

Shri. Shiva Kumar highlighted the fact that Karnataka was attracting investments in a big way for industrial projects over the years and the state was at the forefront of industrialisation in the country. He promised to help industry to sort out all issues pertaining to water, land, environment, etc. in a speedy manner.

Shri. Mukherjee stressed on the need to concentrate on solar energy generation and expressed optimism on the potential of India to become the solar energy leader of the world. The evening was attended by around 200 CEO/ MDs. The panel discussion was conducted by Ms. Mini Menon of Bloomberg TV, followed by a short entertainment programme featuring internally renowned artists like Grammy Award winning percussionist Mr. Bickram Ghosh and globally acclaimed keyboardist Mr. Stephen Devassy. In step with the music, Ms. Asma Menon painted a beautiful painting inspired by the music.

International T&D Conclave, 9th January 2014

For the first time IEEMA organised an International T&D Conclave at ELECRAMA-2014 on 9th January 2014 to present global business opportunities to the tune of USD 30 billion to the participants from the Indian T&D equipment industry.

Mr. Subramaniam V Iyer, Director, Department of Sustainable Energy, The World Bank spoke about the Bank lending USD 8 billion globally to entities producing and transmitting power, including India. Estimates put the need for incremental global investments of USD 100 billion for power (including renewable sources), where the share of T&D equipment and services is expected to be around 20-25%, indicating a remarkable growth opportunity for Indian T&D players. He further mentioned that as per estimates of International Energy Agency (IEA), demand for energy is expected to grow exponentially but the transmission and distribution losses will also grow unless T&D equipment makers improve their efficiency.

Other speakers at the Conclave were Engr. Beks Dagogo-Jack, Chairman of the Presidential Task Force on Power, Government of Nigeria; Mr. Ghani Mahmood, DG of Ministry of Electricity, Government of Iraq; and Mr. Derek Lickorish, Member, UK Government's Department of Energy and Climate Change. Mr. Ajoy Mehta, Managing Director of MSEDCL was the Chief Guest at the Conclave attended by over 200 participants.

CIGRE Technical Sessions, 9th January 2014

For the second time, presentations by globally eminent CIGRE Experts were organised by IEEMA and CIGRE India to share recent technological advancements in the power systems concurrently with ELECRAMA-2014 on 9th January 2014. Mr. N. Murugesan, DG, CPRI, inaugurated the Sessions.

The Sessions encompassed knowledge sharing on high voltage equipment, overhead lines, sub-stations, HVDC and power electronics and distribution systems & dispersed generation. Speakers included Mr. Hiroki Ito (Chairman A3), Mr. Herbert Lugschitz (Secretary B2), Mr. Terry Krieg (Chairman B3), Dr. Bjarne Andersen (Chairman B4) and Mr. Nikos Hatziargyriou (Chairman C6). Over 150 engineers attended the sessions.

ChangeXchange 2014 – 2nd Reverse Buyer-Seller Meet (RBSM), 9th & 10th January 2014

ChangeXchange 2014 - 2nd Reverse Buyer-Seller Meet (RBSM), organised concurrently with ELECRAMA-2014 was a resounding success, with 6,000+ meetings done by foreign buyers spread over 9th and 10th January 2014. Indian Sellers (ELECRAMA-2014 exhibitors) expressed a great deal of satisfaction over business conducted at the RBSM resulting in an estimated business generation of over USD 150 million.

The RBSM was organised with support from the Department of Commerce, Ministry of Commerce & Industry, Government of India, under the Market Access Initiative (MAI) Scheme. ChangeXchange 2014 was much bigger and power-packed than the first edition and was attended by 400+ buyers from 42 countries of Africa, ASEAN, Latin America, SAARC and Iran.

The business buzz was evident at the event and each foreign buyer did an average of 15 meetings per business session. Open only to the 800+ Indian manufacturers of electrical equipment showcasing their products and technology at ELECRAMA-2014, the flow of meetings was smooth and all major buyer cabins saw sellers patiently waiting for their turns.

Power utility companies were the top draws and key attendees included The National Water and Electricity Company of Gambia, Central Electricity Board of Mauritius, Dhaka Power Distribution Company Ltd., Rural Electrification Board of Bangladesh, SBEE Benin, Kenya Power Lighting Company, Kenya Rural Electrification Authority, Electricity of Mozambique EDM, Transmission Company of Nigeria, Electricity Vietnam, ZESCO

Zambia, Zimbabwe Electricity Supply Authority, Electricity Supply Corporation of Malawi, Hydrochile, etc. Procurement representatives of leading electrical equipment MNC companies were also present at the event to explore sourcing opportunities from Indian suppliers.

Seminar on New Generation High Performance Conductor, 10th January 2014 for over a hundred years, electricity has been traditionally delivered using bare overhead conductors such as ACSR and AAAC. However, industry today is in a flux of changes, resulting in shifting to next generation of conductor technology, that is High Performance Conductor (Low Loss and High Temperature Low Sag Capabilities).

To showcase the next generation conductor technology to the users, a Seminar was organised on 10th January 2014 concurrently with ELECRAMA-2014 giving insight to the participants to understand in detail about the types of HPC and their benefits, stringing techniques, types of hardware used, etc. Speakers included Mr. S K Negi, MD GETCO; Mr. Mataprasad, renowned technocrat; Mr. Surender Kumar, PGCIL; Mr. Ajay Bhardwaj, Sterlite Grid; and Mr. Shubhranshu Pattanaik, Deloitte. The Seminar was attended by 175+ participants from various power utilities across India.

TRAFOTECH 2014, 10th and 11th January 2014

TRAFOTECH 2014, the 9th International Conference on Transformers was held on 10th and 11th January 2014 concurrently with ELECRAMA-2014, with the theme 'Transformers for Smart Grid'. Mr. B.N. Sharma, Joint Secretary, Ministry of Power, Government of India, was the Chief Guest at the inaugural session and addressed the more than 500 delegates. Mr. Sharma, in his inaugural address, stated that the government would soon launch a national smart grid mission and monitor the implementation of policies and programmes envisioned in the smart grid road map for the power sector, which would help in finding solutions for some of the daunting challenges being faced. Other dignitaries at the session included, amongst others, Mr. G Kumar Naik, MD, KPTCL; Mr. S.K. Negi, MD, GETCO; Mr. N. Murugesan, DG, CPRI.

There were six technical sessions on - Transformer Applications for Smart Grid; Transformer Efficiency; Reliability through Materials, Accessories and Processing; Sustainability Issues for Transformers; Towards Maintenance Free Transformers; and Fail Safe Transformers. In all 54 papers including 21 from overseas were presented over the two days of the Conference.

Three keynote addresses were delivered by eminent international experts - Mr. Thomas Fogelberg, ABB power Technologies, Sweden on 'Transformer Losses - European Commission Regulations and European Standards'; Mr. Thomas Lazarz, CG Power, Belgium on 'Transformers for a Smart Grid'; Dr. Rajamani, Chief Consultant-Reliance Infrastructure Ltd., India on 'Functional Features of Transformer - Expectations from User Perspective'.

Engineer Infinite 2014 and Innovation Day, 11th January 2014

ELECRAMA believes in the power of the future, more so in the power of the youth and the student, and the Engineer Infinite initiative is geared towards unleashing the creative potential of this powerful youth, for the benefit of this country, and for the world itself. Engineer Infinite 2014 included recent trends in the subjects related to electrical energy sector, IT and computer science branches along with the traditional 'electro technology' branches. It received an overwhelming response and widespread participation from all over the country with more than 1,800 entries + a highly filtered 74 were selected for final display and demonstration during ELECRAMA-2014.

Presentations were made by Mr. D. Patil, Chief Technical Officer, Crompton Greaves Ltd.; and Mr. G Testi, Chief Technical Officer, ABB Ltd.; at the Innovation Day on 11th January 2014, which was attended, apart from others by the student exhibitors at Engineer Infinite – 2014 Student Project Competition.

Innovation Day witnessed a lively panel discussion on the theme of 'Future of Electricity – Technology, Energy Security and Empowerment' with distinguished panelists including Mr. Pankaj Kumar Pandey, Managing Director, BESCOM; Mr. Tarun Vijay, Member of Parliament; Mr. Anil Swarup, Additional Secretary, Cabinet Secretariat, Government of India; Mr. Mustafa Wajid, CEO, Meher Energy Ventures; and Dr. V K Aatre, Former Scientific Advisor to Defence Minister.

The Innovation Day event ended with the prize distribution for the Best Student Projects of Engineer Infinite 2014 competition. A Jury of eminent persons from diverse engineering backgrounds did a thorough evaluation of the projects on display and decided the winners.

You will get there when you are meant to get there and not one moment sooner... so relax, breathe, and be patient. – MANDY HALE

Awards to Exhibitors at a special Function at The Exhibitors Nite-JOSH 2014

IEEMA awards the efforts and entrepreneurship of the exhibitors who participate in the show. The exhibitors participated under different categories with different space allotments for the Best Stall and Best Product categories. The Jury was selected based on their strong technical expertise and long industry experience.

About 75 entries were received for the Best Product category and the assessment was made based on parameters like innovation, usability of product in long run, energy saving criteria, etc.

The following products were chosen as the winners for Best Product under various categories

1. Overall Product developed by an Indian or Foreign Exhibitor: Omicron Energy Solutions Pvt. Ltd. for CIBANO 500 & OMS 605
2. Best Product developed by an Indian Exhibitor: Larsen & Toubro Ltd. for AU series of Final Distribution Products – A Complete Solution
3. Certificate of Appreciation: Sterlite Technologies Ltd. for ULTRAEFF Low Loss Cable
4. Best Product developed by an Indian Exhibitor in Small Scale Sector: Jognics for Mpp Capacitor Winding Machine

Certificate of Appreciation: Teknocrats Control System (I) Pvt. Ltd. for Solar Pump Controller

The Best Stall contest had a separate Jury under each category that included eminent Architects and Planners, Corporate Communications Consultants, Industry Counsellors, etc. The assessment was made taking into consideration various parameters which included overall appeal, optimum use of space, branding and brand projection, use of green materials / technology, innovation in products, behaviour of stand staff towards visitors etc.

The following stalls were chosen as the winners for Best Stall under various categories:

1. Best Stall in the category of IEEMA SSI Pavilion: Yoshama and Company Pvt. Ltd.

   Certificate of Appreciation: Balaji Electro Controls Pvt Ltd.
2. Best Stall in the Category of Shell up to and including 15 sq.m.: Veritek Engineering Pvt. Ltd.

   Certificate of Appreciation: Kloeckner Desma Machinery P.L.
3. Best Stall in the Category of Shell above 15 and up to and including 30 sq.m.: Abhi Metals

   Certificate of Appreciation: Jay International

   Special Mention: Bharat Electro Instrument Mfg Co.
4. Best Stall in the Category of Shell above 30 sq.m.: Citizen Metalloys Ltd.

   Certificate of Appreciation: Ensto India Pvt. Ltd.
5. Best Stall in the Category of Bare Space up to and including 100 sq.m.: DSM India Pvt. Ltd.

   Certificate of Appreciation: Quality Power Electrical Equipments Pvt. Ltd.

   Special Mention: Qualitrol (Div. of DHR Holding India Pvt. Ltd.)
6. Best Stall in the Category of Bare Space above 100 and up to and including 300 sq.m.: Ravin Cables Ltd.

   Certificate of Appreciation: Jyoti Ltd.

   Special Mention: Raychem RPG Ltd.
7. Best Stall in the category of Bare Space above 300 sq.m.: Anchor Electricals Pvt. Ltd.

   Certificate of Appreciation: Skipper Electricals (India) Ltd.

   Special Mention: Crompton Greaves Ltd.
8. Best Stall in the Category of Overseas Exhibitors: Hyosung Corporation

   Certificate of Appreciation: Chint Electrics Co. Ltd.

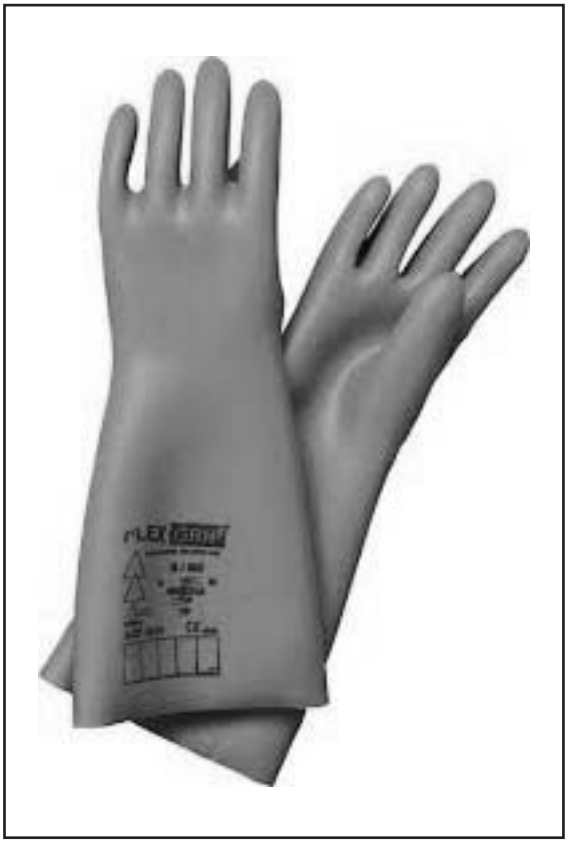
Exhibitors' Night, 11th January 2014

On 11th January 2014, an electrifying evening of fun, food and entertainment was organised for exhibitors featuring the Bolly wood's hottest dynamic duo, Vishal & Shekhar. Over 2,300 participants enjoyed the scintillating musical evening with a thanks giving dinner by the Chairman ELECRAMA-2014.

Courtesy: Ieema

PRODUCT OF THE MONTH

ELECTRICAL SAFETY GLOVES INSPECTION AND CLASSIFICATION



Rubber insulating gloves are among the most important articles of personal protection for electrical workers. To be effective, electrical safety gloves must incorporate high dielectric and physical strength, along with flexibility and durability. To ensure safety and performance, they should meet and/or exceed the requirements of current Indian standard 4770 – 1968, American Society for Testing and Materials (ASTM) D120 specifications.

A glove system consists of:

Rubber insulating gloves - Classified by the level of voltage and protection they provide.

Liner gloves - To reduce the discomfort of wearing rubber insulating gloves in all seasons, for year round use. Liners provide warmth in cold weather, while they absorb perspiration in the warm months. These can have a straight cuff or knit wrist.

Leather protector gloves - Worn over rubber insulating gloves to provide the mechanical protection needed against cuts, abrasions and punctures. Look for those that are steam pressed on curved hand forms to ensure proper fit over rubber gloves.

Electrical Safety Glove Classification

Employees who work in close proximity to live electrical current may require a variety of electrically insulating protective equipment. The Occupational Safety and Health Administration (OSHA) outlines this in their electrical protective equipment standard (29 CFR 1910.137) which provides the design requirements and in-service care and use requirements for electrical-insulating gloves and sleeves as well as insulating blankets, matting, covers and line hoses. Electrical safety gloves are categorized by the level of voltage protection they provide and whether or not they're resistant to ozone. Voltage protection is broken down into the following classes:

- Class 00 - Maximum use voltage of 500 volts AC/proof tested to 2500 volts AC
- Class 0 - Maximum use voltage of 1,000 volts AC/proof tested to 5,000 volts AC
- Class 1 - Maximum use voltage of 7,500 volts AC/proof tested to 10,000 volts AC
- Class 2 - Maximum use voltage of 17,000 volts AC/proof tested to 20,000 volts AC
- Class 3 - Maximum use voltage of 26,500 volts AC/proof tested to 30,000 volts AC
- Class 4 - Maximum use voltage of 36,000 volts AC/proof tested to 40,000 volts AC

Ozone resistance is covered by the "Type" designation. A Type I glove is not ozone-resistant, while a Type II is ozone-resistant.

Once the electrical safety gloves have been issued, OSHA requires that "protective equipment be maintained in a safe, reliable condition." This requires that gloves be inspected for any damage before each day's use. Gloves must also be inspected immediately following any incident that may have caused damage. OSHA also requires that insulating gloves be given an air test along with the inspection.

The air testing method is described in STM F 496, specification for in-service care of insulating gloves and sleeves. Basically, the glove is filled with air, either manually or with a powered inflator, and then checked for leakage. The leakage is detected by listening for escaping air or holding the glove against the tester's cheek to feel air releasing.

As stated in ASTM specifications for in-service care and use of rubber gloves and sleeves, gloves and sleeves should be expanded no more than 1.5 times their normal size for Type I, and 1.25 times normal for Type II during the air test. The procedure should then be repeated with the glove turned inside out.

In addition to this daily inspection, OSHA requires electrical safety equipment shall be subjected to periodic electrical tests. OSHA references the testing criteria in 1910.137(b)(2)(viii) where the test voltage and intervals are given.

Gloves that have not been placed into service after an electrical test shall not be placed into service unless they have been electrically tested within the previous 12 months. See reference below for testing agency information.

OSHA recognizes that gloves meeting ASTM D 120-87, specification for rubber insulating gloves, and ASTM F 496, specification for in-service care of insulating gloves and sleeves, meet their requirements.

Electrical Safety Glove Inspection

In order to maintain the highest level of insulating protection and ensure long life, it is essential that electrical safety gloves (and sleeves) are properly cared for and stored.

Before each use, gloves and sleeves should be inspected for holes, rips or tears, ozone cutting, UV checking and signs of chemical deterioration. Refer to ASTM F 1236, standard guide for visual inspection of electrical protective rubber products for additional information.

Gloves and sleeves should also be examined to determine if they show any damage as a result of chemical contamination, particularly from petroleum products. The first sign of exposure is swelling in the area of contamination. Should any rubber equipment be exposed to chemical contaminants or be suspect of any other physical damage, it should be turned in for inspection, cleaning and electrical testing.

Since sleeves cannot be inflated, they are inspected along the edge as they are rolled. Rolling will stretch the sleeve along the edge, making cuts, tears and ozone cutting more visible. After the outside of the sleeve is inspected, the procedure should also be repeated with the sleeve turned inside out.

INDIA PROPOSES NEW NATIONAL OFFSHORE WIND ENERGY AGENCY

The Ministry of New and **Renewable Energy** (MNRE) announced plans this month to establish a National Offshore Wind Energy Agency, which will be tasked with exploring and promoting **India**'s vast potential for offshore **wind** energy production. Dr. Farooq Abdullah, the New and **Renewable Energy** Minister, announced the Ministry's plans during the National Level Consultation on Nation Wind Energy Mission, which was held last Thursday in New Delhi. During his address to the committee, Dr. Abdullah cited the "immense potential" for offshore energy production in **India** and said he will make formal applications with the Union Cabinet for the establishment of the **wind** energy agency.

The Offshore Wind Energy Steering Committee, established by the MNRE last year, has identified several key regions for the development of offshore **wind** turbines, including those along the coastlines of Tamil Nadu, Gujarat and Maharashtra. Foreign direct investment into the offshore **wind** energy sector in **India** has seen a dramatic increase over the last several years, growing from inflows of US$214 million in fiscal year 2010-11 to over US$1.1 billion in 2012-13. Government incentives, including excise duty exemptions and a ten-year tax holiday on profits attributed to **wind** energy projects, have helped attract increasing foreign interest in the country's offshore **wind** energy potential.

The new National Offshore Wind Energy Agency would seek to continue this positive trend by working "towards improving [**India**'s energy] investment climate by resolving issues connected with resource potential, grid connectivity, clearance procedure and zoning," according to an official press release issued last Thursday. "This initiative is part of the efforts of the Ministry to remove hurdles in **wind** power development in the country, and bring together all stakeholders on a common platform to work in a coordinated and concerted manner," the release added. The MNRE hopes offshore **wind** energy production will be as successful as the Ministry's onshore program, which receives over US$16 billion in foreign investment each year and has a production capacity of 20,000 megawatts, ranking the country fifth among the world's largest producers of **wind** energy. You can stay up to date with the latest business and investment trends across **India** by subscribing to Asia Briefing's complimentary update service featuring news, commentary, guides, and multimedia resources.

Courtesy: EQ International

The two most abundant forms of power on earth are solar and wind, and they're getting cheaper and cheaper...

NEW BATTERY MATERIAL COULD HELP WIND AND SOLAR POWER GO BIG

An organic molecule, called quinone, could reduce, by two-thirds, the cost of energy storage materials in a type of battery called a flow battery, which is well suited to storing large amounts of energy.

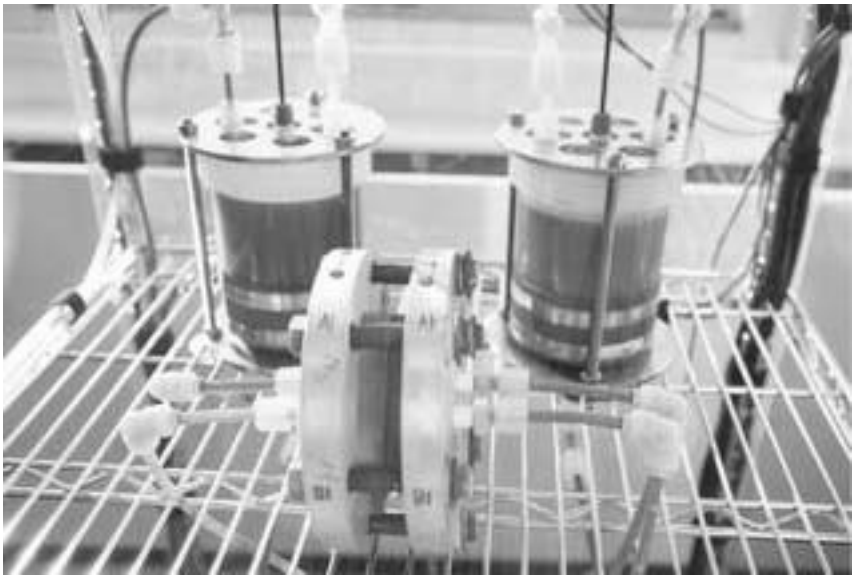
Utilities would love to be able to store the power that wind farms generate at night — when no one wants it — and use it when demand is high during the day. But conventional battery technology is so expensive that it only makes economic sense to store a few minutes of electricity, enough to smooth out a few fluctuations from gusts of wind.

Harvard University researchers say they have developed a new type of battery that could make it economical to store a couple of days

of electricity from wind farms and other sources of power.

The new battery, which is described in the journal *Nature* , is based on an organic molecule — called a quinone — that's found in plants such as rhubarb and can be cheaply synthesised from crude oil. The molecules could reduce, by two-thirds, the cost of energy storage materials in a type of battery called a flow battery, which is particularly well suited to storing large amounts of energy.

If it solves the problem of the intermittency of power sources like wind and solar, the technology will make it possible to rely far more heavily on renewable energy.



Such batteries could also reduce the number of power plants needed on the grid by allowing them to operate more efficiently, much the way a battery in a hybrid vehicle improves fuel economy.

In a flow battery, energy is stored in liquid form in large tanks. Such batteries have been around for decades, and are used in places like Japan to help manage the power grid, but they're expensive — about $700 per kilowatt-hour of storage capacity, according to one estimate.

To make storing hours of energy from wind farms economical, batteries need to cost just $100 per kilowatt-hour, according to the U.S. Department of Energy.

The energy storage materials account for only a fraction of a flow battery's total cost. Vanadium, the material typically used now, costs about $80 per kilowatt-hour.

But that's high enough to make hitting the $100 target for the whole system impossible. Michael Aziz, a professor of materials and energy technologies at Harvard University who led the work, says the quinones will cut the energy storage material costs down to just $27 per kilowatt-hour.

Together with other recent advances in bringing down the cost of the rest of the system, he says, this could put the Department of Energy target in reach.

The Harvard work is the first time that researchers have demonstrated high-performance flow batteries that use organic molecules instead of the metal ions usually used. The quinones can be easily modified, which might make it possible to improve their performance and reduce costs more.

"The options for metal ions were pretty well worked through," Aziz says. "We've now introduced a vast new set of materials."

After identifying quinones as potential energy storage molecules, the Harvard researchers used high-throughput screening techniques to sort through 10,000 variants, searching for ones that had all the right properties for a battery, such as the right voltage levels, the ability to withstand charging and discharging, and the ability to be dissolved in water so they could be stored in liquid tanks.

So far the researchers are using quinones only for the negative side of the battery. The positive side uses bromine, a corrosive and toxic material.

The researchers are developing new versions of the quinones that could replace the bromine.

The Harvard researchers are working with the startup Sustainable Innovations to develop a horse-trailer sized battery that can be used to store power from solar panels on commercial buildings.

The Harvard researchers still need to demonstrate that the new materials are durable enough to last the 10 to 0 years that electric utilities would like batteries to last, says Robert Savinell, a professor of engineering and chemical engineering at Case Western Reserve University. Savinell wasn't involved with the Harvard work. He says initial durability results for the quinones are promising, and says the new materials "without a doubt" can be cheap enough for batteries that store days of electricity from wind farms. And he says the materials "can probably be commercialised in a relatively short time" — within a few years.

The researchers face competition from other startups developing cheaper flow batteries, such as EnerVault and Sun Catalytix. Sun Catalytix is developing inorganic molecules to improve performance and lower cost, although it isn't saying much about them. EnerVault uses iron and chromium as storage materials and is developing ways to reduce the cost of the overall system.

Courtesy: The Hindu, dt: 22.01.2014

HELP LINE

Query: Kindly provide the specs for PTs

Mr. M. PARAMASIVAN, Email: paramasivaneee@gmail.com

Explanation:

ACCURACY OF POTENTIALTRANSFORMERS

The ratio and phase-angle inaccuracies of any standard ASA accuracy class1 of potential transformer are so small that they may be neglected for protective-relaying purposes if the burden is within the "thermal" volt-ampere rating of the transformer. This thermal volt-ampere rating corresponds to the full-load rating of a power transformer. It is higher than the volt-ampere rating used to classify potential transformers as to accuracy for metering purposes. Based on the thermal volt-ampere rating, the equivalent-circuit impedances of potential transformers are comparable to those of distribution transformers. The "burden" is the total external volt-ampere load on the secondary at rated secondary voltage. Where several loads are connected in parallel, it is usually sufficiently accurate to add their individual volt-amperes arithmetically to determine the total volt-ampere burden. If a potential transformer has acceptable accuracy at its rated voltage, it is suitable over the range from zero to 110% of rated less voltage. Operation in excess of 10% over voltage may cause increased errors and excessive heating. Where precise accuracy data are required, they can be obtained from ratio-correction-factor curves and phase angle-correction curves supplied by the manufacturer

- **Rated primary voltage:** This is the rated voltage of the system whose voltage is required to be stepped down for measurement and protective purposes.
- **Rated secondary voltage:** This is the voltage at which the meters and protective devices connected to the secondary circuit of the voltage transformer operate.
- **Rated burden:** This is the load in terms of volt-amperes (VA) posed by the devices in the secondary circuit on the VT. This includes the burden imposed by the connecting leads. The VT is required to be accurate at both the rated burden and 25% of the rated burden.
- **Accuracy class required:** The transformation errors that are permissible, including voltage (ratio) error and phase angle error. Phase error is specified in minutes. Typical accuracy classes are Class 0.5, Class 1 and Class 3. Both metering and protection classes of accuracy are specified. In a metering VT, the VT is required to be within the specified errors from 80% to 120% of the rated voltage. In a protection VT, the VT is required to be accurate from 5% upto the rated voltage factor times the rated voltage.
- **Rated voltage factor:** Depending on the system in which the VT is to be used, the rated voltage factors to be specified are different. The table below is adopted from Indian and International standards.

Rated voltage factor	Rated time	Method of connecting primary winding in system
1.2	Continuous	Between phases in any network Between transformer star-point and earth in any network
1.2 1.5	Continuous for 30 seconds	Between phase and earth in an effectively earthed neutral system
1.2 1.9	Continuous for 30 seconds	Between phase and earth in a non-effectively earthed neutral system with automatic fault tripping
1.2 1.9	Continuous for 8 hours	Between phase and earth in an isolated neutral system without automatic fault tripping or in a resonant earthed system without automatic fault tripping

- **Temperature class of insulation:** The permissible temperature rise over the specified ambient temperature. Typically, classes E, B and F.

As per IEC 60044-2 "Instrument transformers - Inductive voltage transformers"

Accuracy class	Ratio error from 0,8Un to 1,2Un	Phase displ. from 0,8Un to 1,2Un
0,1	0,1%	5'
0,2	0,2%	10'
0,5	0,5%	20'

Accuracy class	Ratio error from 0,8Un to 1,2Un	Phase displ. from 0,8Un to 1,2Un
1	1%	40'
3	3%	-

Ratio errors and phase displacement of metering classes

Accuracy class	Ratio error from 0,05Un to voltage factor x Un	Phase displ. from 0,05Un to voltage factor x Un
3P	3%	120'
6P	6%	240'

Ratio errors and phase displacement of protection classes

Voltage Transformer Burdens - Normally expressed as volt-amperes at a designated power factor. May be W, X, M, Y, or Z. W is 12.5 V.A. @ 0.10 pf; X is 25 V.A. @ 0.70 pf; M is 35 V.A.@ 0.20 pf; Y is 75 V.A. @ 0.85 pf and Z is 200 V.A. @ 0.85 pf. ***Courtesy: Kappa Electricals, Chennai***

SOLAR COULD POWER HALF OF KENYA BY 2016, ACCORDING TO EXPERTS

The Kenya Renewable Energy Association – in collaboration with the Kenyan government and a number of private companies – has identified nine potential sites for the ambitious construction of solar power plants in the country.

A pot of $1.2 billion has been made available to Kenya's burgeoning solar power industry, which could potentially power more than half of the country's energy needs by 2016, according to local experts.

Initial planning and design stages for the nine sites have now been completed, and construction of the plants is expected to begin shortly. The government is thought to be ready to contribute half of the total cost, with private companies with a vested interest in solar funding the other half.

"We hope that when the entire project is completed by 2016, more than 50% of Kenya's energy production will consist of solar," said Cliff Owiti, Kenya Renewable Energy Association's senior administrator. "Already we are witnessing solar investments in Kenya such as a factory that was opened here in 2011 that manufactures solar energy panels."

Owiti confirmed to the *Guardian* newspaper that more than $500 million has already been invested in Kenyan solar projects, which are considered a far cheaper and more reliable option than hydroelectric power. "With high investments in solar, we will witness almost no blackouts and power charges will reduce because electricity will be in high supply."

Kenya's current power generation capability ranks 22nd in Africa, and for solar energy the nation ranks 46th in the world. "When the project is complete and solar is in good use, electricity costs could fall by as much as 80%," added Germano Mwaba, economics professor at the University of Nairobi. ***Courtesy: PV Magazine***

THANK YOU.....

Mr. N. Sivaraju, B.E., M.B.A., Senior Electrical Inspector, Coimbatore has retired from service on 31st January 2014.
On behalf of our association we wish you to get the best of everything in Life.

Mr. R. Subramanian, Deputy Secretary, TamilNadu Electrical Licensing Board has retired from service on 31st January 2014.
On behalf of our association we wish you to get the best of everything in Life.

ELECTRICAL INSTALLATIONS IN INDUSTRIAL BUILDINGS - 1

0 FOREWORD

Electrical networks in industrial buildings serve the purpose of distributing the required power to the consuming points where it is used for a multitude of purposes in the industry. The design of electrical installation in industrial premises is therefore more complicated than those in non-industrial buildings.

Industrial installation has to take care of load requirements and supply limitations in a simple and economic manner, ensuring at the same time full protection to human life and loss of property by fire. The network layout should also facilitate easy maintenance and fault localization. Keeping in view the tariff structures as also the economic necessity of conserving power to the maximum extent, power factor compensation assumes special importance.

A particular feature of electrical installations in industrial buildings is the reliability of supply to essential operations for which standby and emergency supply sources/networks had to be designed. The needs of such systems would depend on the type and nature of the industrial works.

Locations in industrial buildings which are by their nature hazardous, require special treatment in respect of design of electrical installations therein. Such special rules for hazardous areas are covered in the Code and these shall be complied with in addition to the general rules specified.

An attempt has been made to classify industrial installations depending on the specified criteria therein. Such a classification, it is hoped would help identify the specific nature of each industry and the locations therein, assisting the design engineer in the choice of equipment and methods.

1 SCOPE

1.1 This Code covers the guidelines for design and construction of electrical installations in industrial buildings.

1.2 This does not cover specific areas in industrial sites, such as office buildings, workers rest rooms, medical facilities, canteen annexe, etc, for which requirements stipulated in the relevant sections of the Code apply.

1.3 This also does not cover locations in industrial sites that are by nature hazardous for which the provisions of the Code apply.

2 REFERENCES

This should be read in conjunction with the Indian Standards listed at Annex A.

3 TERMINOLOGY

For the purpose of this, the definitions given in the Code and the following shall apply:

3.1 Pollution - Any condition of foreign matter, solid, liquid or gaseous (ionized gases), that may affect dielectric strength or surface resistivity.

3.2 Pollution Degree (of Environmental Conditions) - Conventional number based on the amount of conductive or hygroscopic dust, ionized gas or salt and on the relative humidity and its frequency of occurrence, resulting in hygroscopic absorption or condensation of moisture leading to reduction in dielectric strength and/or surface resistivity.

4 CLASSIFICATION OF INDUSTRIAL BUILDINGS

Industrial buildings by definition include any building or part of building or structure, in which products or materials of all kinds and properties are stored, fabricated, assembled, manufactured or processes, for example, assembly plants, laboratories, dry cleaning plants, pumping stations, refineries, dairies, saw mills, chemical plants, workshops, distilleries, steel plants, etc.

Industrial installations are of various types and in a single industrial site, electrical loads of varying requirements are to be met. For the purpose of this Part, industries are classified based on three criteria as given in **4.1 to 4.3.**

4.1 Classification Based on Fire Safety

4.1.1 Industrial buildings are classified into Group G from the fire safety point of view in SP 7. Buildings under Group G are further subdivided as follows:

a) Subdivision G-1- Buildings used for low hazard industries - Includes any building in which the contents are of such low combustibility and the industrial processes or operations conducted therein are of such a nature that there are no possibilities for any self-propagating fire to occur and the only consequent danger to life and property may arise from panic, fumes or smoke, or fire from some external source.

b) *Subdivision G-2 - Buildings used for moderate hazard industries* - Includes any building in which the contents or industrial processes of operations conducted therein are liable to give rise to a fire which will burn with moderate rapidity and give off a considerable volume of smoke but from which neither toxic fumes nor explosions are to be feared in the event of fire.

c) Subdivision G-3 - Buildings used for high hazard industries - Includes any building in which the contents or industrial processes or operations conducted therein are liable to give rise to a fire which will burn with extreme rapidity or from which poisonous fumes or explosions are to be feared in the event of fire.

NOTE: *SP 7 includes Group J buildings for such location where storage, handling, manufacture or processing of highly combustible or explosive materials or products are being carried out. Such installations including such high hazard locations in Group G classification shall comply with the special rules of the Code.*

4.1.2 Typical list of industries for different class of fire hazard are given in Annex B.

4.2 Classification Based on Power Consumption

4.2.1 Industrial buildings are also classified depending on the quantum of electric power requirements for its services as given in Table 1.

Table 1 Classification Based on Power Consumption

(Clause 4.2.1)

Sl No.	Description	Average Power Requirement	Examples
(1)	(2)	(3)	(4)
i)	Light industries	Up to 50kVA	Hosiery, tailoring and jewellery
ii)	Average industries	Above 50 kVA upto 2 000 kVA	Machinery, engine fitting, motor cars, aircraft, light pressings, furniture, pottery, glass, tobacco, electrical manufacturing and textile (*see* Note)
iii)	Heavy industries	Above 2 000 kVA	Heavy electrical equipment, rolling mills, structural steel works, tube making, foundries, locomotives, ship-building and repairing, chemical factories, factories for metal extraction from ores, etc.

NOTE: *Average factory installations are set apart from heavy industries in that the former has no conditions requiring specialized or exceptional treatment.[1)] Terminology based on IS 732. Where different degrees of hazard occupancy exist in different parts of building, the most hazardous of those shall govern the classification for the purpose.*

4.2.2 Loads within the industrial site could be divided depending on their nature and size. For guidance, the classification given in Table 2 shall be referred to.

4.3 Classification Based on Pollution

For the purpose of evaluating creepage distances and clearances, the following four degrees of pollution in the micro-environment are established:

a) Pollution degree 1 - No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.

b) Pollution degree 2 - Only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is to be expected.

c) Pollution degree 3 - Conductive pollution occurs or dry non-conductive pollution occurs which becomes conductive due to condensation - which is to be expected.

d) Pollution degree 4 - Continuous conductivity occurs due to conductive dust, rain or other wet conditions.

NOTES:

1. *Clearances and creepage distances according to the different pollution degrees are given in Tables 13 and 15 of IS/IEC 60947-1. Unless otherwise stated by the relevant product standard, equipment for industrial applications is generally for use in pollution degree 3 environment. However, other pollution degrees may be considered to apply depending upon particular applications or the micro-environment.*

2. *The pollution degree of the micro-environment for the equipment may be influenced by installation in an enclosure. Means may be provided to reduce pollution at the insulation under consideration by effective use of enclosures, encapsulation or hermetic sealing. Such means to reduce pollution may not be effective when the equipment is subject to condensation or if, in normal operation, it generates pollutants itself.*
3. *Pollution will become conductive in the presence of humidity. Pollution caused by contaminated water, soot, metal or carbon dust is inherently conductive. Small clearances can be bridged completely by solid particles, dust and water and therefore minimum clearances are specified where pollution may be present in the micro-environment.*

Table 2 Load Groups in Industrial Buildings

(Clause 4.2.2)

Sl. No.	Groups	Type to Load	Examples	Corrected Power Factor
(1)	(2)	(3)	(4)	(5)
i)	1	Small and large loads, fairly evenly distributed over the whole area and loaded constantly during, the working day (precision mechanical engineering)	Repair shop Automatic lathe, workshop, spinning mill, weaving mill	>0.85
ii)	2	Loads fairly evenly distributed over the whole area, but varying loads and with peak load at different times (for example metal working industry)	Tool making Press shop Machine shop Welding shop	do do do do
iii)	3	Loads having very high power requirement in conjunction with smaller loads of negligible size compared to the total load (for example, raw material, industry)	Heat treatment shop, Steel works, Rolling mills	do

5 GENERAL CHARACTERISTICS OF INDUSTRIAL BUILDINGS

General guidelines on the assessment of characteristics of installations in buildings are given in the Code. For the purposes of installations falling under the scope, the characteristics given below shall apply.

5.1 Environment

5.1.1 The following environmental factors shall apply to industrial installations:

Environment	Characteristics	Remarks
(1)	(2)	(3)
Presence of water	Presence of water negligible, or possibilities of free falling drops or sprays	Depends on the location.
Presence of foreign solid bodies	These conditions include possibilities of presence of foreign solid bodies of various sizes likely to affect electrical equipment (such as tools, wires, dust, etc.)	Depends on the location.
Presence of corrosive polluting substances	Atmospheric where the presence of corrosive or polluting substances is significant	Industrial installations, situated by the sea, chemical works, cement works where the pollution arises due to abrasive, insulating or conducting ducts
	Intermittent or accidental subjection to corrosive or polluting chemical substances being used or produced	Factory laboratories boiler rooms, etc.
	Continuous pollution	Chemical works

Environment	Characteristics	Remarks
(1)	(2)	(3)
Mechanical stresses	Impact and vibration of low severity Impact/vibration of high severity	Household and similar conditions Industrial installations subject to severe conditions
Seismic effect and lighting	–	Depends on the location of the buildings

5.2 Utilization – The following aspects utilization shall apply:

Utilization	Characteristics	Remarks
(1)	(2)	(3)
Capability of persons	Instructed persons, adequately advised or supervised by skilled persons (operating and maintenance staff)	Majority of persons utilizing the industrial installations are in this category. However specific zones or operations involving uninstructed persons shall also be kept in view
	Persons with technical knowledge and sufficient experience (engineers and technicians)	Closed operating areas
Contact of persons with earth potential	Persons are frequently in touch with extraneous conductive parts or stand on conducting surfaces	Locations with extraneous conducting parts, either numerous or large area
	Persons are in permanent contact with metallic surroundings and or whom the possibility of interrupting contact is limited	Metallic surrounding such as boilers and tanks
Conditions of evacuation	Low density occupation, easy conditions of evacuation	This category applies to buildings of normal or low height
Nature of processed or stored material	Existence of fire-risks, where there is manufacture, processing or storage of flammable materials, including presence of dust	Wood-working shop, paper factories, textile mills, etc
	Processing or storage of low-flash-point materials including presence of explosive dust	Oil refineries, hydrocarbon stores

5.3 Compatibility

In industrial installations, an assessment shall also be made of any characteristics of equipment likely to have harmful effects upon other equipment or other services.

5.4 Maintainability

Assessment shall also be made of the frequency and quality of maintenance of the installation.

(To be Continued...)

Courtesy: National Electrical Code 2011

The foundation is being laid for the emergence of both wind and solar cells as cornerstones of the new energy economy.

ENERGY STORY

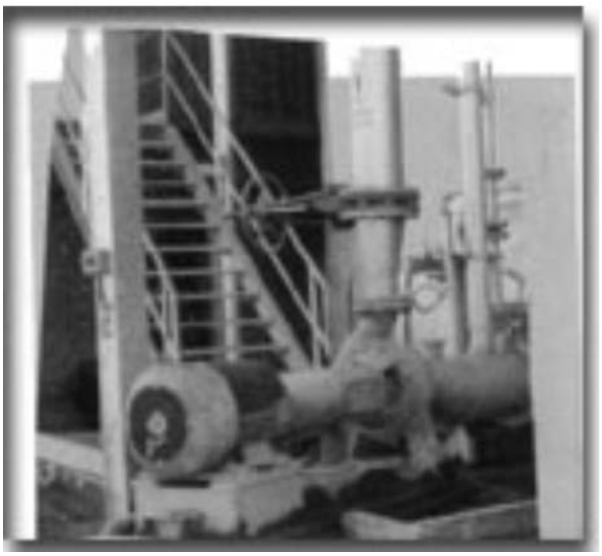
ENERGY EFFICIENCY – THE FIFTH FUEL - PART 11

EFFICIENT ELECTRICAL ENERGY UTILIZATION

Electrical Energy Utilization and Motor Driven Systems:

Energy Efficiencies and Energy Saving opportunities in Pumping Systems

In Motors Driven Systems and Electrical Energy utilization, Pumping Systems are very important in terms sizable Energy Consumption, in Industries, Agriculture, Communities, Buildings and Homes.



Let us see an approximate calculation:-

Total Electrical Energy Consumption 800 Billion Units P/A

Industrial Consumption is approximately 50% ie 400 BU (Billion Units)

Pumps form 30% of the consumption in Industries, ie 15% of the total Energy ie 120 BU

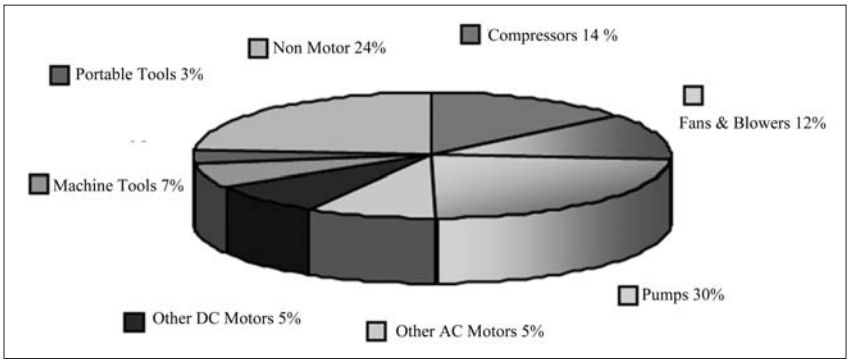
Agricultural Consumption is about 20% of the total in the form of Agri Pumping Sets ie 160 BU

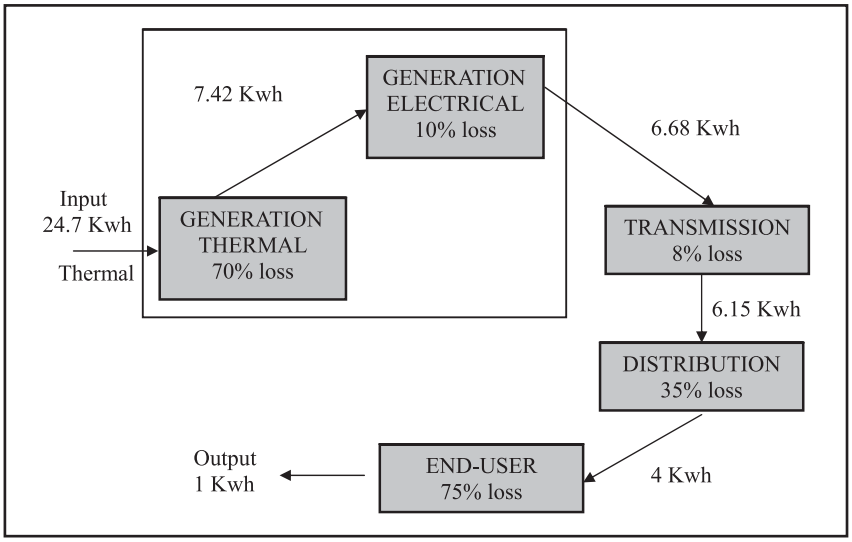
Domestic Pumps, which are more than 30 Billion numbers and other pumps in Municipalities and Village O/H Tanks etc can be assumed to consume about 5% of the total Energy ie 40 BU

Total Consumption of Energy by Motor Driven Pumping Systems is approximately 320 BU

320 BU at the Use Point, converted to MTOE (Million Tons of Oil Equivalent) Units is nearly 28 MTOE

(Conversion Basis — 1 Kwh = 860 K.Cal, Oil Equivalent – 1 Kg of Oil = 10,000 K.Cal)





28 MTOE of Electricity at the End Use Point means 6 x 28 = 168 MTOE of

Resources as explained in earlier Parts and as repeated in the Diagram.

The Total Consumption of Resources P/A for India is about 600 MTOE

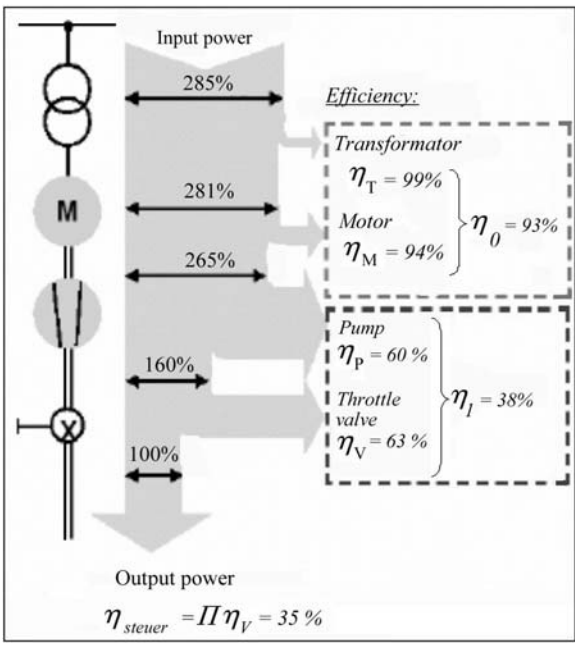
168 MTOE forms 168/600 = 28% of the Total Resources.

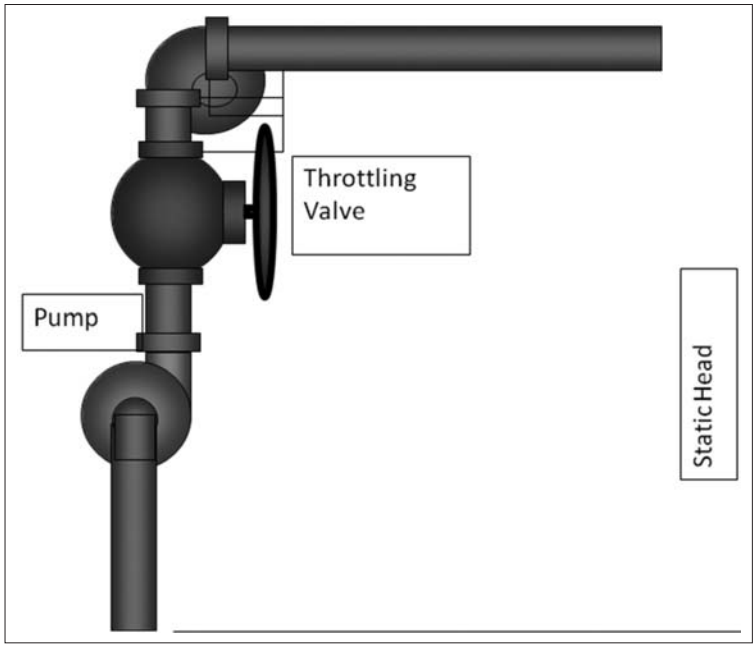
Efficiency Levels and Saving Potentials:

Industries:

In Industrial applications controlling outputs through control valves is what is commonly applied and as discussed in one of the earlier parts and as repeated below, the combined or overall Efficiency Level is only about 35%.

Please note the individual Efficiency Levels of Motors and Pumps which are of High Value, but the problem mainly is Controls.





Agriculture:

India presently has a population of over 20 Million Agricultural Pumps (They have contributed very heavily in achievement of Self Sufficiency in Food Grain Production) comprising mainly of Sunersible Pumpsets and Surface Mounted Pumpsets. There are also sizable numbers of Belt Driven and Compressor Driven Pumping Sets. A broad survey all over the country indicates very poor level of Efficiencies in all the Types and the findings are as follows:

The Overall Efficiency Levels Submersible Pumpsets – 18 to 20% (Similar figures for Belt Driven and Compressor Driven Pumps)

The Overall Efficiency Figures of Surface Mounted (Monoblocks and Coupled) – 20 to 23%

Energy and Resources Saving Potentials:

With the Modern Controls, it will easily be possible to improve the efficiency levels in Industrial Pumping Systems to at least 50%. Hence the Consumption can be reduced by 15% - from 120 BU to 102 BU

In Agriculture, the problems are more severe mainly because Electricity is either free or very heavily subsidised in many states of the country and the solution does not lie in Controls but only depends on increasing individual and combined Efficiency Levels of Motors and Pumps and Pipes and accessories. Efforts are already on in many states to improve efficiency levels to about 40%. If this is achieved, the saving will be about 20% - Consumption reducing from 160 BU to 128 BU.

These will result correspondingly in resources savings and we can see the sizable potentials.

(To be continued)

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

SORRY sometimes saying SORRY is the most difficult thing on Earth... but it's the cheapest thing to save the most expensive gift called RELATIONSHIP. ***www.wisdomquotesandstories.com***

NELSON MANDELA (1918-2013)

Rolihlahla Mandela was born in Mvezo, Transkei, on July 18, 1918, to Nonqaphi Nosekeni and Nkosi Mphakanyiswa Gadla Mandela.

His father died when he was 12 and he became a ward of the Thembu Regent Jongintaba Dalindyebo where he heard stories of his ancestor's valour.

At primary school in Qunu his teacher Miss Mdingane gave him the name Nelson, in accordance with the custom to give all school children "Christian" names.

His university studies were cut short when he was expelled for joining a student protest but he completed his BA by correspondence and graduated in 1943.

He and his cousin Justice fled in 1941 when the Regent began arranging their marriages. In Johannesburg he did his law articles and registered to study for an LLB. He finally graduated in 1989 while in the last months of his imprisonment, he obtained an LLB through the University of South Africa.

He only joined the African National Congress in 1944 when he helped formed the ANC Youth League.

In 1944 he married Evelyn Mase and they had two sons and two daughters one of whom died in infancy. They divorced in 1958.

In 1952 he and 19 others were convicted for their part in a civil disobedience campaign and sentenced to nine months hard labour suspended for two years.

With a two-year diploma in Law he started in 1952 first black law firm with Oliver Tambo.

He was arrested in a countrywide police swoop on 5 December 1955, which led to the 1956 Treason Trial. He was in the last group of 28 acquitted on 29 March 1961.

The police killing on 21 March 1960 police of 69 unarmed protestors led to the country's first state of emergency and the banning on 8 April of the ANC and the Pan Africanist Congress.

In 1958 he married a social worker Winnie Madikizela and they had two daughters. The couple divorced in 1996.

When he and his colleagues were acquitted in the Treason Trial he went underground and planned a national strike for 29, 30 and 31 May. In June 1961 he helped to establish the armed wing of the ANC.

On 11 January 1962 using the adopted name David Motsamayi, he left South Africa secretly and travelled around Africa and visited England to gain support for the armed struggle. He received military training in Morocco and Ethiopia. He was arrested in a police roadblock outside Howick on 5 August 1962 and charged with leaving the country illegally and inciting workers to strike. He was convicted and sentenced to five years imprisonment which he began serving in Pretoria Local Prison.

In October 1963 he joined ten others on trial for sabotage in what became known as the Rivonia Trial. Facing the death penalty his words to the court at the end of his famous 'Speech from the Dock' on 20 April 1964 became immortalized:

"I have fought against white domination, and I have fought against black domination. I have cherished the ideal of a democratic and free society in which all persons live together in harmony and with equal opportunities. It is an ideal which I hope to live for and to achieve. But if needs be, it is an ideal for which I am prepared to die."

On 11 June 1964 he and seven others Walter Sisulu, Ahmed Kathrada, Govan Mbeki, Raymond Mhlaba, Denis Goldberg, Elias Motsoaledi and Andrew Mlangeni were convicted and the next day were sentenced to life imprisonment.

His mother died in 1968 and his eldest son Thembi in 1969. He was not allowed to attend their funerals.

On 31 March 1982 he was transferred to Pollsmoor Prison in Cape Town with Sisulu, Mhlaba and Mlangeni. Kathrada joined them in October. In 1986 he initiated talks with the government about an ultimate meeting with the ANC.

He spent over three months in hospital with Tuberculosis and the last 14 months of his imprisonment in a house at Victor Verster Prison from where he was released on 11 February 1990.

In 1993 he and President FW de Klerk jointly won the Nobel Peace Prize and on 27 April 1994 he voted for the first time in his life.

On 10 May 1994 he was inaugurated South Africa's first democratically elected President. On his 80th birthday in 1998 he married Graça Machel, his third wife.

He stepped down in 1999 after one term as President. He continued to work with the Nelson Mandela Children's Fund he set up in 1995 and established the Nelson Mandela Foundation and The Mandela Rhodes Foundation.

Nelson Mandela never wavered in his devotion to democracy, equality and learning. Despite terrible provocation, he never answered racism with racism. His life has been an inspiration to all who are oppressed and deprived, to all who are opposed to oppression and deprivation.

He died at his home in Johannesburg on 5 December 2013. He was 95.

SHRI K. RAJAH IYER (1890 - 1974)
Former Advocate General between 1945 and 1950

Shri. K. Rajah Iyer was an eminent lawyer who served as the Advocate General of the Madras Presidency between 1945 and 1950. Born on July 15, 1890 in Madurai, he studied law at the Madras Presidency College. Later, when he was twenty-two years old, he learnt the finer points of law as a junior to the very famous Shri. S. Srinivasa Iyengar, who was the then Advocate General of the Madras Presidency. Even while practicing law, Shri. Iyer assisted Shri. Iyengar in revising John D. Mayne's much acclaimed and reference book Hindu Law and Usage.

Later, the genial and affable legal genius would succeed Dr. P.V. Rajamannar as the Advocate General and took on several very famous judicial luminaries of Madras and Andhra High Courts as his juniors. The most famous were Shri. K. Veeraswamy and Shri. K.S. Ramamurthi. Shri. Veerswamy would later become the Chief Justice and Shri. Ramamurthi would serve as a Judge of the Madras High Court.

Shri. Iyer was a very meticulous lawyer never leaving anything to chance. He diligently represented many clients across South Asia. He has appeared before the High Courts of Madras (now Chennai), Ceylon (now Sri Lanka), Rangoon (now Yangon), Karachi, and Lahore. In addition, he had also appeared before the Federal and Supreme Court of India. One of the famous cases he represented was in the Lakshmikanthan murder case where two well-known actors at that time, M.K. Thyagaraja Bhagavathar and N.S. Krishnan, were implicated and found guilty but later exonerated. Even though a short man, Shri. Iyer always attracted a large audience in the courts. His style was factual and arguments always remained civil but exciting.

Shri. Rajah Iyer was a large hearted man helping many people who came in contact with him with money and useful advice. He remained an apolitical lawyer never seeking judicial or other positions with any political party. As he grew older, he spent more time in Bangalore till his end on February 18, 1974. Remembering him after 40 years, a memorial lecture is being organized to reflect his interests in Law, Culture, and Nation.

LIFE: LIGHTER SIDE

A man checked into a hotel. There was a computer in his room, so he decided to send an e-mail to his wife. However, he accidentally typed wrong e-mail address, and without realizing his error, he sent the e-mail.

Meanwhile.....

Somewhere, a widow had just returned home from her husband's funeral. The widow decided to check her e-mail, expecting messages from relatives and friends. After reading the first message, she fainted.

The widow's son rushed into the room, found his mother on the floor, and saw the computer screen which read:

To: My Loving Wife

Subject: I've Reached Safely

Date: 21 st July, 2004

I know you're surprised to hear from me. They have computers here now, and we are allowed to send e-mails to our loved ones.

I've just reached safely and have been checked in. I see that everything has been prepared for your arrival tomorrow.

Looking forward to seeing you then! Hope your journey is as uneventful as mine was .....

NOSE CARE TIPS

To keep your nose and airways healthy, practicing proper hygiene habits and avoiding certain aggravating factors can make all the difference. Proper nasal hygiene is essential to the nose's good function. It reduces cold symptoms, sinus infections, allergies and helps prevent infection. It is important to maintain proper nose care since the nose has many very important functions. It warms, humidifies and purifies the air we breathe. It protects us from external threats by filtering particles in the air with its mucous membrane. It is also responsible for our sense of smell and helps project the sound of our voice.

The protective role of the mucous membrane

The mucous membrane protects us from external threats with its mucous, which blends with impurities. Then, the small nose hairs on the mucous membrane direct these impurities toward the throat and then the stomach. Stomach acids permanently eliminate these impurities. Sneezing is also a way of getting rid of impurities. Proper nose hygiene helps the mucous membrane protect the body.

Establishing a routine for nose care

Proper nasal hygiene starts with healthy living habits by reducing external threats in your environment. Proper nasal hygiene is maintained by cleaning the nose regularly. Cleaning your nose should be part of your daily routine just like brushing your teeth. Using saline water based products helps clean nasal cavities and eliminate impurities. Several products are available on the market such as those by Rhinaris. They can be found in the form of droppers, single-dose ampoules, nasal sprays and flushers. The product you choose will depend on your age and preferences. Some formulations said to be isotonic or hypertonic are available. Isotonic saline-water-based products contain the same salt concentration as those found in the human body, contrary to a hypertonic solution which has a higher salt concentration. There are also nasal sprays with a flow mist that varies from low pressure to high pressure and others that contain eucalyptus. It can sometimes be confusing. Ask your pharmacist to help you choose the product that best suits your needs.

Nasal hygiene for babies

Young children are more likely to suffer from respiratory infections. Because their immune system is not completely developed and they are often in close contact with other children (such as in a daycare setting), this partly explains the high rate of respiratory infections in young children. Young children are also more prone to infection because they have narrow nasal cavities, are unable to blow their noses and spend a lot of time in a sleeping position. This is why it is important to clean the nose by using saline water products on a regular basis to prevent infection.

Nasal hygiene and infection

Millions of Canadians suffer from colds each year. On average, an adult will suffer from one to two colds each year. There is no cure for the common cold, only ways of reducing its symptoms (runny nose, cough, nasal congestion and sore throat). The use of saline water to clear out nasal passages is a safe and effective way of relieving cold symptoms. This also applies to sinus infections. Clearing nasal passages relieves nasal congestion and helps get rid of viruses and bacteria.

Nasal hygiene and allergies

Your nose constantly comes into contact with allergens (mites, pollen and mould). Some people develop allergic reactions accompanied by nasal congestion and sneezing. Using saline water to clean your nose will help reduce your symptoms and eliminate allergens found in mucous.

Dry nose

Dry nose is a common problem whose typical symptoms include a tingling or burning sensation in the nose, dried-up mucous and crusting. It is very uncomfortable and makes us vulnerable to infection. There are several causes of dry nose. Here are a few examples:

- Low humidity levels;
- Heating systems used in homes in the winter time;
- Ageing;
- The use of nasal sprays to administer certain medications;
- Radiation treatments on the head or neck.

To relieve dry nose, it is important to start with proper nose hygiene each day. Next, a nasal lubricant such as Rhinaris Nozoil is a good way of hydrating dry or irritated nasal passages.

Here are a few tips on how to maintain healthy nasal hygiene:

- Do not squeeze a boil or pimple around the area of the nose.
- Do not fry and remove a foreign object from the nasal passage without a doctor's assistance.
- Do not blow the nose vigorously.
- Do not unnecessarily pick the nose.
- Consult your doctor immediately in case of injury and breathing difficulty.
- Avoid carpets;
- Don't let dust accumulate on objects;
- Clean your home regularly;
- Avoid smoking and second-hand smoke.
- Maintain proper humidity levels in your home;
- Maintain a daily nasal cleansing routine especially for young children;
- Clean the nose more frequently when you have a respiratory infection or allergies;
- Use gentle non-irritating products that are specially made for nasal hygiene. Homemade remedies should be avoided.
- Don't hesitate to talk to your pharmacist if you have questions about nasal hygiene or about the different products available to you.
- Avoid exposure to allergens such as scales from animal skins, pollens, cigarette smoke, etc that would lead to nose irritation.
- Use cotton soaked in warm or salt water to clean any crust that is stuck to the inside of your nose. Do not stick it deep inside but only at the entrance of the nose. This is the right way to clean your nose.
- When having irritation or pain in your nose, you can try nasal sprays but do not over-use it.
- Follow the doctor's instructions if you have had surgery.
- Generally, nose takes care of itself unless you harm it. When we breathe in air, nose will clean and humidify itself. Allergies and cold cause problems with nose.
- Breathe in warm steam a day to help moisten the nose and prevent dryness.
- Putting things such as dry tissue or handkerchief on your nostrils create lot of harm. Habits such as nose-picking, rubbing, blowing the nose hard should be avoided.
- Piercing your nose for ornaments might cause infection.

Courtesy: www.jeancoutu.com/en/h
www.alohamaldives.com
www.tipswallet.com

HUMOUR

Irresistible

A man was walking on the beach one day and he found a bottle half buried in the sand. He decided to open it. Inside was a genie. The genie said, "I will grant you three wishes and three wishes only." The man thought about his first wish and decided, "I think I want 1 million dollars transferred to a Swiss bank account." POOF! Next he wished for a Ferrari red in color. POOF! There was the car sitting in front of him. He asked for his final wish, "I wish I was irresistible to women." POOF! He turned into a box of chocolates.

Channels

Little Johnny was not paying attention in class so the math teacher called on him and said, "Johnny! What are 5, 2, 28 and 40?" Little Johnny quickly replied, "NBC, CBS, HBO, and Cartoon Network!"

Church Sign Chuckles

- This Church Is Prayer Conditioned
- God Answers Knee Mail
- PRAY NOW! Avoid Christmas Rush!
- Sign broken, come inside for message
- This is a ch—ch. What's missing? U R!
- Stop in the name of love and meet the Supreme
- Wal-Mart's not the only savings place
- The best position is on your knees!

A New Addition to The Periodic Table of Chemical Elements

Element Name: Wife

Symbol: Wf

Atomic Weight: Dont Even Dare 2 Ask!!!

Physical Properties: Boils at Any temp, Can Freeze at Anytime, Melts if Handled with Love and Care, Very Brittle if Mishandled!

Chemical Props: Very Reactive, Highly Unstable, Possess Strong Affinity for Gold, Platinum, Diamond & Other Precious Items, Money Reducing Agent, Volatile when left Alone

Mainly used to DESTROY or DISSOLVE husband..!

WHAT IS THE DIFFERENCE?

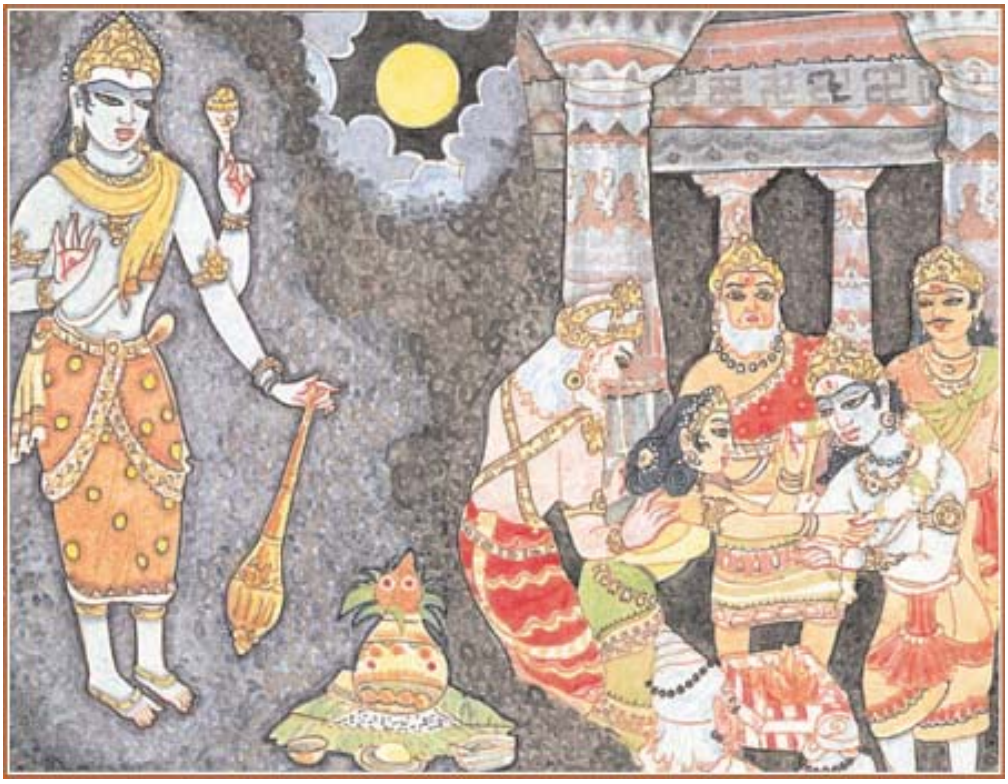
Between ACT and ORDINANCE

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

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

HOME FESTIVALS - 3

Panguni (March/April)



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

(To be continued)

TIRUKKURAL AND MANAGEMENT IN A 'NUTSHELL' 10

Recently there was interesting discussions in a Management Forum about what all go into Building Long Standing Corporations. Long standing basically requires building Valuable Corporate Brands and building of such Corporate Brands take a long time. It therefore becomes necessary to understand what goes into doing business and building organizations, which build reputation and earn revenue as well.

Ethical Values and Social responsibilities are found as most essential dimensions in building long standing corporations. Services to Society should take care of environment and help society with economic development. All these values and standards are really a part of "ARAM" or Dharma, which should be applicable individually and collectively.

In the following 2 simple Kurals, Tiruvalluvar deals with ARAM which helps to build reputation and image and also help in earning revenues.

SirappuEenum Selvamum Eenum;
Arathinwooungu
Aakkam Evano Uyirkku? *Kural 31*

சிறப்புஈனும்: செல்வமும் ஈனும்; அறத்தின்ஊஉங்கு ஆக்கம் எவனோ உயிர்க்கு? குறள் 31

"Righteousness leadeth unto FAME and it bringeth wealth also; then what is there that is more profitable than righteousness."

Arathinwooungu Aakkamum Illai; Athanai
Maraththalin Oongillai Kedu *Kural 32*

அறத்தின்ஊஉங்கு ஆக்கமும் இல்லை; அதனை மறத்தலின் ஊங்குஇல்லை கேடு. குறள் 32

"There is no greater good than righteousness nor no greater ill than the forgetting of it."

The world will not be destroyed
by those who do evil, but by those who watch them without doing anything.
- ALBERT EINSTEIN

YAS ISLAND – ABU DHABI

An emerging entertainment destination within a 30 minute drive of the UAE capital, Yas Island is home to the state-of-the-art **Yas Marina Circuit** – host to the annual F1 Etihad Airways Abu Dhabi Grand Prix. Get to grips with Yas Marina Circuit through a series of track day packages, including 'Driver Experiences', 'Passenger Experiences', 'Private Driving Tuition' programmes and 'Racing License Courses'.

At the circuit's centre piece is **Yas Viceroy Abu Dhabi**, a five star, iconic hotel – the only one in the world to straddle an F1 race track being breathtakingly built half on land and half over water.

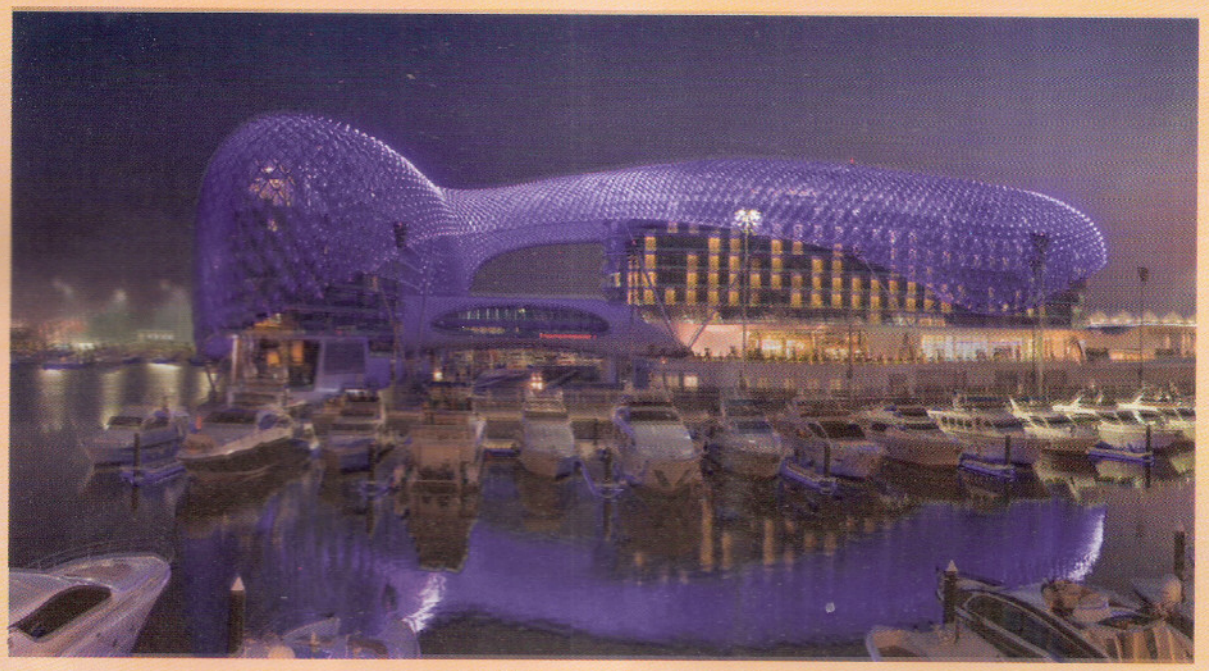
Attracting Super Yachts from as far away as Australia for the annual F1 Etihad Airways Abu Dhabi Grand Prix and, the **Yas Marina** is central to Abu Dhabi's ambitions of becoming a strong rival to traditional yachting grounds such as the Mediterranean and Caribbean. Overlooking the stunning Yas Marina F1 Circuit, **Cipriani** features signature dishes from Harry's Bar in Venice and classic Italian favourites.

It's fast and furious fun for all ages at **Ferrari World Abu Dhabi** - the world's first Ferrari theme park and the largest attraction of its kind. The park tells the Ferrari story with passion and excitement through more than 20 exhilarating and educational rides and attractions, interactive shopping and authentic Italian dining experiences.

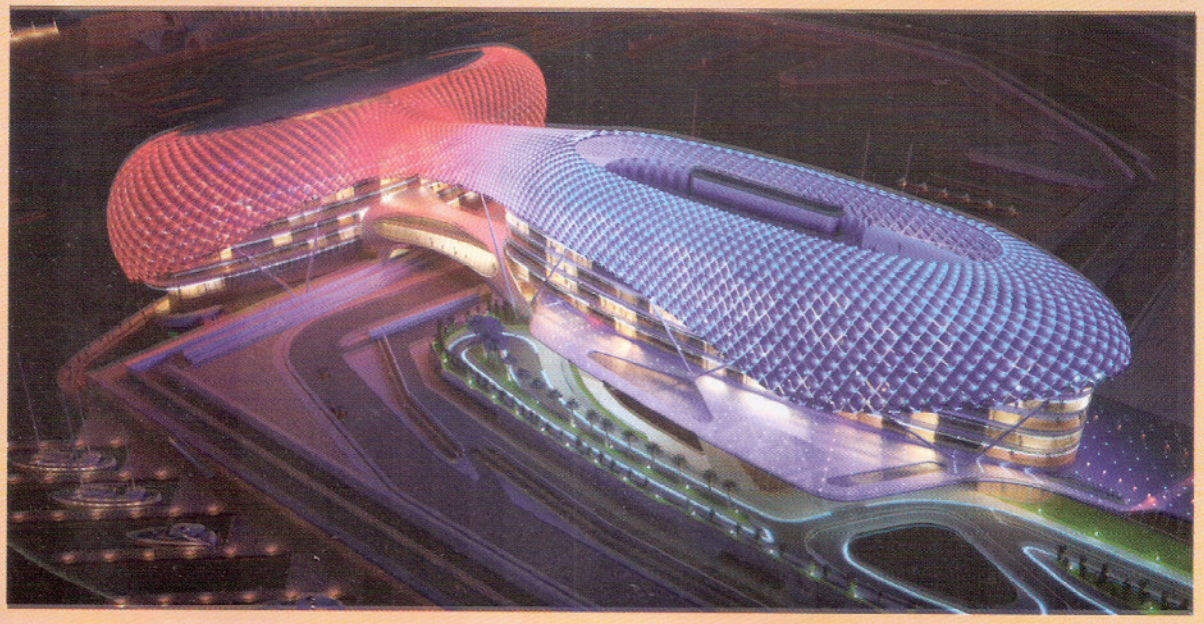
The newly-opened **Yas Water world** spans an area of around 15 football pitches, with 43 rides, slides & attractions – five of which are one-of-a-kind. Visitors to this futuristic water park will be able to try the 238-metre long, world's first, and largest hydro magnetic-powered, six-person tornado waterslide. For adrenaline seekers there are three-metre high waves on Bubble's Barrel, which has the world's largest surfable sheet wave for flow boards and body boards. The Bandit Bomber, a 550–metre coaster, is the first with onboard water and laser effects. Riders can shoot jets of water at targets, drop water bombs and trigger special effects, while people below can spray them with water as they pass. A true full day experience, the park draws on Abu Dhabi's heritage and has 'The Lost Pearl' as its theme. It also features a souk, pearl-diving exhibits and restaurants.

On the west shores of Yas Island, **Yas Links Abu Dhabi** – an award-winning golf course, designed by Kyle Phillips, one of the world's leading golf course architects - is in line with the traditional links golf commonly associated with the coastal towns of Scotland and Ireland. Voted among the 'Top 10 New International Golf Courses' by the influential US publication Golf Magazine, Yas Links features a 7,450 yard par 72 course, utilising five teeing grounds per hole, with all 18 benefiting from ocean views. Recently Yas Links has also been named one of the world's top 25 by influential US magazine, Golf Digest.

YAS ISLAND - ABU DHABI



Yas Viceroy Abu Dhabi



Yas Marina

Yacht Club

Yas Hotel

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