



# TAMILNADU ELECTRICAL INSTALLATION ENGINEERS' ASSOCIATION 'A' GRADE

## NEWSLETTER

ISSUE NO. 186 VOL NO. 17/2022 MONTHLY ISSUE NO. 5 PRIVATE CIRCULATION ONLY OCTOBER 2022

### **FE** Fuji Electric *Innovating Energy Technology*

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## EDITORIAL

Dear Members, Fellow Professionals and Friends,  
GREETINGS TO ALL!

*Happy Gandhi Jayanthi!!*

*Happy Saraswathi Pooja and Ayudha Pooja!!*

*Happy Deepavali!!*

The month of October is marked by Gandhi Jayanthi followed closely by Ayudha Pooja and Vijaya Dasami this year.

The phenomenon of Gandhiji and India is an event of great Historical, Social and Economic significance for our country and the impacts are really powerful and productive. The basic ideologies and the life of Gandhi revolved around the four important principles of Truth, Nonviolence, Sarvodaya and Satyagraha, which indeed formed the four pillars of all programs and progresses and transformation, he worked for. With absolute truth and transparency and simplicity, Gandhiji could unite the whole Nation to make it a strong force with one voice to take the Freedom Struggle forward and succeed. When we got the Independence, the Economy of the country was at its lowest possible level with wide spread poverty, but we had committed leaders and intelligent, hardworking and progressive minded people supported by vast natural resources, which could help the country march forward.

Let us just look at the impact of Gandhian Philosophy in redesigning the Business Ethics in our country, which revolves around 3 dimensions of –

Gandhian Philosophy of Wealth Management, Gandhiji's views on labour management relations and Gandhiji's principle of Trusteeship.

Gandhian Philosophy of wealth management is based upon the "Servodaya principles of Truth, Trusteeship and Non-Violence; wherein class harmony between labour and management have sovereign power.

Trusteeship means the position of trust as applicable to the corporate world defined as the managing and holding the resources by boards of directors and other top level executives on behalf of the stakeholders i.e. equity and other shareholders of the firm; in other words they act like an agent of investors.

According to Gandhiji, proprietors and boards of directors of business firms are only trustees of wealth of society. A brief write up on the Ideology of Gandhiji is published in this issue.

It is in the long standing tradition of our country to worship Knowledge and show utmost reverence to the tools and the machinery that help us to grow wealth and thus grow economy, which are celebrated as Saraswathi Pooja and Ayudha Pooja followed by Vijayadasami, which is considered as auspicious time to commence all good efforts.

We celebrate Deepavali this year in October, and this marks the celebration of 'Brightness' and Joy all over the country. Deepavali is also marked by high degree of economic activities in the form of purchases of all kinds, investments and even commencement new businesses and accounts by many communities. Let us wish for prosperous and joyful Deepavali this year.

**We thank all those members who have helped us by participating in the advertisement appearing for the issue August 2022 – 3SI Eco Power LLP, Asias Electricals, E Power Engineering, Gravin Earthing & Lightning Protection System (P) Ltd., Pentagon Switchgear Pvt. Ltd., Power Cable Corporation, Power Cable Corporation, Sri Bhoomidurga Marketing (P) Ltd., Supreme Power Equipment (P) Ltd., Global EPC India Pvt. Ltd.**

**Editor**

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## **MINUTES OF THE MEETING**

### **EXTRA-ORDINARY GENERAL BODY MEETING WITH ELECTION 2022-2024**

Date: 24.09.2022, Saturday

Place: Hotel Jaya Pushpam, Koyembedu, Chennai

The Extra ordinary General Body Meeting started with a Welcome Note by *President Mr. K. Kannan*.

The *Secretary Mr. G. M. Vishnuram* thanked the President, Treasurer & Entire team – the VPs & Committee members for their contribution to the TNEIEA association. He Explained the progress during the tenure and appreciated the members involved in the activities.

*Treasurer Mr. S. Kalyanavenkataraman*, submitted the audited accounts for the years 2020-2021 & 2021-2022 and circulated copies of audited accounts. All members gave their consent. The Audited accounts passed unanimously, thereafter.

Later the Meeting was handed over to the Election committee, who took over the proceedings.

#### **Election Committee Team:**

**Mr. G. Venkatesh,**

**Mr. SK. Sethuraman,**

**Mr. L. Wilson Susai Raj,**

**Mr. S. Krishnamoorthy,**

**Mr. S. Gopalakirshnan,**

**Mr. M. Mohammad Azam,**

**Mr. R. Muruganantham**

**Mr. S. Umashankar.**

The Election of Office Bearers for the years 2022-2024 was conducted.

*Nominations received for the post of President*

**1. Mr. S.D. Poongundran**

**2. Mr. K. Ramesh**

*Nominations received for the post of Secretary*

**1. Mr. V. Rengarajan**

**2. Mr. D. Santhanam**

*Nominations received for the post of Treasurer*

**1. Mr. Erode G. Kannan**

**2. Mr. S. Kannan**

#### **The Results of the Election 2022-2024**

**President-Mr. S.D. Poongundran,** M/s. Sudhan Power Tech

**Secretary-Mr. V. Rengarajan,** M/s. Shri Vaari Electricals Pvt. Ltd

**Treasurer-Mr. Erode G. Kannan,** M/s. Southern Electrical Systems

*It was decided to revamp the VP zones and Members gave their concurrence for the same.*

#### **The following members were selected as Vice Presidents**

**Mr. JRK Ananda Ramanna,** M/s Shastha Electricals,

**Mr. G.M. Vishnuram,** M/s Emaar Electricals

**Mr. S. R. Senthil Kumar,** M/s Aim Electrical Controls India Pvt Ltd

**Mr. C. Uma Murugan,** M/s Paowertech Engineers

**Mr. S. Kalyana Venkataraman,** M/s Sundhar Electricals Pvt. Ltd.

**Mr. A.A. Murali,** M/s Bestech Electrical Engineering

**Mr. S. Manivannan,** M/s Mani Engineering

**Mr. B. Sasi Kumar,** M/s Yesar Electrics

#### **The following members were selected as Joint Secretary**

**Mr. J.Dhanasekaran,** M/s. Victory Electric

**Mr. N.N. Bharanidharan,** M/s. Nataraja Electricals

The New Secretary **Mr. V. Rengarajan** delivered the Vote of Thanks.

## REVIEW OF THE FIRE SAFETY OF RESIDENTIAL BUILDINGS IN ACCORDANCE WITH THE NATIONAL BUILDING CODE PART – IV – FIRE AND LIFE SAFETY-2

Sl. NO.	Specific points of the standard	Compliance / Observation of the site
1	2.2 Atrium	Does your building have an atrium? If so are draft curtains etc. provided?
2	2.4 Talk Back System	Please Verify whether any talk-back system or any arrangement is provided for the communication of the residents during emergencies
3	2.8 Common Path of Travel	The common path of travel could be different for the basements, ground floor, various occupiable floors. Are they furnished properly in detail in the fire-exit drawings?
4	2.10 Downcomer charging by Fire Service appliances	Whether inlet connections are provided in the ground floor for charging with water by pumping with water from fire service appliances. Whether the arrangements are shown properly in the drawings. Confirm provision of air release valve in the terrace
5	2.13 Emergency lighting system	Whether the operation of the same were tested with the main and standby system at atleast sample locations?
6	2.16 Fire exits / Fire tower	Whether a detailed writeup about the safety arrangements in the fire staircase including the natural exhaust openings provided, fire resistance rating, emergency call systems, floor plan and stairway marking details, pressurization arrangement, fire doors etc. Whether the above details / calculations are duly approved by the structural engineer, licensed engineers of the project?
7	2.22 Fire door and fire door assembly	Verify whether not only the fire door but also the door frame, appurtenances etc. are listed and obtained from the fire door manufacturer. Furnish the details
8	2.27 Lifts (fire lifts)	Verify whether the Automatic Rescue device and other facilities installed in the lifts. Furnish the writeup and manuals of the lifts indicating the safety features. Also furnish the procedure from the manufacturers of:- how the lift arrangement will be extended to higher floors as and when they are getting constructed.- Temporary measures to ensure that the evacuation of personnel is not affected during any lift not being in operation. The procedure to be explained to the statutory fire officers during the building up of higher floors and their approval / suggestion to be received.
9	2.28 Insulation	Insulation particulars of the roofing for the HVAC equipment etc. to be furnished
10	2.32, 3.4.5.4 Fire stops and cable coatings	Furnish the details of the fire stops for the cables etc. provided in the project

<b>11</b>	2.33 Gas based fire suppression system	Are there any Server Room etc. in the building and are they provided with gas-based-fire suppression systems etc. Have calculation for the same been received?  Are there safeguards to ensure that the room is not opened during the gas discharge to control / extinguish fire and also room integrity is maintained.
<b>12</b>	2.34 Fire wall or fire separating wall	Verify whether the DG set room, electrical room, etc. are provided with fire separating walls.
<b>13</b>	2.37 Fire exit hardware	Verify whether panic bars or suitable arrangement to release the latch bolt on application of force are provided.
<b>14</b>	3.1.2 Group A 'Residential Buildings'	Verify the classification of the buildings. (Many residential building could be classified as 'Apartment Houses' - 'Subdivision A-4').  Verify whether any hotel or restaurant are allowed within the building within the current statutory approvals of the building.
<b>15</b>	3.2.5 Temporary buildings / structures	Verify whether the site will be constructing temporary building / structures to enable extension of the building to higher floors.  Verify whether the planning, space allocation, safety plans, debris storage and evacuation plans, power supply tapping to the temporary structures, revised assembly area during such extensions  Whether the assembly area selected (for normal times) will get affected during the extension / modification of the buildings.
<b>16</b>	3.3.1 Type of construction	Verify whether the walls of the staircases are atleast 2 hour fire rated.
<b>17</b>	3.3.3 Load bearing steel structures / columns	Verify whether the safety / fire insulation for any load bearing structures / columns are provided?
<b>18</b>	3.3.4 False ceiling and partitions	Verify whether the fire safety arrangement for the same
<b>19</b>	3.4 Fire resistance rating of structural and non-structural elements	Verify whether the civil / structural engineer has considered the requirements and all approvals from the statutory agencies are received
<b>20</b>	3.4.3.2. Safety measures of high-rise building under construction	Verify whether safety measures like the dry-risers, provision of temporary water storage drums in each floor, provision of 20000 liter at ground floor for construction purpose are provided.
<b>21</b>	3.4.5.4. Safety measures of high-rise building under construction	Verify whether fire rating of minimum 120 minutes for the inspection doors, providing armoured cable for LV cables / metal conduits etc. are provided.
<b>22</b>	3.4.5.5. Refuse Chutes	If refuse chutes are provided, Verify whether the fire safety resistance rating of the same, exit elevation of the refuse chutes, provision of sprinkler protection for the chutes, distance of the chutes from the exits.
<b>23</b>	3.4.5.6. Vertical opening	Safety of vertical opening considered to be mentioned
<b>24</b>	3.4.6. Electrical installations	Verify the safety systems for the electrical installations

<b>25</b>	3.4.6.2 Emergency power for fire and life safety systems (refer and fill up the tabular column to the right of this table)	Verify whether the details attached in the attached chart for the emergency power provided for fire and life safety systems
		a. How emergency power has been planned
		b. Demand load and panel from which the terminals / contactors are given:
<b>26</b>	3.4.6.3.1 Oil filled electrical equipment	Verify whether any oil filled electrical equipment are installed and the safety measures adopted for the same and their acceptance to the statutory agencies
<b>27</b>	3.4.6.4 DG sets	Verify the location of the DG sets and the fire safety protection for the same
<b>28</b>	3.4.6.5 Lightning protection for the building	Verify whether the provision of lightning protection for the building and the acceptance of the same by statutory agencies
<b>29</b>	3.4.7.1 Emergency Lighting	Verify whether the provision of emergency lighting as per the rule
<b>30</b>	3.4.7.4 Exit signages	Verify whether the provision of exit signages and power for the same
<b>31</b>	3.4.8 Smoke management system	Verify the smoke management system are provided for car parking areas, lift shafts, staircases etc.
<b>32</b>	3.4.8.3 Duct work	Confirm any ductwork provided is metallic, return air is also through the metallic ducts and area above the false ceiling is not used as a return air duct and any insulation provided is fire safe
<b>33</b>	3.4.8.4 Fire or smoke dampers	Confirm provision of the same as per standard along with integration with the fire alarm system and also manual operation facility
<b>34</b>	3.4.10 Glazing	Indicate the safety provisions for the same, protection for the area between the facade and floors and the provision of openable panels
<b>35</b>	3.4.11 Surface finishes	Verify whether Class-1 - surface finish with low flame spread are provided or safety provisions if faster fire spreading finishes are utilized.
<b>36</b>	3.4.12 Fire command center	Details of the fire command center to be furnished
<b>37</b>	4.2.1 Exit requirements	Procedure / planning for identifying and using alternative exits to be furnished
		Boom barrier and other security systems shall open to safe position in case of fire emergencies etc.
<b>38</b>	4.4.2.5. Staircase pressurization and lift pressurization	The details of the staircase and lift pressurization or non-pressurization design to be indicated as approved by statutory authorities
		Whether as the building height increases, the pressurization and exhaust fan performance can be changed?

39	4.6 Smoke control	Confirm for the multi-level basements, separate air intake and exhaust outlet shafts are provided. If in case common shaft is provided, then whether exhaust fans are provided with back-draft damper connections
		Whether proper drainage protection for the shafts are provided?
		Whether the natural vent openings are done in such a way that people will not close the same to prevent rain water entry, birds entry etc. and defeat the purpose of the natural vents?
40	4.7 Gas Piping in separate shafts	Whether the gas piping are in separate shafts and in individual buildings, below the false ceiling?
41	4.9 h Annunciations in fire alarm system	Verify whether the following annunciations are available in the fire alarm system
		Water level in all tanks
		Hydrant and Sprinkler System pressures in zones
		Pump 'on/off' status
		Supervision of non-padlocked valves
		Other electro-mechanical interfaces
42	4.10 Fire Officer	A Fire Officer to be appointed and shall always be employed exclusively for this project. Furnish manual / proof for the same
43	5.1 a Pressure control	Furnish the details of the orifice plates for the hydrants to limit pressure to 3.5 bars.
		Furnish the calculations of the Pressure relief valves provided in the hydrant and sprinkler systems.
44	5.1 b Portable fire extinguishers	The chart of the total availability in the building should be available in the control room.
		Temporary lot of additional extinguishers during the building extension also should be available
45	5.1 c Supervisory switch / tamper proof security locks for isolation valves	Same should be provided for all valves
46	5.1 d Hose reel	Same are provided near each internal hydrant.
		One hose reel and hydrant could also be provided in the terrace for testing, training and for exposure protection to this and other buildings. The nozzles for the hydrants and hose reel shall be of adjustable type to develop either solid stream or spray pattern.
47	5.1 e Wet riser connection in the terrace	Same is provided.
		Also power to the same is derived from the Fire Protection PDB cum MCC.



		However a key lockable push button station to be provided in the terrace with interconnection to the above PDB cum MCC so that in case of maintenance to the motor, the power supply could be locked out and possible electrocution avoided. Necessary cabling to be provided
48	5.1.2.1. Static water tanks	Verify whether the usable water volume which should fulfill the NOC requirements
		Provide details of the manholes provided for inspection, repairs, insertion of the fire hose by the fire service department etc.
		If the coverslab of the water tanks forms a part of the driveway, then the same should be suitable to carry a load of 45 T of the fire engine as a 4-point load
		Fire brigade collecting head and fire brigade draw out head are shown in the drawings. The draw head to the fire tank shall also be provided with a proper foot valve with strainer in the bottom and also a priming connection with a 1" connection with isolation valve to remove any air pockets and enable suction.
		The water based fire protection system in sample floors, basements will be checked for operational functionality.
		The pumphouse installation with respect to the various points in this clause to be confirmed.
		Indicate the arrangement to prevent the water from the sprinkler, hydrant systems from entering the lift well, staircase
		Verify the sprinkler location in the ramps so that the branch pipes or sprinklers don't get damaged by any passing vehicle.
		Indicate the method of actuation of the drencher system
49	5.2. Fire alarm system	The standby power supply calculation for the fire alarm system to be furnished.
50	5.2. Residential building - Life safety	Verify whether the bathroom door locks or fasteners are designed to permit the opening of the locked or closed door from the outside in an emergency without the use of special key.
51	D-8 - FORMATS FOR FIRE AND LIFE SAFETY	The details for the following to be verified / available. Note that the role allocation and the number of persons etc. may vary but all the activities to be allocated suitably:
		D.8.3 - Fire safety Director
		D.8.4 - Deputy Fire safety Director
		D.8.5 - Fire wardens and Deputy Fire wardens
		D.8.6 - Building evacuation supervisor
		D.8.7 - Fire party
		D.8.8 - Occupants instructions
D.8.9 - Evacuation drills		

		D.8.10 - Fire Command station
		D.8.11 - Signs
		D.8.12 - Fire prevention and protection program
		D.8.13 - Building information form
		D.8.14 - Representative Floor plan
		D.8.15 - Fire safety plan
52	E-4 - REFUGE AREA	Confirm to the points mentioned in the same including drainage from the refuge area
53	E-6 - FIRE PROTECTION SYSTEM	Confirm to the points in this clause as applicable
54	Annexure H - Car Parking Facilities	Confirm to the points in this clause as applicable

*Wishing all to stay safe and be blessed.*



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## HUMOUR

If you understand English, press 1. If you do not understand English, press 2. *Recording on an Australian tax help line*

My friend, an intern, was given \$50 to get the chairman of the bank some lunch. Told to get himself something, he bought a shirt. *Source: storify.com*

I was at the customer-service desk, returning a pair of jeans that was too tight. “Was anything wrong with them?” the clerk asked. “Yes,” I said. “They hurt my feelings.”...

At an art gallery, a woman and her ten-year-old son were having a tough time choosing between one of my paintings and another artist’s work. They finally went with mine. “I guess you decided you prefer an autumn scene to a floral,” I said. “No,” said the boy. “Your painting’s wider, so it’ll cover three holes in ( our wall.” *Betty Tenney, Sterling Heights, Michigan*

Before google, there were librarians. Here are some queries posed to the poor, suffering staff of

public libraries: • A woman wanted “inspirational material on grass and lawns.” • “Who built the English Channel?” • “Is there a full moon every night in Acapulco?” • “Music suitable for a doll wedding to take place between a Shirley Temple doll and a teddy bear.” • “Can the New York Public Library recommend a good forger?”

A woman called our airline customer-service desk asking if she could take her dog on board. “Sure,” I said, “as long as you provide your own kennel.” I further explained that the kennel needed to be large enough for the dog to stand up, sit down, turn around, and roll over. The customer was flummoxed: “I’ll never be able to teach him all of that by tomorrow!” *From gcfl.net*

**Scene:** A radio newsroom. **Caller:** I just wanted to let you know you’re off the air. **Host:** Yes, we know. The engineers are working on it. **Caller:** It would be nice if you put something on the air that says that. *Source: Overheard in the RADIO Newsroom*

## KNOW THY POWER NETWORK – 167

(A focus on close monitoring and control of energy flow in a premise will lead to energy savings). This step will result in efficient use of energy forms with minimum wastages.

Energy is one of the basic items that we need for our living. Everyone knows this. The main issue, now we face is that the available energy sources are limited and cannot be replenished easily. This makes the energy as a scarce and costly entity and its conservation and savings measures are a must for the present and future.

While going for energy saving measures, we have to pay our smart attention to the supply and consumption of energy as well. i.e. we have to ensure that the energy is consumed in the right and smart way with minimum wastage. This aspect demands our attention to the energy influencing parameters connected with the system and an equipment in our use (Mechanical and electrical). This basic requirement warrants a good knowledge of the equipment and its energy related parameters by the consumers. To cite an example, pressure and temperature are required to be treated as energy influencing parameters in the case of Pumps, Blowers and Air Compressors. So we have to be familiar with all the equipment and the process in our premises before delving deep into Energy Saving Measures. With this need in view, this paper has been brought out.

Sl. No	System / Equipment / Device	Important Energy Related Parametres	Energy Saving Measure Requires
I	II	III	IV
1.	Boilers	Stack temperature / feed water temperature / excess air / blow downs / radiation and convection heat losses, scaling and soot losses, steam pressure, boiler loadings, starting and shut down of boilers, speed control of boiler fans, pumps and blowers. The colour of the flue gas / smoke that emanates from the chimney can be treated as an indicator for the combustion related issues that includes incomplete combustion also	<ul style="list-style-type: none"> <li>(i) Stack temperature should not be kept too low or high. It should be maintained around 200°C.</li> <li>(ii) Heat recovery from flue gases by maintaining its temperature around 200°C. The heat thus gained can be used either for preheating the feed water or for preheating the combustion air depending upon the needs / site situations when the temperature of combustion air is raised by 20°C, one percent increase in boiler efficiency can be expected.</li> <li>(iii) Incomplete combustion, that normally occurs, can be attributed to the burner system problems, poor quality fuels (coal / gas / oil), shortage of air supply, excess air, excess flow / short fall and in full supply. To get a remedy, each one of these problem requires to be treated separately. Removal of the root causes as outlined will be of much help. Attention may also be given to the proper mixing of air at the burner; excess air is generally required to ensure complete combustion. But on this account, the theoretical air cannot be maintained at a higher level. It should be maintained well within the prescribed limits. One percent reduction</li> </ul>

			<p>is excess air can help to achieve 0.6 percent increase in boiler efficiency. Automatic stack damper control is one of the means to effect control on excess air,</p> <p>(iv) Boiler heat losses due to radiation and convective process. To keep these losses at a minimum level, it is desirable to operate the boiler with 25 percent loading or more. Augmenting the insulation of boiler walls and piping can be helpful in reducing these losses.</p> <p>(v) Frequent blow downs to meet / respond to boiler water conductivity and pH can lead to higher heat losses. Automatic blow down controls may be installed if possible to reduce losses. This can reduce costly DM water consumption also.</p> <p>(vi) Elevated stack temperature - 22°C increase in temperature causes 1 percent efficiency loss. This indicates the formation of soot and scaling on boiler tubes. So these deposits may be removed on a regular basis. High exit gas temperatures at normal excess air indicate poor heat transfer performance. This condition is mainly due to the gradual buildup of gas side / waterside deposits. Review of water treatment procedures and regular tube cleanings can help to remove these deposits. Digital type thermometers may be installed at the base of the stack to monitor the exhaust flue gas temperature regular removal of soot can also help to reduce fuel consumption; periodical cleaning of radiant furnace surfaces, boiler tube banks, economizers and air heaters are other recommended measures.</p> <p>(vii) Reduction of boiler steam pressure when need arises can be considered as a means to reduce fuel consumption.</p> <p>(viii) Variable speed controls may be adopted for boiler fans and pumps.</p> <p>(ix) Operation of boilers at low levels (25% or less) may be avoided to reduce heat losses. <b>So loading of the boiler requires careful attention.</b></p>
2.	Steam Equipment	<p>(i) Steams leakage, a visible indicator for steam wastages at pipelines, Valves, flanges and joints</p> <p>(ii) Dry steam for industrial heating process is the best steam for adoption – Wet steam should not be used for such processes – Flash</p>	<p>Steam leaks on high pressure mains are costlier than low pressure mains. Hence a regular surveillance programme for identifying leaks at pipelines, valves etc is recommended. Plugging of steam leaks at vital parts can result in 5 percent of steam consumption with the attendant for such processes. Fuel savings to a considerable level. Whenever possible, flange joints may be replaced by welded joints.</p>

		<p>steam for low pressure heating applications like direct injections. Thus condensate at high pressure is released to low pressure applications is preferred (direct injection). Such methods help to avoid the use of pressure reducing valves. Steam traps may be used to take care of the automatic draining while going to meet the need for any steam (e.g laundry works)</p>	
3.	Furnace	<p>Suggested energy efficiency (Heat Energy Saving) measures for an industry with furnace are</p> <ul style="list-style-type: none"> <li>(i) Complete combustion with minimum air is to be attempted</li> <li>(ii) Heat distribution in the furnace should be properly maintained.</li> <li>(iii) Furnace temperature should be at the optimum temperature</li> <li>(iv) Heat losses from furnace openings should be kept at minimum</li> <li>(v) Correct amount of furnace draught may be maintained</li> <li>(vi) Optimum capacity utilization should be maintained i.e. low loadings are to be avoided</li> <li>(vii) Waste heat recovery from the flue gases have to be adopted</li> <li>(viii) Refractory losses should be kept at minimum</li> <li>(ix) Ceramic coating's may be adopted</li> </ul>	<p>To control air infiltration, maintain the pressure of combustion air; fuel quality and keep the excess air within 25% level. i.e optimization of combustion air is required.</p> <p>Slight positive pressure should be maintained in the furnace.</p> <p>Among the sensible heat salvage measures are (i) Change preheating (ii) Preheating of combustion air (iii) By using waste heat boilers to generate hot water or steam</p>

#### **iv) Buildings (Residential and Commercial)**

The key focus areas with regard to electrical energy saving measures are,

- (i) Areas connected with the receipt and end use of Electrical Energy i.e. (Distribution of Energy in the premises)
- (ii) Lighting systems
- (iii) Air conditioning units

#### **Distribution of Electrical Energy**

To start with, our main focus should be the removal of supply side on (input / in coming supply) issues like voltage unbalance. Harmonics, under and over frequency levels, electrical distribution side electrical mains (uninterrupted) supply with the related consumption are the main focusing areas.

The key point that draws our attention at this juncture is that the costly electrical energy should be consumed in the right and smart way without any wastage. In other words, the smart energy monitoring (both quality and consumption) are the need of the hour. Smart Utilization of electrical appliances and equipment with suitable Apps are generally preferred; smart energy monitor, smart fan, smart plugs for geysers and air conditioners are some of the other devices that invite attention in this regard. Further it is stated that the energy efficiency measures cannot be forced or thrust on people. At this, they can be requested to use these devices by themselves or they should come forward to apply these devices so that their needs can be catered to in an efficient way. In today's world with regular Wi-Fi internet connections. It is not very difficult to employ these smart appliances. In addition, it is to be noted that on closely monitoring the consumption, by using smart energy monitoring systems. Certainly a good savings of electrical energy can be achieved.

To move further, attention needs to be paid to the focus areas as stated here under.

- (i) Electrical mains and its associated systems / parts

#### **(A) Losses causing factors that need attention**

- (a) Power factor of the system, as a whole
- (b) Load factor of the premises as a whole
- (c) Diversity factor of the premises
- (d) Harmonics generating devices / applications in the premises in point
- (e) Unbalance in the loading of the premises as indicated by the neutral current flows.
- (f) Use of aluminium cables / electrical parts, it may be replaced by copper cables / parts
- (g) Bimetallic action as caused by aluminium connections. In such cases bimetallic clamps can be employed
- (h) Loose connections, improper crimping's and undesirable over loading of sockets
- (i) Improper or not optimal running of electrical devices

- (j) Improper selection / mishandling of electrical devices / equipment / poor loading
- (k) Higher drop across the connection to motive power loads
- (l) In correct maintenance
- (m) Applied voltage level. It should not be more than the required level. Tolerance limit – 110 percent of rated voltage
- (n) Manufacturing defects / inadequate design
- (o) Use of inefficient equipment / devices. They may be replaced by star rated energy efficient devices / equipment
- (p) Prevailing poor operating environment. (Moisture ingress, dust, oily surfaces and poor ventilation are the indicators of this condition).
- (q) Improper selection and application of lighting devices also to lead to higher losses besides lighting pollution.
- (r) Wastage of electrical energy caused by running of fans, TV, computer, AC units in unoccupied room.

**B. Recommend Energy Saving Measures for Adoption are,**

- i. Measure and Monitor the electrical consumption especially specific energy consumption of applied equipment
- ii. Focus on the controls – Viz. fan regulators, Remotes, Main Switches
- iii. Use energy efficient, star rate / devices / equipment
- iv. Remove the impurities in the incoming supply by adopting suitable corrective measures (eg) Active Harmonic Filters, Voltage Stabilizers, UPS
- v. By balancing the loads, reduce neutral current flow
- vi. *Introduction of demand side management methods like* Lighting Energy Saver, Power Factor Improvement, Capacitors Maximum Demand Ammeters and Demand controllers
- vii. Periodical / preventive maintenance of equipment in use.

**(V) Air Conditioning Units**

- (i) Temperature control - set the AC temperature at 27°C - one degree increase in temperature saves 6 percent energy
- (ii) Use BLDC (Smart Brushless DC Fans) in the room in addition to AC units
- (iii) If possible arrange to clean the evaporation and condenser regularly; if more units are used keep adequate distance between the AC units for better cooling effects.
- (iv) Reduce the dependence on AC units; instead focus on Green House Measures. E.g. Making / creating a good green space around the house by planting trees etc. If the indoor temperature is brought down by 14°C, heat loads on AC units will be reduced by 80%.

- (v) Install meters for indicating the energy consumption in AC units; close monitoring of consumption will help to avert improper use.
- (vi) Employ voltage stabilizers for AC units to get better voltage control
- (vii) Go for higher star rated AC units when replacement of old units becomes essential
- (viii) If possible paint your roof with white reflection paint to reduce heat load in the rooms.

## (VI) Lighting System

- (i) Install energy efficient light fittings and related components
- (ii) Adequacy of light in a room is to be assessed; the required light fittings are installed in accordance with this assessment. This revamping will help to avert light pollution effects
- (iii) Install smart monitoring and control apps to control lighting in the premises. In addition, it is preferable to go for smart bulbs. Smart down lights and Smart strip lights with facilities for remote switching on or off.
- (iv) Install apps that will help to switch off the lights at unwanted locations. Similarly apps that will help to switch them on automatically at a given time. Our objective is to ensure proper light energy utilization in the premises.
- (v) It is preferably to make the best use of “**natural day lighting**” instead of electric lighting during the day by employing devices like light pipes.
- (vi) Reduction of the voltage supplied to the lighting by employing “**Lighting Energy Savers**” is another method of energy savings (e.g) 210v is sufficient for FT lamps to pin its rated light output; other recommended devices in this connection are Timers, Twilight Switches and Occupancy Sensors.

I feel that I can sign off here

This article will be continued in next issue.



*(To be continued)*

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## HUMOUR

An ad for a hedge clipper that I had to read twice: “A built-in safety switch prevents accidental starting, and blades will stop when you take one hand off.” *Michael Goldstone, Manchester, England*

I spotted several pairs of men’s Levi’s at a garage sale. They were sizes 30, 31, and 32, but I was looking for size 33. So I asked the owner if he had a pair. He shook his head. “I’m still wearing the 33s,” he said. “Come back next year.” *Sally Thorinson, Ferndale, Washington*



## NEW METHOD OF PRODUCING HYDROGEN FROM WATER USING MAGNETS SHOWS ENERGY-EFFICIENT ROUTE TO MANUFACTURING OF THE FUEL

*Indian researchers have come up with an innovative hydrogen manufacture route, which increases its production three times and lowers the energy required that could pave the path towards environment-friendly hydrogen fuel at a lower cost...*

As a fuel, hydrogen has a critical role to play in driving the paradigm shift towards a green and sustainable economy. In addition to having about 3-fold higher calorific value compared to non-renewable energy sources such as coal and gasoline, the combustion of hydrogen to release energy produces water and is thus completely non-polluting. Due to the extremely low abundance of molecular hydrogen in the earth's atmosphere (350 ppbv), electric-field driven breakdown of water is an attractive route for production of hydrogen. However, such electrolysis requires high energy input and is associated with slow rate of hydrogen production. The use of expensive platinum- and iridium-based catalysts also discourages it for wide-spread commercialization. Therefore, the transition to 'green-hydrogen-economy' demands approaches that lower the energy cost and material cost and simultaneously improve the hydrogen production rate.



### **The research work**

A team of researchers from IIT Bombay led by Prof. C. Subramaniam have come up with an innovative route that provides viable solutions to all these challenges. It involves electrolysis of water in the presence of an external magnetic field. In this method, the same system that produces 1 ml of hydrogen gas required 19% lower energy to produce 3 ml of hydrogen in the same time. This is achieved by synergistically coupling the electric and magnetic fields at the catalytic site.

The simple approach also provides the capability to retrofit any existing electrolyser (that uses electricity to break water into hydrogen and oxygen) with external magnets without drastic change in the design, leading to increased energy efficiency of H<sub>2</sub> production.

**Involvements** - The electrocatalytic material — cobalt-oxide nanocubes that are dispersed over hard-carbon based nanostructured carbon florets, is of prime importance to achieve this effect and was developed with the support of the Department of Science & Technology's Material for Energy Storage program at Technology Mission Division. It was put to use for magneto-electrocatalysis through the DST-SERB grant.

The interface between the carbon and cobalt oxide is key to magneto-electrocatalysis. It is advantageous as it forms a system that does not require the constant presence of the external magnetic field and is able to sustain the magnetisation for prolonged time periods; the magnitude of the enhancements achieved (650% increase in current density, 19% lowering of energy required and a 3-fold increase in volumetric hydrogen production rate) is unparalleled, the intermittent magnetic field required is similar to what a fridge magnet can provide. This route can be directly adopted in existing electrolyzers without any change in design or mode of operation and one-time exposure of magnetic field for 10 minutes is enough to achieve the high rate of hydrogen production for over 45 minutes.

**Researchers' voice** - Detailing on the experiment, Prof. Subramaniam said, "The intermittent use of an external magnetic field provides a new direction for achieving energy-efficient hydrogen generation. Other catalysts can also be explored for this purpose".

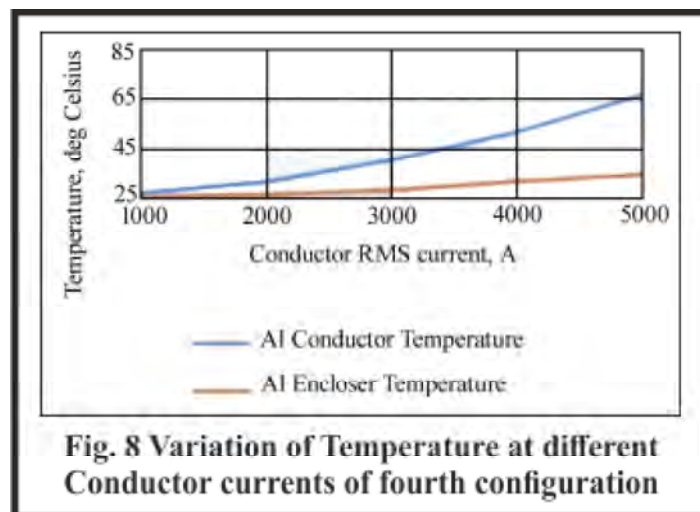
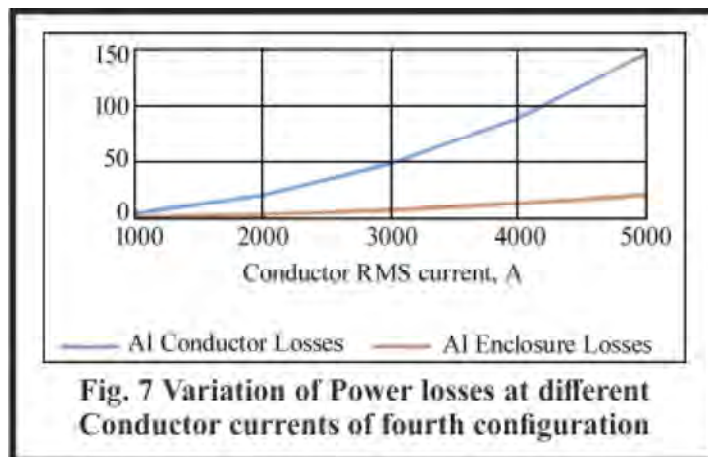
Jayeeta Saha and Ranadeb Ball, the students who were supported by the DST funding, informed, "A basic electrolyser cell of 0.5 nm<sup>3</sup>/h capacity can be immediately upgraded to a 1.5 nm<sup>3</sup>/h capacity by replacing the catalysts and supplying the magnetic field."

'Given the importance of hydrogen-based economy, we aim to implement the Project in a mission-mode and realize an indigenous magneto-electrolytic hydrogen generator,' says Prof. Subramaniam. If their efforts are successful, we might be looking at an environmentally friendly fuel hydrogen replacing petroleum, diesel and compressed natural gas (CNG) in the future, he added.

*Courtesy: Department of Science & Technology*

## NUMERICAL ANALYSES OF POWER LOSSES AND TEMPERATURE RISE OF GAS INSULATED SWITCHGEAR (GIS) MODULES - 3

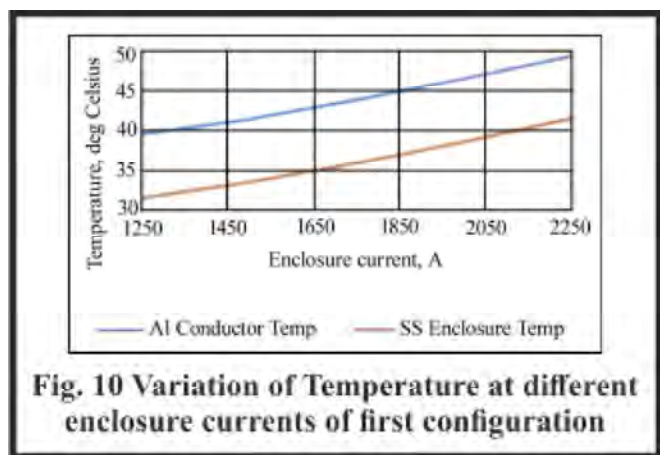
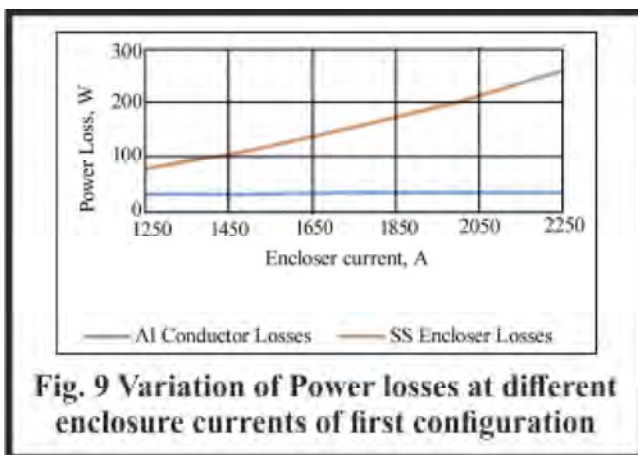
In fourth configuration an aluminium alloy conductor of outer diameter of 125 mm, inner diameter of 90 mm and length 1 meter has been considered. An aluminium alloy enclosure of outer diameter 544 mm, inner diameter 504 mm and length 1 meter has been considered for the analysis. 70% of main conductor current is assumed as enclosure current for the analysis. Ambient temperature is assumed to be 25°C. The losses of conductor and enclosure for various conductor; current are plotted and shown in Fig. 7. The variation of temperature of conductor and enclosure various conductor current are plotted and shown in Fig. 8. From the analysis, it is evident that the dimensions of Aluminium alloy conductor are sufficient enough to withstand normal current rating of 5000 A and above with aluminium alloy enclosure. Further, the aluminium enclosure is good enough to use for current rating beyond 5000 A as the enclosure temperature reaches hardly 35°C even for rated current of 5000 A. It is also evident from the results that conductor losses are 7.5 times more than enclosure losses unlike first two configurations.



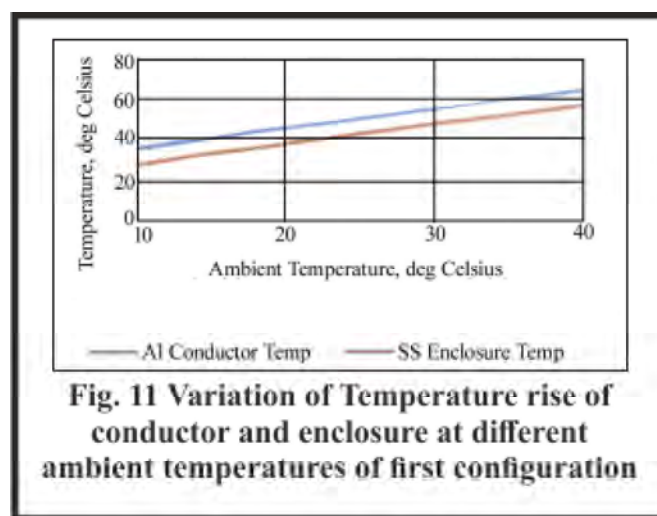
The conductor material in both the models of configuration-2 and configuration-3 is copper only but the enclosure material in configuration-2 is stainless steel and in configuration-3, it is an aluminium alloy. The resistivity of stainless steel is around 26 times that of aluminium alloy and hence stainless steel enclosure losses are more compared to aluminium enclosure losses for same configuration. It is also evident from the results that the aluminium enclosure losses are less compared to those of stainless steel enclosure losses and consequently

temperature rise of aluminium alloy enclosure is less compared to those of stainless steel enclosure. Though the copper conductor losses remain same in both configuration-2 and configuration-3, the temperature of copper conductor is less in configuration-3 compared to that of copper conductor in configuration-2 as aluminium enclosure temperature in configuration-3 is less than that of stainless steel enclosure temperature in configuration-2. Even though Aluminium alloy conductor has slightly higher losses compared to copper conductor, it is cost effective to utilize Aluminium alloy as conductor and enclosure material for GIS application.

An aluminium alloy conductor of outer diameter of 125 mm, inner diameter of 90 mm and length one meter which carries 2500 A rated current has been considered for the analysis. A stainless steel enclosure of outer diameter 544 mm, inner diameter 526 mm and length one meter has been considered for the analysis. Ambient temperature is assumed to be 25°C. The losses of conductor and enclosure for various enclosure currents are plotted and shown in Fig. 9. The variation of temperature of conductor and enclosure for various enclosure currents are plotted and shown in Fig. 10. The enclosure current is varied from 50% to 90% of conductor current in steps of 10%. From the figure, it is clear that enclosure losses increase from 80 W to 260 W with increase of enclosure current from 1250A to 2250 A. It may be noticed that the conductor losses are almost same for all enclosure currents.



Further effect of ambient temperature has been estimated for same configuration. Enclosure current is assumed to be 95% of conductor current. The losses of conductor and enclosure with respect to ambient temperature are calculated and found to be almost constant. The variation of temperature of conductor and enclosure for various ambient temperatures are plotted and shown in Fig. 11. The ambient temperature is varied from 10°C to 40°C in steps of 3°C. From the figure it understood that the temperature of conductor and enclosure also increases linearly with ambient temperature.



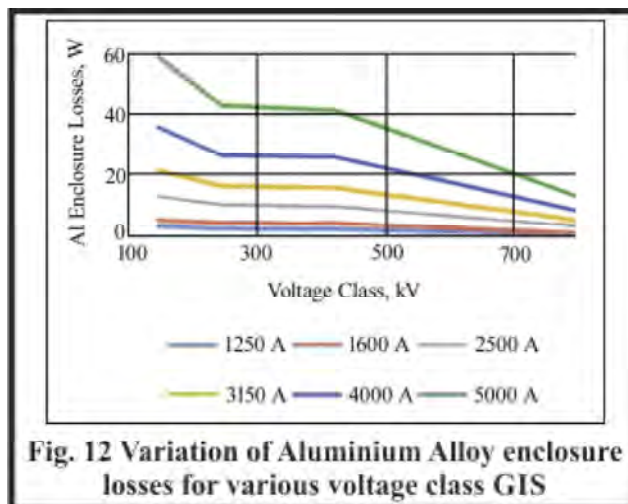
The analyses have been carried out for various voltage class GIS by considering aluminium alloy material for both enclosure and conductor (fourth configuration). Table 3 shows the dimensions considered for the analyses. 95% of mainconductor current is assumed as enclosure current for the analysis.

**Table 3: Dimensions of Enclosure and Conductor for Various Voltage Class GIS Material**

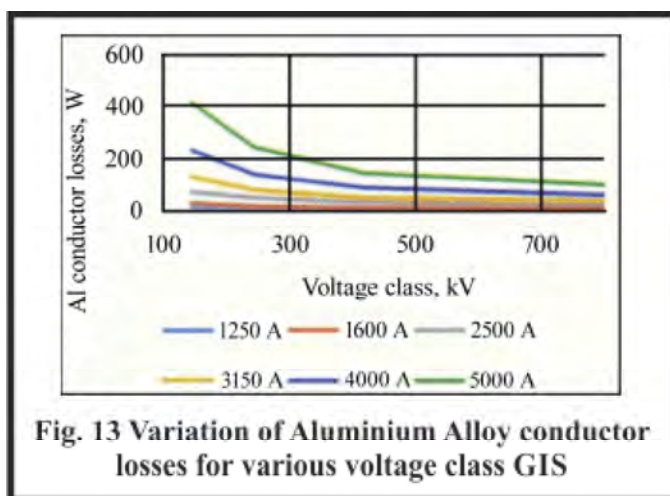
Material Voltage class	Aluminium alloy enclosure	Aluminium alloy conductor
800 KV	OD: 840mm	OD: 180 mm
420 KV	OD: 544 mm	OD: 125 mm
245 KV	OD: 370 mm	OD: 80 mm
145 KV	OD: 290 mm	OD: 64 mm

Average ambient temperature is assumed to be 25°C. The losses of enclosure and conductor for various voltage class GIS are plotted as shown in Fig. 12 and Fig. 13 respectively. The variation of temperature of enclosure and conductor for various voltage class GIS are plotted as shown in Fig. 14 and Fig. 15 respectively. From the analyses, the following may please be noted:

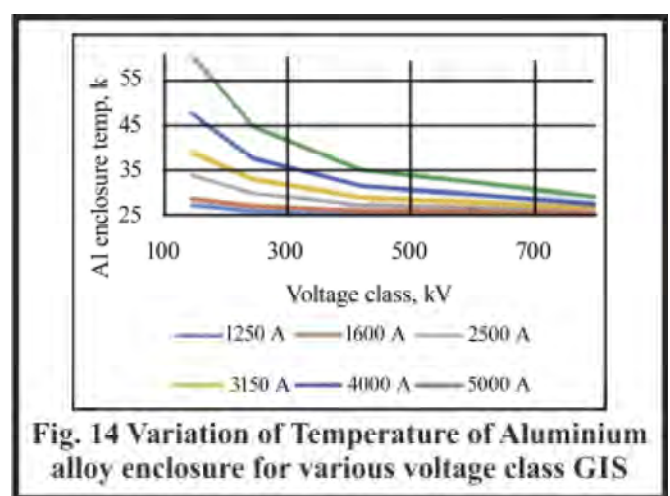
- For 245 kV GIS and above, Aluminium alloy enclosure shall be suitable for current rating up to 5000 A.
- For 145 kV GIS, Aluminium alloy enclosure shall be suitable for maximum current rating of 4000 A.
- For 245 kV GIS and above, Aluminium alloy conductor shall be suitable for current rating up to 4000 A.



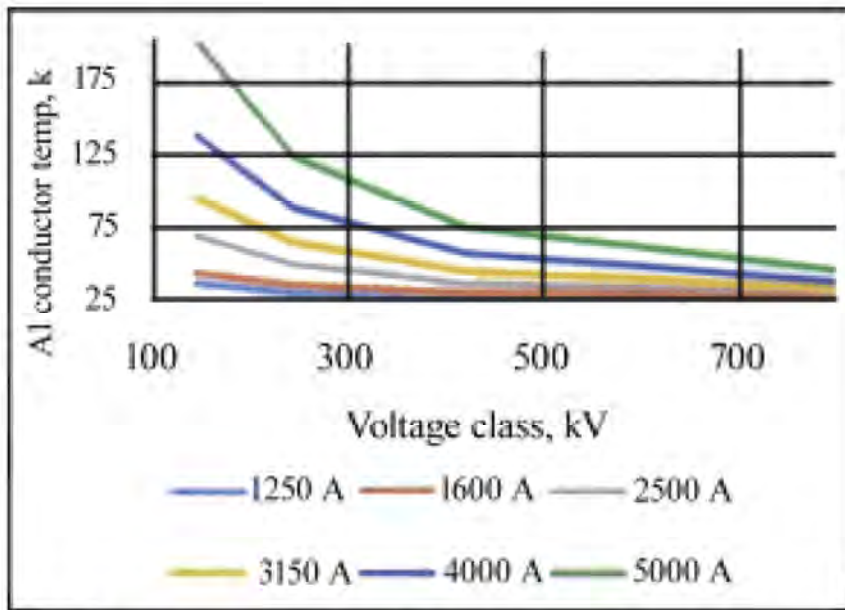
**Fig. 12 Variation of Aluminium Alloy enclosure losses for various voltage class GIS**



**Fig. 13 Variation of Aluminium Alloy conductor losses for various voltage class GIS**



**Fig. 14 Variation of Temperature of Aluminium alloy enclosure for various voltage class GIS**



**Fig. 15 Variation of Aluminium alloy conductor temperature for various voltage class GIS**

- For 145 kV GIS, Aluminium alloy conductor shall be suitable for maximum current rating of 3150 A.
- For fourth GIS configuration under study, Aluminium alloy conductor losses are more than enclosure losses by 6 to 7 times depending on current rating of GIS. Further, at lower current ratings of GIS, ratio of losses in conductor to enclosure decreases.
- With increase of voltage class of GIS, both conductor and enclosure losses decrease significantly due to increase in their dimensions.

### Conclusions

The effect of material of enclosure and conductor, rated current, wall thickness of conductor and enclosure, length of GIS circuit etc. on power losses is analyzed using the developed MATLAB based numerical program. Similarly, the effect of power losses on temperature rise of conductor and enclosure is also estimated using the developed numerical program. The numerical program for estimation of power losses and temperatures of conductor and enclosure in GIS is found to be helpful in selection of materials for enclosure and conductor and optimization of dimensions of gas insulated substation equipment. The effect of conductor currents, materials of conductor and enclosure, ambient temperatures, enclosure currents and voltage class of GIS on the steady state temperatures and resistive losses have been analyzed as part of study. Even though Aluminium alloy conductor has slightly higher losses compared to copper conductor, it is cost effective to utilize Aluminium alloy as conductor and enclosure material for GIS application. Finally, with increase of voltage class of GIS, both conductor and enclosure losses decrease significantly due to increase in their dimensions. For 245 kV GIS and above, Aluminium alloy enclosure and conductor shall be suitable for current rating up to 5000 A and 4000 A respectively.

*Courtesy: Ieema journal, February 2022*

***LIVE as if you were to die Tomorrow.  
LEARN as if you were to live FOREVER.***

***– Mahatma Gandhi***

## ELECTRICAL MAINTENANCE UNIT (QUESTION & ANSWERS) - 14

### *Transformers*

1. What is the colour of silica gel in dry stage and when saturated with moisture in a breather?  
Dry stage – Deep blue  
Saturated stage – Whitish pink
2. What is the static pressure of diaphragm in the transformer explosion vent?  
5 psi
3. In buchholz relay how the top and bottom mercury switches are connected?  
Top mercury switch is connected for alarm and bottom switch for trip.
4. What is the normal value of moisture content allowed in transformer oil?  
<10 ppm.
5. What is the vector group of distribution transformer?  
Dy11.
6. What are the losses in a power transformer and mention how these losses can be minimised?  
There are two losses in a transformer.
  - a. Iron losses.
  - b. Copper losses.

**Iron losses** – Iron losses constitutes of two losses.

- a. Eddy current losses, these are due to the induced emf in the core, which constitutes a current in the core. These will heats up the core. Eddy current losses can be minimised by using laminated core immersed in varnish. This provides a high resistance between the laminations and thus eddy current in reduced.
- b. Hysterisis losses, these are due to the magnetic reversal of current by which there is friction between molecules of core and heat is generated. Hysterisis losses can be minimised by selecting proper magnetic material, like silicon steel.

**Copper losses** – these losses are due to the resistance of the winding, which is equal to  $I^2rt$  (calories). These losses are depends on load. That is the losses are increased to the square of the load current

I – current through winding

r – resistance of winding.

t – time duration.

7. Define the percentage voltage regulation and efficiency of a power transformer.

**Voltage regulation** is the difference between no load voltage and full load voltage by no load voltage.

Voltage regulation =  $\frac{\text{No load voltage} - \text{Full load voltage}}{\text{No load voltage}}$ .

Voltage regulation is mentioned in % (percentage).

% Voltage regulation =  $\frac{\text{No load voltage} - \text{Full load voltage}}{\text{No load voltage}} * 100$

**Efficiency** of a transformer is the ratio of output in watts and input in watts.

Efficiency = Output in watts / Input in watts.

% Efficiency = Output in watts \* 100 / Input in watts.

% Efficiency = Output in watts \* 100 / Output in watts + losses.

8. Mention the important parts of a power transformer and their purposes.

**Conservator:** This allows for shrinkage and swelling of transformer oil. When the oil is heated up it swells and rises to the conservator. When cools down it goes back to main tank. Conservator reduces sludge formation of oil because only the oil surface in conservator is exposed to atmosphere where oil in the main tank is not exposed to atmosphere.

**Breather:** It provides dry air to conservator when transformer breathes. That is when there is shrinkage of oil, atmospheric air enters conservator through breather. The moisture is absorbed in breather by silica gel.

**Buchholz relay (gas operated):** If there is an internal fault, heating up of core, high resistance joints heating up by conduction through insulation and supports. There is heating up of oil, which breaks down and gases are released. This gas actuates the mechanics in the relay, There by closing contacts of mercury switches for alarm. Also if there is a short circuit, the buchholz relay will trip the transformer. Also if there is any leakage of oil through bushing etc. and oil level comes down the relay will give alarm and also will trip the transformer if transformer oil level comes down the point. Gases can be taken from the relay to identify nature of fault.

**Explosion vent:** It provided on transformer main tank, provided with two Bakelite diaphragm which break when the pressure exceeds 5 psi in the transformer tank and relieve the pressure.

**Core:** To provide low reluctance path for the magnetic lines of force. It carries both the HV and LV windings.

**HV Winding:** High voltage is given to HV winding and low voltage is taken from the LV winding.

**LV Winding:** Low voltage is given to LV winding and high voltage is taken from the HV winding.

**Cooling tubes:** These are provided to cool the transformer oil so that the heat of oil will be given to the atmosphere.

**HT bushing:** Carries the HV terminals.

**LT bushing:** Carries the LV terminals.

**Tap changer:** this is provided so that we can get the required voltage output. There are two types of tap changer. Online tap changer and off line tap changer.

9. Mention the properties of transformer oil.

a) Properties of transformer oil are,

b) Colour – pale yellow.

c) Moisture content - <10 ppm.

d) Acidity (KOH/gramme of oil) – <0.1.

e) Dielectric strength – limit value is 45 kV and preferable value is 60 kV.

f) Flash point - 141° C.

g) Inter surface tension – 30 to 40 dynes / cm or 0.3 to 0.4 Newton.

10. How explosion vent works?

Explosion vent is provided on the transformer tank to relieve pressure if the pressure in the transformer exceeds 5 psi. It is swan neck shaped having two Bakelite diaphragms. One at top and another at bottom. These break if the static pressure increases to 5 psi. Wire meshes are provided below the bottom diaphragm and above the top diaphragm. When there is any breakage due to excess pressure the bottom wire mesh prevents broken pieces from entering transformer tank and the wire mesh provided above the top diaphragm protects the diaphragm from any external damage. There is an oil level indicator provided above the bottom diaphragm. It indicates the level of oil in the vent if the bottom diaphragm ruptures. A ruptured diaphragm must be immediately replaced. Also we should check the top diaphragm for any external damage.

11. Explain the operation of silica gel breather.

Silica gel breather is used in a transformer to provide dry atmospheric air to the conservator when transformer breathes. The breather consists of an inner container and outer container. The inner container contains silica gel, which absorbs moisture. An oil bath is provided at the bottom of breather so that the silica gel will not be in direct contact with the atmosphere. Also it will trap dust and dirt entering the breather. Dry silica gel will be deep blue in colour. After it gets saturated with moisture it will turn into white pink. The change of colour silica gel can be viewed externally through transparent viewer provided on the breather. When the silica gel is saturated with moisture it must be replaced or regenerated or recharged. Silica gel is recharged by heating it to a temperature of 250°F to 300°F till the deep blue colour of silica gel is got back.

12. Explain with diagram the operation of on load tap changer.

Tap changer (ON LOAD type) can be used to increase or decrease transformer output voltage without break in the voltage to the load.

The tap changer consists of a diverter switch. The odd taps are taken on one side and even on another side as shown in figure.

The diverter switch is provided so that there will be no break in the supply to the load and also no cut of transition resistance when the tap changing is achieved. Transition resistors are provided to limit the current when the windings are short circuited by the diverter switch.

*Operation:* In the above figure, the voltage at tap 2 is 406 V. the position of diverter switch is shown. It short-circuited with transition resistance.

We want to increase voltage to 420 V at tap 5. When we begin to change the tap the diverter switch connects 2 transition resistance and when the tap changeover is achieved that is when the tap changer reaches tap 5, the diverter switch short circuits transition resistance and thus the resistance is eliminated. The diverter switch switching time is very high. This is to reduce arcing, which can decompose the oil. The whole assembly is immersed in oil. OLTC is connected to HV side, because in LV side current handled will be more. But in HT side current to be handled is lesser than LV side.

13. Explain the procedure for finding out the vector group of a transformer.

*Procedure:* Take the nameplate details. See from nameplate what group the transformer belongs. Suppose nameplate says that transformer belongs to Dy11.

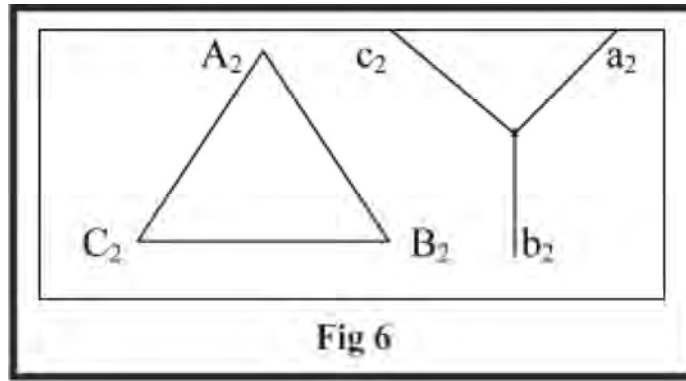
Take the IR value between

HV and LV with body grounded. That is between  $A_2 - a_2$ ,  $B_2 - b_2$ ,  $C_2 - c_2$ .

HV and body with LV grounded and

LV and body with HV grounded.





Connect  $A_2$  to  $a_2$  and give low voltage (415 V) to HV side. Measure voltage between

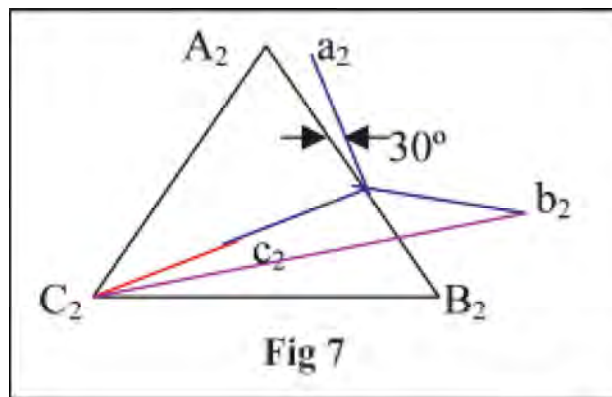
$C_2 - b_2 \longrightarrow 410 V$  (example).

$C_2 - c_2 \longrightarrow 395 V$  (example).

$B_2 - b_2 \longrightarrow 395 V$  (example).

$B_2 - c_2 \longrightarrow 395 V$  (example).

Draw the diagram of Dy11 and check that the readings got are correct.



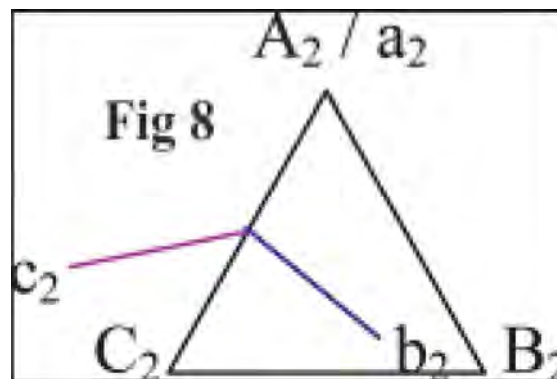
According to the fig.

$$C_2c_2 = B_2b_2 = B_2c_2.$$

And  $C_2b_2$  will be greater than  $C_2c_2, B_2b_2, B_2c_2$ .

That is  $C_2b_2 \gg C_2c_2$ .

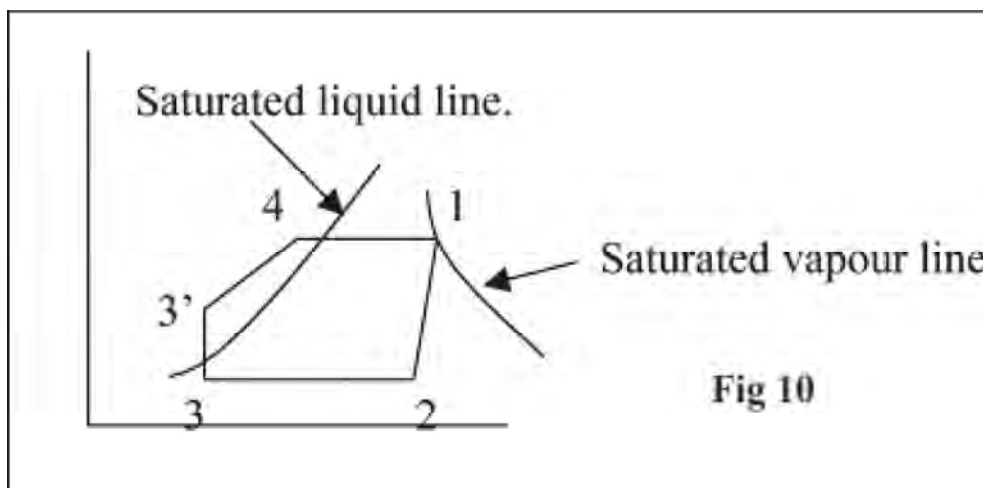
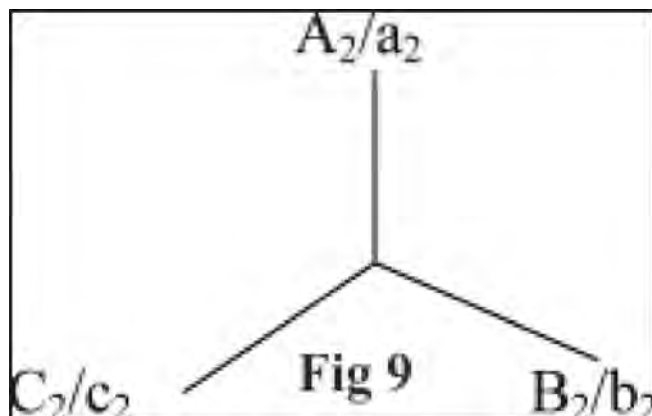
If these conditions are satisfied then that transformer belongs to vector group Dy11.



For Dy1 transformer

$B_2 c_2$  will be greater than  $B_2 b_2$ ,  $C_2 c_2$ ,  $C_2 b_2$ .

That is  $B_2 b_2 \gg B b_2$



For Yy0 transformer

$B_2 c_2 = C_2 b_2$

$B b_2 = C c_2$

$B b_2$  and  $C c_2$  will be lesser than  $B_2 b_2$  and  $C_2 b_2$ .

(To be continued)

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

## HUMOUR

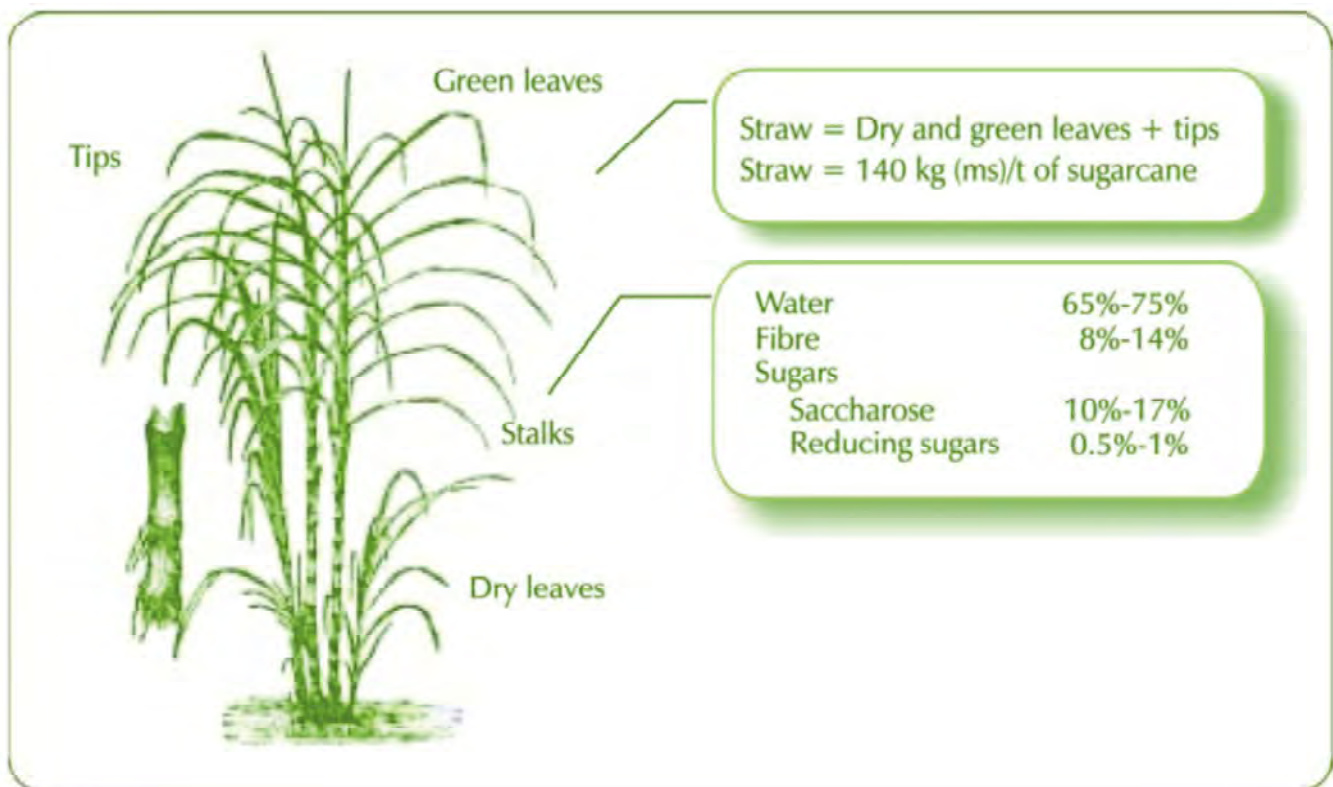
While I was working as a store Santa, a boy asked me for an electric train set. "If you get your train," I told him, "your dad is going to want to play with it too. Is that all right?" The boy became very quiet. So, moving the conversation along, I asked, "What else would you like Santa to bring you?" He promptly replied, "Another train." *From guy-sports.com*

The food at the sandwich shop I frequent is good, but any deviation from the norm throws the staff. I once told a clerk that I wanted only half a sandwich. His reply: "What am I going to do with the other half?" A week later, when I told another clerk the same thing, she responded, "Do you want the top or the bottom?" *Carole Holder, Norman, Oklahoma*

## ENERGY – GLOBAL MISSION AND INITIATIVES INDIA’S COMMITMENTS AND STRATEGIES - 7

### Sustainable Growth, Sustainable Energy, Emission reduction and Renewable Energy.

Sugarcane is an important commercial crop of India which not only produces sugar both for domestic consumption and exports, but is also resource for production of Paper, and Energies like ‘Electricity’, Steam, Ethanol and Bio Oil/ Bio Crude as well, which we are going to briefly analyze in this presentation. The entire sugarcane is used for producing sugar and various other bi products, except probably the ‘Trashes and Tops’ which are currently burnt in the fields. The purpose of this presentation is to understand some of the recent developments and to realize the valuable contribution the ‘Trashes and Tops’ can provide to march towards ‘Net 0’ by reduction of carbon foot prints, by both production of Renewable Energy and by helping to save trees in very large numbers all over the country. The picture of sugarcane below can illustrate the various parts and contents of sugarcane.



In summary, let us understand that from sugar cane harvest, 10% is the Sugar production, 14% is Trashes and Tops, 15 to 30% is Bagasse production depending on moisture content and left over sugar contents. Presently, the entire quantities of Trashes and Tops are burnt in the fields as it is not found economical to collect them and use as boiler fuel. Almost the entire quantity of Bagasse is used as fuel for the boilers in the sugar factories, to produce Steam and Electricity. A very small quantity of Bagasse is sourced by Tamilnadu News Print Limited for manufacture of Paper and Boards.

***First they ignore you, then they laugh at you,  
then they fight you, then you win. – MAHATMA GANDHI***

We are the second largest producers of sugarcane in the world, as per chart given below:

Sugarcane Production - 2020	
14% is trashes and Tops County	(Millions of tons)
Brazil	757.1
India	370.5
China	108.1
Pakistan	81.0
Thailand	75.0
Mexico	54.0
United States	32.7
Australia	30.3
<b>World</b>	<b>1,869.7</b>

The Statewide break up of Indian production is – UP 45%, Maharashtra 20%, Karnataka 10%, Tamilnadu 5% and balance of 20% by all other states.

The production of India is likely to be around 390 million tons in the current year.

A recent statement by a sugar producer makes interesting reading:

“Whether we like it or not, the cyclicity of this sector is a thing of the past. Four, five, six years back yes, it was relevant but no longer now because the returns to the farmers are probably one of the best,” says **Atul Chaturvedi**, Chairman, **Shree Renuka Sugars** 8 9 22

**The returns to farmers can be still higher with appropriate use of technology to produce energy from trashes and tops. This will be discussed in this presentation.**

**Let us have a look at the following 2 recent Press News:**

### **TNPL keen on scaling-up use of wood pulp**

**R Krishnamoorthy**

**JANUARY 18, 2019 20:09 IST**

#### **Due to decline in bagasse availability**

**TIRUCHI**

While setting sights on expansion, Tamil Nadu Papers Limited (TNPL), Karur, is learnt to be devising ways to scale up sourcing of wood pulp to overcome the disadvantage caused by steady decline in availability of fibrous bagasse in sugar mills, the main input for its products, which is a reflection of continual shrinkage in cane cultivation in the State.

TNPL requires 13 lakh tonnes of bagasse and five lakh tons of wood pulp per annum for producing four lakh tons of writing paper and two lakh tons of paper board. Through a tie-up with sugar mills, the TNPL had been procuring bagasse by substituting it with coal for the co-generation plants under a barter system. Since the availability of bagasse has diminished, the TNPL had, last year, issued a tender for procurement of 30,000 metric tons of bagasse from open market sources in Northern Karnataka.

Nevertheless, the year-on-year decline in the area under sugarcane cultivation across the country has pushed the TNPL into a situation of scaling up sourcing of wood pulp as an alternative.

According to a senior official, the TNPL has been procuring wood pulp under two schemes of contract farming in non-forest areas: Farm forestry scheme and captive plantation scheme.

At present, the company has nearly 1.25 lakh acres of land under farm forestry scheme and around 6,000 acres under captive plantation.

Since the availability of land for captive plantation is limited, the company's target is to add 25,000 acres every year under the farm forestry scheme, the official said.

The company is keen on implementing the scheme as a people-centered participatory approach, which will be economically viable, socially acceptable and environmentally compatible.

The company has its network of regional offices across the State to implement the farm forestry scheme under which eucalyptus and casuarina trees are procured for sourcing wood pulp.

Between eucalyptus and casuarina, the wood pulp of the latter is preferred.

Conscious of the necessity to improve its ability to secure inputs for capacity addition, the company that went through a torrid phase a year back due to closure of one of its two units at Karur caused by water shortage and high cost incurred towards import of pulp, has now consolidated its revenue generation, and is under a compulsion to improve margins, sources said.

### **Madras HC Orders State Govt to Not Plant Eucalyptus Trees Anymore in Tamil Nadu**

By: **Archana R**

JULY 26, 2022, Chennai, India

The court's order came as cases related to the removal of invasive trees encroaching on Tamil Nadu forest reserves came up for hearing and the state government submitted a report

The Tamil Nadu government has been told by the Madras High Court not to plant any more eucalyptus trees in the state.

Cases related to the removal of invasive trees encroaching on Tamil Nadu forest reserves came up for hearing on July 25 on the bench of Justices Sathish Kumar and Bharatha Chakravarthy. The state government submitted a report about the removal of invasive species of trees from Tamil Nadu's forested areas.

It was said there that district-level committees had been constituted in order to eradicate all invasive trees from Tamil Nadu's forested areas within the next 10 years. Additionally, it is said that the National Bank for Rural Development (NABARD) and the Japan International Cooperation Agency (JICA) will provide funding for the tree clearance project.

The judges who reviewed the report expressed their disappointment that the Tamil Nadu government was not acting constructively as it only submitted reports about the preservation of forests. The judges further stated that they could not wait for 10 years for this and suggested that if the task of removing invasive trees was given to the private sector, it could be completed more quickly.

The technology of TNPL Plant is based on making paper using Bagasse and as per News, they need 13 Lakh Tons of Bagasse and 5 Lakh Tons of Pulp to achieve 6 Lakh Tons of production. From the sugarcane production details and Bagasse generation details, Tamilnadu produces about 180 Lakh Tons of Sugarcane and generating about 32 Lakh Tons of Bagasse (assuming 18% of Bagasse). It could be easy to adopt the TNPL Technology to use Bagasse only without need for Wood Pulp which can relieve Lakhs of Acres of farm forestry and plantations increasing the Green Coverage of the State. Government can probably intervene to divert the entire quantity of Bagasse for Paper making only in view of 'Value Addition' as well as Carbon Reduction. There is another interesting thing that TNPL produces Bio Gas from the wash water of the Bagasse which meets part of the requirement of 'Heat' to dry the paper, balance of heat requirements being met by use of 'Furnace Oil'. If

the entire production of Paper is with Bagasse only, the Bio Gas production would probably increase resulting in reduction or elimination of use of Furnace Oil, which will also contribute to Carbon reduction.

Now comes the important point of 'Co Generation' in Sugar Factories using Bagasse as fuel for the boilers contributing to 'Biomass Energy' production in the State being lost, as the TNPL proposal is to supply (they are already doing it) adequate coal to the Sugar Factories as a barter for Bagasse. We have made presentations in these very columns in this News Letter about the Technology for Production of Bio Oil/ Bio Crude, from Sugarcane Trashes and Tops which make ideal 'Biomass' for this as per studies in Europe. In fact the Technology of Bio Oil production from Biomass, based on Pyrolysis requires 'Bone dry' Biomass and the moisture in sugarcane trashes, which is only 15%, is found to be very easily dryable. It should be possible to convert the Boilers of the Sugar Plants 'Bio Oil' fired, instead of Bagasse or Coal, which will make the energy produced as 'Green'. The technology of producing Bio Oil from Biomass has already been tried out successfully, particularly in a Trolley mounted setup (pictures shown below) which will be very relevant to India, eliminating the need to transport the sugarcane trashes and tops from the fields after harvest.



The Government can probably examine the whole issue and intervene to involve some leading Institution like the IIT, Madras, who can help put together the Technology and the set up. Experiments in Europe and Canada show that the 'Bio Oil' production is about 50% by weight of the Bone dry Biomass and with a calorific value of about 5000 K.Cal/Kg of Bio Oil. The calculations show that the Bio Oil can replace the Bagasse requirements in full to produce required energies of Steam and Electricity by the Sugar Factories. Once successful, the technology and the mobile setup to produce Bio Oil from sugarcane trashes and tops can be adopted all over the country to create a huge impact in all areas of, more revenue for farmers, large scale production of lakhs of mobile pyrolysis plants, Green Energy, massive Carbon reduction, saving of lakhs and lakhs of trees and farm lands and so on.



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

***Where there is Love there is Life – MAHATMA GANDHI***

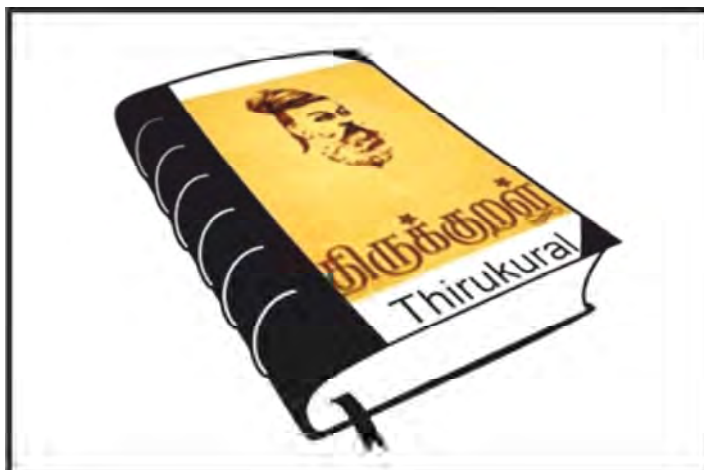
## TIRUKKURAL

Morals from Tirukkural has always been a part of our Newsletter from the inception.

Tirukkural deals with all aspects of human life and civilization including personal life and business and management and running of Government and care for welfare. It is not just a jewel of Tamil Literature, but a great contribution to the world at large for morality and ethics in personal and public life. We take pride in publishing the following interesting details of High Court judgement in 2016.

### **Madras High Court makes in-depth study of Tirukkural compulsory in schools**

*In an attempt to streamline the children from young age, the Madras High Court has directed the state government to ensure that Tirukkural is made part of the school syllabus.*



In an attempt to instill moral values in school going children with the help of ancient literature, the Madras High Court Bench on Tuesday, April 26, 2016, asked the state government to ensure that Tirukkural is made a part of the school syllabus. The court further directed the government to make sure that students from class 6 onwards get to learn the couplets with their intended meanings but not just superficially. The order was passed by Justice R. Mahadevan on a writ petition filed by S. Rajarathinam, a 70-year-old retired Commercial Taxes Officer from Tuticorin district, through his counsel A. Saravanakumar last year.

Rajarathinam had urged the court to direct the state government to introduce Tirukkural as a separate subject in school curriculum than restricting it to the level of being part of Tamil textbooks.

### **What the judge said:**

- The school syllabus drafting committee could exclude 250 couplets that deal with sexual life and include the rest of 1,080 couplets out of the total 1,330 couplets in the syllabus since “the couplets about friendship, hard work, good character, patience, tolerance and confidence will guide them through even during the most difficult of times.”
- Noting that “a crime is committed or a law is violated when a person falls from morality,” justice Mahadevan said that the surge in criminal activities involving children and youngsters and increase in number of matrimonial disputes due to “intolerant, dishonest and inhuman lifestyles” made him think that moral science teaching in schools was either insufficient or done away with.
- He firmly believed that for a thorough understanding of Tirukkural would help in streamlining the character of a person right from childhood. The judge said that the compilation of the famed couplets was way more superior than all the other literary works as it was the third most translated work after the Holy Quran and the Bible and “no other philosophical or religious work has such moral and intellectual approach to problems of life.”
- Referring to the fact that Mahatma Gandhi had learnt Tamil only to read the original text of Tirukkural, after being drawn to it through the writings of Leo Tolstoy, Justice Mahadevan said: “Well, the need of the hour, though may not be another Mahatma, but there is definitely a need for encouraging souls who can make this place a better place to live, in confirmation with the fundamental rights.”
- The state High Court bench even rejected the contention of the School Education Department that increasing the number of Tirukkural couplets taught to students from the present 275 to 1080 would increase academic burden.

- "This court finds that to a student, every subject is difficult unless it is studied. Student life is a difficult phase of life where the students feel that they are forced to study. It is only at a much later stage that they realise the importance of education," the judge said.
- To emphasise his point further he gave example of maths and science, which still are considered to be the most difficult subjects across the world, saying that the government had never thought of reducing the portions in those two subjects as they were considered vital for academic pursuit.
- "Moral science is equally important, if not more. A mere intelligent person without moral aptitude can ruin society more than an unintelligent person with morals. The plea in the present case is not to increase the working hours. Rather, it is only to teach Tirukkural as a separate subject. Hence, this court is unable to accept the contention of the respondents that increasing the number of 'kural's' would cast a burden on the students," the judge said.

The Thirukkural is a classic Tamil sangam literature consisting of 1330 couplets or Kurals. Thiruvalluvar authored it. The work is dated to sometime between the third and first centuries BCE and is considered to precede Manimekalai and Silappatikaram, since they both acknowledge the Kural text.



## TIRUKKURAL ON TRUTH & NON VIOLENCE

Mahatma Gandhi believed very strongly in Sathyam (Truth) and Ahimsa (Non Violence), apart from various other virtues, which were considered as his 2 weapons with which he fought the British as well as other ills of society. There is even a story that Gandhi learnt the concept of nonviolence



from a letter written to him by famous Russian novelist Leo Tolstoy who quoted from a German translation of Tirukkural. The Father of the Nation had said that he came to know about Tirukkural only from Tolstoy. The three Kurals presented below bring out the essence of what Gandhi believed in and every couplet in Tirukkural can be connected to the great qualities and methodologies of Gandhi. Most of us believe that Gandhi was a "Yugapurush", a person born with greatest of qualities once in thousands of years. Thiruvalluvar stresses the point that such greatness is achieved through "Tapas" in the earlier births.

உள்ளத்தாற் பொய்யா தொழுகின் உலகத்தார்  
உள்ளத்து ளெல்லாம் உள்ள குறள் 294

*Ullaththaar Poiyaa Thozhugin Ulagaththaar*  
*Ullaththu lellam Ulan Kural 294*

**"Behold the man whose heart is free from every trace of falsehood; he reigneth in the hearts of all"**

உற்றநோய் நோன்றல் உயிர்க்குறகண் செய்யாமை  
அற்றே தவத்திற் குரு. குறள் 261

*Utranoi Thondral Uyirkkurukan Seiyaamai*  
*Attre Thavaththir Kuru. Kural 261*

**"Patient endurance of suffering and non-injuring of life, in these is contained (the principle of nonviolence) the whole of "Tapas" (Penance)"**

தவமும் தவமுடையார்க்கு ஆகும் அதனை  
அ.திலார் மேற்கொள் வது. குறள் 262

*Thavamum Thavamudaiyarkku Aagum Athanai*  
*Akthilar Merkkol Vathu. Kural 262*

**"Tapas is possible only for those who have acquired merit by Tapas in previous births; it is profitless for others to take it up".**



## HOME FESTIVALS - 10

### Aippasi (October/November)



**Skanda shasti is the first festival of this month**(right), commemorating the victory of Lord Murugan over the demon Sura, of the higher, spiritual self over the lower nature. **Dipavali is the major event of Aippasi**, celebrated everywhere Hindus live and by Buddhists

and Jains, too. In one story of its origins, Vamana, the dwarf avatar of Lord Vishnu, requests the amount of land from King Bali that he can cover in three steps. Granted the request, Vamana covers with his first step all of the Earth, with the second all of the sky, and then asks the king where to take the third step. The king offers his own head (lower left), and in commemoration of the king's humility, the day was established. In another story, Lord Vishnu (center) kills the demon Naragasvaran with His discus. The various observances (lower right) of Dipavali include an oil bath, gifts of new clothes, fireworks (sufficiently indulged in Chennai to rattle dishes off the kitchen shelves), oil lamps for display and abundant pots of delicious food. The early morning bath is always considered to be in the Ganga itself, so one greeting of the day is, "Did you have the Ganga bath?"

## HOME FESTIVALS - 11

### Karttikai (November/December)



**Krittika Dipa (right)** is a joyous festival held on the Krittika nakshatra (when the moon is in Pleiades constellation). Also called Sivalaya Dipa, it is celebrated most famously at Tiruvannamalai (upper left in

**the painting), on top of Arunachala Hill, home of saint Ramana Maharishi.** A bonfire is lit on top that can be seen for miles around. Karthigai Purnima, the full- moon day, honours Lord Murugan. In one traditional story, six sparks from Siva's third eye became six babies (lower left), later gathered into one six-headed Arumugam (centre) by Parvati. Celebrations include lighting hundreds of oil lamps especially the standing lamp (right) of the home. On this day in Orissa, devotees make banana leaf boats and float them in the river with oil lamps.

*(To be continued)*

*Courtesy: What is Hinduism?*

# EXTRA-ORDINARY GENERAL BODY MEETING WITH ELECTION 2022-2024

On 24th September 2022 at Hotel Jaya Pushpam, Chennai



REGISTRATION



Welcome address by **Mr. K. KANNAN,**  
**President, TNEIEA**



**Mr. G. M. VISHNURAM, Secretary**  
Addressing the EGM



**Mr. S. KALYAVENKATARAMAN, Treasurer**  
Addressing the EGM



**President Introducing the TNEIEA Election Committee - 2022-24**



**Members Identity verified before voting**



**Members Casting their Votes**



**Members gathering in EGM**



Election Result announced by Election Committee



Election Committee **Mr. G. Venkatesh** handing over the Winning Certificate to the **Mr. S.D. Poongundran**, as New President



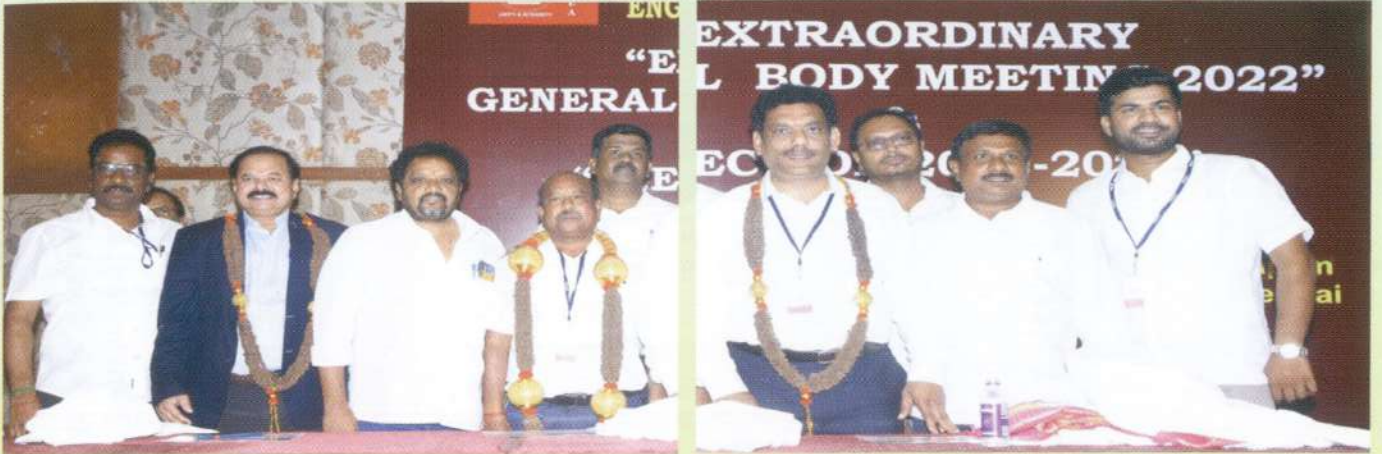
Election Committee **Mr. Wilson Susairaj** handing over the Winning Certificate to the **Mr. V. Rengarajan**, as New Secretary



Election Committee **Mr. Krishnamoorthy** handing over the Winning Certificate to the **Mr. Erode G. Kannan**, as New Treasurer



TNEIEA Members Honouring the New Officer Bearers



TNEIEA Members Honouring the New Officer Bearers



TNEIEA Members gathering in EGM



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**Left to Right : Mr. S. Manivannan, Mr. JRK. Anandaraman, Mr. S. Kalyanavenkataraman, Mr. V. Rengarajan, Mr. J. Dhanasekaran, Mr. A.A. Murali, Mr S.D. Poongundran, Mr. C. Umamurugan, Mr. Erode G. Kannan Mr. S.R. Senthilkumar, Mr. G.M. Vishnuram, Mr.N.N. Bharanidharan**



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