ELECTRICAL INSTALLATION ENGINEER

NEWS LETTER

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EDITORIAL

Dear Members, Fellow Professionals and Friends,

SEASONS GREETINGS TO ONE AND ALL!

We are commencing the Month of March with the Happy News that Wg Commander Abhinandan has come back to our soil, which indeed is a great event considering the very fast and dangerous developments during February concerning the Terrorists activities and the bold measures to retaliate and so on. Interestingly, March 3rd and 4th are National Defense and National Security Days respectively and the events that preceded brought the whole Country together as a mark of strength and consolidation. The events did also provide the demonstration of the Goodwill and Support we command from almost all countries of the world. We can certainly feel proud about the fruits of our genuine interest in bringing about all round peace and cooperation.

The financial year is coming to an end this month and we all certainly look forward to prosperous periods ahead. General Elections for the Look Sabha is also expected to be announced and we can already feel the heat from all vigorous political activities of lot of claims and counter claims by all political groups about the various measures and developments in the past 4/5 years. Looking at the past years without any bias, we all realize that it was a period of all kinds of bold and dynamic measures, in all areas of Finance and Financing, Trade, Banking, Currency, Insurance, Infrastructure, Energy, Cleanliness and very wide spread economic measures covering almost all sections of society. Many of the measures are considered very bold and very essential, but there have been lot of criticism about the implementation and difficulties the Industries, Trade, Commerce and the general public faced. We can understand that these are to be expected, we being a large and diverse country with Democracy in place and with very large administration machinery of both State and Central and with very wide spread financial agencies and institutions to be monitored and controlled. We can also certainly see a sigh of relief from all sections of economy, as things are settling down with regular signs of positive outcomes, be it Tax collections or Digital economy or wider spread of Tax payers and PF accounts and so on. In spite of various natural calamities and damages, we seem to have steadied both in Agriculture and Industries. The very focus and measures with regard to Renewable Energy is paying and is getting global attention. The signs of various forth coming measures with regard to energy are all encouraging.

Like every year, we also remember and review about "Water" on the World Water Day that falls on the 22nd March. In our country, the energy spent in connection with water pumping is very huge and a lot of it can be brought down with more serious attempts of equitable distribution of all available waters. The Government has realized and spelt out that there is no shortage of water in our country but there is only lack of proper distribution. There are definite plans about linking Godhavari and Cauvery early, with the plans of interlinking of all rivers in the country too remaining in more serious discussions and planning. All analysis show that we are a country with abundant resources both with regard to Water and Energy and the need is only 'Focus' and cooperation of all States of the country.

We thank all those members who have helped us by participating in the advertisement appearing for the issue February 2019 – Dehn India Pvt. Ltd., Elecxpo, Galaxy Earthing Electrodes Pvt. Ltd., Kelcon, Power Square Engineers (Indotech Transformers Ltd.), Supreme Power Equipment Pvt. Ltd., Visewham Electricals.

EDITOR

ELECTRICAL INSTALLATION ENGINEER

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ANNUAL GENERAL BODY MEETING FOR THE YEAR 2018-2020 HELD ON 09TH MARCH 2019 AT THE WINDFLOWER RESORTS, PONDICHERRY

Tiruchy Zone Vice President Mr. S. KalyanaVenkatraman invited President, Secretary and Treasurer to dais to preside the AGM.

President welcomed all the members, who have come all the way to AGM in spite of their busy schedule. For the benefit of members, President explained the Association's Registration process. As most of the process for registration is over, he expressed his confidence to get the final approvals from Registrar of societies at the earliest.

Mentioned about family get together arrangements made in Kodaikanal & Ooty. To strengthen unity among members and their family members, expected more such occasions to be conducted in future. Association office has been shifted to St Thomas mount for the convenience of Association members. Soon expressed his desire to acquire a property for Association on its own and occupying it. Insurance for Rs 10 Lakhs for the Association members has been initiated and 65 members have given their consent. He thanked Secretary, Treasurer, VPs, Joint Secretary individually and thanked all the EC members for giving their cooperation during his tenure. Thanked Mr. D. Chandran and other election committee members for their election arrangements. Thanked Mr. R. Muralidharan for AGM arrangements.

Secretary was invited to give his address. Secretary welcomed everybody. He said during his period 14 Nos. EC Meeting, 2 Nos. Emergency Meeting, 4 Nos. Technical Seminars were held. Dubai Electricity & Water Board conference, BIS-ET-20 Meetings, TC-64 International Standing Committee meeting in Australia, Electrical Contractors Association Malaysia meeting, were attended by our Association representative. Association conducted MSME related meeting and GST clarification meetings. Participated in Elexpo. Explained society registration process in brief. Thanked all the Sponsors for Seminars, VPs, EC members for their cooperation.

Treasurer submitted the Audited Report to AGM for approval. Few clarifications from members regarding expenses were clarified by Treasurer. For Gaja Relief Fund only Rs. 65000/- received from members. Decided to hold it in a separate account. Treasurer proposed to the AGM, to retain the Auditor, Mr. Sankaranarayana Sharma to continue as auditor for the year 2019 - 2020. It was proposed by Mr. G. M. Vishnuram and seconded by Mr. G. Venkatesh & Mr. S. Ponnambalam. Officially it has been unanimously accepted to retain Mr. Sankaranaryana Sharma as auditor for the year 2019 - 2020. The Enclosed new members were passed and added to the members list.

Members unanimously accepted the audited accounts and announced passed.

Treasurer requested to raise the subscription to 2500/- (Annual subscription fee) from existing Rs. 2000/- and new member entry fee from 100/- to 500/- this was accepted by the members unanimously.

After passing of Audited Accounts in AGM unanimously, office bearer election for the 2019 - 2020 initiated.

Election Committee headed by Mr. D. Chandran, Mr. G. M. Vishnu Ram, Mr. A. Radhakrishnan & Mr.S. Jagathish took over the Election Proceedings.

For President post Mr. S.D. Poongundran & Mr. U. Baskaran, for Secretary Post Mr. P. Suyambu & Mr. S. Gopalakrishnan were announced as contestants. Members registered themselves, given Ballot papers. Members voted, counted and Results were announced by Election Committee.

Mr. S.D. Poongundran declared elected as President for the year 2018 – 2020

Mr. P. Suyambu declared elected as Secretary for the year 2018 – 2020

As there was only one contestant for Treasurer post, Mr. M. Balamurugan was announced elected unopposed as Treasurer for the year 2018 – 2020.

After the election of President, Secretary & Treasurer the following Vice presidents for all the Zones have been elected by Show of hands.

Mr. M. Mohammed Ismail Ali, VP Tirunelveli Zone, Mr. M. Anand Sathish, VP Madurai Zone, Mr. K. Kannan, VP Chennai Zone, Mr. S. Kannan VP Trichy Zone, Mr. C. Umamurugan VP Cuddalore Zone, Mr. R. Ramachandran VP Salem Zone, Mr. N. Vasu VP Vellore Zone, Mr. M. Manikandan VP Coimbatore Zone.

Mr. B. Paalanikumar-he was elected as Joint Secretary, Chennai. For Joint Secretary other than Chennai, Mr. M. Annadurai was elected unanimously.

The New office Bearers thanked all members who have cooperated with the Association, helping to conduct smooth, Free & Fair election, and making this AGM a grand success. President Mr. S.D. Poongundran specially thanked Mr. R. Muralidharan for his excellent arrangements made for this AGM

The Secretary thanked everybody for making this event a grand success

Event ended with a grand dinner.

KNOW THY POWER NETWORK - 138

Finally we have reached the end of the road leading to our destination viz. affordable and reasonably accurate protection against over voltage, short Circuits, over Loads and Earth fault/Earth leakage currents. In this article, the last item "Earth Fault Protection" is dealt with.

We all know that the Earth fault happens in a Three Phase Network with solide viz. earthed system when single phase to Earth and Double phases to Earth contacts occur. In EHV and HV Networks, these faults can be quickly cleared to the maximum extent possible by employing sensitive earth fault relays with low settings. Even here we face several short comings & operating problems. In the case of analog electro-mechanical relays, it is difficult to achieve tangible protection from them because of the higher burden imposed by these relays on the Current Transformers. At times, the current Transformers may not respond to these faults at all owing to their inevitable magnetic core saturation. At present with the introduction of Static and Numerical relays, this issue does not create major problems. However in the cases like falling of snapped HT conductors on rocky surfaces or when High impedance faults occur, these relay fail to operate in time because of the presence of very low leakage currents in the order of a few Ampere or Milli Amperes.

In the case of LT circuits, this further gets accentuated. It is mainly due to the very presence of low Earth leakage currents and this situation leads to many undesirable fatal accidents. Till date, no satisfactory solution has been evolved for this serious problem. The related studies are still going on without any applicable solution. This brings the Protection against both Fallen HT and LT conductors to the centre stage and demands a focused attention from Power System Protection Engineers. As regards the LT Circuits, it poses a big question (viz.) How to establish electrical safety under all electrical leakage conditions?

It is a very difficult and critical question to be answered. All these push us to a situation where electrical leakage plays a predominent role. To meet this situation and to learn more about this problem, we should start from the day-to-day events and finally arrive at a solution.

Am I Correct?

1. ENCOUNTER OR FACE-OFF WITH ELECTRICITY

Almost all of us, atleast once or twice, had a close encounter with electricity.

This face off commonly occurs when

- We work with the kitchen Mixie or Washing Machine or other appliances or Electrical Equipment like Refrigerator and Air-conditioner.
- Replacing a blown-off fuse in a rewirable fuse unit.
- Mishandling a drilling machine
- Opening a bath room tap.
- Replacing a fuse bulb or Tube Light.

All these occur because, our "Humble Servant" "Electricity" now takes role of a Master. (i.e.) Due to ground faults, the current leak to earth through our bodies. (Human bodies). Kindly state honestly how did you feel while meeting with (or embracing) electricity. This duel starts with some unpleasant sensation which gradually enhanced to unbearable pain in the chest (Heart) and finally Ventricular Fibrillation. If luck is not on our side or we are unable to loosen the contact/embrace of the live circuit, it may end with fatality. Limiting values of leakage currents that are safer for human beings to (let -go) escape from the Clutches of electricity - 10 mA to 30 mA (peak) for a maximum time limit of 30 mA. Any Value exceeding this level may lead to a situation from where "ESCAPE" will be difficult. The contacts with electricity may be direct or indirect; in addition to Voltage and current, the frequency of supply has also an effect on human beings. After crossing a certain value of current and frequency, the human muscles will become cramped and it is well high impossible for a person to let go escape of live parts on his own efforts.

2. REMEDIAL MEASURES AGAINST ILL EFFECTS OF ELECTRICITY

It may be noted that leakage currents of 300 milli amps and above may cause insulation failure and leading to electrical sparks and finally end up with major fires. This kind of leakages should also be considered, while attending to the ill effects of electricity on human beings and animals.

Under these low leakage current conditions, fuses are of no use; only breakers like Earth Leakage Circuit Breaker are extremely effective. These breakers interrupt circuit within a few milliseconds upon sensing the earth leakage currents. Normally, these breakers with 30 milli amps sensitivity will trip in less than 30 milliseconds. This helps to eliminate the risks associated with direct and indirect contacts with live parts. In the case of protection to other assets/properties, it can be set to trip at 100 ms. or initial an alarm for taking immediate action. This kind of protection will arrest the loss of electrical energy and fire risks associated with old and sub-standard wirings. This type of ELCB may also be provided to detect the leakage in X-ray Installations. In view of its effective functioning against electrical leakage, IE Rules have been amended to make the use of this device as a mandatory requirement in LT Circuits. It is also prescribed as one of the protective device in luminous tube sign installations and X-ray installations. Upon getting proper input signals this device will disconnect the supply instantly when there is an occurence of earth fault/leakages to ground from phases.

3. ELCB-ITS FUNCTIONING

After getting sufficient information on Earth fault currents, leakages to Earth and the protections needed to guard against them, you may be curious to know about ELCB and the principle of its operation.

Fig 1. shows the circuit of ELCB under normal operation. It has a core balance relay which will function with differential current that flows in the secondary circuit.

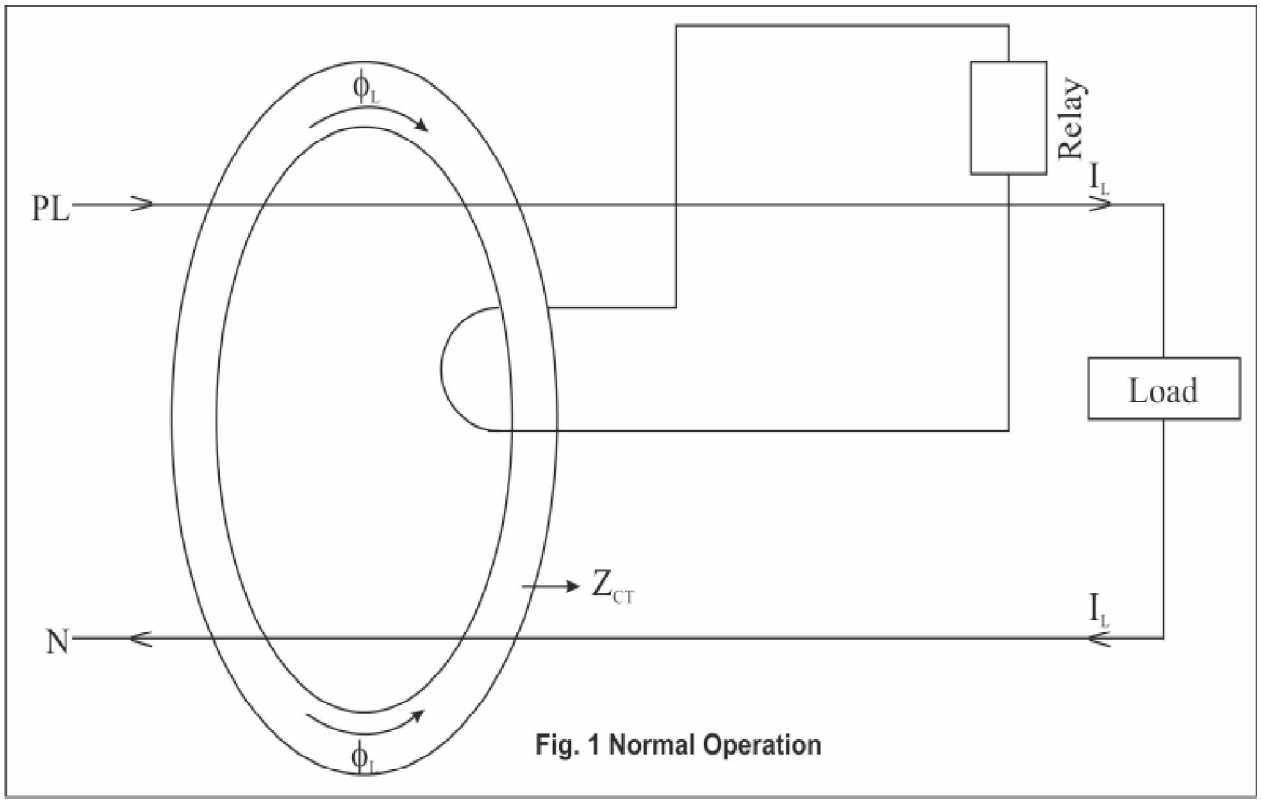

Fig. 1 Normal Operation

Under normal condition, the current flowing in the two wires of the Circuit in point is equal in magnitude but in opposite direction. Hence it cancels/balance one another. Consequently no voltage is induced since on the secondary side of the CT since the two fluxes present in this circuit cancel each other.

Fig 2 shows the circuit when an earth fault occured. Now there will be a difference between the currents flowing in the two lines and this differential will produce an output in the secondary side of the CT proportional to differential current. This output will be adequate to' Cause the ELCB to trip and interrupt the current flows in the circuit. This tripping will happen whenever the differential current exceeds the preset value of earth leakage current. Now 30 mA is generally set with all ELCBs and the device will trip in 30 ms or less.

Thus the risks associated with the direct and indirect contacts with the live parts is totally eliminated. In view of its principal of operation, ECCBs are called as Residual current Circuit Breakers (RLCBs).

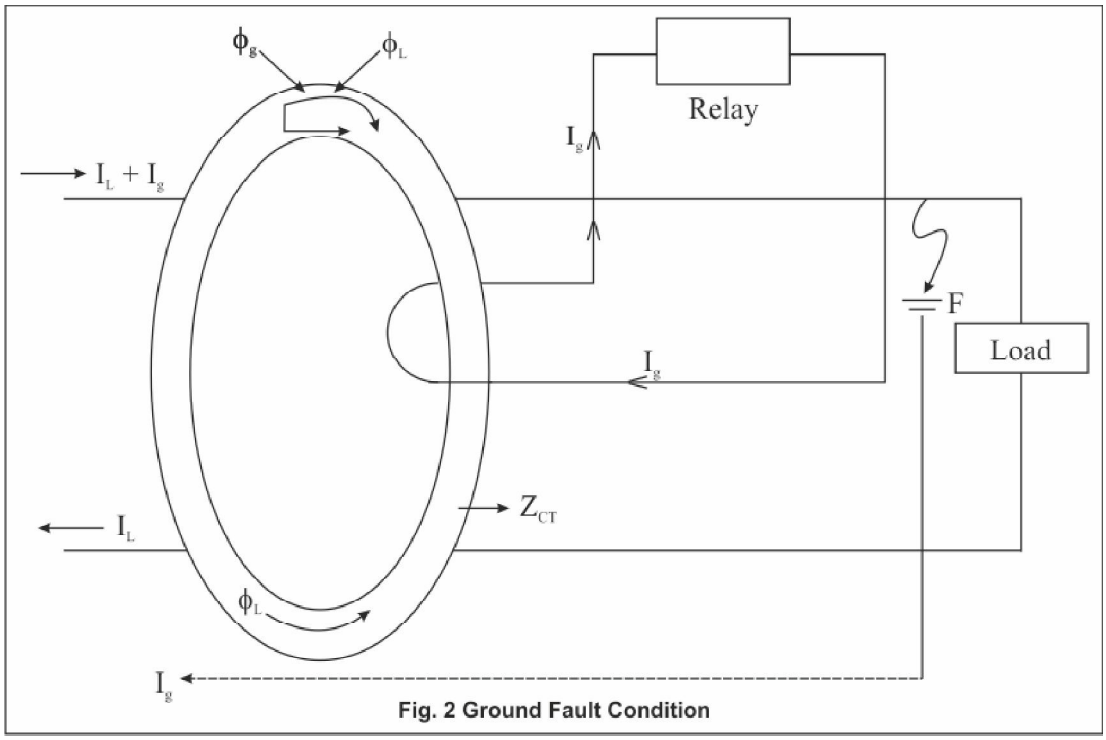

Fig. 2 Ground Fault Condition

4. PARAMETERS FOR SELECTON OF ELCB

The parameters that are required to be considered for the selection By ELCB are

- Sensivity of current
- Rated voltage and frequency
- Rated current
- Operating Time.
- 2 pole or 4 pole
- Protective Coordination

The rated current ranges from 16 A to 220 A and the sensitivity from 10 mA to 500 mA. These devices are suitable for AC and DC Circuits with some minor adjustment.

5. CONCLUDING REMARKS

Before concluding this article, let me add some more useful information.

(1) Electrical Accident are brought under two catagories

- Shock hazard
- Fire hazard

Both the cases may lead to fatal unless adequate precautions are taken. For all these proper earthing is the only response; no other protective method can come to our rescue. If you permit leakage currents to sustain without any interruption, in addition to fire and fatal accidents; they may cause corrosion through electrolysis of concerned metallic parts. In such cases, the earth leakage currents will be of higher magnitude. It may also cause a good earthing system ineffective and prone to untoward incidents. Insulation of wires may get deteriorated due to ageing and may expose itself to leakages. In view of the above, it is not desirable to attribute short circuit, for all electrical hazards. This is generally done when it is difficult to ascertain actual cause of for fire or other accidents. To ensure adequate protection it is generally suggested the ELCR setting of 30 mA for shock hazard and 300 mA for fire hazard.

With this, I would like to sign off here.

(To be continued…)

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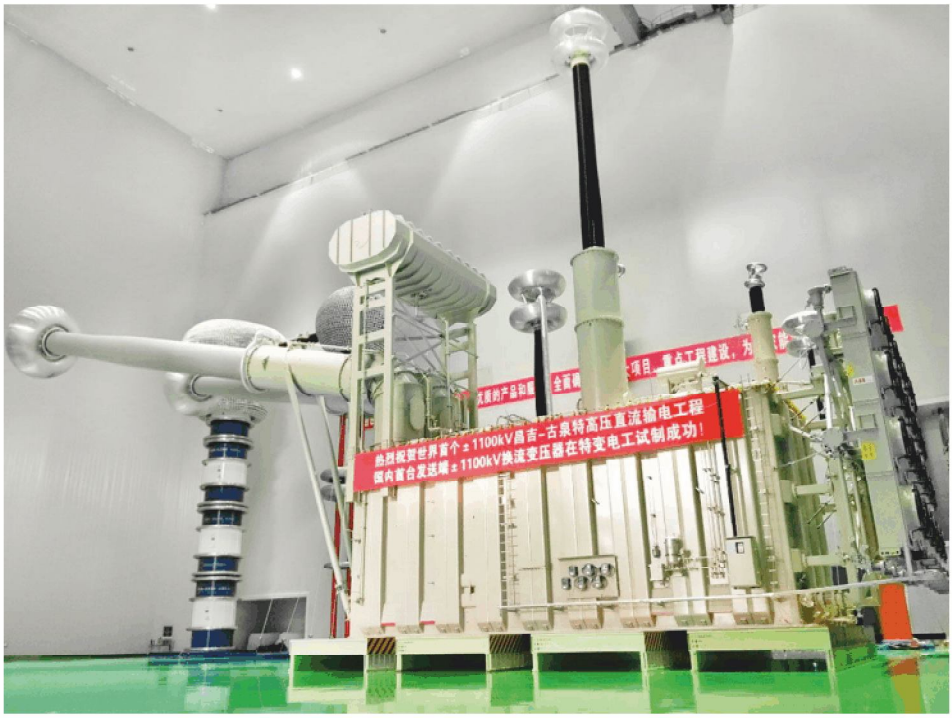
CHINA'S STATE GRID CORP CRUSHES POWER TRANSMISSION RECORDS



China's primary grid operator has energized its biggest and most powerful line yet, a 1.1-million-volt direct current (DC) behemoth that crushes world records for voltage, distance and power.

The new ultra-high voltage DC (UHVDC) line built by Beijing-based State Grid Corporation of China can transmit up to 12 gigawatts. That is enough to power 50 million Chinese households, according to a statement issued in Chinese by State Grid last week, and 50 percent more than most of the 800-kilovolt UHVDC lines that State Grid has built over the past decade.

The new 1100-kv UHVDC line absorbs the grid's alternating current at an AC/DC converter station near the capitol of Xinjiang—China's vast northwestern territory—and sends DC power to a second converter station in Anhui province in eastern China. That 3,293 kilometer run extends power transmission's distance record by over 900 kms.

State Grid dubs it the "Power Silk Road" in its statement because it follows the eponymous ancient route's path through northwest China's Hexi Corridor and can replace the equivalent of 25,000 coal trains' worth of coal-fired generation in China's heavily polluted eastern cities. In addition to battling air pollution, it could also deliver a hefty reduction in greenhouse gas emissions if State Grid prioritizes export of the northwest's abundant solar and wind power.

Jin Zhang, a senior engineer and deputy division head in State Grid's DC transmission project department, told IEEE Spectrum during interviews in Beijing last year that State Grid began developing 1100-kv UHVDC technology more than a decade ago. They recognized, he said, that China would need to transfer power farther over distances that would incur large losses on 800-kv lines.

Early risk-benefit studies identified 1100-kv as the optimal next step, said Zhang, in part because of the big AC transformers that mediate between the converter stations and the surrounding AC grids. Installing a smaller number of large transformers is most cost-effective, he said, but for a 1200-kv converter station such transformers might be impossible to deliver from factories.

The transformers at State Grid's newly-energized 1100-kv converter stations are movable, but they are hardly small. Zurich-based ABB, which provided some of the new line's components along with Munich-based Siemens and a number of Chinese suppliers, says transformers it built for State Grid's project weigh 800 metric tons, and stretch to 37 meters in length. One of State Grid's domestic suppliers, TBEA, set up UHV transformer manufacturing in Xinjiang to minimize transport costs.

Supersizing was also required for other 1100-kv components, such as power lines and transmission towers, to manage the system's unprecedented electromagnetic fields. Magnus Callavik, general manager of

Beijing-based ABB Sifang Power System Co., a joint venture that provided one set of AC/DC converters for the new line, says the 300-kv jump from 800-kv required a "completely new" design.

"It sounds like you're only adding an incremental part," Callavik said. "But it's very challenging for insulation design, structure and weight of the whole design, [plus] system aspects such as how you integrate with the transformer and other systems."

Zhang pointed to the bushings that carry DC power between each station's electronic converters, housed indoors, and the UHVDC transmission lines outside. The bushings keep electricity from flashing over to the converter halls' walls. With the step up from 800-kV, Zhang said they grew by half a meter to roughly 1.3 meters in diameter and from under 20 meters in length to over 30 meters. "Higher voltage means higher impulse levels, mainly during switching. So we need longer air clearances," said Zhang.

UHVDC technology is seen by Chinese president Xi Jinping as a key technology for his "Belt and Road" international development programme. And at the UN's 2015 Sustainable Development Summit Xi proposed the construction of intercontinental power links to massively scale-up cross-border sharing of renewable energy.

But UHVDC also has an important role to play domestically, where Xi has promised to turn China's skies blue again. Specifically, Xi has committed to ending rampant wastage of renewable power generation, whereby wind, solar and hydro power plants are deliberately shut off due to grid capacity and stability limits or to simply make room for coal-fired generation.

State Grid's new 1100-kv line could help reduce renewable energy curtailment because Xinjiang's wind and solar power plants are among China's largest and also the country's most heavily curtailed. More than one-fifth of Xinjiang's solar generating potential and one-quarter of its wind power was squandered in 2017, according to Chinese government statistics. Sending that power to eastern China instead of wasting it would help State Grid meet Xi's promise to shrink curtailment to less than 5 percent in all regions by 2020.

State Grid is working hard to meet that goal, according to Zhang. While 12-gigawatts of new coal power generation was planned along with State Grid's 1100-kv UHVDC project, Zhang told Spectrum that many of the anticipated plants were cancelled. "At least more than half will be renewable power," he said of the power exports the new line will carry.

One more question hangs over the impact of State Grid's 1100-kv technology: whether its massive power flows can be safely integrated with China's congested eastern grids. Challenges associated with absorbing power injected by big DC lines led to the break-up of China's southern grid in 2016. State Grid is counting on another major UHV innovation — its growing network of 1000-kv AC lines — to solve that problem.

SUCCESSFUL CONCLUSION OF INTERSOLAR INDIA'S 10TH ANNIVERSARY AND BRIGHT OUTLOOK FOR THE FUTURE WITH "THE SMARTER E INDIA"

Intersolar India, the most pioneering Exhibition and Conference for the Solar Industry closed its doors on December 13, 2018 and has well arrived in Karnataka's technology hub. Business professionals and exhibitors from 13 countries had a vast time to network on various occasions – on the show floor, at the Buyer Seller Forum, the conference, the many free of charge workshops and the extraordinary 10th Anniversary Networking Event – a highlight of the final first exhibition day. Delegates enjoyed a high-level conference and exhibition program as well as the many partner events at the BIEC in Bengaluru. In November 2019 Intersolar India will return to Bangalore and deliver an even deeper view into the renewable energy future: It will be part of "The smarter E India" - India's innovation hub for the new energy world - addressing the needs of a changing energy world in India. It presents cross-sector energy solutions and technologies and reflects the interaction of the solar, energy storage and electric mobility industry. The smarter E India will bring together the renowned Intersolar India, ees India and Power2Drive India. The exhibition trio will take place at the Bangalore International Exhibition Centre in the capital state of Karnataka on November 27-29, 2019.

According to Mercom India Research, India's cumulative solar installations have reached 6.6 GW year-to-date (Q3, 2018), with large-scale projects making up 5,382 MW and rooftop installations accounting for 1,240 MW (27%). Raj Prabhu, CEO of the Mercom Capital Group said that in the long-term, prospects for solar remain bright in the country. The energy transformation in the country continues and 2018 maybe the first year where solar makes up over 50 percent of new capacity additions. A complimentary white paper on the India Solar Market has been released by Intersolar India and its knowledge partner Mercom India Research at this year's event, providing an in-depth look at the market drivers and challenges facing the Indian solar market.

Highlights of Intersolar India, December 11-13, 2018 in Bangalore Intersolar India 2018 celebrated its 10th anniversary in the capital city Bangalore of the key solar state Karnataka with a great success. After 8 years in Mumbai, moving south was a strategic decision to follow the current market trends. The event kicked off on December 11, 2018 with the official lamp lighting and opening ceremony that comprised keynote speeches

of government officials and solar experts. The first exhibition and conference day ended with the 10th Anniversary networking event that welcomed key VIPs, conference delegates and exhibitors. The high-level event program and special knowledge partner workshops were packed with exciting and diversified topics that gave the delegates numerous opportunities to get insights on the latest trends and key drivers of the solar and energy storage industries during all 3-days at the conference centre and at the free of charge Innovation Stage on the exhibition floor. The Buyer-Seller Forum again increased focused B2B interaction during prescheduled business meetings between exhibitors and key buyers. Many country and state pavilions were present from China, Germany, Korea, Switzerland and Indian State Kerala. Furthermore, 5 start-ups have been welcomed at the Start-Up Pavilion showcasing their innovations and ideas. Intersolar India once again provided a perfect platform for all industry professionals to meet, exchange ideas, discuss challenges and solutions and promote the interest of the solar, energy storage and electric mobility industry.

Save the Dates for The smarter E India in Bangalore on November 27-29, 2019

The transition to renewable energy, decarbonization and digitalization is bringing lasting changes to the energy world. The old system was static and centralized, with just a handful of large-scale fossil fuel and nuclear power plants supplying consumers with energy. A new, decentralized system is now emerging which relies primarily on photovoltaics and wind power and has many more active participants. An increasing number of homeowners and companies are becoming prosumers – generating, consuming and storing their own energy. In addition, the previously separate sectors of electricity, heating, cooling and mobility are becoming more and more interconnected.

The current developments in the energy industry and power generation are also recognizable in India. The power segment is undergoing huge changes because of the government's move towards renewable resources. In India, a target to install 175 GW of renewable energy capacity by 2022 was set by the Government in July 2018. This means in detail 100 GW from solar power, 60 GW from wind power, 10 GW from bio-power and 5 GW from small hydropower. The rise in electricity consumption and increasing awareness towards environmental issues are both supporting alternative and eco-friendly power generation solutions.

"The smarter E India" - India's innovation hub for the new energy world – is addressing the needs of a changing energy world in India. It presents cross-sector energy solutions and technologies and reflects the interaction of the solar, energy storage and electric mobility industry. The smarter E India addresses all the key areas along the value chain and brings together local experts and international stakeholders in the energy future. Starting in 2019, The smarter E India will bring together the renowned Intersolar India, ees India and Power2Drive India. The exhibition trio will take place at the Bangalore.

FIRM HELPS INDIAN FMCG TO REPLACE COAL WITH TURMERIC

The facilities management firm GSH Group India has won the Environment category at this year's Energy Institute Awards for its work with Indian FMCG firm Kaleesuwari, in helping it switch from coal to biomass products, including turmeric and sawdust, to produce steam for its refineries in India. And now it's moving onto chilli.

GSH has worked with Kaleesuwari since 2015 managing its refineries in India to produce steam used in the extraction of oils from nuts, seeds and other raw materials for sale into the food, personal and household markets in the country. In November 2017 they started to mix biomass – including sawdust, wood charcoal powder and turmeric – with coal as a fuel for the fluidized-bed combustion boilers in two power refineries in Palani and Chennai. Over the course of the following six months, this increased to 60% and 20% biomass respectively, and GSH achieved a 60% reduction in CO_2 emissions together with a 15% reduction in the cost of steam. Biomass ash content is low compared to coal, making for easy and more environmentally-friendly disposal. And the products, which are sustainably sourced from close to the refineries, are safer to store.

The results have seemingly been so positive that GSH is now in the process of switching over completely to biomass and increasing the range of biomass products it uses including chilli powder.

The announcement was made on 22 November at a glittering awards ceremony at the Sheraton Grand London Park Lane in front of the industry's leading figures. The awards recognise schemes and projects that enhance the environment or offset carbon emissions including a demonstrable commitment to managing the risks of energy to the environment and reducing the carbon footprint of the industry. GSH faced fierce competition in this category – including a project to reduce air pollution in Beijing and another in an Iranian gas refinery.

"Innovation is at the heart of the GSH approach, and this project epitomises the way we do business," said Mark Thomas, CEO of GSH Group. "I am thrilled that our engineers' hard work and dedication to our clients and the environment has been recognised by the Energy Institute."

"GSH Group should be proud of the inroads they've achieved in reducing the environmental impact of Kaleesuwari's steam production process and showing other businesses in India that shifting from coal to alternative fuels can be a viable option," said *Energy Institute president Malcolm Brinded*. "Beating climate change – while extending the tremendous benefits of energy to all populations – calls for innovation and a lot of hard work, by many smart people, all around the world."

The EI Awards, now in their 19th year, is run by the Energy Institute to recognise those individuals and businesses shaping the world's energy future. The awards celebrate the achievements of the energy industry across the globe, giving recognition to individuals and organisations who take an innovative and responsible approach to solving the industry's challenges of providing society with clean, sustainable, low cost and dependable energy.

TATA POWER SOLAR BAGS THE PRESTIGIOUS GLOBAL PERFORMANCE EXCELLENCE AWARD 2018

Tata Power Solar wins GPEA 2018 in the world class category, recognised as a "role model for future organisations to emulate"

Abu Dhabi: Tata Power Solar, India's largest solar energy company and Tata Power's wholly-owned subsidiary, bags the prestigious **Global Performance Excellence Award (GPEA) 2018** in the category **'world class'** under the aegis of Asia Pacific Quality Organisation. The company becomes one of the thirty role model organisations from 10 Asia and Pacific Rim countries who were recognised for achieving significant milestones in their business excellence journey.

The coveted award was given to Tata Power Solar at a glittering event at the Jumeirah Etihad Towers Hotel, Abu Dhabi, on December 11, 2018. The award is the only internationally recognised accolade that reflects the evolution of organisations in the field of quality. The GPEA is primarily a Baldrige or EFQM (European Foundation for Quality Management) based model that provides a comprehensive approach to managing organisational success through embracing validated best practices. Tata Power Solar has been recognised as a **'role model for future organisations to emulate'.**

Speaking on the achievement, Praveer Sinha, CEO and managing director, Tata Power, said, "We are proud to have been presented the revered Global Performance Excellence Award. This recognition reaffirms our determination to deliver world-class quality service to our consumers. The award has emboldened our spirits to continue excelling and sustaining our leadership position in the solar industry."

Speaking on the occasion, Ashish Khanna, MD and CEO of Tata Power Solar, remarked, "We at Tata Power Solar are extremely honoured on being the only Indian solar company to have received the esteemed award on a global platform. The award comes at an opportune time wherein our unwavering vision to increase international footprint, strong legacy of more than 29 years and international presence are duly recognised. It is also reassuring to our stakeholders that we deliver sustainable value and set benchmarks."

CANADA LOOKS AT TRANSITION TO A LOW CARBON ECONOMY

Ranked seventh in the world for installed wind capacity, Canada already has a strong base of operational projects and is clearly no stranger to the sector. Yet without standing wind resources across the country, the market still holds much opportunity and definite room for growth as Canada looks to transition to a low carbon economy.

Making this shift requires decreased dependence on fossil fuels, especially in the energy and transportation sectors, which provides an opening to significantly expand wind power output over the next 15 years.

However, bringing online a large volume of wind energy in a short span of time may bring new challenges to maintaining the integrity and reliability of the electrical grid. Adapting Canada's energy system to handle a much larger percentage of variable resources, while certainly feasible, is, unfortunately, not something that happens overnight. It requires anticipating pressures the transition may place on the energy system ahead of time and evaluating options, such as advanced wind forecasting and more flexible dispatching of other generation resources, to mitigate any challenges to stability.

To accomplish this and lay the foundation for growth, the Canadian Wind Energy Association (CanWEA) and Natural Resources Canada (NRCan)invested in the recently completed Pan-Canadian Wind Integration Study (PCWIS). This ground breaking research is the first of its kind to cover Canadain its entirety and also investigated a number of new cross-border opportunities, given Canada's access to many portions of the northern U.S. electrical grid.

The study is an excellent example of successful public-private collaboration because it brought together the best minds and the collective resources of both government and industry organizations. For example, it combined CanWEA's knowledge of Canadian energy markets and Environment Canada's forecasting infrastructure with the power systems expertise of GE Energy Consulting and the weather and power modeling capabilities of Vaisala. Through this work, Canada has made substantial strides towards improving its understanding of the role wind energy can play in its future energy mix.

How Much Wind Can Canada's Grid Handle?

When government and energy industry stakeholders contemplate a shift from a present state of approximately 4% wind generation on the Canadian energy system to a future with a third or more, it is not surprising that they

may feel some apprehension and voice concerns. How much can the system really handle before it breaks? What is the tipping point? Will the benefits of carbon free wind energy outweigh the risks to reliability? How much back-up reserve generation will be needed in case wind output suddenly dips or fails to materialize? What about the costs and carbon impacts of reserves from traditional energy sources?

The PCWIS project analyzed several future possibilities, including scenarios where wind made up 20% and 35% of the system total. GE Energy Consulting conducted the research to investigate and quantify the operational impact of integrating these quantities of wind energy into the grid. However, before this work could be undertaken, GE required support from Vaisala in the form of massive amounts of wind energy data across Canada and northern parts of the U.S.

Working together with Environment Canada, Vaisala leveraged the numerical weather prediction (NWP) modeling capabilities of both organizations and then applied advanced statistical techniques to accurately predict wind power production across large geographic areas and long-term climatological windows. The resulting dataset includes three years of meteorological data at 10-minute intervals and 2 km horizontal resolution as well as detailed energy production profiles for nearly 55,000 potential onshore and offshore wind project locations.

Finally, GE Consulting combined the wind generation estimates from Vaisala with transmission, generation, and load information about Canada's electricity systems to model present and future scenarios. The conclusions of the final report are very encouraging, determining that even under the 20% and 35% wind energy scenarios Canada can integrate this energy both reliably and cost-effectively. This is in large part because the study found that the levels of required regulation reserves are actually much lower than previously estimated. While the level of reserves does increase with additional wind, it is on average less than 2% of the newly added capacity.

Benefits to the Canadian Wind Industry

At COP21 in late 2015, Canada committed to reducing its carbon emissions 30% below 2005 levels by 2030 and also supported the more aggressive global warming limit of 1.5 degrees Centrigrade. Bearing this in mind, the PCWIS provides some timely good news for Canadian leaders mapping out the pathway toward compliance with commitments made in last year's Paris Agreement. The relatively modest transmission and regulation reserves needed to ensure a stable grid while incorporating new wind capacity mean that wind energy can play an enhanced role in reducing the carbon footprint of Canada's electricity industry.

In addition, the study demonstrates the potential for wind energy exports from Canada to the U.S. Developing a Canadian renewable electricity export strategy is one of the recommendations to the federal government of the joint CanWEA and Canadian Solar Industries Association (CanSIA) climate action team.The PCWIS report shows that Canada will have the ability to do this while also strengthening its own infrastructure.

Looking to the Future Canada's favourable political environment and the positive conclusions of this new integration research remove two important barriers to expanding wind energy within the country. Considering the nation's extensive wind resources and the amount of new clean energy capacity needed for the country meet its commitments and achieve its vision for a transformed energy economy, wind is bound to play a key role in Canada's clean energy future.

Dr. Jim McCaa has over a decade of experience in the renewable energy space. He is a regular author and speaker at industry and educational conferences, having played a key role in several major integration research efforts around the globe and having personally conducted over 100 wind and solar resource assessments. Dr. McCaa holds a Ph.D. in Atmospheric Sciences from the University of Washington and a B.A. in Mathematics and Physics from Kalamazoo College.

Francesca Davidson is a renewable energy and strategic communications professional with broad industry experience spanning 8 years of work within the clean energy sector. She received her degree from the University of Washington, graduating cum laude in honors English with secondary focuses on architecture, natural sciences, global cultures, and macro-economics.

Never leave a true relation for few faults. Nobody is correct at the end.
AFFECTION is always greater than PERFECTION.

NECA AWARDS FOR 2018

National Energy Conservation Day is celebrated every year on December 14 by Ministry of Power in association with Bureau of Energy Efficiency. In order to recognise the efforts of industry and other establishments towards promoting energy efficiency, on this Day, Ministry of Power organises National Energy Conservation Awards event every year. On this occasion 26 industrial units from various sectors were given awards for their excellent performance in energy efficiency. Altogether 333 units and establishments across the country participated in this year's National Awards Programme and a total saving of 3917 Million units have been reported which is worth Rs. 2000 crores. Further, in order to raise the awareness about energy efficiency and energy conservation, the Ministry of Power also organises National Painting Competition. The prize distribution for the winners of this competition is also organised on this Day. This year, awards for winners for the National Painting Competition have been given to 19 school children. In this Painting Competition approximately 90 lakhs school children from class IV to IX participated from all the States. The final competition was held in Delhi on December 12.

The Ministry of Power, Government of India has launched a scheme in 1991, to give national recognition through awards to industries and establishments that have taken special efforts to reduce energy consumption while maintaining their production. The awards were given away for the first time on December 14, 1991, which was declared as the 'National Energy Conservation Day'. These awards are given by eminent dignitaries holding very high positions in the Government of India in a function organized on 14th December every year.

SL No	List of Award Winners NECA 2018
1	Kapilas Cement Manufacturing Works (Unit of OCL India ltd.), Cuttack, Odisha (I)
2	OCL Bengal Cement works, Paschim Midnapore, West Bengal (II)
3	(1) Heidelberg Cement India Limited Jhansi, Uttar Pradesh (Certificate of Merit) (2) Shree Cement Ltd, Unit - 1 Beawar, Rajasthan (Certificate of Merit)
4	Shriram Alkali and Chemicals, Bharuch, Gujarat (I)
5	Grasim Industries Limited, Chemical division, Rehla, Jharkhand, (II)
6	Grasim Industries Limited, Chemical Division, Nagda, Madhya Pradesh (Certificate of Merit)
7	Ipca Laboratories limited, Ratlam , Madhya Pradesh (I)
8	Nectar Lifesciences Ltd. - Unit-II , Mohali, Punjab (II)
9	Kaira District Co-operative Milk Producers' Union Ltd. Amul Dairy, Anand, Gujarat (I)
10	Balaji Dairy [Unit of Mother Dairy Fruit & Vegetable Pvt. Ltd, Tirupati, Andhra Pradesh (II)]
11	(1) JSW Steel Coated Products Limited, Kalmeshwer, Nagpur, Maharashtra (Certificate of Merit) (2) Kirloskar Ferrous Industries Limited, Koppal, Karnataka (Certificate of Merit)
12	Century Pulp & Paper (A division of Century Textiles & Industries Limited), Nainital, Uttarakhand (I)
13	Orient Paper Mills, Unit – Amlai, Shahdol, Madhya Pradesh (II)
14	(1) JK Paper Limited, Unit: JKPM, Rayagada, Odisha (Certificate of Merit) (2) Bilt Graphic Paper Products Limited (Unit: Ballarpur), Maharashtra (Certificate of Merit)
15	Nilkamal Ltd, Kharadpada Silvassa (I)
16	Jagdamba Polymers Pvt. Ltd Balasore, Odisha (II)
17	Raychem RPG Pvt Ltd Palghar, Maharashtra (Certificate of Merit)
18	Electrotherm (India) Ltd., Kutch, Gujarat (II)
19	JK Tyre & Industries Ltd., Vikrant Tyre Plant,Mysuru, Karnataka (I)
20	Balkrishna Industries Limited, (Chopanki) Bhiwadi, Rajasthan (II)

21	Vidisha Railway Station, Bhopal Division, West Central Railway (I)
22	Jamnagar Railway Station, Western Railway, Rajkot (II)
23	(Certificate of Merit)-1- • Dwarka Railway Station, Rajkot Division, Western Railway • Rajkot Railway Station, Rajkot Division, Western Railway (Certificate of Merit)-2 – • Surendranagar Railway Station, Rajkot Division, Western Railway, (Certificate of Merit)-3 • Hyderabad Railway Station, Secunderabad Division, South Central Railway (Certificate of Merit)-4 • Nizamabad Railway Station, Hyderabad Division, South Central Railway (Certificate of Merit)-5 • Guwahati Railway Station, Timsukhia Division, Northeast Frontier Railway • Jaipur Railway Station, Jaipur Division, North Western Railway Kazipet Railway Station, Secunderabad Division, South Central Railway
24	Lal Bahadur Shastri International Airport, Varanasi, Uttar Pradesh (Certificate of Merit)
25	Divisional Railway Hospital, North Eastern Railway, Izatnagar, Bareilly, Uttar Pradesh (I)
26	Divisional Railway Hospital, Rajkot, Gujarat (II)
27	(1) Divisional Railway Hospital, Ratlam, Madhya Pradesh (Certificate of Merit) (2) Maharishi Ayurveda Hospital, Shalimar Bagh, Delhi (Certificate of Merit) (3) Sant Parmanand Hospital, Civil Lines, New Delhi (Certificate of Merit)
28	Floatels India Pvt Ltd; (Poovar Island Resorts), Trivandrum, Kerala (I)
29	Crowne Plaza, Adyar Park, Chennai, Tamil Nadu (Certificate of Merit)
30	BSES Yamuna Power Ltd, Karkardooma, Delhi (I)
31	Dakshin Gujarat Vij Company Limited, Surat, Gujarat (II)
32	(1) BSES Rajdhani Power Ltd., Nehru Place, New Delhi (Certificate of Merit) (2) Southern Power Distribution Company Limited, Tirupathi, Andhra Pradesh (Certificate of Merit)
33	Energy Management Centre, Kerala (I)
34	Andhra Pradesh State Energy Conservation Mission (APSECM) (II)
35	Arunachal Pradesh Energy Development Agency (APEDA) (Certificate of Merit)
36	Passenger Reservation System Complex building (PRS/SC), Secunderabad, Telangana (I)
37	Rail Soudha, Zonal HQ's Office Building South Western Railway, Hubballi, Karnataka (II)
38	(1) Rail Nilayam (General Manager/SCR Office), Secunderabad, Telangana (Certificate of Merit) (2) Hyderabad Bhavan (Divisional Railway Manager/Hyderabad Office), Secunderabad, Telangana (Certificate of Merit)
39	Air Conditioners (Fixed Speed & Variable Speed AC) **Model No:** 4011238, **Voltas Ltd.**
40	Ceiling Fans **Model No:** EE50**, Crompton Greaves Consumer Electricals Ltd.**
41	Refrigerator (Direct Cool Refrigerator & FrostFree Refrigerator) **Model No**: RD EDGE PRO 190 CT INV 5.2*, **Godrej**
42	Storage Water Heater **Model No**: RACOLD ESWH-25V, **Ariston Thermo India Pvt. Ltd. (Racold)**
43	Pumps(Monoset, Open well, Submersible Pumps) **Model No**: CRI4R-5/07, **C.R.I Pumps Pvt. Ltd.**

BAMBOO: NATURE'S FORGOTTEN SOLUTION FOR GREEN INDUSTRY

Sometimes, the best technology isn't a technology at all. Bamboo,the fast-growing grass plant, common to Africa, Asia and South America, is a natural, renewable and low-carbon material with the tensile strength of steel, and a huge amount of potential for greening infrastructure.

Bamboo drainage pipes: the underground infrastructure of the future?
Image: Engineering Research centre for Bamboo Winding Composites

As available, scalable solutions go, bamboo is a forgotten solution. There are over 30 million hectares of bamboo across the world, and more is being planted every year: As a way to restore degraded land, and as a vital means of income for millions of people across the world.

The 44-member states who make up the International Bamboo and Rattan Organisation (INBAR) have national plans to restore an area of more than 5.5 million hectares of poor quality soil by 2020, using bamboo. When other countries in the world are taken into account, the figure may be much higher.

There is more research every year to support the vast potential of bamboo as a carbon sink. Like all plants, bamboo stores carbon. However, because it grows particularly fast—some species grow up to 90cm a day—and matures within a few years, it can be harvested regularly.

This means bamboo can create a large number of durable products which store carbon over several years, in addition to the carbon stored in the plant itself. Recent research shows that over a period of 30 years, one hectare of bamboo plants and products can sequester up to 600 tonnes carbon—more than certain species of tree.

These durable products are important, because they are the secret to bamboo's success. They include flooring, furniture and 'flatpack' housing, as a young designer, who recently won a prestigious architecture prize with his 'four hour' bamboo house design, showed.

And in China, bamboo is being used to build storm-drainage pipes, utility poles, street lights, wind turbine blades and shock-resistant exteriors for bullet-train carriages, prompting The Economist to predict last year that China's bamboo sector is "about to shoot up."

With a tensile strength greater than that of mild steel, and an ability to withstand compression twice as well as concrete, bamboo products can provide a low- or even negative-carbon alternative to materials like PVC, concrete, plastic and steel.

Replacing traditional materials with bamboo could be an important way to 'green' emissions-intensive infrastructure initiatives, and the plant is gaining traction at high levels. At the recent United Nations climate conference in Katowice, Poland, China's Special Climate Change representative, Xie Zhenhua, said that the plant "can provide valuable opportunities for the green development of developing countries along the Belt and Road."

And at the high-level Forum on China-Africa Cooperation, held in Beijing this year, all heads of state agreed to an action plan which mentioned the need for "innovative development of bamboo and rattan industries", citing its potential for poverty alleviation and sustainable economic growth.

At the same time, in Ecuador, bamboo housing has been officially endorsed by the government as a suitable construction material, and was approved for use in the country's 'Housing for All' scheme, which aims to build 325,000 homes by 2021.

If bamboo is such a supergrass, why is it not in use more widely? At INBAR, we recognise a number of obstacles. Lack of information—about the spread of local bamboo resources, and their uses—is a key factor, at the level of both smallholders and policymakers. Speaking at a conference of the UN Convention to Combat Desertification, Paola Agostini of the World Bank summarised the problem: "I am convinced about bamboo, but we still have a way to go to convince many others."

The solution to lack of awareness lies not only in advocacy—by representing bamboo in international fora, such as UN events—but also in the provision of information and training to people in different sectors.

The International Standardisation Organisation is commissioning more research into standards for bamboo products and housing, to enable more rigorous testing and guidelines for designers and architects. On a national level, more countries could follow the example of Ecuador, which recently published a technical guide for farmers regarding the sustainable management of bamboo plantations.

Cost is another critical issue. As in many nascent industries, a number of products in the bamboo sector are not yet cheap enough to compete with well-established materials. The 'transition cost' of swapping resources, and sourcing new suppliers, is an additional barrier.

Strong government support is needed to incentivise the take-up bamboo. The Philippines' presidential Executive Order, signed in 2010, makes a good start, by "directing the use of bamboo for at least 25 per cent of public school desk and other furniture requirements."

The benefits of such support can be seen in China, where strategic subsidies since the 1980s and a keen desire by some businesses to stop relying on timber imports—has created an industry valued at $30 billion.

On a tour of her factory last year, Vikida Yu, vice-president of Fujian-based HeQiChang Bamboo Products, talked about the perception change which has happened in her lifetime. "At school, I actually preferred wood. You just saw it more frequently. We didn't know much about bamboo."

Her company used wood to make shipping floor containers for all of its products, but the requirements and increasing costs of importing from abroad prompted Yu and her team to explore other options.

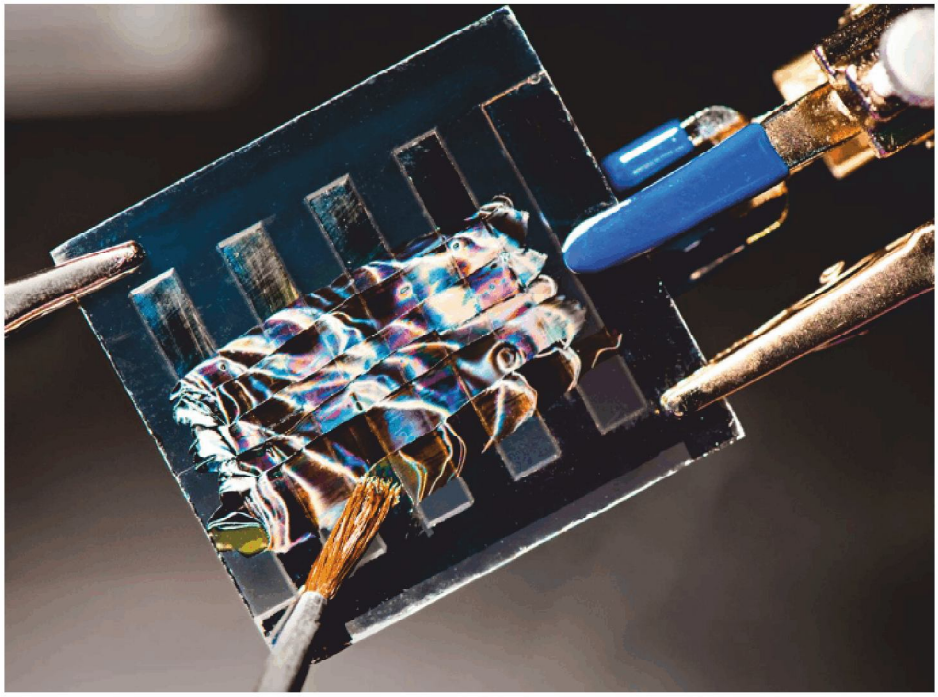
Now, the company is making 4 million containers' worth of bamboo shipping container flooring a year, all of which is locally sourced, and much of which is eventually bought by the shipping behemoth Maersk. "These days, in China we see that bamboo can make so many things. It exceeds expectations. It's just changed our lives."

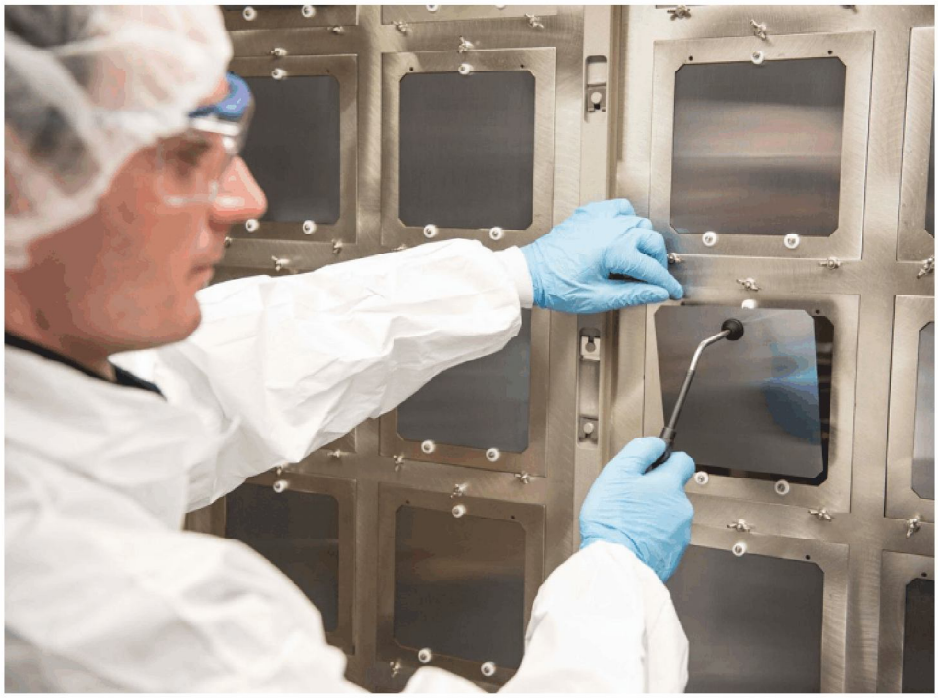
The role of bamboo construction has never been more important. Approximately 70 per cent of global greenhouse gas emissions come from infrastructure construction and operations such as power plants, buildings, and transport. Future development risks locking the world into a high-carbon pathway for hundreds of years.

As bamboos grow throughout the tropics in Africa, Asia and the Americas, it could provide a natural, renewable material for infrastructure in developing countries.

USE BAMBOO – GO GREEN

POWER FROM COMMERCIAL PEROVSKITE SOLAR CELLS IS COMING SOON





At a factory on the outskirts of Brandenburg en der Havel, Germany, bunny-suited technicians are manufacturing the future. The shiny, thin squares they're assembling into flat modules promise to outperform the best solar panels on the market.

The pilot factory is owned by Oxford PV—a spinout from the University of Oxford, in England—which since 2012 has worked on commercializing solar cells made from a type of crystal known as a perovskite. The first perovskite solar cells were announced just 10 years ago, by the research team of Tsutomu Miyasaka at Toin University, in Yokohama, Japan. But those early lab prototypes were incredibly unstable and had an efficiency of just 3.8 percent.

Since then, researchers and manufacturers have made steep gains in efficiency, and they've also addressed the devices' stability and scalability. In December, for example, Oxford PV posted its latest efficiency milestone of 28 percent. By contrast, the current record for silicon PV is 26.7 percent, and commercial silicon panels are far less efficient.

Now the company is getting ready to introduce the world's first commercial tandem silicon-perovskite solar modules, which combine a thin-film layer of perovskite material with a silicon solar device. The solar modules look and behave very much like traditional silicon solar panels, says Chris Case, Oxford PV's chief technology officer. The main difference is that they produce more power. What makes these developments so remarkable is that just seven years ago, the perovskite solar industry didn't even exist. Now, dozens of firms are vying to bring the technology to market. And hundreds of researchers worldwide are studying new perovskite materials and processing methods and refining their understanding of how the devices work. At press time, the number of academic papers on perovskites was on track to top

5,000 for 2018, Case says (although that number also includes reports on perovskites as photodetectors, X-ray detectors, and LEDs).

And in just 10 years, perovskites have gone from fussy, low-efficiency experimental devices to commercial-grade products that meet or exceed the performance of conventional solar cells. No other solar PV technology—not OLEDs, dye-sensitized or quantum-dot solar cells—compares.

"We're at a disruption point in history," Case says. "Right now, in most places in the world, solar PV without subsidies is cheaper than any other form of electrical generation." Perovskites will ensure solar power's conquest, he says.

What makes perovskites so attractive is that the materials are much better than silicon at converting photons into electricity.

"One of my colleagues likes to say that if you were looking for the ideal material for solar, you would never pick silicon," says Joseph Berry, who leads the perovskite solar team at the National Renewable Energy Laboratory (NREL), in Golden, Colo. "The reason [silicon] has become such a dominant material has everything to do with the total R&D dollars that have been spent on silicon," for integrated circuits as well as solar.

"Silicon has to be pure and perfect to have the characteristics we covet," Berry says. "Perovskites are defect tolerant. We can handle the material poorly and still get a competitive device efficiency." Perovskites also lend themselves to a variety of low-cost production methods, including spin coating and roll-to-roll printing. NREL researchers have even developed a perovskite ink that can be painted on.

Berry predicts that constructing a gigawatt-scale factory for perovskite solar modules will eventually cost about a tenth of what it now costs to build a comparable silicon solar panel factory. The end product can be flexible and nearly transparent, so experts envision using them as window glazing and as spray-on coatings for buildings.

Perovskite originally referred to a mineral containing calcium, titanium, and oxygen, first discovered in 1839. The word has since come to encompass a large class of compounds that have the same crystal structure as the mineral. Their chemical composition is described by the shorthand AMX3, where A is typically an organic molecule, M is a metal (such as lead or tin), and X is a halogen (such as iodine or chlorine). Miyasaka's group, at Toin University, used the compound methyl ammonium lead triiodide for its first perovskite cell. But there are hundreds of thousands of compounds that can form that crystal structure, according to Oxford PV's Case.

Regardless of the chemistry, any perovskite solar cell has to meet three basic criteria for commercialization: stability, efficiency, and scalability. Case says his company has addressed all three by combining thin films of silicon and a perovskite into one "tandem" cell that can be produced using the same manufacturing methods used for today's solar panels.

Back in 2012, when the company began working on perovskites, Oxford PV targeted pure-perovskite products that could be coated on glass and used as windows and other components of buildings. "That's still a great idea, but we realized that the path to commercialization could be 5 to 10 years," Case says. "We're focused on delivering on a shorter horizon."

When sunlight enters Oxford PV's tandem cell, photons pass through a transparent electrode layer and then hit the perovskite layer, which absorbs at shorter wavelengths than silicon does, toward the blue end of the spectrum. The photons that aren't absorbed then pass through a thin junction layer and encounter the silicon layer, which absorbs at somewhat longer wavelengths. The net result is that more of the available light is absorbed by the cell.

"To make a tandem cell that's 26 or even 30 percent efficient, you only need a perovskite layer that's in the range of 15 to 17 percent, plus a normal silicon layer that's 20 percent efficient," Case explains.

Oxford PV is far from alone in pursuing tandem perovskites. Other players include Toshiba and Panasonic in Japan and the Stanford spin-off Tandem PV. Meanwhile, a number of companies continue to bet on pure-perovskite solar cells: Poland's Saule Technologies, China's Wonder Solar and Microquanta Semiconductor, and the U.S. startup Energy Materials Corp. (EMC).

EMC didn't set out to be a perovskite solar company. "Initially, we were based in Atlanta, developing something called optical antennas, which are a different way to convert light into electricity," says EMC cofounder and

CEO Stephan DeLuca. About three years ago, he says, "we realized that the path to commercialization was going to be long." At that point, EMC switched to solar perovskites.

The startup's focus is on commercializing roll-to-roll processing for its perovskite cells. "If you want to make these things low cost to compete with silicon, you have to do it fast," DeLuca says. "Our target is to use a 1.5-meter-wide roll running at 50 meters a minute. That's the kind of speed you need to scale up."

Using vacuum deposition, as Oxford PV and other companies are doing, means "you need to cook the film for half an hour, so scaling up is more challenging," DeLuca claims. Building a perovskite solar factory based on roll-to-roll processing should be significantly cheaper than one based on traditional silicon technology, he adds. Couple of years ago, EMC relocated to Rochester, N.Y., to take advantage of the contract manufacturing facilities offered by Eastman Kodak. At present, EMC's devices have five layers, which the roll-to-roll machine lays out in one pass.

EMC's perovskite cells are based on a device architecture developed by Jinsong Huang and his team at the University of North Carolina at Chapel Hill. "Most people in this field use what's called a NIP structure," Huang says, referring to a device in which a layer of negatively doped (or n-type) material sits on top, with a layer of undoped "intrinsic" material in the middle and positively doped (or p-type) material at the bottom. One downside to NIP structures is that they require manufacturing temperatures of about 200 °C, which adds to their cost and limits the methods that can be used to make them.

EMC's devices are PIN structures, with p-type material on top. "We find they work much better and can be fabricated using room-temperature processes," including roll-to-roll printing. "It's definitely the fastest approach you can think of," Huang says. "There are already so many providers to make things like polymer thin films. You don't have to reinvent every piece of equipment."

Despite the enormous gains and intense activity, though, some solar researchers remain skeptical about the potential of perovskites. In a recent interview for PV Magazine, the Australian solar pioneer Martin Green noted that "there are all kind of instabilities that must be addressed," including sensitivity to moisture, oxygen, and even light.

"It is very hard to see a silicon manufacturer adopting a product that is more efficient but doesn't have the same stability as its baseline product—because no manufacturer wants to get a bad reputation regarding stability; in fact, it could be fatal," Green was quoted as saying.

EMC's DeLuca says that not all perovskites have that flaw. "The reporting of instabilities in certain perovskite formulations and device stacks has been important to the understanding of the materials but has also resulted in a misconception that perovskites as a class of materials all act the same—that is, they are all unstable," says DeLuca. The misconception may spring in part from the fact that methyl ammonium lead triiodide, which is still widely used by academic researchers, is one of the unstable compounds. "The right choice of the perovskite material and the other layers making up the device stack yields stable devices."

Case says that Oxford PV's cells have been engineered to be stable and have passed every major accelerated lifetime test used for standard PV modules. The company will field the first modules in 2019, and it's working with an as-yet-unnamed "major manufacturer of silicon solar cells and modules."

In September, the company launched a £5 million (US $6.4 million) five-year joint research program with the University of Oxford aimed at reaching 37 percent efficiency. If the program succeeds, the result will be solar modules with nearly twice the power-converting ability of today's commodity panels. And even if Oxford PV doesn't hit that mark, another company probably will.

For his part, NREL's Berry says it's important not to rush the technology by bringing products to market that haven't been fully vetted.

"When we started, I wasn't a true believer," Berry says. "I was of the opinion that if there's a fatal flaw, let's kill it and move on. Four years in, I think there is a real opportunity for this technology to change the world. That's not an opportunity you get every day, and you certainly don't want to mess it up."

Difficulties in your life do not come to destroy you.
But help you to realize your hidden potential and power.

ECO NIWAS SAMHITA 2018 - AN ENERGY CONSERVATION BUILDING CODE FOR RESIDENTIAL BUILDINGS LAUNCHED

Implementation of this Code expected to save 125 Billion Units of electricity per year by 2030, which is equivalent to 100 million ton of CO_2 emission 26 industrial units get National Energy Conservation Awards for excellent performance in energy efficiency; 19 school children win National Painting Competition prizes

Giving a further fillip to India's energy conservation efforts, Ministry of Power has launched the ECO Niwas Samhita 2018, an Energy Conservation Building Code for Residential Buildings (ECBC-R).The Code was launched on the occasion of National Energy Conservation Day 2018 in the presence of Chief Guest Smt. Sumitra Mahajan, Hon'ble Speaker, Lok Sabha and Shri R.K. Singh, Minister of State (IC) for Power and New & Renewable Energy here, today.

The implementation of this Code is will give a fillip to energy efficiency in residential sector. It aims to benefit the occupants and the environment by promoting energy efficiency in design and construction of homes, apartments and townships. This Code has been prepared after extensive consultations with all stakeholders, consisting of architects & experts including building material suppliers and developers. The parameters listed in the Code have been developed based on large number of parameters using climate and energy related data. Initially, Part-I of the Code has been launched which prescribes minimum standards for building envelope designs with the purpose of designing energy efficient residential buildings. **The Code is expected to assist large number of architects and builders who are involved in design and construction of new residential complexes** in different parts of the country. Implementation of this Code will have potential for energy savings to the tune of 125 Billion Units of electricity per year by 2030, which is equivalent to about 100 million ton of Co_2 emission.

ECBC for commercial buildings was already in place and revised and updated version of ECBC for commercial buildings was launched in June 2017. It is estimated that energy demand in the building sector will rise from around 350 billion units in 2018 to approximately 1000 billion units by year 2030.

While launching this ECBC-R, Shri R.K.Singh stated that building sector will have highest growth in energy demand in coming 10-15 years. Government is encouraging all building professionals including architects, builders to generate awareness towards energy conservation while constructing new residential homes.

National Energy Conservation Awards:

National Energy Conservation Day is celebrated every year on 14th December by Ministry of Power in association with Bureau of Energy Efficiency. In order to recognise the efforts of industry and other establishments towards promoting energy efficiency, on this Day, Ministry of Power organizes National Energy Conservation Awards event every year. On this occasion **26 industrial units from various sectors were given awards for their excellent performance in energy efficiency.** Altogether 333 units and establishments across the country participated in this year's National Awards Programme and a total saving of 3917 Million units have been reported which is worth Rs.2000 crores.

Further, in order to raise the awareness about energy efficiency and energy conservation, the Ministry of Power also organises **National Painting Competition**. The prize distribution for the winners of this competition is also organised on this Day. This year, awards for winners for the National Painting Competition have been given to 19 school children. In this Painting Competition approximately 90 lakhs school children from class IV to IX participated from all the States. The final competition was held in Delhi on 12th December 2018.

On this occasion, the Chief Guest Smt. Sumitra Mahajan, Lok Sabha Speaker stated that sustainable development and resource conservation are practised by India for many thousand years. Conservation of energy and use of clean energy resources are the priority area for Government as well as the people of our country.

On the sidelines of NECA function, an exhibition depicting India's journey on the path of energy efficiency and energy conservation, highlighting various initiatives and their current progress towards contribution to country's energy security, was also organised.

About BEE:

BEE is a statutory body under Ministry of Power which is mandated to implement policy and programmes in the area of energy efficiency and conservation. The objective of such initiatives is to reduce energy intensity in our country by optimizing energy demand and reduce emissions of greenhouse gases (GHG) which are responsible for global warming and climate change. India has committed to reduction of 33-35% GHG emission by 2030 as part of the document submitted to UNFCCC.

ALPHABET'S WIND ENERGY KITES TO FLY OFFSHORE

Renewable energy technologies seem to fill every nook and cranny of the earth. Turbines generate power on the seafloor and off coastlines. Solar panels carpet desolate deserts and abandoned wastelands. Volcanic aquifers, mountain streams, and urban sewage systems all help to produce electricity. For Makani, an airborne wind energy company, the next place to tap is roughly 300 meters in the air.

The California startup recently spun out of X—Alphabet's experimental technology lab, or "moon shot factory"—to become an independent business within Google's parent company. Makani is also partnering with Royal Dutch Shell in a bid to launch the startup's high-flying kites where they haven't flown before: offshore.

Starting this year, Makani will begin testing a floating system for one of its kites at the Metcentre, an offshore wind testing facility in southwest Norway. The kite will be tethered to a small spar buoy, which itself will be moored with a synthetic line and a gravity anchor. The goal is to operate where today's floating wind turbines can't go, either because it's too challenging or cost-prohibitive to build supportive platforms.

"Two-thirds of coastal waters globally are too deep for today's wind technology to economically access these resources. This is where we think Makani can help," Fort Felker, the CEO of Makani, said in a blog post published 12 February announcing the partnership.

Makani is one of a few startups seeking to harness the higher-speed, more consistent winds that blow at higher altitudes than conventional turbines can reach. Before joining X in 2013, Makani garnered tens of millions of dollars in support from Google's philanthropic arm and the Advanced Research Projects Agency-Energy at the U.S. Department of Energy. The startup has since scaled its 20-kilowatt proof-of-concept kite into a 600-kilowatt commercial prototype, which engineers are testing at a site in Parker Ranch, Hawaii.

The current prototype features a carbon fiber wing spanning 26 meters, or about the wingspan of a small jet airliner. A tether stretching nearly half a kilometer long connects the kite to a ground station. Prior to flight, the station rotates to position the kite downwind. Engineers then use a flight control system to spin the kite's eight rotors and lift it vertically, like a powerful drone.

Once the kite reaches a height of about 300 meters, it begins gliding in vertical loops, spinning the rotors and driving a permanent magnet motor-generator. Electricity moves down the conductive tether and is transferred onto the grid. Makani says its kites are 90 percent lighter than turbines of a similar power rating, owing to the use of "lightweight electronics and smart software" instead of steel.

As Makani transfers to the craggy coastlines of Norway, engineers will tailor this system for the water. That's where Shell comes in.

The energy giant, which reported $21.4 billion in 2018 profits, has decades of experience operating offshore systems for oil and gas production. It's also investing heavily in alternative fuels, grid systems, and early-stage renewable technologies. In recent weeks, Shell announced it was acquiring Sonnen, a German energy storage company, and the electric-vehicle charging startup Greenlots. With Makani, Shell is a minority shareholder and technical partner, though deal terms remain confidential.

Shell's moves reflect a broader push by oil and gas majors to diversify their energy portfolios. As global transportation networks—cars, trucks, trains, ships—begin to electrify, these behemoth businesses are looking to claim a slice of the future. At the same time, countries and companies worldwide are adopting climate change strategies and pushing to replace fossil fuels with low-carbon technologies.

"Most oil and gas majors are thinking a lot about electricity these days," says Joshua Rhodes, a research associate at the University of Texas at Austin's Energy Institute. "They're in the business of providing energy for mobility." In that context, it makes sense for Shell to partner with a cutting-edge startup like Makani.

Khorana says he's skeptical that the wind energy kites will be able to compete with floating offshore wind farms, even if the buoys can access trickier locales. The high-flying turbines won't likely be able to produce power at a similar or lower cost of electricity than the multigigawatt floating-turbine pilot projects popping up worldwide. It's also still unclear how flying kites will be regulated in offshore environments, he added.

However, airborne wind energy systems could establish a solid niche market in other challenging terrains, such as mountainous areas where it's too cold or dark to use solar panels or too rugged to install wind turbines. "It's impossible to say 'no' to [technologies] like this, because there's always niches they can play in," Khorana says.

ABB SHOWCASES THE WORLD'S MOST ENERGY-LEAN UNINTERRUPTIBLE POWER SUPPLY

The DPA 250 S4 features ABB's decentralized parallel architecture (DPA™), covers the power range 50 to 1,500 kW and is specially designed for critical, high-density computing environments such as small- to medium-sized data centers, commercial buildings, healthcare facilities, railway signaling applications and airports.

One DPA 250 S4 250 kW cabinet can host up to six 50 kW modules for 250 kW N+1 redundant power. Up to six 250 kW frames and up to 30 modules can be paralleled for 1,500 kW of uninterrupted, clean power. Secure ring-bus communication ensures there is no single point of failure in the system.

As well as providing a fully scalable and easily maintained UPS, with unparalleled uptime and energy efficiency, the DPA 250 S4's dual conversion mode ensures power going to the critical load is cleansed of any grid noise or fluctuations. Its transformer-free IGBT (Insulated Gate Bipolar Transistor) converters, which feature three-level topology with interleaving controls, mean that the device is lighter and more energy efficient, with reduced cooling requirements. The DPA 250 S4 delivers a market-leading module efficiency of 97.6 percent and a system efficiency of 97.4 percent, setting the standard for the future of UPS evolution. Power losses are more than 30 percent below those of similar products on the market, which has a direct impact on the total cost of ownership.

Elina Hermunen, ABB UPS Product Management, comments: **"In a world in which skilled labour pools are shrinking, operating margins are tightening and energy efficiency is becoming ever more important, the DPA 250 S4 offers the customer a way to meet these challenges without having to compromise on quality or take the risk that the power to the critical load fails."**

A traditional UPS is very inefficient when the load is low. Under such conditions, ABB's Xtra VFI mode switches the UPS to 'lean-power' operation by optimizing the number of modules used to feed the load. In case of a load step, more modules are instantly switched to online mode. Xtra VFI mode also cycles the active modules to level aging.

Featuring smart and secure power connectors, the DPA 250 S4 modules can be online-swapped, while other UPS modules in the system support the load, which both speeds and simplifies maintenance.

Every DPA 250 S4 UPS module has all the essential functional units needed for independent operation. A primary benefit of the DPA is that it increases system reliability and availability compared to other modular UPS solutions as there is inherent redundancy between the UPS modules on all functional levels. DPA is ideal for organizations seeking zero downtime and low cost of ownership. Because DPA allows modules to be added as power needs grow, there is no need to oversize the original configuration, which reduces initial capital outlay.

The front-facing and top or bottom cable entry allow different installation schemes. Backup power options are flexible and lithium-ion batteries can be accommodated.

ABB has led the way in modular UPS technology and the launch of the DPA 250 S4 sets new standards in reliability and energy efficiency.

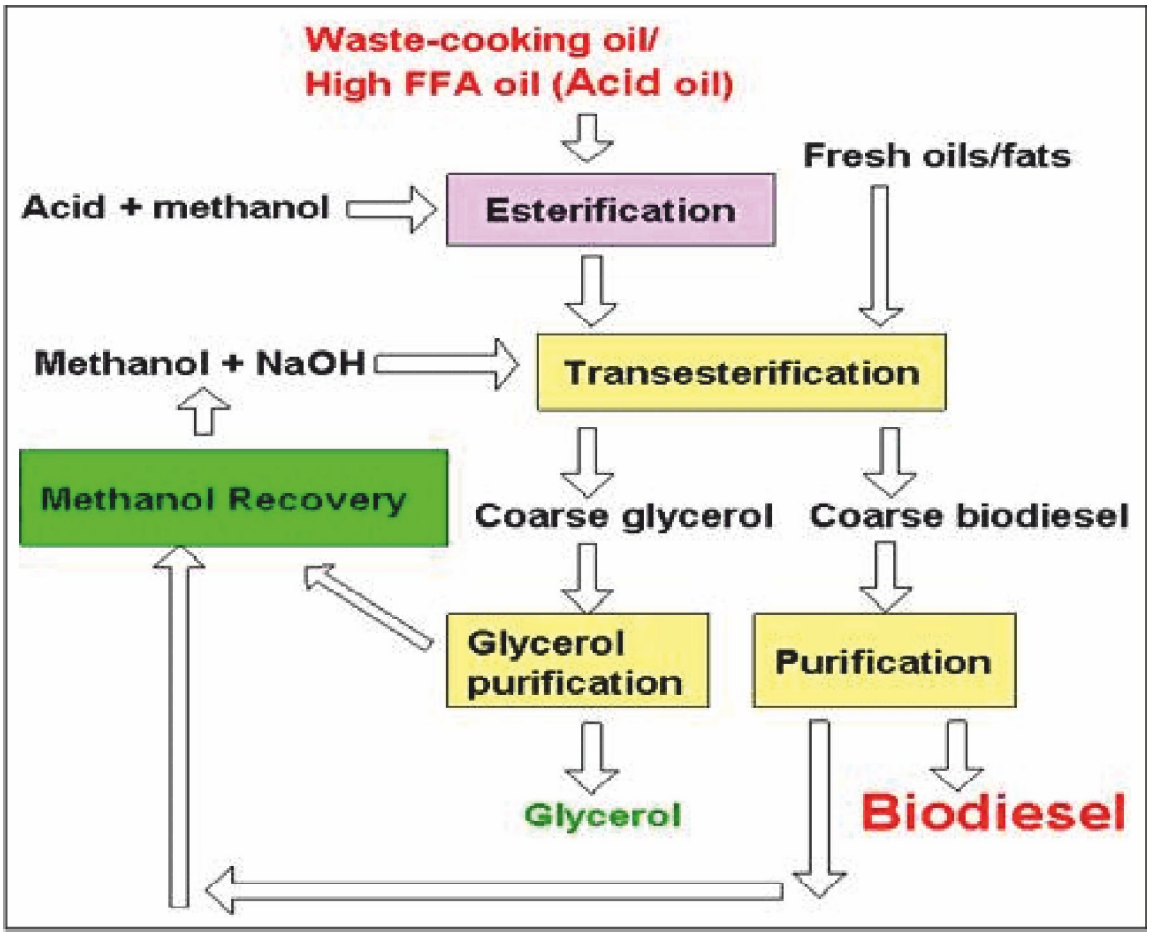
ENERGY, ELECTRICAL ENERGY AND RENEWABLE ENERGY – 18

Sustainable Growth, Sustainable Electrical Energy and Renewable Energy

Biodiesel Technology & Production

The Technology, the designing of the appropriate Process and Building Plants for Bio Diesel Production in India is quite mature and there are Plants Designers and Builders who are able to fine tune the Processes and the feeds of Oils to be converted to Diesel and the Catalysts for getting the best of outputs after detailed analysis of the available oils for the plant, be it Waste or used Cooking Oils or Jatropa or other non edible vegetable oils or wastes from Palm Oil or wastes from other Vegetable oil refineries and so on.

Design and Construction of Biodiesel Production Plant

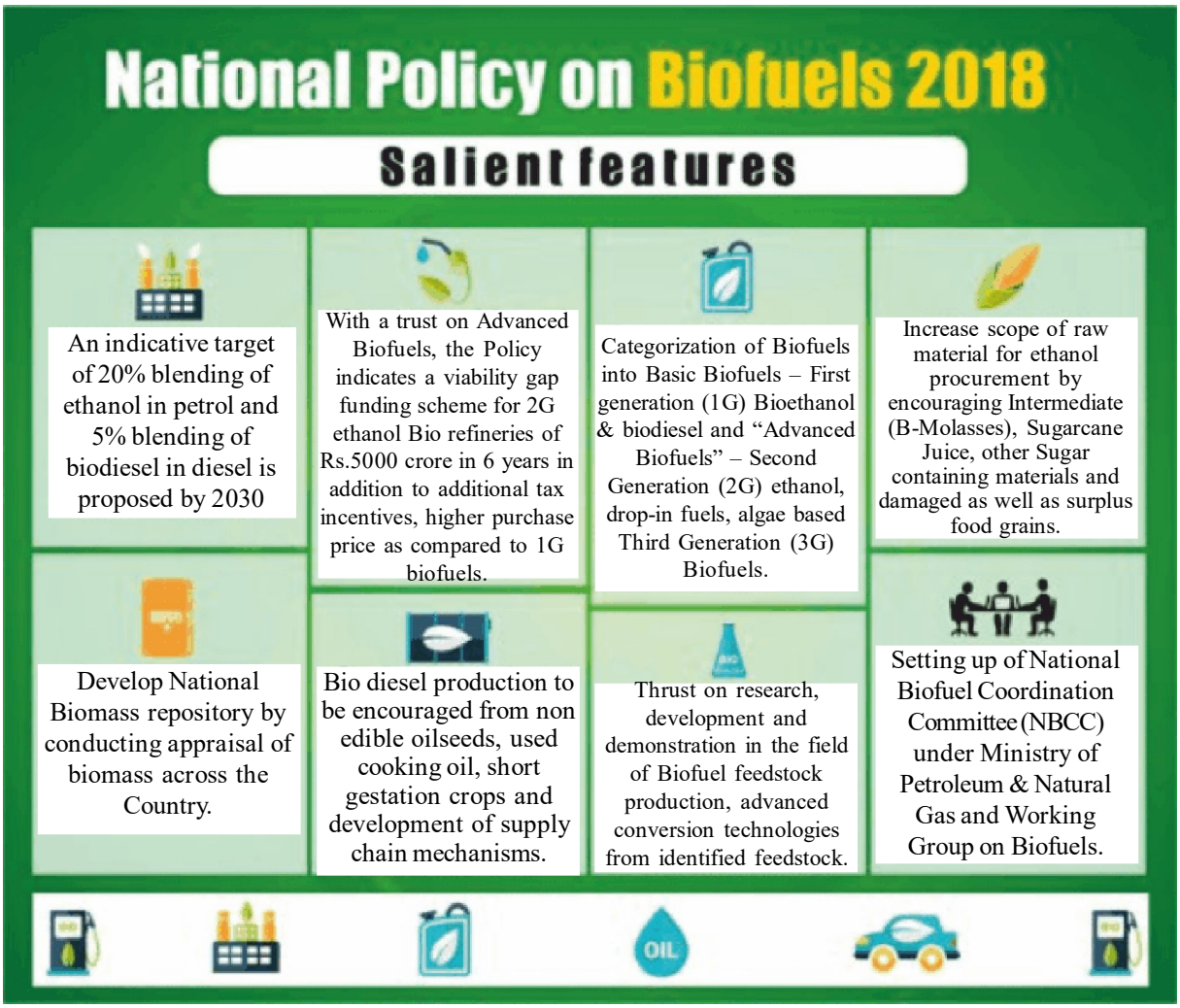


Transesterification is a technology based on chemical reaction of triglycerides with methanol to form methyl esters and glycerin in the presence of an alkaline catalyst. In principle, materials including edible, vegetable oils and animal fat can be transesterified. If the feedstock quality does not meet the specification, pre-treatment and/or esterification are required for the appropriate process.

Transesterification occurs in the mixing section of a two-stage mixer-settler unit, while the subsequent settling section allows the separation of methyl esters lighter and glycerin heavier. After rectification, the surplus methanol in the glycerin-water mixture can be reused in the process (See Figure above).

Before we proceed with some more Technology details pertaining to Bio Diesel Production from Jatropa and Waste Palm oil etc, it will be useful to look at the GOI's Policy on Bio Fuels including Bio Diesel.

The second row second item deals with Bio Diesel as can be seen the problem is really the supply chain and costs of raw materials for the Bio Diesel manufacture.



Bio Diesel from Jatropa

Jatropha curcas L. is a non-food bioenergy, a second-generation biofuel plant that provide a portion of the fuel supply.

Jatrophacurcas L. belongs to the Euphorbiaceae family. *Jatropha*is a multipurpose plant that originated in Central America but can now be found throughout the tropics, including Africa and India. As a second-generation (non-food supply) biofuel crop, it can affordably and sustainably help to provide a portion of the current fuel supply with minimal environmental impact. It is found to be growing in many parts of the country, rugged in nature and can survive with minimum inputs and easy to propagate. A good crop can be obtained with little effort. Depending on soil quality and rainfall, oil can be extracted from the jatropha nuts after two to five years. The annual nut yield ranges from 0.5 to 12 tons. The kernels consist of oil to about 60 percent; this can be transformed into biodiesel fuel through esterification. Then further, process for production of jet-range hydrocarbons from crude Jatropha oil using hydrogen produced in-situ from formic acid which is used for aviation.

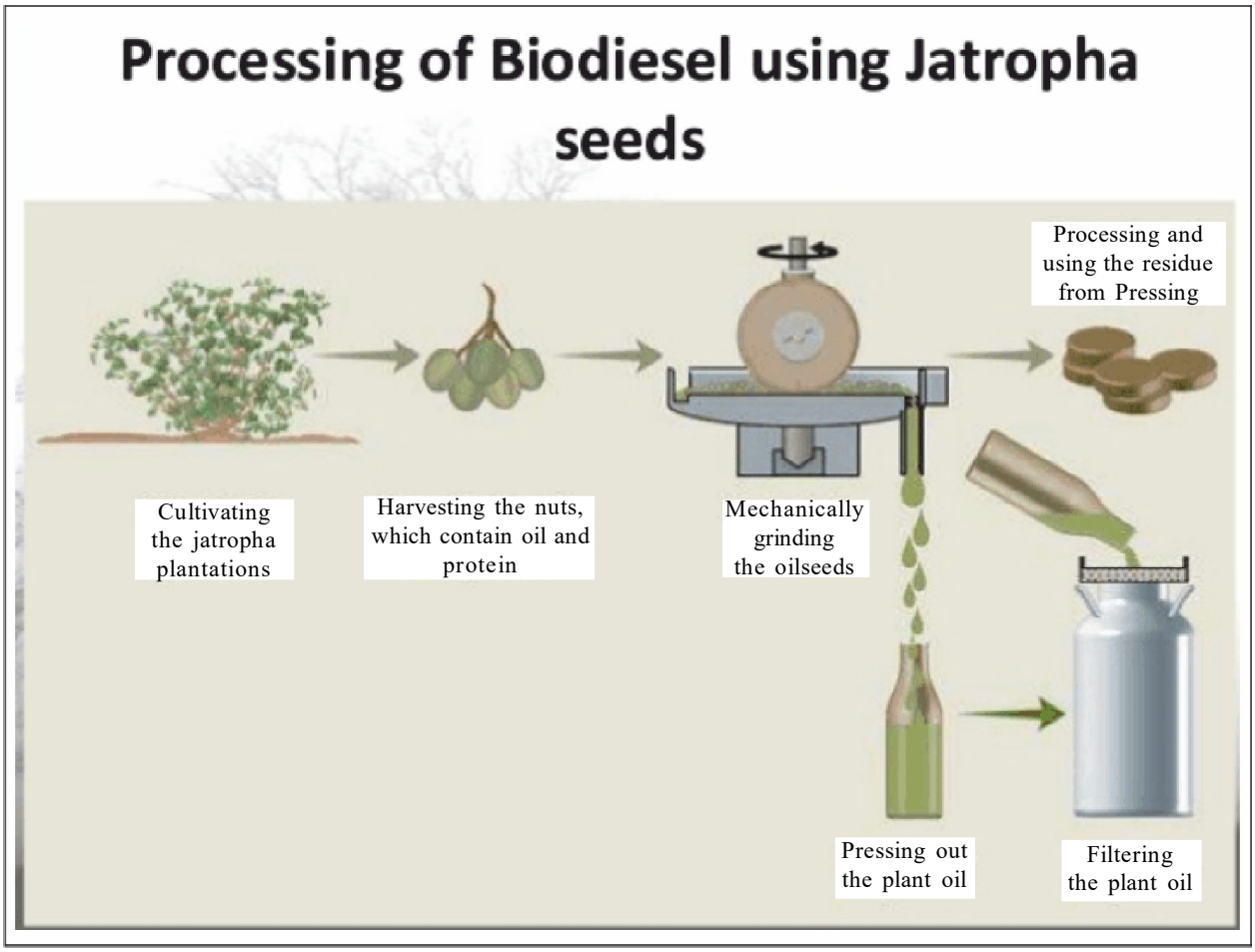
CROP YIELD

It appears very difficult to estimate unequivocally the yield of a plant that is able to grow in very different conditions.

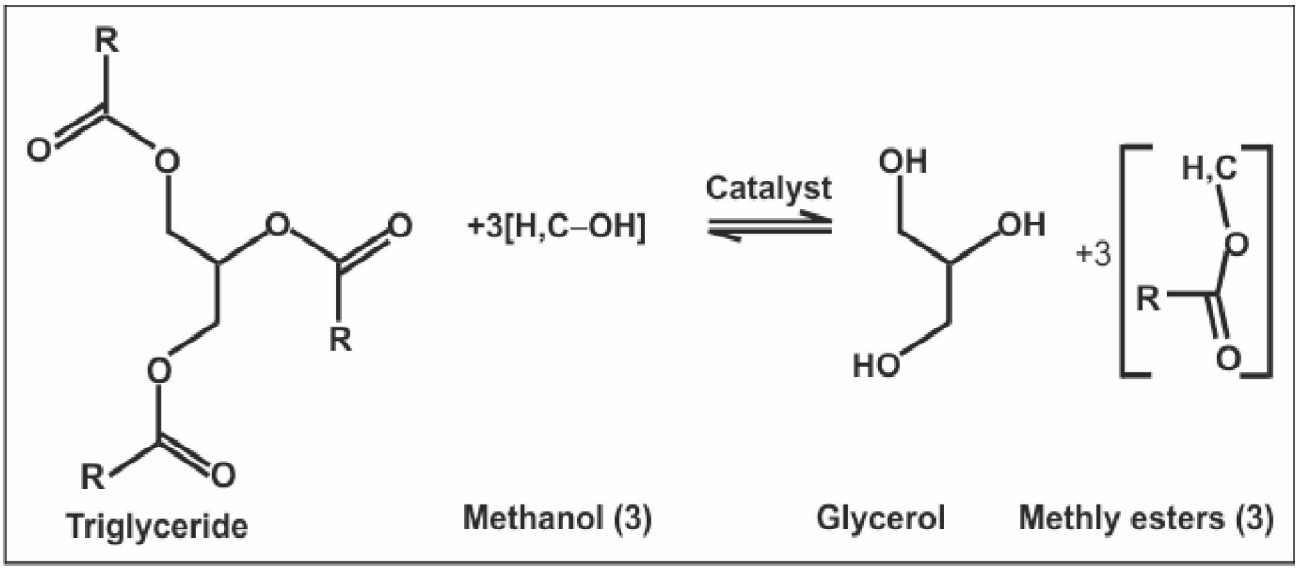
Yield is a function of water, nutrients, heat and the age of the plant and other. Many different methods of establishment, farming and harvesting are possible. Yield can be enhanced with right balance of cost, yield, labour and finally cost per Mt. Seed production ranges from about 2 tons per hectare per year to over 12.5t/ha/year, after five years of growth. Although not clearly specified, this range in production may be attributable to low and high rainfall areas.

There are several forms of biofuel, often manufactured using sedimentation, centrifugation, and filtration. The fats and oils are turned into esters while separating the glycerin. At the end of the process, the glycerin settles and the biofuel floats. The process through which the glycerin is separated from the biodiesel is known as transesterification. Glycerin is another by-product from *Jatropha*oil processing that can add value to the crop. Transesterification is a simple chemical reaction that neutralizes the free fatty acids present in any fatty substances in *Jatropha*.

A chemical exchange takes place between the alkoxy groups of an ester compound by an alcohol. Usually, methanol and ethanol alcohol are used for the purpose. The reaction occurs by the presence of a catalyst, usually sodium hydroxide (NaOH) or caustic soda and potassium hydroxide (KOH), which forms fatty esters (e.g., methyl or ethyl esters), commonly known as biodiesel. It takes approximately 10% of methyl alcohol by weight of the fatty substance to start the transesterification process.



Some of the chemicals that are used in the manufacturing of biodiesels are ethanol or methanol that bring into use methyl esters. Methanol is derived from fossil fuels, and ethanol is derived from plants. In the transesterification stage, the by-product is glycerol, which is approximately 10% of the raw oil by weight. Glycerol yield can be less than 10% of the raw oil, and a greater conversion to glycerol means greater revenue, assuming that the price of the glycerol remains constant. Revenues generated from coproducts like glycerol can reduce the net marginal cost of biodiesel production.



The major debate of growing biofuel crops worldwide is food vs fuel issue which has led to decision of growing non-food source bio-energy crop in degraded land.

If the Jatropha plantation is carried out only in marginal land without any kind of competition with the food crops then it can reduce energy insecurity of the country without affecting food security, rather promotes rural development.

For production of the huge amount of the jatropha oil motivation of the farmers to grows jatropha own their degraded land only and proper credit mechanism needs to be developed by the governments to help small farmers to cultivate and sell crop profitably.

Economic feasibility

The economic feasibility (studied in India) of prepared biodiesel was calculated by calculating the various economics of jatropha plantation, jatropha oil extraction, jatropha ethyl ester production. The cost of oil per kg and production cost per litre was found to be Rs. 25.34 ($0.40 and 28.64 ($0.45), respectively.

Jatropha biodiesel production in the biodiesel processor were developed and started with oil of Jatropha. The cost of production for the processor was around Rs. 5000 ($500) and plant age was considered approximately 10 years. The cost of JEE was estimated as Rs. 28.64 ($0.45) by considering seeds and Jatropha oil cost of Rs. 6/kg ($0.096) and Rs. 26/kg (0.41), respectively. Biodiesel production was found to be affordable and comparable to the existing diesel prices.

The key benefits are:

- Jatropha easy to cultivate, cost effective, can grow on all the climatic conditions and soils.
- The percentage of yield is high and the extraction of oil is also maximum.
- Jatropha provides higher rate of output than any other crops.
- Drought resistant plant.
- Ability to grow well on poor and infertility soil, in marginal areas and can withstand any type of climate.
- Needs only little amount water and maintenance.
- The plant can be harvested for about 50 years.

- High oil content
- Small development period
- Grow in low and high rainfall areas
- Does not require any special maintenance
- Can be harvested in non-rainy season
- Multi products are developed using a single jatropha plant. The products include bio-diesel, soap, mosquito repellent, and organic fertilizer.
- Tests conducted by the EPA have shown that the hydrocarbon emissions of Jatropha biodiesel are roughly half that of fossil diesel, leading to a reduced carbon footprint.

A View of a medium sized Plant

(To be continued)

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

THINK BIG

One Poor boy was looking at a rich man's car.

Rich man took the boy for a ride.

Boy: Your car is great, isn't it expensive?

Man: Yes. My brother gifted it to me.

Boy: Ohh. (Thinking)

Man: What are you thinking? let me guess, you also want to have such car...

Boy: ***No... I want to become like your brother.***

ANIL AGARWAL VEDANTA | *Vedanta* | ENTREPRENEUR

ANIL AGARWAL VEDANTA
VEDANTA

"From A Scrap Metal Dealer In Mumbai To Founder Of One Of The Largest Metals Mining Group In The World In The Space Of Two Decades, His Journey Is Quite Inspiring", Aroon Puri, Editorial, September 10, 2010

Anil Agarwal, an Indian born businessman is the founder and the Executive Chairman of the Vedanta Resources Corporation. His Net Worth (2013) is $3.5 Billion.

He founded the Sterlite Industries in 1976 and in the year 1986 he established Vedanta Resources. Vedanta Group is the first Indian Group that has obtained a listing on the London Stock Exchange, Vedanta Group is the largest producer of zinc and the second largest producer of copper in the world.

Having ranked eighth in 2003, as of March 2012, Agarwal is the 15th richest Indian. Vedanta Resources has a span over four continents with its head office in London. The other offices are in Australia, Zambia and India. In his company he has a share of more than 50% thus aiding him to book a place among the top thirty richest people in Britain. People call him the "Metal King" and "-billionaire philanthropist". He has his mansion in UK where he lives with his wife and two children.

He is a man known for his charity. He has given 510 million Euro to build the Vedanta University in Orissa, India. He is also determined to bring education and nutrition to under- privileged children in the shadow of poverty.

Vedanta has emerged as India's most powerful commodities firm, with interest in non-ferrous metals such as copper, aluminum, zinc and crude oil with a market capitalization of Rs.19,000 crore. Learning from advertsity and moving on, has been a trademark of Anil. His ability to acquire and turn around under-performing companies has helped Vedanta, become the largest contributor to the exchequer and largest employer in five states: Odisha, Rajasthan, Tamil Nadu, Chhattisgarh and Goa.

On India Today's Power list 2013, High and Mighty, Anil has been ranked No.5.

HUMOUR

This is a collection of leave applications written by people in various parts of India.

1. An IT Company, Bangalore: An employee applied for leave as follows: Since I have to go to my village to sell my land along with my wife, please sanction me one-week leave."

2. This is from another IT Co, Bangalore: From an employee who was performing the "mundan" ceremony of his 10 year old son: "As I want to shave my son's head, please leave me for two days.."

3. Another gem Leave-letter from an employee who was performing his daughter's wedding: "as I am marrying my daughter, please grant a week's leave.."

4. From an Eng. Co. Administration dept: "As my mother-in-law has expired and I am only one responsible for it, please grant me 10 days leave."

5. Another Govt. employee applied for half day leave as follows: "Since I've to go to the cremation ground at 10 o-clock and I may not return, please grant me half day casual leave"

6. An incident of a leave letter "I am suffering from fever, please declare one day holiday."

7. A leave letter to the headmaster: "As I am studying in this school I am suffering from headache. I request you to leave me today"

8. Another leave letter written to the headmaster: "As my headache is paining, please grant me leave for the day."

9. Letter written for application of leave: "My wife is suffering from sickness and as I am her only husband at home I may be granted leave".

10. A candidate's job application: "This has reference to your advertisement calling for a ' Typist and an Accountant - Male or Female'... As I am both (!!) for the past several years and I can handle both with good experience, I am applying for the post.

Always remember that your Present situation is not your Final Destination.
The Best is yet to Come.

சர்க்கரை நோயாளிகள் என்ன மாதிரியான பழங்கள் சாப்பிடலாம்!!

பழங்களில் சர்க்கரையளவு அதிகமாக இருக்கும் என்று சொல்லி சர்க்கரை நோயாளிகளை பழம் சாப்பிட விடாமல் தடுத்திருப்போம். சில சமயங்களில் அவர்களே சாப்பிடாமல் இருந்திருப்பார்கள். இது தவறு, சர்க்கரை நோயாளிகள் குறிப்பிட்ட பழங்களை சாப்பிடக்கூடாதே தவிர, பழங்களையே மறந்துவிட வேண்டும் என்பதல்ல. சர்க்கரை நோயாளிகள் சாப்பிடக்கூடிய பழங்களைப் பற்றி இப்போது காணலாம்.

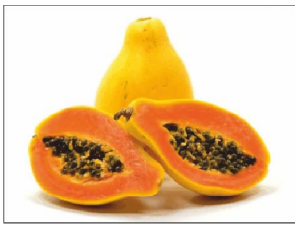
ஆப்பிள்:

இதில் கலோரிகள் குறைவாகத் தான் இருக்கும். அத்துடன் ∴பைபரும் அதிகமாக இருப்பதால் சர்க்கரை நோயாளிகள் தாராளமாக இதனை எடுத்துக் கொள்ளலாம். இப்பழம் வெறும் உங்கள் வயிறை மட்டும் நிரப்பாமல் சர்க்கரையின் அளவு வேறுபடாமலும் இருக்க உதவிடும். ஆப்பிளில் க்யுர்சிட்டின் (Quercetin) மற்றும் பைட்டோ நியூட்டிரியன்ட்ஸ் உள்ளது. இதைச் சாப்பிட்டால் இதய நோய் வருவதற்கான வாய்ப்புகள் குறையும்.

பீச் பழம்:

பீச் என்று ஆங்கிலத்தில் சொல்லப்படுகிற இந்தப் பழத்தில் குறைவான குளூக்கோஸ் தான் இருக்கிறது. அத்துடன் அதில் மினரல்ஸ்களும் விட்டமின்களும் ஆன்ட்டி ஆக்ஸிடண்ட்கள் நிறைந்து இருக்கும். இதனை சர்க்கரை நோயாளிகள் தாராளமாக உண்ணலாம்.

பப்பாளி:



இதில் குறைவான சர்க்கரையும் அதிகப்படியான மினரல்ஸ் மற்றும் விட்டமின்கள் இருக்கின்றன. இன்ஸுலின் சுரப்பையை சீர்ப்படுத்திடும்.

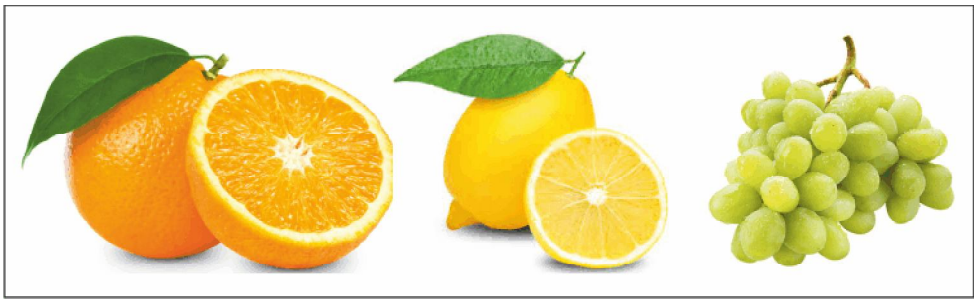
நெல்லி:

இதில் பாலி∴பீனால் அதிகமாக இருக்கின்றன. இது ரத்தத்தில் உள்ள சர்க்கரையளவை மட்டுமல்ல இன்ஸுலின் சுரப்பையும் கட்டுப்படுத்துகிறது. இதனால் ரத்தச் சர்க்கரையளவு குறைக்கவும் செய்யும். சர்க்கரை நோயாளிகள் இதனை தாராளமாக சாப்பிடலாம்.

செர்ரீ:

இதில் நிரம்பியிருக்கும் ஆன்டி ஆக்ஸிடண்ட் மற்றும் ஆந்தோசயனின் ரத்தச் சர்க்கரையளவு சீராக இருக்கும்படி பார்த்துக் கொள்ளும்.

சிட்ரஸ்:



சிட்ரஸ் அமிலம் நிரம்பிய ஆரஞ்ச், எலுமிச்சை. திராட்சை போன்றவற்றை எடுத்துக் கொள்ளலாம். இதில் நிரம்பியிருக்கும் ஆன்ட்டி ஆக்ஸிடண்ட்கள் நம் உடலில் உள்ள கொழுப்பை குறைக்கவும், சர்க்கரையளவை சீராக்கவும் உதவிடும்.

(Courtesy: Pesot, December 2017)

வியப்பூட்டும் இந்தியா – 15

கும்ஹார் மண்பாண்டங்கள்

பரபரப்பான தலைநகர் டெல்லியிலிருந்து ஒரு மணி நேரப் பயணத்தில் அமைந்திருக்கிறது, கும்ஹார் கிராமம். இங்குள்ள மக்களுக்கு மண்பாண்டங்கள் செய்வது தான் தொழில். இந்தக் கிராமத்தில் வசிக்கும் 700 குடும்பங்களும் விதவிதமான கண்கவர் மண்பாண்டங்களைச் செய்து வருகிறார்கள். **இந்தியாவிலேயே மிகப் பெரிய அளவில் மண்பாண்டங்கள் செய்யும் ஒரே இடம் கும்ஹார்தான்!**

40 ஆண்டுகளுக்கு முன் ராஜஸ்தானில் உள்ள அல்வார் என்ற வறண்ட கிராமத்திலிருந்து புலம் பெயர்ந்து வந்தவர்கள் இந்த மக்கள். இப்போது தங்களின் கற்பனைத் திறனாலும் கடின உழைப்பாலும் வெளிநாடுகளுக்கும் மண்பாண்டங்களை ஏற்றுமதி செய்யும் அளவுக்கு உயர்ந்திருக்கிறார்கள்.

பானை செய்வதற்கான களிமண்ணை ஹரியானாவிலிருந்து கொண்டு வருகிறார்கள். மண்பாண்டங்கள் செய்வதற்கான மண்ணைத் தயார் செய்வது பெண்களின் வேலை. சக்கரங்களில் வைத்து உருவங்களைச் செய்வது ஆண்கள் வேலை.

கும்ஹாரில் எல்லோரும் சுறுசுறுப்பாக வேலை செய்து கொண்டிருப்பார்கள். ஒவ்வொரு வீட்டின் முன்பும் களிமண் கொட்டிக் கிடக்கும். மண்ணை உடைத்து சலிக்கிறார்கள். பிறகு தண்ணீர் ஊற்றிப் பிசைந்து.

அதை நாள் முழுவதும் ஊறவைக்கின்றனர். மீண்டும் ஒருமுறை காலால் பிசைகிறார்கள். வெண்ணை போன்று மென்மையாகக் களிமண் மாறும்.

தயார் செய்யப்பட்ட அந்தக் களிமண்ணை சக்கரங்களிலோ அச்சிலோ வார்த்து விதவிதமான மண்பாண்டங்கள் செய்கின்றனர். காய்ந்த பிறகு சூளையில் வைத்து 4 முதல் 5 மணி நேரம் வரை சுடுகின்றனர். பிறகு அவற்றின் மீது அழகான சாயம் பூசுகின்றனர்.

அகல் விளக்கு, தண்ணீர்ப் பானை, அலங்காரங்கக் கிண்ணம், பூந்தொட்டி, பூச்சாடி, சுவரில் தொங்கும் அலங்கார பொருட்கள், தலைவர்களின் சிலைகள் என்று வெவ்வேறு அளவுகளில் செய்கிறார்கள். தீபாவளி பண்டிகையின் போது ஒரு நாளைக்கு 3000 – 4000 அகல் விளக்குகள் தயாரிக்கின்றனர். இந்தியர்கள் அதிகம் வாழும் நாடுகளான கனடா, இலங்கை, இங்கிலாந்து, மலேசியா, சிங்கப்பூர். ஆஸ்திரேலியா போன்ற நாடுகளுக்கு இவற்றை அனுப்புகின்றனர்.

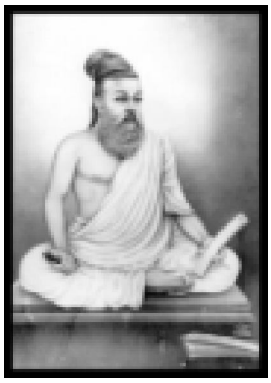
இந்த மக்களின் வீடுகளும் மண்ணால் தான் கட்டப்பட்டுள்ளன. உடைந்த பானைகளை அடுக்கி, மண் சேற்றால் பூசி. சுவர்களாக்கி வீடு கட்டுகின்றனர். வெளியிலிருக்கும் வெப்பத்தைவிட, வீட்டுக்குள் வெப்பம் குறைவாக உள்ளது.

சுற்றுலாப் பயணிகள் இவர்களிடம் உரையாடலாம். பானை செய்யக் கற்றுக்கொள்ளலாம். மிகச் சிறந்த அனுபவத்தையும் மகிழ்ச்சியையும் கொடுக்கிறது கும்ஹார்.

தொடர்புக்கு: ஆம்பூர் மங்கையர்கரசி, mangai.teach@gmail.com

Courtesy: தி இந்து, தேதி: 17.01.2018

TIRUKKURAL AND FAIR AND ETHICAL MANAGEMENT - 2



Let us look at SQ in more details which broadly revolves around Values, Ethics, Fairness, Win – Win approach and many more such, and most importantly, the Manager or the Leader must have a clear and stable mind dealing with the above. EQUANIMITY is considered to be one of the important dimensions of SQ and let us see more about it.

"With equanimity, what passes through your mind is held with spaciousness so you state even killed and aren't thrown off balance. The ancient circuitry of the brain is continually driving you to react one way or another—and equanimity is your circuit breaker. Equanimity breaks the chain of suffering by separating the feeling tones of experience from the machinery of craving, neutralizing your reactions to those feeling tones."

Equanimity, in simple terms is to maintain total balance, both at times of successes and problems. Let us look at 2 Kurals that deal with the need of balance all the time and it is the focus and unstinted efforts and Leadership that can enable a person to go through the both at times of success and problems.

Atremenru Allar Patupavo Petremendru Oombuthal Thetra Thavar ***Kural 626***

அற்றேமென்று அல்லற் படுபவோ பெற்றேமென்று ஓம்புதல் தேற்றா தவர். குறள் 626

"The men that exult not at good fortune; can they ever have to fret themselves saying – Alas we are ruined"

Poriyenmai Yaarkkum Pazhianru Arivarinthu Aalvinai Inmai Pazhi ***Kural 618***

பொறியின்மை யார்க்கும் பழியன்று அறிவறிந்து ஆள்வினை இன்மை பழி. குறள் 618

"It is no shame if fortune faileth a man; but it is a disgrace if he abstains deliberately from (providing leadership and direct and ensure) exertion"

(To be continued)

HOME FESTIVALS - 4

சித்திரை - Chitrai (April/May)

This month begins with the completion of Ram Navami, the nine days of celebration of Lord Rama's birth ages ago, which started in the previous month. At the upper left we see a decorated picture of Lord Rama's coronation. Next (Proceeding clock wise) comes a Vaisnava priest telling the stories of Lord Rama's birth and life; behind him are great parts of *paanagan,* a delicious drink of sugar and ginger, and a basket of *sundal*, spiced chickpeas, served to the storyteller's guests, who also receive palm fans, as this is the hot season. Tamil New Year often falls on April 14 (as does the New Year of several other communities). The lady at upper right is shown with the new clothes and jewellery which are part of the celebration, as well as bananas, mangoes and the ingredients for *vepon pu pachadi*, a combination of bitter neem blossoms, sugar and mango – a reminder to face the unpleasant in life with a sweet smile. At lower left is the marriage of Siva and Parvati, Meenakshi Kalyanam, with brother Vishnu pouring the sacred ganga water on the earth joined hands. At lower right is the dark form of Yama, Lord of Death, who figures in three stories associated with this month; that of Savitri, who won her husband back from Yama in a battle of wits; Nachiketas, the boy who extracted three boons from Him and Markandeya, who won eternal youth from Lord Yama through the worship of the Sivalinga. ***(To be continued)***

FIRST ELECTRIC VOLVO TRUCKS DELIVERED TO CUSTOMERS

Volvo Trucks delivered its first all-electric vehicles on 19 February: a refuse truck to waste and recycling company Renova, and a distribution truck to the logistics company DB Schenker and partner haulier TGM, operating in Sweden.

The Volvo FL Electric trucks are part of a pre-series developed in collaboration with selected customers. Series production of the Volvo FL Electric (earlier post) and its powerful sibling, the Volvo FE Electric (earlier post), will commence with a limited number of trucks for the European markets in the second half of 2019.

The absence of motor noise and exhaust emissions contributes to better working conditions for the drivers and a quieter, cleaner urban environment. The drivers who will operate the electric trucks have had the opportunity to test-drive them prior to delivery, as part of the operator training.

In December 2018, Volvo Trucks announced that its upgraded D11 and D13 diesel engines for Volvo FH, FM and FMX meet the new Euro 6 Step D regulation and contain a number of improvements that enable transport operators to reduce fuel costs.

The Volvo FL Electric and Volvo FE Electric trucks are developed for distribution, refuse handling and other urban transport applications. The Volvo FL Electric has capacity for a GVW (gross vehicle weight) of 16 tonnes, while the Volvo FE Electric has capacity for a GVW of 27 tonnes.

What are their application areas, how are they engineered, what is their performance like? Anna Thordйn, Product Manager, Electromobility at Volvo Trucks has the answers.

For which application areas are the electric trucks intended?

Both trucks are primarily intended for transport operations in urban conditions, such as distribution and refuse collection.

How do the two models differ from one another?

The Volvo FL Electric is a nimble and light truck designed for gross weights of up to 16 tonnes, while the Volvo FE Electric has a more robust design engineered for heavier operations, with gross weights of up to 27 tonnes. The Volvo FE Electric is also available with a Low Entry Cab that makes getting in and out more convenient and also increasing traffic safety by higher visibility, making it easier to keep an eye on other road users.

What driveline do you use?

For the Volvo FL Electric we have chosen an electric motor with a maximum power rating of 130 kW. The Volvo FE Electric has dual electric motors for a maximum power rating of 370 kW and continuous power output of 260 kW. Transmission to the driven wheels is via our two-speed gearbox, propshaft and rear axle.

How much energy do the trucks store on board?

The battery capacity and battery packaging is flexible in order to always optimise and suit customers individual transport needs. Both trucks have up to 300 kWh capacity, which is more than sufficient for a demanding day's work in urban conditions.

How often must the batteries be recharged, and how long does this take?

That all depends on in which transport application the truck is used, and which type of charging system you choose. Discharged batteries can either be fully charged with up to 150 kW direct current (DC) via CCS2 in one to two hours, or with 22 kW alternating current (AC) from the mains grid in about ten hours. In practice however the charging time is shorter since the batteries are never completely discharged.

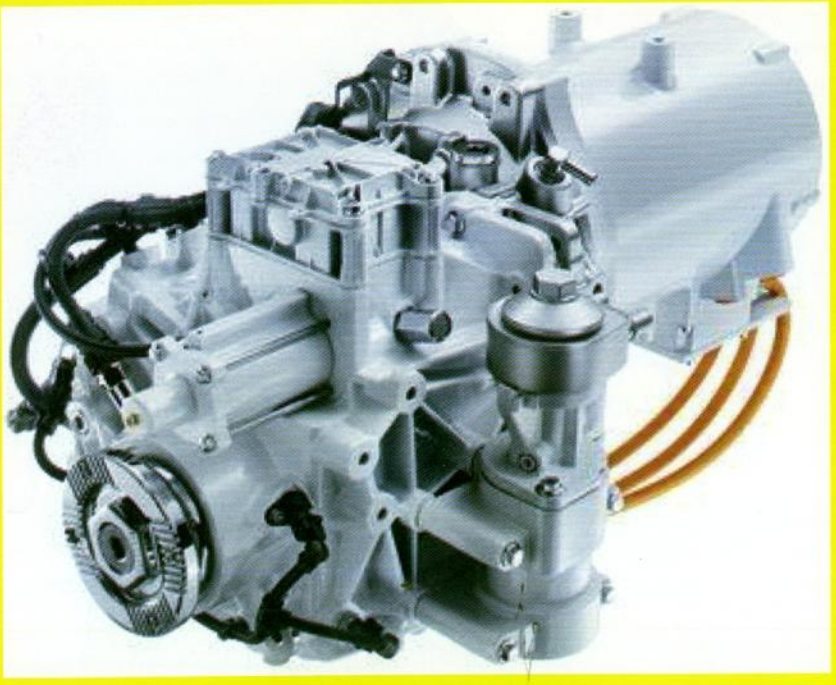
What's it like to drive the electric trucks compared with today's Volvo FL and Volvo FE?

There's a big difference between the two driveline technologies. Low-frequency engine noise and vibrations are totally absent, as are exhaust gases. Electric power also offers rapid and linear acceleration since the electric motor delivers full torque from start. The Volvo FE Electric also has power shift functionality which delivers particularly smooth gear changes.

What payload can we expect?

In round figures an electric truck with four batteries carries about one tonne less payload than its diesel-driven counterpart. But it all comes down to the application. The Volvo FL Electric trucks that will operate in Gothenburg, for instance, have just three batteries since battery capacity has been optimised to maximise payload on the particular routes where the trucks will operate.

FIRST ELECTRIC VOLVO TRUCKS DELIVERED TO CUSTOMERS



ANNUAL GENERAL BODY MEETING - PHOTOS

President Addressing the AGM

Unprecedented Turnout

Mr. Kalyana Venkatraman Explaining the Election Process

Mr.Poongundran Presidential Candidate delivering his Speech

Mr. P. Suyambu, Secretarial Candidate delivering his speech

Mr. Gopalakrishnan, Secretarial Candidate delivering his speech

Registration of Voters

Voters Caste their votes

Counting of Votes in Progress....

Members anxiously awaiting the result...

Members anxiously awaiting the result...

Counting of Votes in Progress....

Mr. Poongundran, New President receives official declaration from Election Committee

Mr. Suyambu, New Secretary receives official declaration from Election Committee

President, Secretary, Treasurer, Vice Presidents, Joint Secretaries

AGM Venue – Windflower Resort, Pondicherry

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