ELECTRICAL INSTALLATION ENGINEER

NEWS LETTER

TAMILNADU ELECTRICAL INSTALLATION ENGINEERS' ASSOCIATION 'A' GRADE (Regn. No. 211/1992)
No.1/61-10, Plot no. 48, Ground Floor, 3rd Street, Ravi Colony, Near Kathipara, St. Thomas Mount, Chennai – 600 016.
Phone: 044-22330601, 9710204300 Email : tnagrade@gmail.com Website : www.teiea.com

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Shri A.K. Venkatasamy
9.12.1940 to 11.05.2021

SHRI. A.K. VENKATASAMY, A PIONEER OF THE TAMILNADU ELECTRICAL INSTALLATION ENGINEERS' ASSOCIATION 'A' GRADE

9.12.1940 to 11.05.2021

We are very proud and feel indebted to Shri. A.K. Venkatasamy for his long association for decades as the President of the Association and his valuable contributions for the growth of the Association from strength to strength. We take pleasure in providing brief accounts of his life and achievements as guiding light for Entrepreneurs and Enterprises as well his work and contributions to our Association.

Shri. A.K. Venkatasamy was Founder Chairman of the Shanti Group of Companies, a conglomerate in South India, whose diverse activities range from providing services such as the design, installation and commissioning of turnkey electrical projects to manufacturing products such as auto components for the automobile industry and ingredients for flavours and fragrance industry.

He founded the Shanti Group in 1968 and expanded it over a period of 5 decades, successfully developing its products and processes and growing it through pre-liberalization India to the twenty-first century. If Chinese tech companies are known for their 9-9-6 working hours and lifestyle, Shri. A.K. Venkatasamy was known for his 9-9-7 lifestyle as he spent most of his waking hours six days a week on the Shanti Group with Sundays devoted to charitable and spiritual organizations such as the Adhiparasakthi Charitable Medical Educational and Cultural Trust, of which he was the Trustee Treasurer and the Melmaruvathur Adhiparasakthi Spiritual Movement.

In addition to his responsibilities as the Chairman of the Shanti Group of Companies, he has advised or served on several government bodies including the Bureau of Indian Standards and the Tamilnadu Electrical Licensing Board. He was President of Tamilnadu Electrical Installation Engineers' Association for more than two decades. He was also Director of Kovai Medical Center and Hospital Limited and Idhayam Hospitals Erode Limited. He has helped the association in many ways. He gave an unsecured loan of Rs.10 lakhs to the association, so it can buy its own office space and even sent his own engineer to Mumbai to get the documents required for registration.

In another incident, the then government of Tamil Nadu was working on a plan to cancel electrical contractor licensing procedures. If followed through, this would have rendered all electrical contractors businesses insolvent. Shri. A.K. Venkatasamy along with Shri S. Sitaraman and Late Shri. N.S. Venkatraman met the Electricity Minister with a proposal that would stop this government plan.

Born in a pre-Independence era into an agricultural family in the village of Alambadi in Erode district of Tamil Nadu to Shri. Kuttianna Gounder and Smt. Kuttiammal at a time when you were expected to follow the footsteps of your parents and anything beyond that spelt struggle, Shri. A.K. Venkatasamy's meteoric rise as a leading businessman in Chennai was anything but predictable. Starting his education at his local village school, Shri. A.K. Venkatasamy's inherent curiosity, quickness of mind, ability to learn and absorb and navigate the world around him led him to Chennai and to embark on an entrepreneurial life which took him around the world and across several industries.

On the news of his death, friends, acquaintances and strangers called his family to share in the loss. One reflection was universal: Beyond his achievements, it was his personality that was mourned. He was always there when you needed him and his many acts of support and kindness that he seemed to forget as soon as he performed them but made such a difference to others.

His achievements would not have been possible without the constant support of his wife, Smt. Kannamma Venkatasamy. They have been blessed with two children and three grandchildren.

The sudden demise of Shri. A.K. Venkatasamy is a great loss for his Family Members, Friends, and Association Members.

ELECTRICAL INSTALLATION ENGINEER

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EDITORIAL

Dear Members, Fellow Professionals and Friends,

Seasons Greetings To One And All!

Best Wishes To All For Good Health, Safety And Wellness!!!

It is with deep regret, we record the message of passing away of ***Sri A.K.Venkataswamy*** *on* ***11th of May 2021.*** *He was not only one our esteemed members but was also President of our Association for decades. Apart from valuable contributions to build our Association to Great Strengths, this News Letter too owes its birth one of his many initiatives. We are dedicating this issue to his memory, contributions and achievements.*

The aggressive second wave of COVID has resulted in serious all round problem for the entire World and in particular to our country, due to our size and population. We are experiencing serious problems with the second wave. We know that every crisis brings both challenges and opportunities. The times have been best utilized to create care and solutions as well as "Vaccines" for long term protection. We can certainly assure ourselves that it is only a matter of time before we get everything under control.

In terms of Businesses, Economy and Management, the Pandemic, in a way, seems to have created problems to every one in every country uniformly. It is an absolute fact that the world is connected which is proven by the Pandemic, and very soon the connectivity levels are progressing to end up in 'Hyper Connectivity'. As expressed by some of the experts, the World Order was designed after the Second World War, resulting in the birth of UNO, WTO, IMF and so on and it was actually a 'Bi Polar World' at that time with US and Russian Blocks. It later became 'Uni Polar', with the fall of Russia. The present times have created both challenges and opportunities for all, but the World Order is constantly disturbed by Autocratic countries and their Economic Power, and even among democracies, the liberal and true democracies are disturbed more. The majority of the World has come to believe that Democracy is the best for the World and there are discussions that the World Order needs to be 'Re Designed', taking into account the threats that have been created to the Planet Earth, in the course of the past 100 years. It is also important to understand the levels of technology and connectivity at present which is heading towards super technologies and connectivity and what are real concerns for the present and the future are "The Planet" and "The People". The questions are – How are we going to ensure the safety of the Planet? How are we going to design the Governance of People, Economies, Prosperity, Peace and Happiness?

The months of May and June have many events for the Planet and the people

The Month of May, marks the celebrations of World Workers Day (May 1st), World Telecommunication and Information Society Day (May 17th) and the International Day of Biological Diversity (May 22nd) and some thoughts about all these are important in the context of present times.

We all understand that Capital and Labour are important components of Economy. The productivity and prosperity through capital and labour is decided by Innovation and Technologies, which have galloped in the past decades, making mass labour more and more irrelevant. Today's work force comprises more and more of knowledge and skill workers, the levels of technology and skill requirements going up steadily.

Biodiversity has been badly disturbed during the past 100 years, since the time of industrial revolution and the Fossils have to be completely done away with to restore Biodiversity and save the Planet.

June 5th marks the "World Environment Day" signifying the steps needed to protect the environment and prevent 'Global Warming' through Energy Efficiency and Renewable Energy.

Let us all resolve to contribute our might in all Planet and People focused measures.

We thank all those members who have helped us by participating in the advertisement appearing for the issue April 2021 – E Power Engineering, Eco Care

Editor

KNOW THY POWER NETWORK - 159

5. With the back ground details thus far furnished, we are in a position to work out a structured frame work for safety audit in any premises that includes industries and commercial establishments. Its out-line is as follows

"A structured frame work for safety audit – at a glance

- Scope of the work - physical examination to distinguish electrical arrangements and confirmation of compliance with Indian Electrical Safety rules, risks and to recommend electrical security".
- Needful, background information – In brief (This covers all aspects of possible threats and the related solutions, tolerance levels of the equipment, devices and cables).
- Concepts that require attention
  - (i) Employee awareness, Acceptance of responsibility and participation.
  - (ii) Maintenance of safe working conditions
  - (iii) Safety policy and programme
  - (iv) Safety rules, regulations – compliance
  - (v) Identification of potential electrical hazards / threats in the promises on hand.

Safeguarding against such potential threats (Refer – Know thy power network – 156 – Electrical Installation Engineers – Newsletter – Feb 2021).

- Protection and guarting of equipment
- Preparation of strategies check lists for the safety audit
- Audit procedures that include

  Making the audit report with recommendations and their related Cost - Benefit Analysis
- Concluding remarks

6. Now let us briefly discuss some of the items mentioned in this list.

(i) Safety Policy and Safety Programme

The safety programme is a well-documented programme which is conducted at regular intervals. This programme with pre-determined principles, procedures and controls to ensure the electrical safety to the employees. Periodical mock drills on safety training to the employees are included in it. The details of this programme should be made available to the employees and employers as well.

The safety policy of the energising is aimed at the creation of a safe working condition. The principles that constitute it includes inspection, maintenance to be performed, planning the repair jobs, de-energising methods, identifying the hazards in the plant protecting the employees against them and usage of safety rules.

As per this policy, the employer should provide necessary safety related tools, devices, work procedures and the precautionary measures whereas the employees should work in alignment with the safety policy of the organization.

(ii) Safety Rules Compliance

The safety rules as specified in Electricity Act – 2003 should be complied with safety expresses its presence through the strict compliance of the prescribed rules, norms and regulations; it never permits even a minor / single deviation. One should never lit down his guards; it should always be firmly fixed in its assigned places.

(iii) Audit procedures

The Electrical Safety Audit generally contains

- Pre - Audit Survey
- Actual Audit
- Post – Audit Survey
- Perceptual Safety Survey
- Formation of inspection team and its inspection procedures
- Effective Safety Observations
- Taking notes and making the report
- Final recommendations based on cost – benefit Analysis

The audit report should invariably state,

(a) What are the safety issues that exist in the plant / premises

(b) What protection should be in place and what exactly exist; what are the short falls that warrant attention?

(c) What are the safety rules that are not complied with; what are the corrective procedures required for it?

The evaluation should be based on these. To illustrate how the report on over voltage protection should meet this condition, it is suggested that it should contain

- Possible threats faced
- Protection required to guard against these threats
- Confirm whether these protective measures are actually available at site in proper working condition. If not, what are the short falls and
- What are the corrective measures needed.

In the same way, the short circuit protection of the plant equipment and devices is required to be evaluated. To make it simple, it can be brought out as shown below.

Prevailing fault level at the site in point	I^2t withstand level of the protective devices like fuses, breakers etc Cables, Capacitors etc	I^2t withstand level of the protected devices like transformers Motors,	Short fall if any, in this analysis
1	2	3	4

Finally we reach the distinction of Electrical Safety Check list which is essentially required for this audit; it simply defines the parameters / items that need to be given focus during the verification / examination of electrical equipment, the items that contributes / involves / results in potential hazards and the corresponding protections arranged.

(iv) Electrical Safety Audit - Checklist

Over voltage surges that include lightning (both direct and indirect strokes) switching surges and VF Tos.

- Presence of static electricity hazards in the plant.
- Details of incidents that involve electrical mischances and close misses.
- Details of safety procedures followed in regard to electrical systems and techniques. (work permits, interlocks, lock out labels, safety wardens, danger boards, safety ropes etc)

Some of the items that have been outlined earlier may find a place in this check list also but such repetition may kindly be a permitted. With this I would like to conclude my write up on "Safety Audit and how to perform it comprehensively".

Kindly stay tuned for my next article.

(To be continued)

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

HUMOUR

A family of mice were surprised by a big cat. Father Mouse jumped and and said, "Bow-wow!" The cat ran away. "What was that, Father?" asked Baby Mouse. "Well, son, that's why it's important to learn a second language."

The doctor to the patient: 'You are very sick'

The patient to the doctor: 'Can I get a second opinion?'

The doctor again: 'Yes, you are very ugly too...'

A man goes to the doctor and says, "Doctor, wherever I touch, it hurts."

The doctor asks, "What do you mean?"

The man says, "When I touch my shoulder, it really hurts. If I touch my knee - OUCH! When I touch my forehead, it really, really hurts."

The doctor says, "I know what's wrong with you - you've broken your finger!"

Patient: Doctor, I have a pain in my eye whenever I drink tea.

Doctor: Take the spoon out of the mug before you drink.

A: Just look at that young person with the short hair and blue jeans. Is it a boy or a girl?

B: It's a girl. She's my daughter.

A: Oh, I'm sorry, sir. I didn't know that you were her father.

B: I'm not. I'm her mother.

A: Why are you crying?

B: The elephant is dead.

A: Was he your pet?

B: No, but I'm the one who must dig his grave.

"Look closely at nature. Every species is a masterpiece, exquisitely adapted to the particular environment in which it has survived. Who are we to destroy or even diminish biodiversity?"
– E. O. WILSON

3-PHASE DISTRIBUTION TRANSFORMERS 11 OR 433 KV/415-240V (OUTDOOR TYPE) - 6

30 TESTS:

30.1 All the equipment offered shall be fully type tested by the bidder or his collaborator as per the relevant standards including the additional type tests. The type test must have been conducted on a transformer of same design **during the last five years** at the time of bidding. The bidder shall furnish four sets of type test reports along with the offer. **In case, the offered transformer is not type tested, the bidder will conduct the type test as per the relevant standards including the additional type tests at his own cost in CPRI/ NABL accredited laboratory in the presence of employers representative(s) without any financial liability to employer in the event of order placed on him.**

30.2 Special tests other than type and routine tests, as agreed between purchaser and bidder shall also be carried out as per the relevant standards.

30.3 The requirements of site tests are also given in this clause.

30.4 The test certificates for all routine and type tests for the transformers and also for the bushings and transformer oil shall be submitted with the bid.

30.5 The procedure for testing shall be in accordance with IS1180 (Part-1): 2014 /2026 as the case may be except for temperature rise test.

30.6 Before dispatch each of the completely assembled transformers shall be subjected to the routine tests at the manufacturer's works.

31 ROUTINE TESTS:

31.1 Ratio, polarity, phase sequence and vector group.

31.2 No Load current and losses at service voltage and normal frequency.

31.3 Load losses at rated current and normal frequency.

31.4 Impedance voltage test.

31.5 Resistance of windings at each tap, cold (at or near the test bed temperature).

31.6 Insulation resistance.

31.7 Induced over voltage withstand test.

31.8 Separate source voltage withstand test.

31.9 Neutral current measurement-The value of zero sequence current in the neutral of the star winding shall not be more than 2% of the full load current.

31.10 Oil samples (one sample per lot) to comply with IS 1866.

31.11 Measurement of no load losses and magnetizing current at rated frequency and 90%, 100% and 110% rated voltage.

31.12 Pressure and vacuum test for checking the deflection.

32 TYPE TESTS TO BE CONDUCTED ON ONE UNIT:

In addition to the tests mentioned in clause 30 and 31 following tests shall be conducted:

32.1 Temperature rise test for determining the maximum temperature rise after continuous full load run. The ambient temperature and time of test should be stated in the test certificate.

32.2 Impulse voltage test: with chopped wave of IS 2026 part-III. BIL for 11 kV shall be 75 kV peak.

32.3 Short circuit withstand test: Thermal and dynamic ability.

32.4 Air Pressure Test: As per IS – 1180 (Part-1):2014.

32.5 Magnetic Balance Test.

32.6 Un-balanced current test: The value of unbalanced current indicated by the ammeter shall not be more than 2% of the full load current.

32.7 Noise-level measurement.

32.8 Measurement of zero-phase sequence impedance.

32.9 Measurement of Harmonics of no-load current.

32.10 Transformer tank shall be subjected to specified vacuum. The tank designed for vacuum shall be tested at an internal pressure of 0.35 kg per sq.cm absolute (250 mm of Hg) for one hour. The permanent deflection of flat plates after the vacuum has been released shall not exceed the values specified below:

Horizontal length of flat plate (in mm)	**Permanent deflection (in mm)**
Upto and including 750	5.0
751 to 1250	6.5
1251 to 1750	8.0
1751 to 2000	9.0

32.11 Transformer tank together with its radiator and other fittings shall be subjected to pressure corresponding to twice the normal pressure or 0.35 kg / sq.cm whichever is lower, measured at the base of the tank and maintained for an hour. The permanent deflection of the flat plates after the excess pressure has been released, shall not exceed the figures for vacuum test.

32.12 Pressure relief device test: The pressure relief device shall be subject to increasing fluid pressure. It shall operate before reaching the test pressure as specified in the above class. The operating pressure shall be recorded.

The device shall seal-off after the excess pressure has been released.

32.13 **Short Circuit Test and Impulse Voltage Withstand Tests**: The purchaser intends to procure transformers designed and successfully tested for short circuit and impulse test. In case the transformers proposed for supply against the order are not exactly as per the tested design, the supplier shall be required to carry out the short circuit test and impulse voltage withstand test at their own cost in the presence of the representative of the purchaser.

32.13.1 The supply shall be accepted only after such test is done successfully, as it confirms on successful withstand of short circuit and healthiness of the active parts thereafter on un-tanking after a short circuit test.

32.13.2 Apart from dynamic ability test, the transformers shall also be required to withstand thermal ability test or thermal withstand ability will have to be established by way of calculations.

32.13.3 It may also be noted that the purchaser reserves the right to conduct short circuit test and impulse voltage withstand test in accordance with the IS, afresh on each ordered rating at purchaser cost, even if the transformers of the same rating and similar design are already tested. This test shall be carried out on a transformer to be selected by the purchaser either at the manufacturer's works when they are offered in a lot for supply or randomly from the supplies already made to purchaser's stores. The findings and conclusions of these tests shall be binding on the supplier.

32.13.4 Type test certificates for the tests carried out on prototype of same specifications shall be submitted along with the bid. The purchaser may select the transformer for type tests randomly.

33 ACCEPTANCE TESTS:

33.1 **At least 10% transformers of the offered lot (minimum of one)** shall be subjected to the following routine/ acceptance test in presence of purchaser's representative at the place of manufacture before dispatch without any extra charges. The testing shall be carried out in accordance with IS: 1180 (Part-1): 2014 and IS: 2026.

33.2 Checking of weights, dimensions, fitting and accessories, tank sheet thickness, oil quality, material, finish and workmanship as per GTP and contract drawings.

33.3 Physical verification of core coil assembly and measurement of flux density of one unit of each rating, in every inspection with reference to short circuit test report

33.4 Temperature rise test on one unit of the total ordered quantity

34 TESTS AT SITE:

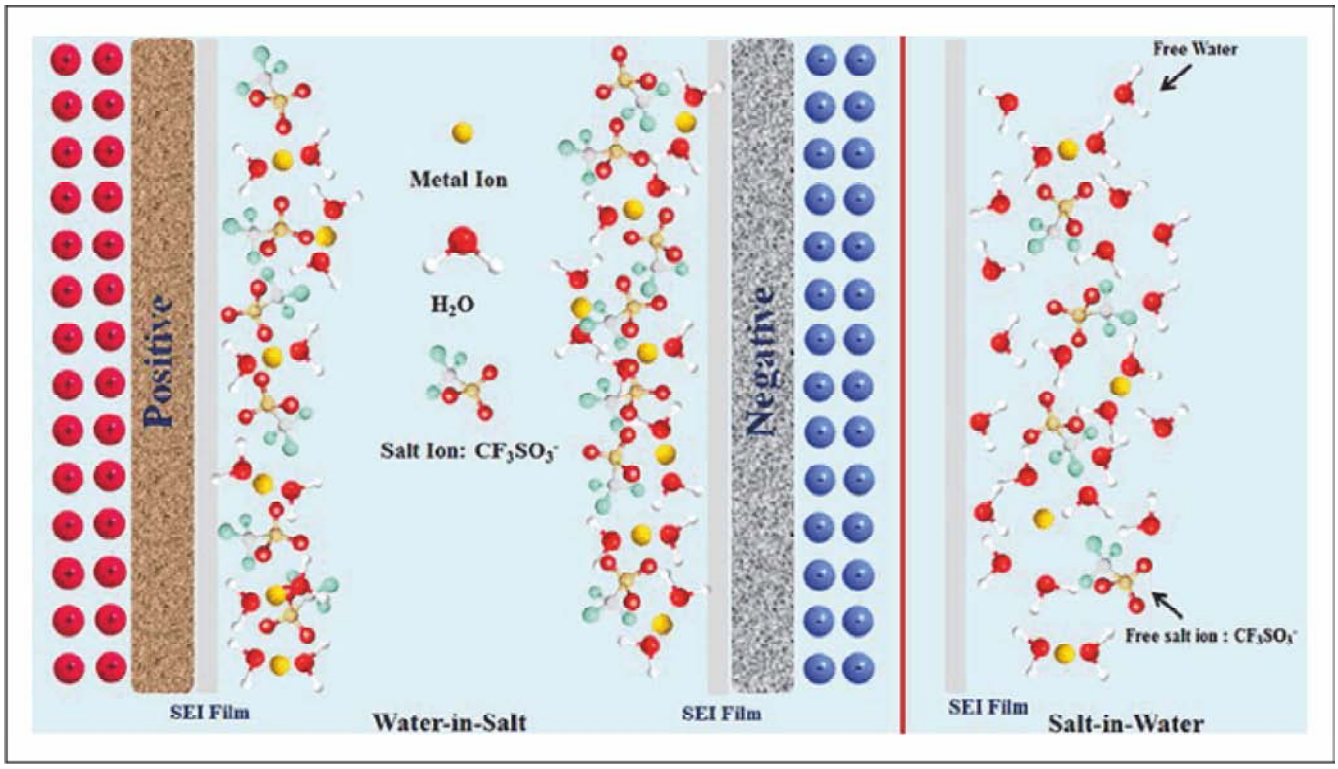
The purchaser reserves the right to conduct all tests on transformer after arrival at site and the manufacturer shall guarantee test certificate figures under actual service conditions.

(To be continued)

Courtesy: www.mstcecommerce.com>RenderFileViewVideo

SALT ENHANCES RECHARGEABLE LITHIUM-ION BATTERIES

Using salt as a key ingredient, Chinese and British researchers have designed a new type of rechargeable battery that could accelerate the shift to greener, electric transport on our roads.



Many electric vehicles (EV) are powered by rechargeable lithium-ion batteries, but they can lose energy and power over time. Under certain conditions, such batteries can also overheat while working or charging, which can also degrade battery life and reduce miles per charge.

To solve these issues, the University of Nottingham is collaborating with six scientific research institutes across China to develop an innovative and affordable energy store with the combined performance merits of a solid-oxide fuel cell and a metal-air battery. The new battery could significantly extend the range of electric vehicles, while being fully recyclable, environmentally-friendly, low-cost and safe.

A solid-oxide fuel cell converts hydrogen and oxygen into electricity as a result of a chemical reaction. While they are highly-efficient at extracting energy from a fuel, durable, low-cost and greener to produce, they are not rechargeable. Meanwhile, metal-air batteries are electrochemical cells that uses a cheap metal such as iron and the oxygen present in air to generate electricity. During charging, they emit only oxygen into the atmosphere. Although not very durable, these high-energy dense batteries are rechargeable and can store and discharge as much electricity as lithium-ion batteries, but much more safely and cheaply.

In the early research phases, the research team explored a high-temperature, iron-air battery design that used molten salt as a type of electrolyte — activated by heat — for electrical conductivity. Cheap and inflammable, molten salts help to give a battery impressive energy storage and power capability and a lengthy lifecycle.

However, molten salts also possess adverse characteristics. University of Nottingham study lead, Professor George Chen said: “In extreme heat, molten salt can be aggressively corrosive, volatile and evaporate or leak, which is challenging to the safety and stability of battery design. There was an urgent need to fine-tune these electrolyte characteristics for better battery performance and to enable its future use in electric transport.”

The researchers have now successfully improved the technology by turning the molten salt into soft-solid salt, using solid oxide nano-powders. Professor Jianqiang Wang, from the Shanghai Institute of Applied Physics, Chinese Academy of Sciences, who is leading this collaboration project has predicted that this quasi-solid-state (QSS) electrolyte is suitable for metal-air batteries which operate at 800 ^{o}C; as it suppresses the evaporation and fluidity of the molten salts that can occur at such high operating temperatures.

Project collaborator, Dr Cheng Peng, also from the Shanghai Institute of Applied Physics, Chinese Academy of Sciences, explains a unique and useful design aspect of this experimental research. The quasi-solidification has been achieved using nanotechnology to construct a flexibly-connected network of solid oxide particles that act as a structural barrier locking in the molten salt electrolytes, while still allowing them to safely conduct electricity in extreme heat.

Professor Chen, who is leading a molten salt electrolysis laboratory in Nottingham, hopes the team’s “encouraging results” will help to establish a simpler and more efficient approach to designing low-cost and high-performance molten salt metal-air batteries with high stability and safety.

He adds, “The modified molten salt iron-oxygen battery has great potential applications in new markets, including electric transport and renewable energy which require innovative storage solutions in our homes and at grid-level. The battery is also, in principle, capable of storing solar heat as well as electricity, which is highly-desirable for both domestic and industrial energy needs. Molten salts are currently used at large scale in Spain and China to capture and store solar heat which is then converted to electricity — our molten salt metal air battery does the two jobs in one device.”

“We cannot win this battle to save species and environments without forging an emotional bond between ourselves and nature as well - for we will not fight to save what we do not love.” – STEPHEN JAY GOULD

ELECTRICAL MAINTENANCE UNIT
(QUESTION & ANSWERS) - 8

116. What are the systems of wiring?

Following are the general systems of domestic wiring and industrial wiring.

a. Cleat system wiring.
b. Casing and capping system wiring.
c. Lead sheathed system wiring.
d. C.T.S, T.R.S, P.V.C sheathed system wiring.
e. Conduit system wiring.

117. What are the testing of wiring installation?

Following are the tests to be done after installation of wiring.

a. Polarity test.
b. Short circuit test.
c. Continuity test.
d. Insulation test between conductors and conductors to the earth.
e. Earth continuity test.

118. What are the advantages of AC over DC?

a. For the same capacity alternators are cheaper than DC generators, because alternator is not having commutator arrangement and there by small in size.
b. Alternating current produces pulsating magnetic field and thereby it posses the property of inductance and capacitance.
c. Alternating current can be step-up or step-down by static transformer.
d. AC can be transmitted with very less cost in comparing to DC transmission.
e. Alternating line losses are very less comparing to DC line losses.
f. An alternators and AC motor requires very less maintenance.
g. Charge per unit for AC is less than DC.

119. Define AC.

Alternating current is that type of electric current, which changes its magnitude and direction periodically.

120. What is cycle?

One complete set of changes in value and direction of alternating quantity and emf or current is called a cycle.

121. What is periodic time?

Periodic time is the time taken to complete on cycle. Its symbol is 'T'. For example Indian standard frequency is 50 cycles per second. So the periodic time T = 1/50 seconds. That is equal to 20 m seconds.

122. What is frequency?

Number of cycles per second is called frequency.

123. What is amplitude value or peak value?

It is the maximum value of an alternating quantity that can be obtained in any one direction.

124. What is instantaneous value?

The value of an alternating quantity at a particular instant is called instantaneous value.

125. What is average value or mean value?

Average of all instantaneous values of emf or current over a half cycle is known as average value or mean value.

Average value = $0.637 * E_{max}$ or I_{max}

126. What is root mean square value (R.M.S)?

The R.M.S value is also known as effective value or virtual value. The instantaneous value of both the directions will all be squared up and will be added together. Then divide to get the average with the number of instantaneous values and find the square root of this average to calculate the R.M.S value of the emf or current.

Or

The R.M.S value of an alternating current or emf is equal to the same value of direct current (DC), which produces the same amount of heat with the same time when applied the DC through the same circuit as AC is produced.

R.M.S value = maximum value / $\sqrt{2}$ = 1/$\sqrt{2}$ = 0.707.

4" R.M.S value or effective value = $0.707 * E_{max}$ or I_{max}

127. What is form factor?

The ratio of the R.M.S value to the average value is called the form factor.

∴ Form factor = $0.707 * E_{max}$ or I_{max} : $0.637 * E_{max}$ or I_{max}

= $0.707 * E_{max}$ or I_{max} / $0.637 * E_{max}$ or I_{max}

= 1.11

So that R.M.S value = average value * 1.11

Or average value = R.M.S value / 1.11

128. What is crest factor or peak factor?

The ratio of maximum value to the R.M.S value is known as crest factor. So the crest factor = maximum value / R.M.S value.

= E_{max} or I_{max} / (E_{max} or I_{max} /$\sqrt{2}$)

= E_{max} or I_{max} * $\sqrt{2}$ / E_{max} or I_{max} = $\sqrt{2}$ = 1.414

129. What is vector quantity and what is scalar quantity?

Vector quantity

A quantity, which has both the direction and magnitude is said to be a vector quantity. Examples are force, emf, current etc.

Scalar quantity

A scalar quantity is that, which has only magnitude but no direction. Examples are temperature, mass, volume etc.

130. What is phase?

The development of an AC quantity through different stages is known as Phase. The term phase refers to the number of separate individual voltage setup in an AC circuit.

131. What is in-phase?

When those two vectors (voltage and current) attain (reaches) their maximum and minimum values simultaneously (at the same time), then those two quantities are said in-phase. Here between those quantities there is no angle.

132. What is out of phase?

When two alternating quantities voltage and current do not reaches their maximum and minimum values simultaneously, then they are called out of phase.

133. What is phase angle?

Phase angle is an angular displacement between two alternating quantities. Phase angle is measured in electrical degrees or radians.

134. What is quadrature quantity?

When the phase angle between two vectors is 90° electrical, then they are said to be quadrature quantity.

135. What anti-phase quantity?

When two quantities are out of phase by 180° electrical, then they are said to be anti-phase quantities.

136. What is leading quantity?

The alternating quantity that reaches its maximum value earlier than the other quantity is known as the leading quantity.

137. What is lagging quantity?

The alternating quantity that attains its maximum value later than the other quantity is called the lagging quantity.

138. What is the relation between voltage and current in AC circuit containing only resistance?

Current (I) is in-phase with the voltage.

$I = V/R$ amps.

$P = I * V * \cos\varphi$ or I^2R watts. (Where $\cos\varphi$ is zero because the voltage and current are in-phase. So $\cos\varphi$ 0° (zero) = 1)

139. What is the relation between voltage and current in AC circuit containing only inductance?

Current (I) is lags behind the voltage by 90°.

$I = V/X_L$ amps.

$X_L = 2\pi fL$ ohms.

$P = I * V * \cos\varphi$ watts. (Where $\cos\phi$ is 90 because current lags behind voltage by 90°. So $\cos\phi$ 90° = 0)

∴ $P = I * V * 0 = 0$ watts.

140. What is the relation between voltage and current in AC circuit containing only capacitance?

Current (I) is leading the voltage by 90°.

$I = V/X_C$ amps.

$X_C = 1/2\pi fC$ ohms.

$P = I * V * \cos\varphi$ watts. (Where $\cos\varphi$ is 90 because current is leading the voltage by 90°. So $\cos\varphi$ 90° = 0)

∴ $P = I * V * 0 = 0$ watts.

141. What is inductance and inductive reactance?

Inductance

A coil carrying alternating current produces an alternating flux, which causes to link with same coil and produces an emf in the coil, which opposes the applied emf. This property is known as inductance. The unit for measurement is henry.

Inductive reactance

The opposition or the reactance offered by the property of inductance in the circuit is known as inductive reactance and denoted by the letter XL. The unit for measurement is ohm.

142. What is capacitance and capacitive reactance?

Capacitance

The property of a capacitor to store electrical energy in it, when it is connected to an electric supply is called capacitance. Unit for measurement is farad. Capacitor store an electric energy in the unit of charge and the unit of charge is coulomb.

Capacitive reactance

The opposition due to capacitance of capacitor in an electric circuit is called capacitive reactance and it denoted by the letter XC. The unit for measurement is ohm.

143. What is impedance?

The total opposition offered by an AC circuit for the flow of current through it is called Impedance. The letter 'Z' denotes it and the unit is ohm.

$\therefore Z = \sqrt{R^2 + (X_L \sim X_C)^2}$

$Z = \sqrt{R^2 + (X)^2}$

Where ~ indicates the difference of X_L and X_C and denoted in the letter X (net reactance of the AC circuit).

144. What is ohm's law for AC circuit?

$I = V/Z$ amps.

$Z = V/I$ ohms.

$V = I * Z$ volts.

145. What is the current and power in an AC circuit?

Current

AC circuit contains resistance 'R' and reactance 'X'.

In resistive circuit $I_R = I \cos\varphi$. Because resistance current (I_R) is in-phase with voltage (E_R).

In reactance circuit $I_X = I \sin\varphi$. Because reactance current will lead or lag the voltage (E_R) by 90°

So the resultant current (I) is the vector sum of $I \cos\varphi$ and $I \sin\varphi$. So that circuit current $I = \sqrt{(I \cos\varphi)^2 + (I \sin\varphi)^2}$ amps.

$I \cos\varphi$ is sometimes known as power component of current or the power current or energy current and the $I \sin\varphi$ is known as reactive component of current or wattles current. Because $I \sin\varphi$ is not taking any energy from the circuit.

Power

Power in watts = terminal voltage * power component of current.

a. ***True power*** = $E * I * \cos\varphi$ watts.

This true power is sometimes known as energy component or active component or watt-full component. Because this is the power used to produce torque in motor and supplies heat, light etc. or this true power is the power consumption of all source of electric circuit.

b. ***Reactive power*** = $E * I * \sin\phi$ watts.

This reactive power is sometimes known as reactive or in-active component or watt less component or VARS.

c. ***Apparent power*** = $E * I$ watts.

The terminal voltage multiplied by the actual resultant current (I) is called the apparent power or volt-ampere or VA.

(To be continued)

Courtesy: https://www.scribd.com/document/244623258/Question-and-Answers-Electrical-Maintenance-Unit

LIGHTING FUNDAMENTALS – 5

Fluorescent Ballasts

The two general types of fluorescent ballasts are magnetic and electronic ballasts:

Magnetic Ballasts

Magnetic ballasts (also referred to as electromagnetic ballasts) fall into one of the following categories:

- standard core-coil (no longer sold in the US for most applications)
- high-efficiency core-coil
- cathode cut-out or hybrid

Standard core-coil magnetic ballasts are essentially core-coil transformers that are relatively inefficient in operating fluorescent lamps. The high-efficiency ballast replaces the aluminum wiring and lower grade steel of the standard ballast with copper wiring and enhanced ferromagnetic materials. The result of these material upgrades is a 10 percent system efficiency improvement. However, note that these "high efficiency" ballasts are the least efficient magnetic ballasts that are available for operating full-size fluorescent lamps. More efficient ballasts are described below.

"Cathode cutout" (or **"hybrid"**) ballasts are high-efficiency core-coil ballasts that incorporate electronic components that cut off power to the lamp cathodes (filaments) after the lamps are lit, resulting in an additional 2-watt savings per standard lamp. Also, many partial-output T12 hybrid ballasts provide up to 10% less light output while consuming up to 17% less energy than energy-efficient magnetic ballasts. Full-output T8 hybrid ballasts are nearly as efficient as rapid-start two-lamp T8 electronic ballasts.

Electronic Ballasts

In nearly every full-size fluorescent lighting application, electronic ballasts can be used in place of conventional magnetic "core-and-coil" ballasts. Electronic ballasts improve fluorescent system efficacy by converting the standard 60 Hz input frequency to a higher frequency, usually 25,000 to 40,000 Hz. Lamps operating at these higher frequencies produce about the same amount of light, while consuming 12 to 25 percent less power. Other advantages of electronic ballasts include less audible noise, less weight, virtually no lamp flicker, and dimming capabilities (with specific ballast models).

There are three electronic ballast designs available:

Standard T12 electronic ballasts (430 mA)

These ballasts are designed for use with conventional (T12 or T10) fluorescent lighting systems. Some electronic ballasts that are designed for use with 4' lamps can operate up to four lamps at a time. Parallel wiring is another feature now available that allows all companion lamps in the ballast circuit to continue operating in the event of a lamp failure. Electronic ballasts are also available for 8' standard and high-output T12 lamps.

T8 Electronic ballasts (265 mA)

Specifically designed for use with T8 (1-inch diameter) lamps, the T8 electronic ballast provides the highest efficiency of any fluorescent lighting system. Some T8 electronic ballasts are designed to start the lamps in the conventional rapid start mode, while others are operated in the instant start mode. The use of instant start T8 electronic ballasts may result in up to 25 percent reduction in lamp life (at 3 hours per start) but produces slight increases in efficiency and light output. (Note: Lamp life ratings for instant start and rapid start are the same for 12 or more hours per start)

Dimmable electronic ballasts

These ballasts permit the light output of the lamps to be dimmed based on input from manual dimmer controls or from devices that sense daylight or occupancy.

Types of Fluorescent Circuits

There are three main types of fluorescent circuits:

- rapid start
- instant start
- preheat

The specific fluorescent circuit in use can be identified by the label on the ballast.

The **rapid start** circuit is the most used system today. Rapid start ballasts provide continuous lamp filament heating during lamp operation (except when used with a cathode cut-out ballast or lamp). Users notice a very short delay after "flipping the switch," before the lamp is started.

The **instant start** system ignites the arc within the lamp instantly. This ballast provides a higher starting voltage, which eliminates the need for a separate starting circuit. This higher starting voltage causes more wear on the filaments, resulting in reduced lamp life compared with rapid starting.

The **preheat circuit** was used when fluorescent lamps first became available. This technology is used very little today, except for low-wattage magnetic ballast applications such as compact fluorescents. A separate starting switch, called a starter, is used to aid in forming the arc. The filament needs some time to reach proper temperature, so the lamp does not strike for a few seconds.

HID Ballasts

Like fluorescent lamps, HID lamps require a ballast to start and operate. The purposes of the ballast are similar: to provide starting voltage, to limit the current, and to match the line voltage to the arc voltage.

With HID ballasts, a major performance consideration is lamp wattage regulation when the line voltage varies. With HPS lamps, the ballast must compensate for changes in the lamp voltage as well as for changes in the line voltages.

Installing the wrong HID ballast can cause a variety of problems:

- waste energy and increase operating cost
- severely shorten lamp life
- significantly add to system maintenance costs
- produce lower-than-desired
- light levels
- increase wiring and circuit breaker installation costs
- result in lamp cycling when voltage dips occur

Capacitive switching is available in new HID luminaires with special HID ballasts. The most common application for HID capacitive switching is in occupancy-sensed bi-level lighting control. Upon sensing motion, the occupancy sensor will send a signal to the bi-level HID system that will rapidly bring the light levels from a standby reduced level to approximately 80% of full output, followed by the normal warm-up time between 80% and 100% of full light output. Depending on the lamp type and wattage, the standby lumens are roughly 15-40% of full output and the input watts are 30-60% of full wattage. Therefore, during periods that the space is unoccupied and the system is dimmed, savings of 40-70% are achieved.

Electronic ballasts for some types of HID lamps are starting to become commercially available. These ballasts offer the advantages of reduced size and weight, as well as better color control~ however, electronic HID ballasts offer minimal efficiency gains over magnetic HID ballasts.

(To be continued)

Courtesy: U.S. EPA Green Lights

WORLD'S LARGEST SOLAR POWER PLANT MOVES FORWARD IN ABU DHABI WITH CONTRACT AWARD

Plans to develop the world's largest solar power plant in the deserts of the Gulf have been given the go-ahead, with the authorities in the UAE awarding the project to a multinational consortium on July 26.

The state-owned Emirates Water and Electricity Company (EWEC) has awarded the contract for the 2GW plant to Abu Dhabi National Energy Company (Taqa), another local firm Masdar, French utility company EDF and China's JinkoPower. As ratings agency Standard & Poor's noted, EWEC is a subsidiary of ADQ, which also holds a stake in Taqa.

The total cost of the project at Al Dhafra, some 35km from Abu Dhabi city, has not been revealed. However, when bids for the scheme were submitted earlier this year, Abu Dhabi Power Corporation (ADPower) said it had secured the world's lowest tariff for a solar power plant, with a bid of 1.35 U.S. cents per kilowatt hour (kWh), on a levelized cost of electricity.

Abu Dhabi is already home to one very large solar power plant, the 1.2GW Noor Abu Dhabi which started commercial operations in April last year. Also run by Taqa, it claims to be the world's largest operational single-project solar PV plant.

Neighbouring Dubai has a different but similar claim to fame for its mammoth solar power development, the Mohammad bin Rashid Al Maktoum Solar Park, which it says is the largest single-site solar energy project in the world, It is being developed over multiple phases and is designed to have a total capacity of 5GW of renewable energy by 2030.

Race for renewables

Gulf governments are committing ever more resources to the development of renewable energy sources, in part to allow them to earn more revenue by exporting greater quantites of their oil and gas to international customers. Hence the rush to develop large solar schemes and, more controversially, nuclear power plants.

However, not all schemes are progressing as hoped. Earlier this month, the Kuwaiti government cancelled the Al Dabdaba solar plant, as a result of the coronavirus pandemic. The $1.4bn project, which was due to be developed by the Kuwait National Petroleum Company, had already been severely delayed.

Assuming Abu Dhabi's Al Dhafra plant moves ahead as planned, it is expected to provide enough energy to power 160,000 households and reduce Abu Dhabi's carbon dioxide emissions by some 2.4 million tonnes a year, equivalent to taking 470,000 cars off the road.

The two local companies, Taqa and Masdar, will together hold 60% of the company, with the remaining 40% shared between their international partners, EDF and JinkoPower. Financial close is expected in the third quarter of this year, with the first power due to come on-stream in the first half of 2022.

HOW GENERATORS WORK - 3

How Do I Size A Generator?

The single most important part of installing a backup generator or a prime generator is getting the size right. Undersized generators won't be able to provide you with all the power you need and you'll be forced to pick and choose which electrical components will receive power from the generator and which ones won't. Even worse, running an undersized machine can strain the unit, causing the generator to cut out mid-operation, may lead to premature generator failure, and can possibly damaging the devices connected to it.

Some think that it's acceptable to install a smaller than needed standby generator since it won't be running all the time, but this is faulty logic because when a standby generator is needed it must power the entire facility. In other words, you still require the generator to provide a certain amount of power whether the generator is run continuously or only on an emergency basis.

It's generally better to buy a bigger generator than a smaller one, but oversized generators have their drawbacks as well. Installing a generator that provides much more power than you need is a waste of resources. You'll overspend on the genset itself, spend more on fuel and other consumables than you need, and also run the risk of damaging the devices connected to the generator.

Generators range in power capacity from 5 kW to 50 kW in the residential market and from 50 kW to over 3 Megawatts in the commercial and industrial markets, giving buyers plenty of choices, but also raising plenty of questions as to which generator is right for them. Correctly sizing a generator involves several factors and considerations. The best way to ensure you have sized the generator correctly is to consult a certified electrician. An electrician can determine your exact power needs, your electrical system capacity and any necessary upgrades, and how to best install a generator.

Still, you can get an idea of your power needs yourself by:

- **Creating a list of everything that needs to be powered by the generator**.
- **Noting the starting and running wattage of each of those items**. You can find this information on the device's identification plate or the owner's manual.
- **Calculating the total power requirements in kVA or kW**. Some devices will provide power requirements in amps. You'll need to convert amps to kW or kVA to determine power demands. *Use this power calculator* to create your conversions.

Once you have the total power requirements of facility, you can buy a generator that best meets your needs. *Used and surplus generators* are a great way to save money and still get a quality machine. Since generators are so durable and long-lasting, even well-maintained used generators have a lot of life left in them. Reputable generator suppliers will have checked the unit over for issues and reviewed the maintenance log and possibly even have made necessary repairs before they put the generator up for sale. As long as you have a maintenance record and know the history of the generator, there is no reason to shy away from used generators. Surplus generators offer similar benefits but without any or with very few running hours on the machine.

How Does an Electric Generator Work?

An electric generator is a machine that's used to create electrical power, which can be used for any number of applications from small power tools to large industrial applications. This is a popular alternative to using grid power generated from wind turbines or fossil fuels and a high voltage steam turbine in a power plant or power station.

There are many types of generators out there, from *petrol generators, portable generators* and inverter generators. To *home generators* that may run on natural gas, *standby generators* for a power outage, and much larger industrial generators. However in this article, we will specifically be talking about diesel generators, also known as gensets.

Here at Advanced, our highly experienced industry experts know everything there is to know about diesel *gensets*. So, this blog will aim to explain how a power generator works, and what are the main working components that make them up.

How is Electricity Generated?

A simple explanation for this is that diesel generators operate as an electrical machine that convert one source of energy into another form of energy. In this case, a power generator works by taking mechanical energy and converting it into electrical energy.

Contrary to what many may assume, there isn't actually any real 'creation' of electricity. A single electric generator or multiple synchronous generators can't make electricity appear out of thin air. It's all to do with Michael Faraday's theory of electromagnetic induction, which we will talk about more as we go through the different generator parts.

Courtesy: Critical Power Products & Services

"We share this planet with many species. It is our responsibility to protect them, both for their sakes and our own." – Pamela A. Matson

BASICS OF BIODIVERSITY – THE PLANET AND THE PEOPLE

(International Day of Biological Diversity on 17th May)

1. Biodiversity makes up all the living beings on planet earth, including all animals, plants, and microorganisms
2. Biodiversity is essential as it maintains the ecological balance of our planet
3. There are many harm-causing factors the environment and biodiversity in today's world of development and capitalism
4. Many endemic species are facing the risk of endangered or extinct status due to their homes being destroyed
5. Many species are endangered, which means that they are on the verge of extinction
6. There are several protected conservatories and forest reserves to help preserve the biodiversity of certain regions world over
7. It is vital to make efforts to restore biodiversity by reforestation
8. There is a dire need to spread awareness to let people know the dire consequences of biodiversity loss
9. Humans must realize the role we have played in the depletion of biodiversity
10. It is time to start taking care of and protecting the earth's flora and fauna much better than before

Biodiversity is all around us, in the potted plants and mosquitoes in our homes, to the millions of species of animals and plants that exist in the deepest forests and jungles in the world. In simple words, biodiversity refers to the plentitude of flora and fauna around us in the world, on planet earth. It plays an incredibly necessary role in the world around us, as each organism, whether plant or animal, has a relevant role to play in its ecological system.

So why is biodiversity important in the first place? The answer to this question is much more simple than you'd think it to be – biodiversity is important because it is what our planet earth is made of. Whether we are talking about the hydrosphere or all of the earth's land, it is filled with all kinds of animals, plants, and microorganisms. Thus, if these organisms, also known as the biodiversity of planet earth, keep constantly depleting, there will be nothing left of our planet.

There are thousands of species today that are endemic to specific regions in the world, which means that if the ecosystems in those regions cease to exist, these species of flora and fauna will, too. For example, the lemurs of Madagascar are endemic to Madagascar. Due to human-made circumstances, ecosystems are being destroyed, resulting in endemic species being put under the category of endangered species are those on the verge of extinction, more often than not, due to unnecessary human activities. The Bengal tiger is endangered, and dodo birds have been extinct for centuries now. Another word for Conservation of Biodiversity is caring for the environment.

In today's world of new advancements in infrastructure technology everyday, world leaders find it necessary to cut down a lot of trees in forests. This process is also called deforestation and is extremely harmful to the environment. The harm to the environment is due to the loss of trees which provide us oxygen and the multitude of organisms that depend on the ecosystem that these forests provide for them. Kilometers worth of forests are cut down in the name of development, reducing the biodiversity on our planet by tens of thousands with every ecosystem destroyed.

Even though biodiversity is decreasing, there are ways to restore it, even if not completely to its full extent. The best way to do this is reforestation, which refers to replanting trees to allow the forest to grow its trees back. Another solution to battle the loss of biodiversity is to spread awareness about the repercussions of the same. Governments have gone to the extent of setting up forest reserves and conservatories to protect the wildlife and flora of specific forest regions. This shows concern and responsibility on the part of these governments.

It is essential to restore biodiversity in the world. For this to happen, humans must take control of our questionable actions against ecosystems around the world. It is time to take care of and protect the earth's flora and fauna much better than we have been in the past.

AIRBUS REVEALS CONCEPTS FOR NEW ZERO EMISSION COMMERCIAL AIRCRAFT

Airbus has revealed three concepts for the world's first zero emission commercial aircraft which could enter service by 2035.

Airbus, the world's largest airline manufacturer, has revealed three concepts for the world's first zero-emission commercial aircraft which could enter service by 2035. These concepts each represent a different approach to achieving zero-emission flight, exploring various technology pathways and aerodynamic configurations in order to support the Company's ambition of leading the way in the decarbonisation of the entire aviation industry.

All of these concepts rely on hydrogen as a primary power source – an option that Airbus believes holds exceptional promise as clean aviation fuel and is likely to be a solution for aerospace and many other industries to meet their climate-neutral targets.

"This is a historic moment for the commercial aviation sector as a whole and we intend to play a leading role in the most important transition this industry has ever seen. The concepts we unveil today offer the world a glimpse of our ambition to drive a bold vision for the future of zero-emission flight," said Guillaume Faury, Airbus CEO. "I strongly believe that the use of hydrogen – both in synthetic fuels and as a primary power source for commercial aircraft – has the potential to significantly reduce aviation's climate impact."

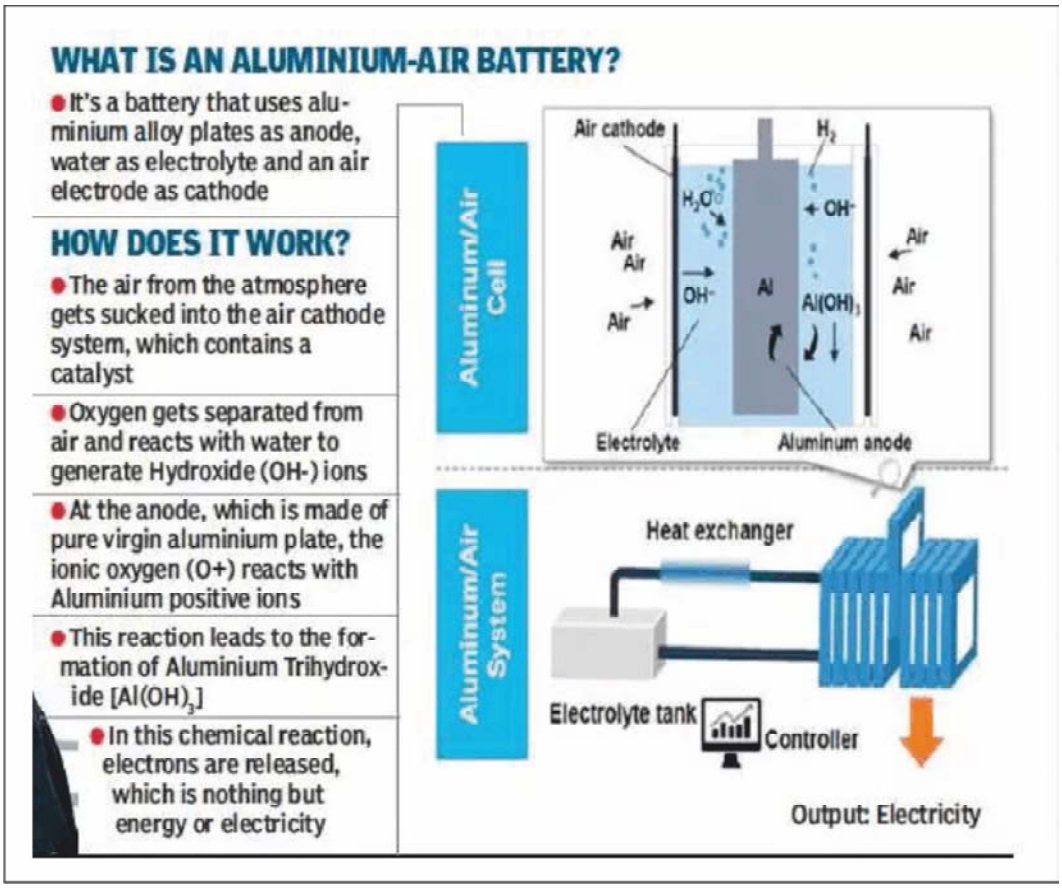
The three concepts – all codenamed "ZEROe" – for a first climate neutral zero-emission commercial aircraft include: A turbofan design (120-200 passengers) with a range of 2,000+ nautical miles, capable of operating trans continentally and powered by a modified gas-turbine engine running on hydrogen, rather than jet fuel, through combustion. The liquid hydrogen will be stored and distributed via tanks located behind the rear pressure bulkhead. A turboprop design (up to 100 passengers) using a turboprop engine instead of a turbofan and also powered by hydrogen combustion in modified gas-turbine engines, which would be capable of traveling more than 1,000 nautical miles, making it a perfect option for short-haul trips. A "blended-wing body" design (up to 200 passengers) concept in which the wings merge with the main body of the aircraft with a range similar to that of the turbofan concept. The exceptionally wide fuselage opens up multiple options for hydrogen storage and distribution, and for cabin layout.

"These concepts will help us explore and mature the design and layout of the world's first climate-neutral, zero-emission commercial aircraft, which we aim to put into service by 2035," said Faury. "The transition to hydrogen, as the primary power source for these concept planes, will require decisive action from the entire aviation ecosystem. Together with the support from government and industrial partners we can rise up to this challenge to scale-up renewable energy and hydrogen for the sustainable future of the aviation industry."

ALUMINIUM-AIR BATTERIES AN IMPORTANT DEVELOPMENT FOR INDIA'S EV SPACE

State-owned Indian Oil Corporation Ltd. has entered into a joint venture with Israel based battery technology startup Phinergy to develop aluminium-air technology based battery systems for electric vehicles and stationary storage, as well as hydrogen storage solutions.

Top automakers, including Maruti Suzuki and Ashok Leyland, have already signed letters of intent with the newly formed joint venture to commercially deploy the battery solutions produced by IOC Phinergy.



What is an aluminium-air battery?

Aluminium-air batteries are said to be a lower cost and more energy-dense alternative to lithium-ion batteries which are currently in widespread use for electric vehicles in India. Aluminium-air batteries utilise oxygen in the air which reacts with an aluminium hydroxide solution to oxidise the aluminium and produce electricity. One of the key downsides of aluminium-air batteries is that they cannot be recharged like lithium-ion batteries. Therefore, large scale use of aluminium-air battery based vehicles would require the wide availability of battery swapping stations.

Aluminium-air battery-based electric vehicles are, however, expected to offer much greater range of 400 km or more per battery compared to lithium-ion batteries which currently offer a range of 150-200 kilometres per full charge.

Experts have noted that the aluminium plate in an aluminium-air battery is converted into aluminium trihydroxide over time and that aluminium can be reclaimed from aluminium trihydroxide or even traded directly for industrial uses.

Why is this technology important for India's EV push?

Currently, India is largely dependent on imports of lithium-ion batteries from China for electric vehicles. While some Indian companies have started manufacturing lithium-ion batteries in the country, metal-air battery solutions including aluminium-air batteries could offer a viable alternative to lithium-ion batteries and boost the domestic manufacture of batteries to meet India's growing demand for energy storage. Aluminium-air based batteries are also expected to be significantly cheaper than lithium-ion batteries, thereby reducing the cost of electric vehicle usage and boosting electric vehicle adoption in the country.

CABINET OKAYS RS 4,500 CR PLI SCHEME FOR PV MODULES; DOMESTIC MANUFACTURERS CELEBRATE

The Cabinet has approved the Ministry of New & Renewable Energy's (MNRE) proposal for the implementation of Production Linked Incentive (PLI) Scheme under 'National Programme on High Efficiency Solar PV (Photo Voltic) Modules' for achieving manufacturing capacity of Giga Watt (GW) scale in high efficiency solar PV modules with an outlay of Rs 4,500 crore.

Solar capacity addition presently depends largely upon imported solar PV cells and modules as the domestic manufacturing industry has limited operational capacities of solar PV cells and modules.

The government's move is expected to reduce import dependence in a strategic sector like electricity, and also to support the 'Atmanirbhar Bharat' initiative.

MNRE said that, solar PV manufacturers will be selected through a transparent competitive bidding process, and the PLI will be disbursed for 5 years post commissioning of solar PV manufacturing plants, on sales of high efficiency solar PV modules.

Moreover, manufacturers will be rewarded for higher efficiencies of solar PV modules and also for sourcing their material from the domestic market. Thus, the PLI amount will increase with increased module efficiency and increased local value addition.

Through this scheme the government is targeted for additional 10 GW capacity of integrated solar PV manufacturing plants, and to attract direct investment of around Rs 17,200 crore for such plants.

Besides, this initiative is expected to create demand of Rs 17,500 crore over 5 years for 'Balance of Materials', and will provide direct employment of about 30,000 and indirect employment of about 1,20,000 persons.

Moreover, the scheme is likely to help in import substitution of around Rs 17,500 crore every year, and provide impetus to Research & Development (R&D) to achieve higher efficiency in solar PV modules.

Welcoming the government's move, Dr Hitesh Doshi, Chairman and Managing Director of Waaree Group, in a quick reaction said, "By diverting demand to India, the domestic manufacturers will get the much-needed confidence to invest in expanding capacity. It will make the sector more operational and accessible to foreign players and enable solar manufacturers to help government achieve its clean energy targets."

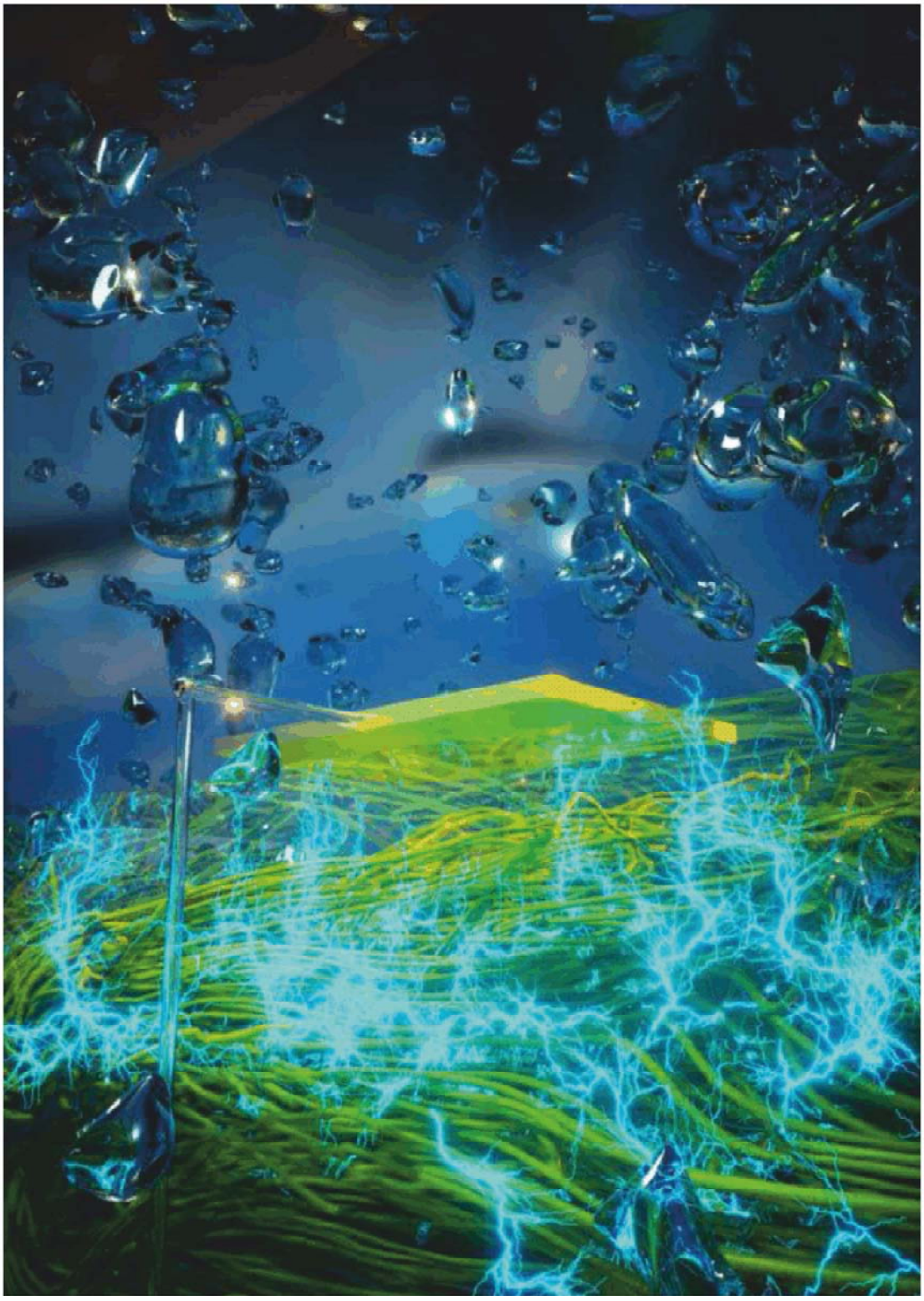
He also mentioned that, "although a concentrated PLI scheme of INR 6,238 crore can incentivize manufacturers, the solar sector requires additional investment to create an ecosystem that encompasses the complete demand-supply value chain."

Agreeing with Dr Hitesh Doshi, Gyanesh Chaudhary, MD of Vikram Solar, said "with this decisive step towards creating a self-sustaining ecosystem for solar equipment manufacturing in India, we are confident that India is well-poised to become the manufacturing hub for renewable energy technologies.

At Vikram Solar, we are confident of capitalizing on the new opportunities with our state-of-art technologies, manufacturing prowess and diversified product portfolio. The PLI scheme will aid our growth and unwavering resolve in shaping the solar revolution. Vikram solar will remain at the forefront of partnering with the government in building the new, energy rich, and self-reliant India."

AIR-GEN' DEVICE GENERATES ELECTRIC POWER FROM AMBIENT HUMIDITY

"We are literally making electricity out of thin air. The Air-gen generates clean energy 24/7," said Dr. Jun Yao, an electrical engineer at the University of Massachusetts Amherst.



"It's the most amazing and exciting application of protein nanowires yet," added Professor Derek Lovley, a microbiologist at the University of Massachusetts Amherst.

The Air-gen device can generate power even in areas with extremely low humidity such as the Sahara Desert. "It has significant advantages over other forms of renewable energy including solar and wind, because unlike these other renewable energy sources, the Air-gen does not require sunlight or wind, and it even works indoors," Professor Lovley said.

The device requires only a thin film of protein nanowires less than 10 microns thick.

The bottom of the film rests on an electrode, while a smaller electrode that covers only part of the nanowire film sits on top. The film adsorbs water vapour from the atmosphere.

A combination of the electrical conductivity and surface chemistry of the protein nanowires, coupled with the fine pores between the nanowires within the film, establishes the conditions that generate an electrical current between the two electrodes. The current generation of Air-gen devices produces a sustained voltage of around 0.5 V across a 7-μm-thick film, with a current density of around 17 μA/cm2.

"I saw that when the nanowires were contacted with electrodes in a specific way the devices generated a current," said Xiaomeng Liu, a Ph.D. student at the University of Massachusetts Amherst.

"I found that that exposure to atmospheric humidity was essential and that protein nanowires adsorbed water, producing a voltage gradient across the device."

Next steps the scientists plan include developing a small Air-gen 'patch' that can power electronic wearables such as health and fitness monitors and smart watches, which would eliminate the requirement for traditional batteries.

They also hope to develop Air-gens to apply to cell phones to eliminate periodic charging.

"The ultimate goal is to make large-scale systems," Dr. Yao said. "For example, the technology might be incorporated into wall paint that could help power your home. Or, we may develop stand-alone air-powered generators that supply electricity off the grid."Once we get to an industrial scale for wire production, I fully expect that we can make large systems that will make a major contribution to sustainable energy production."

COAL INDIA SUPPORTING HOSPITALS THROUGH SETTING UP OXYGEN PLANTS, VENTILATORS AVAILABILITY

Amid a continuous demand for medical oxygen for coronavirus patients in the country, State owned Coal India Ltd (CIL) has started a mission 'Praana Vayu', under which it is facilitating setting up oxygen plants and ventilators availability at hospitals and Covid care centres. "Responding to the needs, Coal India has launched Mission 'Praana Vayu', which is about providing oxygen support in various forms right from oxygen plants to oxygen banks," the maharatna firm has said in a statement.

CIL said that in the once-in-a-century crisis arising out of COVID-19, the spotlight is on oxygen support.

There is a surge in demand for medical oxygen as the therapeutic treatment of COVID-19 revolves around availability of this vital element, CIL said.

For obvious reasons, oxygen capacity expansion has emerged as a major requirement towards boosting healthcare facilities in the fight against the pandemic, it added.

The company is assisting District Hospital Simdega in Jharkhand to establish oxygen plant at a cost of Rs 99 lakh which also includes creation of ICU infrastructure.

An oxygen plant is being set up at Railway Hospital Danapur (Patna) at a cost of Rs 55 lakh. This is a tertiary care hospital catering to East Central Railway and neighbouring zones.

The company is supporting Rs 47 lakh towards ventilators for Covid facility in Kolkata Police Hospital at Bhowanipur, Kolkata. In a unique model, the company has engaged a voluntary organisation to establish oxygen banks at 10 locations of Jharkhand and Bihar at a cost of Rs 1.34 crore.

In another initiative, CIL will be establishing oxygen cylinder bank with 200 cylinders in Nadia district of West Bengal through a voluntary organisation. The refilled cylinders will be free-home-delivered to needy persons.

The subsidiary companies of CIL are also contributing heavily to the oxygen cause.

CIL and its constituent companies have together spent Rs 523 crore under CSR in FY2020-21, out of which 264 crore i.e. 50 per cent was spent on Covid relief measures.

CIL and subsidiaries are contemplating further augmentation of oxygen facilities in their hospitals as well as in the government hospitals in their areas of operation.

These initiatives will supplement government's immediate efforts for arresting second wave of COVID-19, at the same time, contribute to the national priority of augmenting healthcare capacity building.

With the Centre declaring COVID-related measures as a common CSR theme for CPSEs for the year 2021-22, CIL group is committed to channelise its CSR activities towards COVID care and relief.

FLUKE ii910 PRECISION SONIC IMAGER TURNS EVEN SUBTLE SOUND WAVES INTO REAL-TIME IMAGE

Fluke has revolutionized the way engineers and technicians do the leak detection in industrial plants by introducing its first sonic imager with SoundSight technology barely 18 months ago. This is now becoming a most sought after tool for industry engineers and technicians to improve safety, energy efficiency, productivity and quality of their facilities. Fluke has expanded its capabilities on the new technology – SoundSight – and launched yet another innovative solution for the industries suffering from such pain points.

Partial Discharge is a very serious issue that you would like to be able to monitor quickly and easily. Whether you are inspecting insulators, transformers, switchgears or high voltage power lines; you need to be sure that you spot a problem quickly and early. Partial discharge that goes unchecked can cause blackouts, fires, explosions, or death from arc flashes. In addition to the danger that partial discharge poses to human lives and the environment, there is a significant monetary risk of downtime. Having equipment go down can cost millions of dollars per hour of downtime.

The new Fluke ii910 Precision Acoustic Imager is the perfect tool for high voltage electricians, electrical test engineers, and grid maintenance teams that are constantly inspecting and maintaining power distribution and industrial high voltage equipment. The ii910 provides a safe, quick and easy way to detect and locate partial discharge in order to maintain high voltage equipment and prevent catastrophic events. With the SoundSight technology the ii910 translates the sounds that it hears into a visual representation–so that you can quickly locate problem areas.

The higher frequency capability and high sensitivity sensors of Fluke ii910 allows early detection to facilitate early maintenance planning. The increased sensitivity of ii910 detects leaks that are smaller or farther away or difficult to locate earlier.

Finally, here is the better and safe way to detect compressed air, gas, steam and vacuum leaks and partial discharge from further distance. The Fluke ii910 Precision Acoustic Imager enables you to:

-Detect partial discharge early allowing for proper scheduling of maintenance. This increases uptime

-Quickly and easily scan areas to find potential problems

-Detect and analyze partial discharge from a safe distance

-Detects and analyses compressed air, gas, steam and vacuum leaks

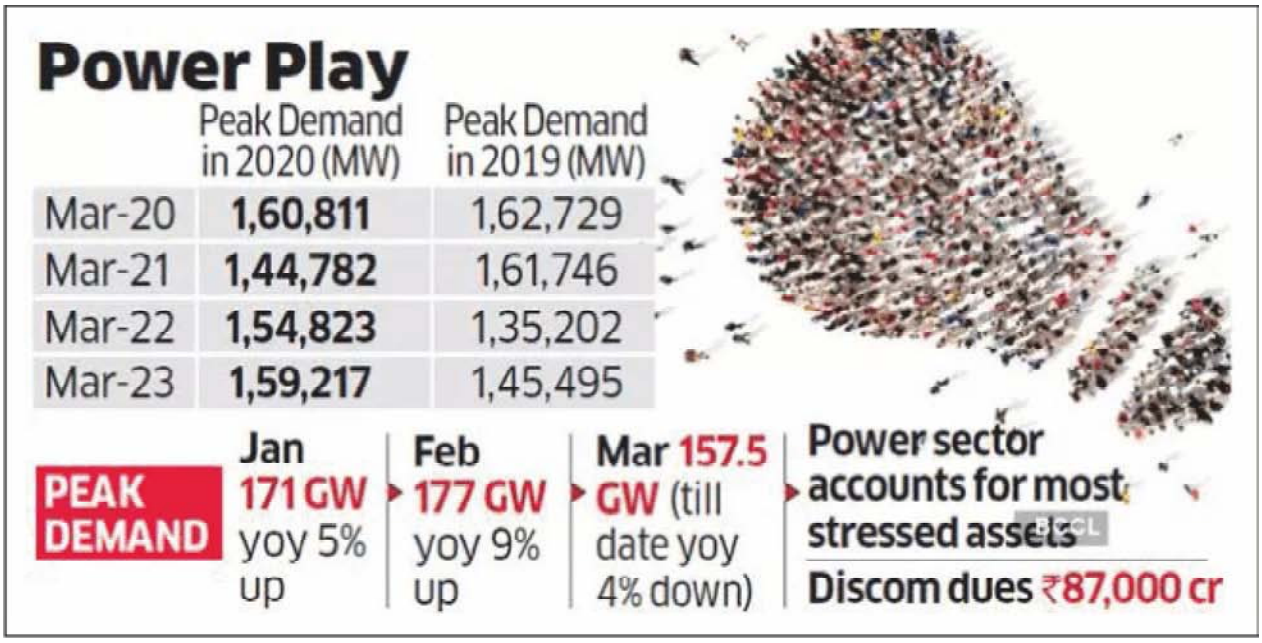
The ii910 comes complete with Imager; AC power supply and battery pack charger (including universal AC adapters); two rugged lithium ion smart battery packs; USB cable; rugged, hard carrying case; two rubber array covers; adjustable hand strap and adjustable neck strap.

About Fluke

Founded in 1948, Fluke Corporation is the world leader in compact, professional electronic test tools and software for measuring and condition monitoring. Fluke customers are technicians, engineers, electricians, maintenance managers, and metrologists who install, troubleshoot, and maintain industrial, electrical, and electronic equipment and calibration processes.

INDIA'S ELECTRICITY USE FALLS IN MAY DUE TO COVID-19 LOCKDOWNS

India's electricity use fell 6.2 % during the first half of May compared with the second half of April, government data showed, as coronavirus lockdowns imposed by states across the country stifled power demand.



Total daily average electricity supply to states fell to 3,666 billion units during the first sixteen days of May, compared with 3,910 billion units during the second half of April, data from federal grid regulator POSOCO showed.

Industries and offices account for half the country's annual electricity consumption. Power generation in India generally starts rising from April and peaks in May due to a higher air-conditioning load.

Power use in May has been higher than the same time the previous year except in two southern states and two northeastern states, the data showed, indicating curbs have been less strict than last year despite surging deaths due to the pandemic.

India's federal government - which imposed a stringent national lockdown in April and May 2020 - has resisted imposing country-wide curbs during India's second wave, but most states have restricted movement.

Senior government officials had cited the recovery in demand for power in late 2020 as a sign the economy was beginning to recover from its worst slump in decades.

Three-fourths of the regions recorded a dip in power use in May compared with the second half of April due to curbs imposed to control the spread of the virus.

Power use rose in the northern states of Rajasthan, Uttar Pradesh, Haryana, Punjab and Delhi - among the regions worst affected by the coronavirus, even as overall power generation fell 6.3% compared with the second half of April.

Power supplied to Maharashtra, Tamil Nadu and Gujarat - India's richest and most industrial states which together account for nearly a third of the total electricity consumption - fell by over 5%.

"Collective human actions are transforming, even ravaging, the biosphere - perhaps irreversibly - through global warming and loss of biodiversity." – MARTIN REES

OPERATION AND MAINTENANCE MANUAL FOR UNI-SOLAR POWERBOND EPVL - 3

Repair of Surface Damage

If the ETFE front surface becomes damaged and is not repaired quickly, system performance can be degraded and the laminate could fail. Patch repair kits and instructions can be provided by your USO representative .

When to Clean

The amount of electricity generated by a solar cell is proportional to the amount of light falling on it. A shaded cell will produce less energy.

The non-stick ETFE front surface of *UNI-SOLAR* Power*Bond* ePVL products promotes automatic self-cleaning. It is normally NOT necessary to perform an all encompassing cleaning of dirt from the solar array, provided that the array is installed on more than a 5% slope.

Punctual cleaning should be performed on any panels that are excessively affected by a collection of bird droppings, dirt, or miscellaneous debris, such as fallen leaves. This punctual cleaning should be performed at each maintenance visit.

The monetary value of cleaning dirt and debris from the array is a trade-off between the cost of the cleaning, increased energy production as a result of the cleaning, and the inevitable re-soiling of the laminates over time once they have been cleaned.

To help determine the performance benefit of cleaning, perform the following steps to measure the short circuit current of individual laminates before and after cleaning:

Measure and record the operating voltage of each series string and verify that all strings feeding the same inverter have a similar operating voltage (within ± 5V of each other). Any difference greater than 5V between strings needs to be investigated.

- Isolate a single string, making sure all the DC isolation switches are open (OFF) and all the string fuses have been removed
- Disconnect the laminates that will be used for the test by opening connections via an MC4 disconnect tool
- Verify that the current sunlight is effectively constant (clear sky, strong sunshine, no clouds)
- Connect a DC multimeter across the terminals (10A or greater) to measure and record short circuit current
- Clean the laminate as described on page 10
- Measure and record the current and verify the percent difference between the two readings. This percent difference is the potential gain that will be derived from cleaning the product

Cleaning Process

Recommendations

- Wear rubber soled boots and cut resistant gloves when cleaning laminates
- Survey the roof for any loose wires, damaged modules, and tough stains that will require special attention
- While surveying, remove all larger debris from the roof surface
- Use a leaf blower to remove all smaller size debris from the roof surface
- Use a garden hose to get the entire PV laminate wet, making sure not to spray water on electrical wires
- Pressurized power washers should NOT be used directly on the laminates. If these devices are being used to clean the roof around a solar array, ensure that the nozzle of the power washer remains at least two feet away from the surface of the laminates at all times while cleaning

- When spraying a module, do NOT spray water directly on the electrical connections

- Clean the laminates using a soft sponge or mop. A mild biodegradable detergent can be added to the water if desired, but abrasive soaps or solvents should NOT be used
- After cleaning, rinse off any residues with clean water and then clean the standing water off using a sponge or mop
- Observe where the cleaning agent run-off is from the laminates, checking to make sure that this runoff is directed into the site storm drain system

Precautions for High Snow Areas

If the product is installed in areas classed as high snow risk, and the roof slope is greater than 60°(x%), then additional edge protection should be fitted to the upper edge of all laminates. This added protection serves to protect the bond between the substrate and laminate from sliding snow and ice, helping to ensure long-term reliability.

Edge protection kits are available from your USO representative.

Rooftop Snow Removal

Potentially lethal voltages are present in a grid-connected solar system. If the concentration of snow on the solar installation needs to be removed, special care needs to be taken to protect the front surface of the laminates and connections from damage.

Snow removal precautions:

- Clearly mark skylights and any other hazardous areas with snow poles
- Identify the location of trip hazards, such as combiner boxes and cable trays, with snow poles
- Ensure that all drains, gutters, and downspouts are clear and operating properly
- Do NOT use tools or snow removal equipment with sharp edges or surfaces that could scratch the laminate surface
- Use a snow pole, marked at 15 cm (6 in) from the base, as a guide to determine the depth of the snow
- Remove the snow down to but NOT below the 15 cm (6 in) mark. Removing snow below this height could potentially damage the laminates and/or system components

Precautions for High Temperature Areas

In areas where high temperatures are common and/or can exceed 85°C (185°F), and the roof slope is greater than 20°, additional bonding solutions may be required. During maintenance, check for de-bonding or slippage of laminates, contacting your USO representative for further assistance, if needed.

Courtesy: Unisolar

RACOLD WINS 'MOST ENERGY EFFICIENT APPLIANCE OF THE YEAR 2020' AWARD FROM BEE

Bureau of Energy Efficiency recognizes Racold under electric storage water heater category.

Racold, India's largest provider of water heating solutions, has added yet another milestone to its credit by bagging the 'Most Energy Efficient Appliance of the Year 2020' BEE award in the electric storage water heater category. With this win, Racold sets a new benchmark in the industry for energy efficiency standards and has the distinction of being the only brand in the category to win the BEE award for the 10th time.

The Bureau of Energy Efficiency Award was presented to Ariston Thermo India's Managing Director along with the Research and Development Head, by the Chief Guest, Shri R. K. Singh Hon'ble Minister of State (IC) for Power and New & Renewable Energy, and Minister of State for Skill Development & Entrepreneurship at a glittering ceremony held online. Since its inception, the company has placed energy efficiency at the heart of its sustainable growth strategy and are deeply committed to energy conservation.

Racold's Electric Storage Water Heater 25 Litre product is a combination of Design, Style and Energy Efficiency. It comes with an environmental friendly "Zero ODP" thermal insulation and glossy ABS outer body that helps in protecting heat loss which ensures a 5 star energy rating. Other features like Titanium plus coated inner tank provides better protection against aggressive corrosion and durability, Smart Mix feature helps in giving extra Hot water to the consumers.

The company has dedicated itself to creating sustainable, environment friendly products for its consumers and has helped a great deal in bringing India one step closer to its Climate Pledge.

Mr. Mohit Narula, Managing Director, Ariston Thermo India Pvt. Ltd. commented, "Ever since the origin of Racold, our goal has been to strive for a cleaner and sustainable planet. Energy conservation and efficiency have been our core driving factors while bringing innovative and stylish products to our consumers. It is a proud moment for all of us at Racold to win this prestigious award and is a testimony for our commitment towards energy conservation and sustainability."

The Bureau of Energy Efficiency (BEE), under the Ministry of Power, is mandated to regulate and promote energy efficiency and its conservation in India. The BEE recognizes innovation and achievements in energy conservation by industries and manufacturers of BEE star labelled appliances. The awards are also recognition of their demonstrated commitment to energy conservation and efficiency.

The BEE approved 5- star rated water heaters not only help in cutting down electricity bills but also help in preserving energy.€

ENERGY INDEPENDENCE AND ENERGY SELF RELIANCE - 9

Sustainable Growth, Sustainable Energy and Renewable Energy

The following extracts from News Papers and Energy Magazine bring out the challenges, prospects, policies, plans and prospects of India about Energy Self Reliance.

Wind and Solar Initiatives have been in the forefront ever since with lot of investments, visibility and progress.

Bioenergy which is a 'Firm Energy' (24x365) as against Wind and Solar which are 'Infirm Energy' (Seasonal and part of the day only), require investments in Innovation and Technology as India has a huge potential.

Following are some of the recent headlines of Solar and Bioenergy areas to understand that we are marching ahead but it requires gear change to higher gear with more investments particularly to harness Bioenergy potentials which are very high.

Unlocking India's opportunity to be self-reliant in clean energy

The energy landscape in India is being reshaped in fundamental ways. While this transformation had been happening gradually but steadily in recent years, it has now been accentuated by the covid-19 crisis, the ensuing lockdown and the more recent India-China border tensions. Cumulatively, as the energy mix shifts towards renewables, it presents a window of opportunity for India to act now by strengthening its domestic capability and, thereby, achieving energy security.

Several structural disruptions have been enabling the energy mix transition at a steady clip. First, there is a disincentive for thermal power with projects getting priced out due to low solar tariffs, as cheap as Rs.2.5 per kilowatt hour (kWh). With solar tariffs expected to fall further and the emphasis on reducing pollution by thermal plants, there has been limited focus on new thermal capacity creation. This is, however, consistent with global trends.

Consequently, thermal Plant Load Factor (PLF), which is a measure of the power plant's capacity utilization, declined from 60% in FY19 to 56% in FY20. In addition, the emergence of hybrid renewable-storage projects for round-the-clock (RTC) power at a levelized tariff, lower than thermal, is expected to further accelerate this trend. Recently, ReNew won a 400MW project at a levelized tariff of Rs.3.55 per kWh compared to typical thermal tariffs of over Rs.4 per kWh.

The lockdown has triggered approximately 20% power demand decline, driven by a slump in the commercial and industrial (C&I) segment as is evident from the PMI, which fell from 55.3 in January to 30.8 in May. As a result, coal PLF declined to 42% in April from 63% in the corresponding month last year, largely due to the lower position of thermal in merit order dispatch. In contrast, PLF of renewables remained unchanged at 16% vs 17% last year due to the must-run status, while gas PLF increased from 23% to 27% driven by low gas prices and the need to balance the higher share of renewables. According to Bain and Co.'s analysis, LNG prices in India will remain attractive for the next two years before demand comes back and low-cost supply sources dry out.

Further, we anticipate a significant slowdown in generation capacity addition over the near to medium term, as power demand growth is expected to recover only by the first quarter of 2022, at the earliest.

With increasing cost competitiveness, renewables are expected to respond fastest to power demand recovery. However, a continued growth in renewables beyond 20% of total supply from a current 11%, will necessitate substantial investment in transmission capacity for power evacuation as well as a smart grid infrastructure—both of which will be dependent on the health of power utilities. Renewables penetration should improve gas power plant utilization from the existing 25% levels, enabled by a fall in gas prices.

While EV penetration is likely to get somewhat delayed worldwide due to low oil prices, this may not impact the penetration rate of renewables in India as the government has not passed on the benefit of low global oil prices. In fact, we are already witnessing an acceleration in low-end segments like e-rickshaws driven by falling prices. However, the EV segment will introduce a demand-side variability into the grid, in addition to the inherent supply uncertainty caused by renewables, necessitating investments in smart grids and battery storage.

In addition to the pressures of a multipolar world, the recent India-China border tension could affect sourcing of solar modules and batteries over the medium term. Therefore, as a broad country strategy, it will be prudent to use the supply uncertainty as a push factor for Make in India to develop local capacities for solar cells and batteries, and limit dependency on China.

The time to act is now, given both the scale of opportunity and the urgency to redefine global supply chains. This will help India emerge stronger from the current crisis and achieve the government's goal of Atmanirbhar Bharat.

At 62-Million Tons potential output, CBG can replace entire CNG demand

If achieved the targeted 15 million tonnes of compressed biogas (CBG) production that can take care of a whopping 40 per cent of the current annual consumption of CNG, which was 44 million tonnes in FY19, according to the oil ministry.

PTI

December 24, 2019, 10:52 IST

The Satat initiative envisages setting up 5,000 CBG plants across the country with an estimated production of 15 million tonne CBG annually by 2023, which would be fully absorbed by the state-run companies. Mumbai: A senior petroleum and natural gas ministry official on Monday said compressed biogas (CBG) can meet the entire natural gas demand of the nation because if tapped fully it can generate around 62 million tonne equivalent of CBG annually.

It can be noted that the oil ministry had in October 2018 launched an ambitious plan under the Satat (sustainable alternative towards affordable transportation) initiative, under which state-run oil and gas companies would invite expressions of interest from individual entrepreneurs to set up CBG plants.

The Satat initiative envisages setting up 5,000 CBG plants across the country with an estimated production of 15 million tonne CBG annually by 2023, which would be fully absorbed by the state-run companies.

If achieved the targeted 15 million tonne of CBG production that can take care of a whopping 40 per cent of the current annual consumption of CNG, which was 44 million tonne in FY19, according to the oil ministry.

The PSUs tasked with the job are Indian Oil, Bharat Petroleum, Hindustan Petroleum, Gail and Indraprastha Gas.

“If CBG is exploited fully, it can produce around 62 million tonne equivalent of CBG annually which is sufficient to replace the entire gas demand of the nation,” Vijay Sharma, a director at the ministry, said while addressing a road-show on Satat by these companies in nearby Navi Mumbai.

While announcing the scheme, Oil Minister Dharmendra Pradhan had said that setting up CBG plants across the country will require an investment of nearly Rs 1.75 lakh crore.

The push towards green energy through CBG is in line with the government target of reducing crude imports by 10 per cent by 2022, by when it had also promised the farmers to double their incomes.

The government expects this initiative to generate direct employment for 75,000 people and produce 50 million tonnes of bio-manure for crops.

Compressed bio-gas can be produced by processing through anaerobic decomposition of various waste/ biomass sources such as agriculture residue, cattle dung, sugarcane press mud and spent wash of distilleries, sewage water, municipal solid waste, bio-degradable fractions of industrial waste etc, and since it has properties similar to CNG, thus it can be used as green fuel in automotive, industrial and commercial sectors along with CNG.

Sharma said wider introduction of CBG into the transport segment has multiple benefits like waste management, cutting carbon emissions, and additional revenue source to farmers etc.

He also said if tapped fully CBG can make the farmers move from being ‘annadata to urjadata’ and contribute to the brown revolution in the energy sector.

India investing billions into compressed biogas rollout

November 23, 2020

Under the Sustainable Alternative Towards Affordable Transportation (SATAT) initiatives, the Government of India envisages setting up of 5 000 compressed biogas (CBG) plants by 2023-24 with a production target of 15 million tonnes, facilitating new employment opportunities and enhancing farmers’ income towards invigorating the rural economy.

"Rs.2 lakh crore (≈ EUR 22.6 billion) is to be invested for setting up 5000 compressed biogas in the country", said Shri Pradhan Petroleum Minister.

To boost the availability of affordable and clean transport fuels in India, a Memorandum of Understanding (MoU) was signed on November 20, 2020, between the Ministry of Petroleum & Natural Gas (MoPNG) and leading oil and gas marketing companies (OMCs), and technology providers to establish compressed biogas (CBG) plants across India under the Sustainable Alternative Towards Affordable Transportation (SATAT) initiative (photo courtesy PIB).

In the presence of Union Minister of Petroleum and Natural Gas & Steel Shri Dharmendra Pradhan, MoUs were signed with energy companies JBM Group, Adani Gas, Torrent Gas, and Petronet LNG for setting up of CBG plants, and with technology providers in CBG sectors IndianOil, Praj Industries, CEID Consultants & Engineering, and Bharat Biogas Energy for facilitating the availability of technology for the projects.

We have developed a clear-cut roadmap for SATAT. I am glad to note that Indian industry players have shown immense interest in SATAT. Letter of Intent (LoI) for 600 CBG plants have already been given and with today's signing of MoUs for 900 plants, a total of 1 500 CBG plants are at various stages of execution. Rs 30,000 Cr (≈EUR 339.3 million) of investment is envisaged in these 900 plants. A total of 5 000 CBG plants with an approximate investment of Rs. 2 lakh crores (≈ EUR 22.6 billion) are envisaged. Biofuels have the potential to reduce our fuel import bill by Rs. 1 lakh crore (≈EUR 11.3 billion), said Minister Pradhan at the MoU signing event for setting up 900 CBG plants.

Flagship program

Launched by the Government of India on October 1, 2028, the SATAT initiative for boosting production and availability of CBG as an alternative and affordable clean fuel for the transportation sector envisages setting up of 5 000 CBG plants by FY 2023-24. The signing of the MoUs will give a big fillip to the clean energy initiative of the Government.

SATAT will establish an ecosystem for the production of CBG from various waste and biomass sources in the country leading to multiple benefits viz. reduction of natural gas import, reduction of greenhouse gas (GHG) emission, reduction in burning of agriculture residues, remunerative income to farmers, employment generation, and effective waste management.

The Minister also thanked the Reserve Bank of India for including CBG in the priority sector lending framework. Over the last two years, SATAT has grown into one of the flagship programs of MoPNG.

The benefits out of the SATAT will go to our farmers, rural areas, and tribals. With the inclusion of forest waste, agri-waste, animal husbandry waste, and marine waste, SATAT involves a multi-pronged approach. With liberalized policy regime ensuring ease of doing business for entrepreneurs, off-take guarantee, financing, and technology support, SATAT is all set to contribute towards doubling farmer's income, generating employment for the youth, and ensuring clean energy for sustainable development, Minister Pradhan said.

The initiative is in line with the goals of AatmaNirbhar Bharat, Swachh Bharat Mission, and boosting the MSME sector.

An evaluation on energy self–sufficiency model of a rural cluster through utilization of biomass residue resources: A case study in India

13 August 2020, Revised 11 February 2021, Accepted 21 April 2021

Highlights

- A cluster of villages were surveyed to assess the available biomass resources, their power potential and GHG emissions.
    - Experimental evaluations were performed on bioenergy production technologies.
        - Biomass based per-capita electricity potential for the block is estimated to be 655.18 kWh.
            - Obstacles that exist in the introduction of biomass as a replacement of fossil fuels have been explored.

Similar studies have been conducted in Tamilnadu also, in Vedaranyam Taluq, where it was found feasible to have a 5 MW to 7.5 MW Biomass Power Plant utilizing only the surplus or waste Biomass, which are either burnt or composted. There are about 310 Taluqs in Tamilnadu and except for districts like Chennai etc (where it can be MSW instead of Biomass) there are good potentials in about 250 Taluqs. There are some Taluqs (like for example Namakkal and Palladam Taluqs where the potentials can be about 60MW each taluq with Poultry Litter availability) which has more potential than say 5MW. First estimates can be of the order of about 2500 Mw, and what is needed is appropriate technologies. Unfortunately, the Biomass Power experience in Tamilnadu as well as elsewhere in the country have been bad, mostly because of technology and availability of Cost effective fuel or Biomass.

(To be continued)

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

"Biodiversity is the greatest treasure we have... Its diminishment is to be prevented at all cost." – THOMAS EISNER

TAMILNADU ELECTRICAL INSTALLATION ENGINEERS ASSOCIATION 'A' GRADE

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தமிழ்நாடு அரசு

மக்கள் நல்வாழ்வு மற்றும் குடும்பநலத்துறை

இந்திய மருத்துவம் மற்றும் ஹோமியோபதி ஆணையரகம்

நிலவேம்பு குடிநீர்

இவற்றில் சேரும் மருந்துகள்

நிலவேம்பு

வெட்டிவேர்

விலாமிச்சம்வேர்

சந்தனம்

பேய்ப்புடல்

கோரைக்கிழங்கு

சுக்கு,மிளகு

பற்பாடகம்

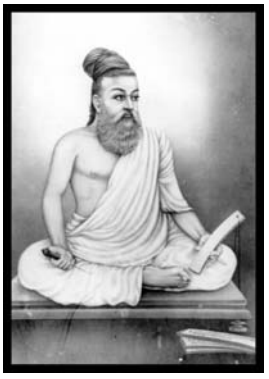
குடிநீர் அளவு

5 வயது முதல் 12 வயது வரை உள்ள குழந்தைகளுக்கு 10 மி.லி. தினமும் 2 வேளை அருந்தவும்.

பெரியவர்களுக்கு 50மி.லி. தினமும் 2 வேளை அருந்தவும்.

எல்லா வகை காய்ச்சலும் குணமாகும்

TENETS FROM TIRUKKURAL FOR GOOD GOVERNANCE AND GOOD LEADER



Tirukkural is considered as the Moral Book of the World and it is no wonder that it is translated in very many languages of the World and it referred and respected by all.

It can be comprehended that Tirukkural deals with morals of every one's personal life, professional life and love life to attain high levels of Happiness, Satisfaction and Position and respect in this life as well as later. Tiruvalluvar has totally offered to this world as many as 1330 Kurals and the beauty and the wonder is that you can search and find analysis and solution for any situation in your life and society.

The problem of the society at large of the world in present times is the "Pandemic" and all the focus, attention and actions by all, including the Governments, for more than a year now, are to understand the problem and initiate action. There have been lot of progress in understanding and attending to solve the problem, but things have not under control yet. Two Kurals are picked up in this context and let us see what Tiruvalluvar has to advise on this.

Utravan Theerppan Marunthuzhaich Chelvaanendru
Appal Naarkootre Marunthu ***Kural 950***

உற்றவன் தீர்ப்பான் மருந்துழைச் செல்வானென்று
அப்பால் நாற்கூற்றே மருந்து. ***குறள் 950***

"The patient, the physician, the medicine and the apothecary, on these four doeth all care depend and four again are the attributes of each of them."

Utran Alavum Pinialavum Kaalamum
Katran Karuthich Cheyal ***Kural 949***

உற்றான் அளவும் பிணியளவும் காலமும்
கற்றான் கருதிச் செயல் ***குறள் 949***

"Let the physician take the measure of the patient as well as of the disease and let him take account of the season that is; and then let him set about the care with every precaution."

In the Kural 950 above, he has also rightly included the importance of the manufacture and distribution of the medicines. This seems to have taken a beating at present times due to the unexpected magnitude, which are also getting sorted out by the aggressive actions by all concerned.

Kural 949 addresses very rightly, the needs to understand the patient (mental conditions), the extent to which he is affected and the time factor to attend to the problem must all be analyzed and understood clearly by the doctor and his team in order to attend to the patient appropriately.

HOME FESTIVALS - 7

ஆடி - Aadi (July/August)

There are two major home festivals this month. The first is **Adi-Perukku**, in honour of the Kaveri River. Women and girls go to the nearest river where they place offerings on a bamboo tray (upper left) into the water, then have a feast upon the riverbank. **Varalakshmi Vratam** ("Vow to bring Lakshmi") is also a ladies' festival, in which paintings of the Goddess of Wealth are made upon the walls (upper right), kumbha pots intended for worship are decorated with Her image. Beside the pot are placed various cosmetics, comb, beads, etc and worship is done. Then the ladies sing songs inviting the Goddess to their home. Kozhukkatai, rice and jaggery cakes are a favourite of the day. In the evening, friends are invited to the home and given clothing, coconuts and sweets.

(To be continued)

Awarded to **Shri. A.K. Venkatasamy,** our revered *Chairman & Managing Director, Shanti Group of Companies* in recognition and appreciation of excellent achievements in his Professional Career by our then *President of India*, **Dr. A.P.J. Abdul Kalam** during Golden Jubilee Celebration of Nachimuthu Polytechnic College, Pollachi in the year - 2006

Tsunami Relief Fund - 2005
From Left to Right:- **Sri S. Sitaraman,** *Treasurer,* **Sri A.K. Venkatasamy,** *President,* ***Chief Minister*** **J. Jayalalitha & T.M. Bhikkaji,** *Secretary*

MEMORIES

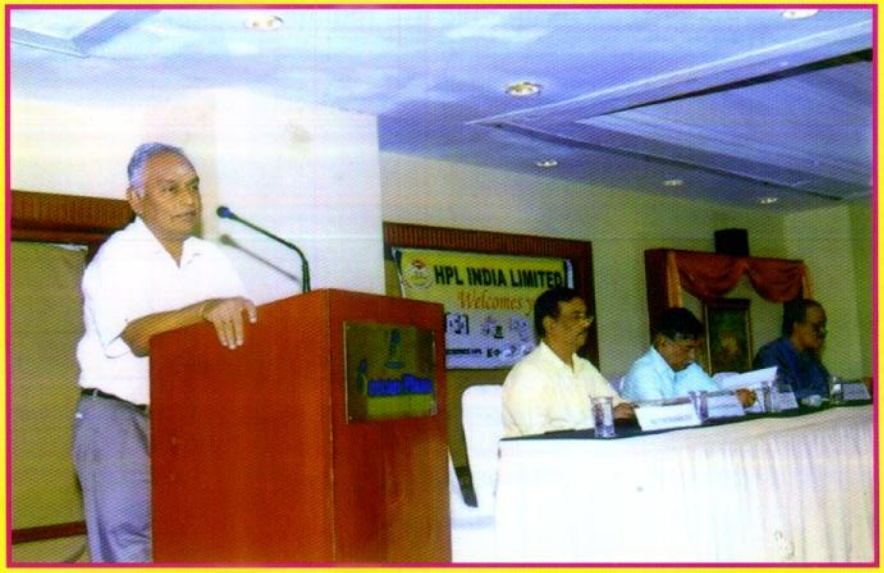
Inauguration of Technical Training Institute - 12.03.2005

Inauguration of Newsletter – March 2006

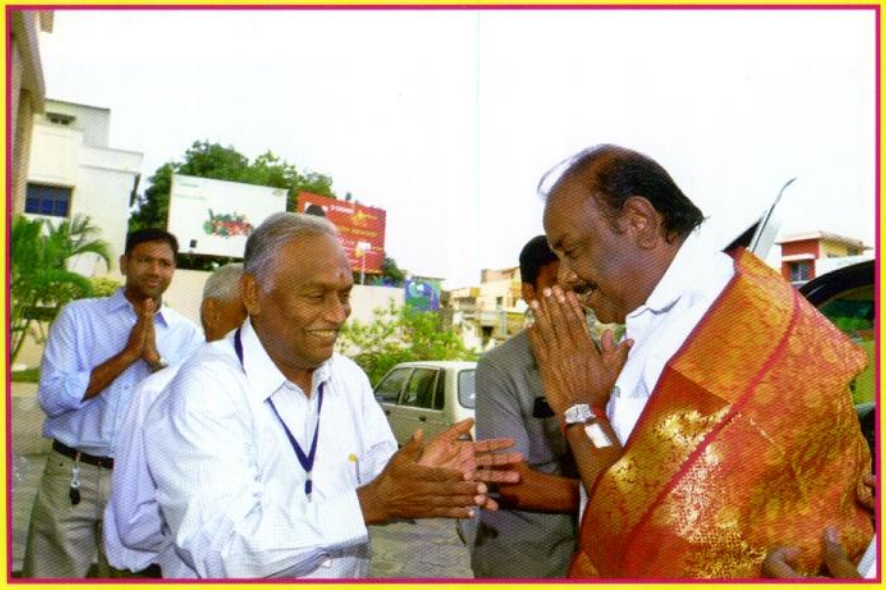
Industry Applications Society - 28.10.2006

Technical Seminar – Coimbatore - 17.03.2007

Technical Seminar –27.10.2007



Electrical Safety Week - Technical Seminar – 06.05.2009



Our past President Shri. A.K. Venkatasamy Welcomed Honorable Minister Mr. Nantham Vishwanathan &
Over Voltage Phenomena in a Power Network – An Overview Book release Celebration - 18.08.2012

Newsletter 100th issue celebration - 21.06.2014

Newsletter 100th issue celebration - 21.06.2014

Newsletter 100th issue celebration - 21.06.2014

Cosidici National Awards – For outstanding Entrepreneurs – 2017

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