ELECTRICAL INSTALLATION ENGINEER

NEWS LETTER

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EDITORIAL

Dear Members, Fellow Professionals and Friends,

Seasons Greetings To One And All!

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

Just at the end of February, we are informed of the Good News that the GDP growth of India has improved and reached 7.2%, regaining the position as the fastest growing Economy of the World. These figures are bound to improve further considering the demographic advantage and various other natural advantages we have compared to many other parts of the World. Economic History of the World over the past 2000 years reiterates that India was holding the position of Top Economy of the World for long till around 1800 AD, which is expected to be regained in another 15/20 years or less. With all this Glory ahead, we are all pained to hear the massive frauds that have almost become daily affairs, resulting in erosion of Wealth and along with it, the erosion of faith and Goodwill of people in all the Financial Institutions of this Country and their Management. When our Country has a Great Background of Values and Ethics and Morals, which are sought after by many, so called, advanced Nations of the World, it is very sad to experience the steep degradation of all the Values in our Country, particularly in people who hold positions of managing wealth of the Country, be it money or other resources. We were hearing about wide spread irregularities at the Banks, during some of the recent Economic Measures, and the Banks seem to have thrown open their coffers, indulging in and enabling massive frauds. We hope and pray that the Powers that control would prevail and eradicate the evil and cleanse the System.

World Water Day falls on 22nd March, coinciding with which, National Water Week is fixed between 17th and 23rd of March to deliberate and initiate activities for all round betterment. Water is Life, Water is Energy and it is everything. When the World is constantly worried about the small percentage of usable water for human beings etc, our Country, with its annual rainfall of over 1,50,000 TMC of water, in varying degrees of excesses and deficiencies across the Country, is in fact, confronted with the problems of Ran Waters and Flood Waters Harvesting, to ensure Water Security across the Country. As per statistics, even at present, with good number of Dams across many rivers, more than two thirds of the waters go to the sea, in the form of excesses and floods. We are now a days hearing from many, that soon, Godavary will be linked with Cauvery, to overcome the shortages of waters for agriculture in Tamilnadu. There have been talks for long about interlinking of all the Rivers of the Country etc, but that does not seem to be moving at all, even after the intervention of the highest judicial body of the Country. Interlinking or proceeding to establish a National Water Grid should be commenced forthwith, to harness this important basic need, that is Water for all and for everything. One interesting analysis from the angle of "Electrical Power" which is our business, it is estimated that movements of waters across the Country can help generate 1 Lakh MW or more of Electricity, which will also be 'Environment Friendly'.

We have been writing often in the past about the poor efficiencies in all our activities concerning Energy and Productivity. Combining Life and activities enabled by Water and Energy, our Mission can be "Water and Energy for all at its Best Efficiency".

We thank all those members who have helped us by participating in the advertisement appearing for the issue February 2018 – Supreme Power Equipment Pvt. Ltd., Ashlok Safe Earthing Electrode Ltd., Elecxpo – 6th Edition, Power Cable Corporation, Alfa Switchgear (I) Pvt. Ltd., Galaxy Earthing Electrodes (P) Ltd., Consul Neowatt Power Solutions Pvt. Ltd., Universal Earthing Systems Pvt. Ltd., Pentagon Switchgear Pvt. Ltd., Dehn India Pvt. Ltd., Wilson Power and Distribution Technologies Pvt. Ltd.

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ELECTRICAL INSTALLATION ENGINEER

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106.	Sivasakthi Electricals	Chennai	044-43563120, 98403 34304	EA 2231
107.	Sivasakthi Enterprises	Chennai	044-24825353, 94442 30438	EA 2262
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109.	Sri Renukadevi Enterprises	Chennai	044-24845868, 9444009914	EA 2495
110.	Sri Rukmani Electricals	Chennai	94443 09210	EA 2748
111.	Sri Vignesh Electricals	Chennai	044-24570591, 98410 39377	EA 1753
112.	SSE Enterprises	Chennai	044-22385465, 98844 22365	EA 2223
113.	Sterling & Wilson P. Ltd.	Chennai	044-42956600, 97899 76503	ESA 306
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Let us delve further into the topic viz. Electrical Accidents.

Suggested Remedial Measures

The working atmosphere or environment should be made conducive for the workers to perform their works calmly and correctly. The workers may also be imparted with proper training to meet any emergency that may crop up during the course of their works.

Each accident, however trivial, may be analyzed in depth by keeping the human factor in proper perspective. A detailed study may perhaps be undertaken on the problems faced by the workers who suffer from fear psychosis and are accident – prone by keeping a close watch on them and also to help sort out their mental problems. For this, the modern stress relieving techniques may be adopted. A psychological research programme on the mental attitude of the employee like errors of judgement, absent mindedness and fatigue may be carried out in a place / region where accidents are comparatively high. Scientific selection, placement and training methods may be adopted while posting persons for the operation and maintenance of power houses, sub-stations and EHT lines and also other works related to Electricity Distribution and Utilization. The persons for these jobs are to be selected on the basis of their personality traits, stress reactivity level and their ability to meet emergencies. Workers, who are susceptible to frequent changes in mood, hyper sensitive type and who are inclined to disregard safety rules should not be posted to hazardous jobs through they may be otherwise qualified for these posts.

Standardised modern psycho-technical testing programme has to be instituted periodically for all the workers above certain age group working in vital sectors. Periodical reorientation should also be given to the aged workers to overcome their personality defects.

Though it may not be immediately practicable to introduce the above measures in a vast organization like Electricity Boards, Railways and Road Transport Corporation, it may be tried in various stages / phases. A practically possible proposition will be helpful to enforce scrupulously the practice of hosting a safety sergeant

while undertaking major shut down works in a substation or power station or in a production / manufacturing centre. Under no circumstances, a single worker should be engaged for any maintenance and fault rectification works. This includes all the works in LT Distribution networks. To the maximum extent feasible the workers should not be subjected to continuous over work.

So far the human element in electrical accidents has been put in a clear perspective. It is only a small attempt; more works are needed on this front. Modern scientific approaches will help to create a better attitudinal climate and more favourable mental makeup in the workmen which will in consequence minimize most of the accidents which are assigned to "Human Factors".

Before proceeding further, let me share some of my random stray thoughts on the topic in point.

1. It is preferable for the general insurance companies, while fixing fire policy for the insurance of old buildings to adopt a "Sliding Scale" of premium based on the ageing of the electrical wiring and other related components in the building. This measure will lead to the periodical inspection of LT wiring; this measure will also help to mitigate fire accidents brought by leaky electrical circuits.
2. When we think of achieving something we tend to focus more on the 'end product' rather than the means that would help to achieve it i.e. how that end product may be actually achieved in terms of the concrete steps required to accomplish it. **Simply put the means adopted to achieve the end require much attention.** In the instant case, the end product is the safety of operating persons which will help to ward off accidents. This is our prime objective. i.e. safety management is our aim. Thus there is a big need for us to focus our attention entirely on the means with the same passions with which we covet the goal itself. Further we have to understand the thin separating line between the accident leading to the loss of a life and the timely undertaking of the precautions that help to save of that life. It is this median that needs to be focused.

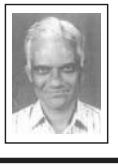
In sum, electrical accidents are decided by a constellation of factors that are extraneous to the skills of the related persons, the related events and has a huge impact on the outcome of the games.

The common consumers who widely utilize electrical energy do not know anything about it nor have any control over it. They faithfully expect the great care and concern from the organization which produce maintain and control the supply of electrical energy to their premises. This organization operate and maintain the both HV and LV line wires equipment and other systems. If any carelessness / irresponsibility creeps into the functioning of this organization, it will result in irrepairable loss of human lives and properties and fire accidents. The commoners totally depend on the Electricity Supply Provider for their protection and safety from electrical sources. If any mishap occurs the officials and workers of this organization will be held responsible. Inspite of this basic responsibility, electrical accidents due to broken / snapped loose conductors routinely occur. Why do they occur? What happen to the protective measures adopted by this Supply Provider. **From the occurrence of accidents so far, it seems that they have not yet developed any reliable effective device or means to ward off the unpleasant events brought by these defective lines and equipment. What hampers the installation of the required protective devices? Why they have not addressed this basic need - the absence of which is the main cause for many fatal accidents.** The specific answers to these questions and an interesting electrical accident involving the snapped line support of a 11 Kv line will be described in the forth coming article.

Till then kindly stay tuned.

Let me sign off here.

(To be continued…)



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DO YOUR WORK WITH PRIDE, PUT SAFETY IN EVERY STRIDE

CHINESE CITY ROLLS OUT ASIA'S FIRST SOLAR HIGHWAY

A few days before New Years Eve, the capital of the northeastern Shandong province, Jinan, opened the continent's first solar highway for vehicles. The highway is composed of photovoltaic panels that encompass one kilometer (0.62 mile). The solar highway is expected to handle 10 times more pressure than normal asphalt highways do. It is also expected to generate one million kWH of electricity per year – enough to power 800 homes. The power generated will be used to power street lights and a snow-melting system on the road.

Jinan's solar highway covers 5,875 square meters (63,200 square feet) and is composed of three layers: transparent concrete on the top, photovoltaic panels in the middle, and insulation on the bottom.

China, the world's biggest carbon emitter, also ranks first for its usage of solar energy. Since 2013, China was crowned as the world's biggest solar market, beating Germany as the country with the most photovoltaic installations three years ago. China planned to install a record number of solar power stations in 2017. About 54 gigawatts will be put in place this year, raising a forecast of more than 30 gigawatts made in July 2017. That amount of additional capacity will likely surpass all the solar energy generated in Japan in 2017.

"The amount of rooftop solar plants and projects aimed at easing poverty were more than expected and developers rushed to build some ground-mounted solar projects before they [were] allocated subsidies," said Yvonne Liu, a Bloomberg New Energy Finance analyst in Beijing.

At around the same time in 2016, Tourouvre-au-Perche, a village in France rolled out what it claimed was the world's first solar-panel road, running a one kilometer (0.6-mile) route, covered with 2,800 square meters of electricity-generating panels. In 2014, the Netherlands built a bike path embedded with solar panels.

However, some argue that solar highways and roads in general don't really produce what they're worth. The Conversation argues that the price of maintaining a solar highway will always keep the technology in the niche market. It also argues that the market will not change since asphalt is a mixture of waste products from the refining of oil and fine gravel or aggregate. However, glass is more energy-intensive since it is formed by melting silica. Bitumen or asphalt roads are cheaper at $5 per square meter in comparison to their solar counterparts at around $15-20 per square meter. (France's solar highway project, for example, cost a staggering €5 million (a little over $6 million) to build).

Even with the triple price difference, the solar roads are not likely to be as efficient as rooftop solar panel installations. The Conversation argues that roads are not oriented to face the sun. Most roads are at ground level and are easily shaded, so they aren't engineered to take advantage of most of the direct sunlight. Moreover, as roads are prone to collecting dirt, this will further shade the modules. Photovoltaic panels work best when they are cool; this is why their backing is typically exposed for ventilation. Finally, solar highways and roads are likely to experience higher temperatures due to friction with running wheels, further reducing their performance.

COCA COLA TO RUN FACTORIES ON SOLAR POWER IN ANDHRA PRADESH, TELANGANA

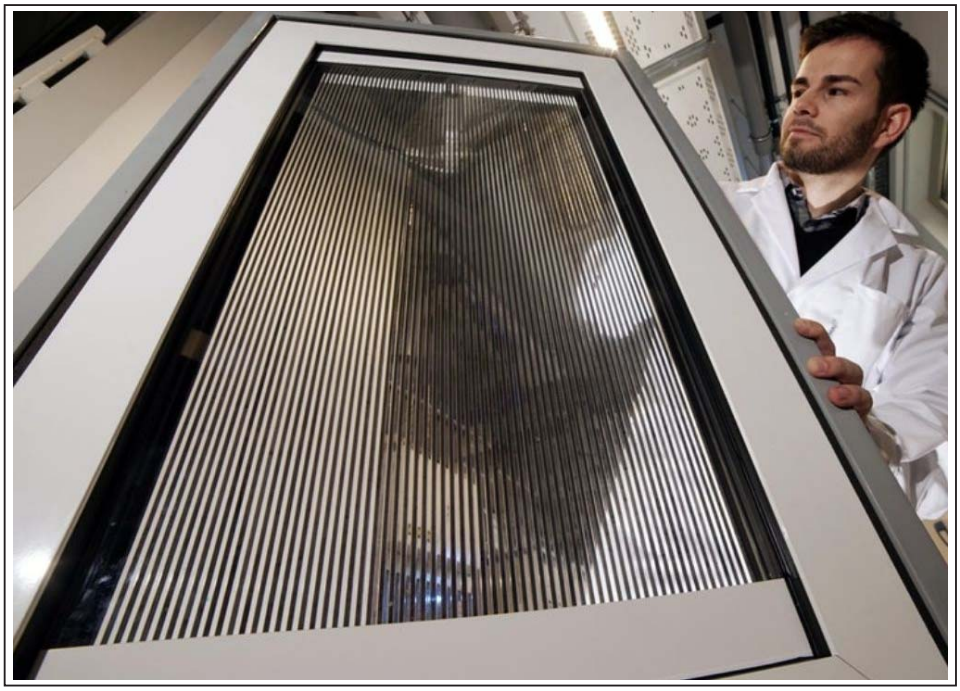
FMCG major Hindustan Coca-Cola Beverages (HCCB) Pvt Ltd on Monday said it will be using solar power as the primary source of energy for manufacturing operations at all its factories in Andhra Pradesh and Telangana.

HCCB, which owns and operates three factories in the two states, has signed agreements with Vibrant Energy, a Hyderabad-based green energy solutions company, to procure 2.7 crore units of solar power for the three factories. HCCB, which owns and operates three factories in the two states, has signed agreements with Vibrant Energy, a Hyderabad-based green energy solutions company, to procure 2.7 crore units of solar power for the three factories. HCCB will procure 1.2 crore units from Vibrant Energy for its factory in Ameenpur (Telangana) and 1.5 crore units for its factories in Vijaywada and Srikalahasti (AP). Starting immediately, 75% of the power requirements of HCCB's factory at Ameenpur will be met by solar energy. Likewise, 50% of HCCB's power requirements for its factories in Vijayawada and Srikalahasti, will be met through solar energy, the company said. Prior to these agreements, HCCB ran a pilot project for usage of solar power for its factory operations by procuring 45 lakh units of solar power from Solar PPA and will continue with its agreements with Solar PPA.

Christina Rugiero, CEO, Hindustan Coca-Cola Beverages Pvt Ltd, said, **"Ensuring the wellbeing of the planet is a shared goal. As one of India's top manufacturing company, preserving and protecting the environment is a responsibility that we take seriously. We are inspired by India's ingenuity and the government's vision of achieving 40% cumulative electric power capacity from non-fossil fuel based energy resources by 2030."**

Source: Energy World

SMART WINDOWS FOR CONTROLLED SHADING, SOLAR THERMAL ENERGY HARVESTING



Climate protection and the reduction of carbon dioxide emissions have been on top of global development agendas. Accordingly, research and development projects have been conducted on national and international levels, which aim for the improvement of the CO_2-footprint in diverse processes. Apart from particularly energy-intensive sectors of the industry, the building sector in particular is among the biggest CO_2-emmitters: from residential homes, manufacturing facilities and storage depots to big commercial buildings, about 40 percent of the energy consumption within the EU are due to the heating, cooling, air conditioning and lighting of buildings. Considering next-generation smart windows and façade devices, one aspect of this problem is addressed in the research project Large-Area Fluidic Windows (LaWin) which has been coordinated at the Friedrich Schiller University Jena, Germany, since 2015. A new type of such smart windows is now presented in the upcoming issue of **'Advanced Sustainable Systems'**. In their paper 'Large-Area Smart Window with Tunable Shading and Solar-Thermal Harvesting Ability Based on Remote Switching of a Magneto-Active Liquid' the Jena materials researchers introduce prototypes of a window that changes its light permeability at the touch of a button, and, at the same time, can be used for solar-thermal energy harvesting.

In latest prototypes, the liquid is loaded with the nanoscale magnetic iron particles. These can be extracted from the liquid with the help of a magnet. Vice versa, they can be re-suspended by simply switching-off the magnet. "Depending on the number of the iron particles in the liquid, the liquid itself takes on different shades of grey, or it will even turn completely black," Wondraczek explains. "Then, it becomes possible to automatically adjust the incidence of light, or to harvest solar heat which can then be put to further use within the building." The efficiency in terms of heat gain per area is comparable with that of state-of-the-art solar thermal facilities. But unlike those, the present system can be readily integrated in a vertical façade. Switching between on and off - the release or capture of particles - happens in a separate tank. An electrical connection at the windows is not necessary.

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Source and top image: Friedrich Schiller University

MADRAS HC STAYS SAFEGUARD DUTY ON SOLAR POWER EQUIPMENT

The Madras High Court has issued a temporary stay on a preliminary report of the Director General of Safeguards recommending imposition of 70% safeguard duty on imported solar equipment.

ShapoorjiPallonji Infrastructure, a contractor-cum-developer of solar projects and part of the ShapoorjiPallonji Group, had petitioned the court against the recommendation, maintaining the company was never given a chance to respond to the original petition on the basis of which DG (Safeguards) suggested imposing 70% duty.

The DG had on December 19 last year sent a notice to all stakeholders saying it had initiated an enquiry into the matter on the basis of a petition filed by Indian Solar Manufacturers Association claiming that large scale imports of solar panels and modules from China, Malaysia, Taiwan and Singapore were causing "serious injury" to domestic manufacturers of similar equipment.

The notice gave stakeholders 30 days to reply. However, the DG (Safeguards) announced preliminary findings on January 5.

"Much prior to the expiry of 30 days, the impugned preliminary findings have been rendered, which is contrary to the procedure stipulated," Justice TS Sivagnanam said in his order. "The status quo, which is prevailing as on date, shall continue and no further precipitate action, shall be taken," it said.

Solar developers prefer imported equipment because they are 25-30% cheaper than domestic ones, thanks to economies of scale and government subsidies in the exporting countries. Independent Solar Power Producers Alliance, an association of solar developers, too, has filed a petition in Delhi HC seeking a stay on the recommendation.

The petition is yet to be heard. Although the recommendation of DG (Safeguards) is preliminary, there is a provision in the Customs Tariff Act for it to be immediately imposed, pending a final decision by the secretaries of relevant departments. That is why ShapoorjiPallonji and ISPPA rushed to court for relief.

DG's preliminary recommendation will be followed by a public hearing on the matter, after which a report will be sent to a panel of secretaries of commerce, revenue, industrial policy, external affairs and new and renewable energy for a final decision. In its petition before Delhi High Court, ISPPA questioned the legitimacy of ISMA, which filed the petition that DG (Safeguards) acted upon, noting that it comprised just five solar manufacturers whose production capacity was barely 7.5% of the entire solar manufacturing sector in the country.

It also claimed that domestic solar manufacturing capacity was barely 10% of their requirements for solar projects - considering the ambitious target of 100,000 MW of solar capacity by 2022 that India was pursuing - which forced developers to import, and imposition of such steep duty would derail the effort.

It also noted that a separate petition, again filed by ISMA, seeking antidumping duty on imported solar equipment was pending before the Directorate General of Antidumping and Allied Duties (DGAD) which had held a public hearing on the matter.

INDIAN WIND ENERGY
A BRIEF OUTLOOK 2016 - 2

GWEC
GLOBAL WIND ENERGY COUNCIL

OUTLOOK FOR 2017 AND BEYOND

The government, in its latest budget announcement for FY 2016-17 reduced the AD from 80% to 40%. Furthermore, the GBI could come to an end at the end of the 2016/17 financial year. These two factors contributed to a rush of installations at the end of the 2016-17 fiscal year. However, the first auctions for wind power were held in early 2017 successfully. We expect installations during 2017 to reach approximately 5,000 MW. A further 4-5 GW tender is expected during 2017, a positive step towards reaching the 2022 target of 60 GW.

GWEC GROWTH SCENARIOS FOR THE INDIAN WIND MARKET

GLOBAL WIND POWER SCENARIOS FOR 2020 AND 2030

There are several published scenarios examining the future role of wind power globally as a part of system transformation necessary for a clean energy future. GWEC developed its scenarios in collaboration with the German Aerospace Centre (DLR) and the Institute for Sustainable Futures at the University of Technology Sydney. These scenarios are updated biennially, the latest update Global Wind Energy Outlook 2016 (GWEO) presents scenarios out to 2020, 2030 and 2050.

The GWEO 2016 uses the International Energy Agency's New Policies Scenario from the World Energy Outlook as a baseline; and the IEA's 450 Scenario has been included as the climate consequences of different energy pathways have once again risen up the international political agenda. The two original scenarios are the GWEC Moderate Scenario and the GWEC Advanced Scenario.

GLOBAL WIND ENERGY OUTLOOK 2016 SCENARIOS

IEA New Policies Scenario

The IEA's New Policies Scenario (NPS) is based on an assessment of current directions and intentions of both national and international energy and climate policy, even though they may not yet have been incorporated into formal decisions or enacted into law. Examples of this would include the emissions reduction targets adopted in Paris in 2015, the various commitments to renewable energy and efficiency at national and regional levels, and commitments by governments in such fora as the G-8/G-20 and the Clean Energy Ministerial. The New Policies scenario is now at the center of the IEA's World Energy Outlook analysis; and we have extrapolated it out to 2050 for comparison purposes.

IEA 450 Scenario

The 450 Scenario (450), first introduced in the IEA's World Energy Outlook in 2010, sets out an energy pathway consistent with the goal of having about a 50% chance of limiting the global increase in average temperature to 2 C, which would require the concentration of greenhouse gases (GHG) in the atmosphere to be limited to around 450 parts per million of carbon-dioxide equivalent (ppm CO_2-eq) in the long-term. The basis of the 450 Scenario is, however, different. Rather than being a projection influenced by policy actions, it deliberately selects a plausible energy pathway to achieve the desired goal. Near-term policy assumptions for the period to 2020 draw on measures that were outlined in the WEO Special Report on Energy and Climate.

GWEC Moderate Scenario

GWEC's Moderate Scenario (MS) has many of the same characteristics as the NPS, taking into account all policy measures to support renewable energy either already enacted or in the planning stages around the world, and at the same time assuming that the commitments for emissions reductions agreed by governments at COP21 (Paris, 2015) will be implemented, although on the modest side. At the same time it takes into account existing and planned national and regional targets for the uptake of renewable energy in general and wind energy in particular, and assumes that they are in fact met.

Through the period out to 2020, the MS is very close to our annual five-year market forecast, based on industry orders and planning as well as intelligence from our global network about new and emerging markets. After 2020 it is difficult to make a precise forecast given the current set of global uncertainties, but at that stage we assume that an even broader range of governments will begin to respond to essential asks of national energy

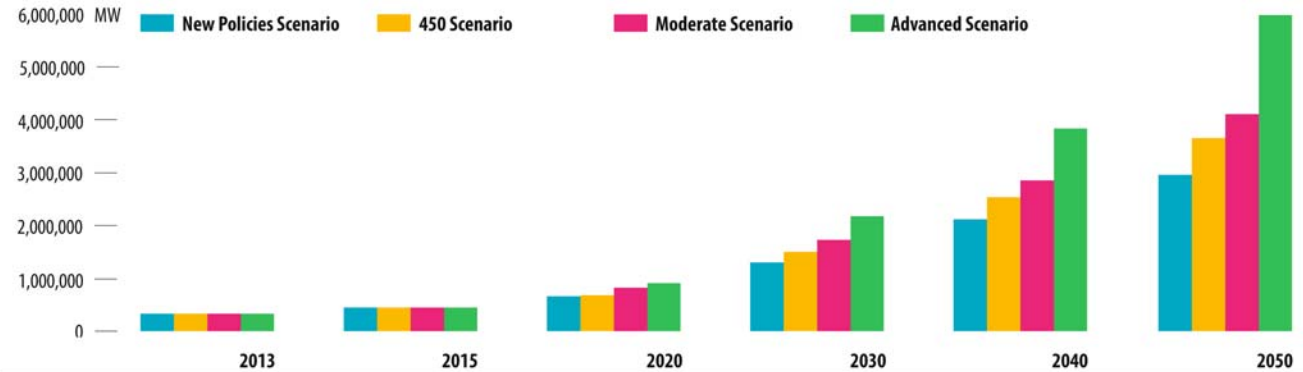
security and long-term price stability offered by wind energy. Further the cost of wind continues to come down and the price of conventional generation continues to go up.

GWEC Advanced Scenario

GWEC's Advanced Scenario (AS) is the most ambitious, and outlines the extent to which the wind industry could grow in a best case 'Wind Energy Vision'. It assumes an unambiguous commitment to renewable energy in line with industry recommendations, the political will to commit to appropriate policies and the political stamina to stick with them. Further, it does NOT assume massive new-build nuclear or a large take up of carbon capture and storage technologies, as is the case in the IEA scenarios.

The AS also assumes that governments enact clear and effective policies on carbon emission reductions in line with the now universally agreed objective of keeping global mean temperature rise below 2C above pre-industrial temperatures. Wind power is critical to meeting the first objective in that battle - which is getting global emissions to peak and begin to decline before the end of this decade.

GLOBAL CUMULATIVE WIND POWER CAPACITY



	2013	2015	2020	2030	2040	2050
New Policies Scenario						
MW	318,354	432,656	639,478	1,259,974	2,052,583	2,869,611
TWh/a	714	868	1,569	3,311	5,394	7,541
450 Scenario						
MW	318,354	432,656	658,009	1,454,395	2,458,757	3,545,595
TWh/a	714	868	1,614	3,822	6,462	9,318
Moderate Scenario						
MW	318,354	432,656	797,028	1,675,624	2,767,351	3,983,995
TWh/a	714	868	1,955	4,404	7,273	10,470
Advanced Scenario						
MW	318,354	432,656	879,446	2,110,161	3,720,919	5,805,882
TWh/a	714	868	2,157	5,546	9,779	15,258

Source: GWEC

Scenario Results

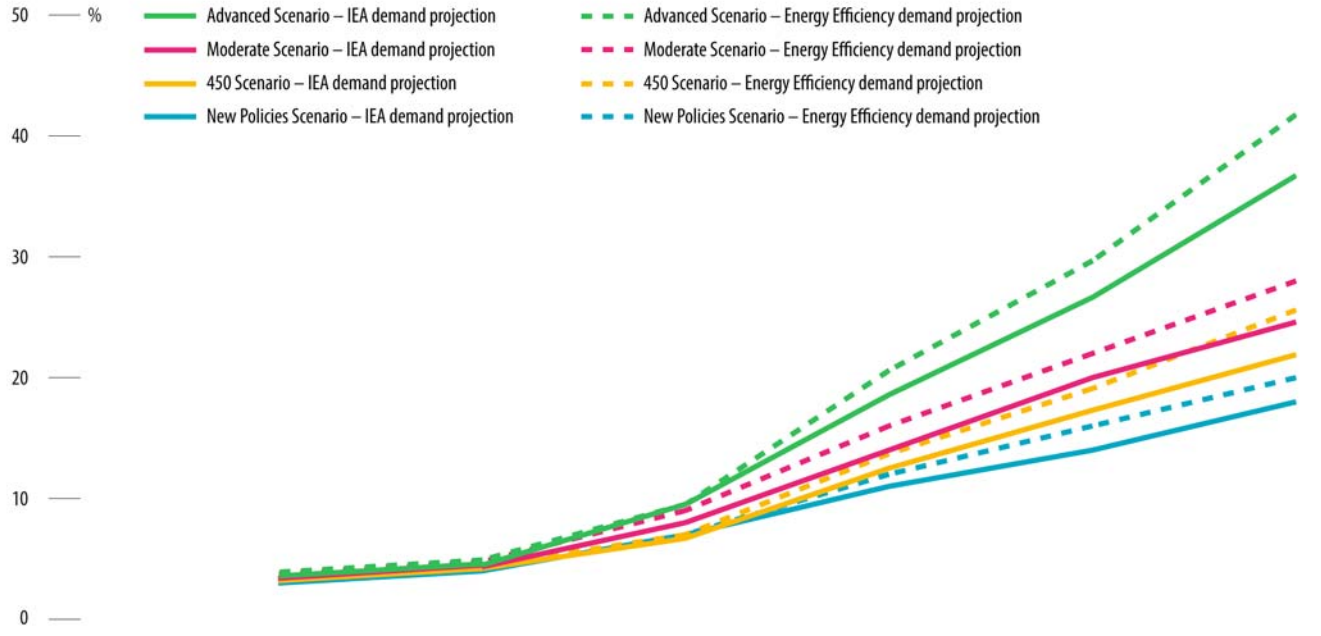
The IEA New Policies Scenario (NPS) projects that annual wind energy markets will match the stellar results from 2014 and cross the 50GW mark in 2016 as well; and then shrink to just under 38 GW/annum by the end of the decade. It then projects an increase to near 2015 levels in the middle of the next decade, gradually decreasing to 43 GW/annum by 2030 and essentially stays in the mid-30s in terms of GWs installed per annum, remaining flat for the rest of the period out to 2050 in net terms. On the basis of this, cumulative installed capacity would still reach 639 GW by 2020, and 1,260 GW by 2030. The latter is almost 300 GW

higher than the NPS projections two years ago. By 2050, the NPS foresees global wind installations reaching 2,870 GW.

The 450 Scenario also sees 2016 at 2014 levels, but is substantially higher than NPS installations out to 2020, for a total of 658 GW. It then projects a marked increase in installations with installed capacity reaching 1,454 GW by 2030, which is almost 200 GW higher than the NPS projections. By 2050, this scenario foresees global wind installations reaching 3,546 GW.

The GWEC Moderate Scenario (MS) follows our short term market projections prepared for our annual market update out to 2020, with annual market size reaching almost 80 GW/ annum by 2020 for a total installed capacity of 792 GW. We expect robust growth in the period after 2020. By 2030 total installed capacity would reach nearly 1,676 GW. By 2050, this scenario foresees global wind installations reaching 3,984 GW.

WIND POWER SHARE OF GLOBAL ELECTRICITY DEMAND



	2013	2015	2020	2030	2040	2050
New Policies Scenario						
IEA demavnd projection	3%	4%	7%	11%	14%	18%
Energy Efficiency demand projection	3%	4%	7%	12%	16%	20%
450 Scenario						
IEA demand projection	3%	4%	7%	13%	17%	22%
Energy Efficiency demand projection	3%	4%	7%	14%	19%	25%
Moderate Scenario						
IEA demand projection	3%	4%	8%	14%	20%	25%
Energy Efficiency demand projection	3%	4%	9%	16%	22%	28%
Advanced Scenario						
IEA demand projection	3%	4%	9%	18%	26%	36%
Energy Efficiency demand projection	3%	4%	9%	20%	29%	41%

Source: GWEC

INDIA – CUMULATIVE CAPACITY UP TO 2050

Total Capacity in MW	2013	2014	2015	2020	2030	2040	2050
New Policies Scenario	20,150	22,465	25,088	50,063	111,938	184,838	256,789
450 Scenario	20,150	22,465	25,088	67,098	155,736	254,827	358,314
Moderate Scenario	20,150	22,465	25,088	44,734	116,257	227,137	372,830
Advanced Scenario	20,150	22,465	25,088	56,297	163,473	294,184	452,197

The GWEC Advanced Scenario (AS) maintains ambitious growth rates throughout this decade, assuming that a broad, clear commitment to the decarbonisation of the electricity sector emerges quickly with the ratification of the 2015 Paris Climate Agreement. Annual market size would top 100 GW by the end of the decade, bringing total installed capacity to just over 879 GW by 2020, and to 2,110 GW by 2030, which could only occur with comprehensive and robust climate action globally and essential political will to tackle the climate challenge. By 2050, this scenario foresees global wind installations reaching 5,806 GW. This is almost 3,000 GW higher than the current baseline scenario of the long-term NPS projections for the wind sector.

The GWEO Scenarios for India

India continues to be the second largest wind market in Asia, with wind energy installations crossing 28.7 GW in 2016. India has committed to a target of 175 GW of renewables by 2022. This target includes achieving 60 GW of cumulative wind power capacity by 2022.

Under the NPS, India's wind power market would reach 50 GW by 2020 and 102 GW by 2030. Wind power would then produce close to 105 TWh every year by 2020 and 294 TWh by 2030, and help save 63 million tons of CO_2 in 2020 and 177 million tons in 2030. Under the 450 Scenario, the Indian wind power market would reach 67 GW by 2020 and 155.7 GW by 2030.

Under the MS, the total installed capacity would reach 44.7 GW by 2020 and 116.2 GW by 2030.The wind industry will see investments of €5 billion per year by 2020 and €10.4 billion per year by 2030. Employment in the sector would grow to over 74,000 jobs by 2020 and over 128,000 jobs ten years later.

The AS shows that the wind development in India could go much further: by 2020 India could have almost 56 GW of wind power in operation. By 2030 wind power would generate over 400 TWh per year and avoid the emission of 258 million tons of CO_2 each year. Investment would have reached a level of €11.4 billion per year.

Which path shall India take? The higher-end scenarios will depend on increasingly sophisticated grid integration of renewables in general, strictly enforced state RPOs, and the development of an effect intrastate and interstate power market, open to all, with low or no transmission fees. It will require the wind industry to step up its game on scheduling and forecasting, as well as allowing renewables to participate in balancing and ancillary services markets.

India's current installations are on a path towards meeting GWEC's Advanced Scenario projections for 2020. If the current pace of installations were sustained over the medium term, Indian wind power installations would be on a path to crossing the 300GW mark around 2040. Wind power can provide the much-needed cheap power for meeting India's development and environment agenda.

ABOUT GWEC OPENING UP NEW MARKETS FOR BUSINESS

GWEC is a member-based organisation that represents the entire wind energy sector. The members of GWEC represent over 1,500 companies, organisations and institutions in more than 80 countries, including manufacturers, developers, component suppliers, research institutes, national wind and renewables associations, electricity providers, finance, insurance companies and law firms.

Our mission is to ensure that wind power establishes itself as the answer to today's energy challenges, providing substantial environmental and economic benefits.

GWEC works with national and international policy makers and industry associations to help open new markets for wind power i.e. UNFCCC, the IEA, international financial institutions, the IPCC and IRENA. GWEC has a proven track record of success in helping to build the wind power industry in emerging markets around the world, including Brazil, China, India, Mexico and South Africa.

For more information, please contact: **Global Wind Energy Council**
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info@gwec.net, www.gwec.net
Find out more about GWEC's policy work, publications, events and other membership benefits on our website www.gwec.net

ABOUT IWTMA

Indian Wind Turbine Manufacturers Association (IWTMA) is 18 years old association of wind turbine and component manufacturers in India and was founded by the group of members from wind industry. It is headquartered in Chennai with an office in New Delhi. IWTMA plays a vital role in policy making both at Centre collaborating with the Ministry of New and Renewable Energy and at the States with all other allied ministries and departments such as Ministry of Power, Ministry of Finance, Ministry of Environment and Forests, Central Electricity Regulatory Commission, Central Electricity Authority, National Load Dispatch Centre etc.

IWTMA is invited in the various committees of NIWE, which includes the robust certification process and also on the Governing Council of NIWE. The mission of IWTMA is to promote and harness wind energy for an all inclusive sustained growth – now and in the future. IWTMA also aggressively campaigns for this "Green Revolution" (Clean Energy) to encompass the economy, business, rural employment and contribute towards self reliance to meet the growing need of power.

Indian Wind Turbine Manufacturers Association

- *Strives towards high efficiency in energy generation through the best technologies and cost efficiency through large volume*
- *Strives to achieve prominence of wind energy in the energy mix to conserve depleting fossil fuels*
- *Spreads the message on the utilization of green power to lessen the adverse effect of global warming and climate change*

For more information, please contact:

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1st Main Road, Adyar, Chennai 600020, India.
Tel: +91 44 4301 6188 +91 44 4301 5773
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HUMOUR

What is...?

Q. What is a snake's favourite subject?

A. Hissssssssstory

Dog chase

My dog used to chase people on a bike a lot. It got so bad, finally I had to take his bike away.

Sleeping Pills

Doctor: "I've found a great new drug that can help you with your sleeping problem."

Patient: "Great, how often do I have to take it?"

Doctor: "Every two hours."

Sleep and Mosquitos

Sleep with an open window tonight! 1400 mosquitos like that. 420 mosquitos commented on it. 210 mosquitos shared this. One mosquito invited for the event. 2800 mosquitos will be attending the event.

Best Part

A wife goes to consult a psychiatrist about her husband: "My husband is acting so weird. He drinks his morning coffee and then he goes and eats the mug! He only leaves the handle!"

Psychiatrist: "Yes, that is weird. The handle is the best part."

Lottery

Harry prays to God: Dear Lord, please make me win the lottery.

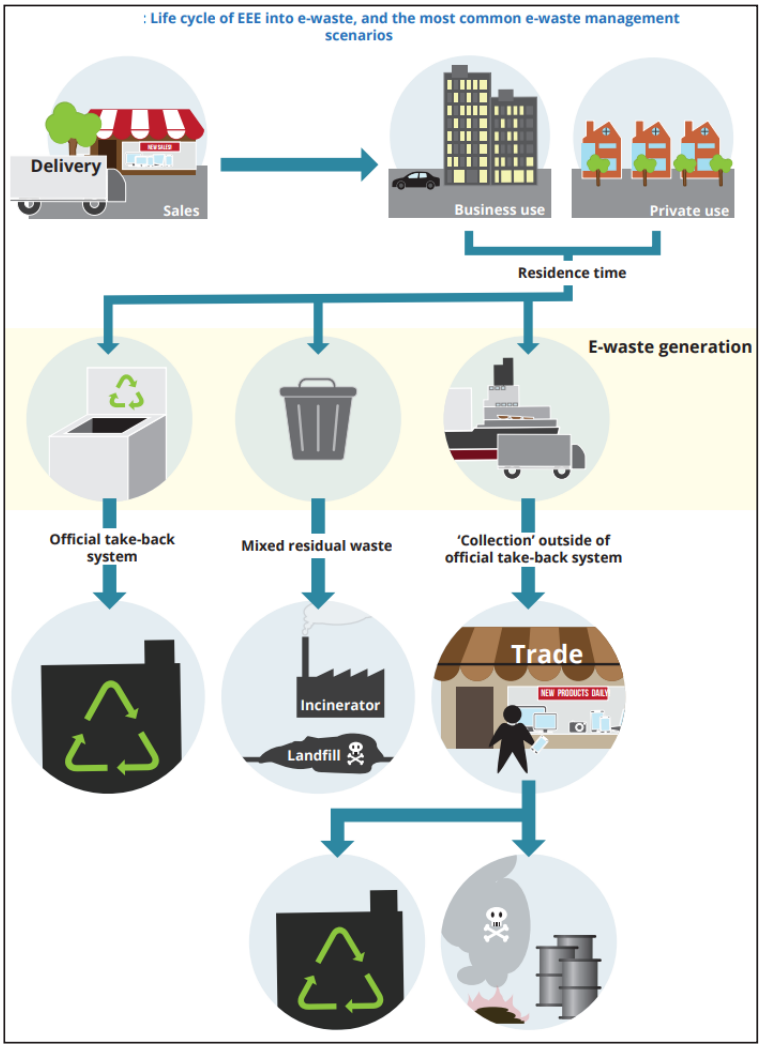
The next day Harry begs the Lord again: Please make it so I win the lottery, Lord!

The next day, Harry again prays: Please, please, dear Lord, make me win the lottery!

Suddenly he hears a voice from above: Harry, would you kindly go and buy a lottery ticket.

E-WASTE IS GROWING AND FILLING THE WORLD'S LANDFILLS

Almost every major franchise has pointed to its move away from the usage of paper and move towards recycling or going green in an attempt to reduce the amount of environmental damage caused by frivolously using paper. And while the world's paper waste is somewhat improving, that doesn't seem to be the case for disposal of our electronics. According to a study by the United Nations' International Telecommunication Union, e-waste is equally if not more problematic than paper waste, and needs to be tended to.



Arguably, as technology advances, new electronics are becoming more compact and fragile, generally implying a shorter life span. This, coupled with the commodification of technology and consumerist culture, means that the turnover for electronics today is higher than ever before. **What is known as "e-waste" or electronic waste is the disposal or discarding of electronics like chargers, laptops, phones, and televisions.** Electronics like chargers and the everyday smartphone are made with highly hazardous materials, and improper disposal of them through shredding, burning or dismantlement often results in poisonous greenhouse gas emissions, not to mention soil and water pollution.

In the United States, the most common electronic devices owned by the average American adult are cellphones followed by smartphones and laptops. According to the UN-ITU's study, the world saw an increase from 20 percent to 50 percent in the number of households connected to the internet between 2007 and 2017. Although increased internet usage and ownership of internet/cellular data-enabled devices implies a growth in global connectivity, this exponential growth has serious repercussions on the environment.

	USA	China	EU5	France	Germany	Great Britain	Italy	Spain
2015	21.6	19.5	20.4	21.6	18.8	23.5	17.7	20.0
2014	20.9	21.8	19.5	19.4	18.2	22.0	18.7	18.2
2013	20.5	18.6	18.3	18.0	17.1	20.0	18.6	16.6

Source: Kantar World Panel 2016

The UN-ITU claims that approximately 45 million tons of electronic waste were disposed of in 2016 alone, yielding a monetary waste of $55 billion as a result. Of the 45 million tons that were discarded, only 20 percent were recycled or reused in some manner.

The world, however, does not contribute equally to electronic waste. According to the report, Western, Northern Europe and Russia combined contribute approximately 28% to global e-waste while Africa only contributes

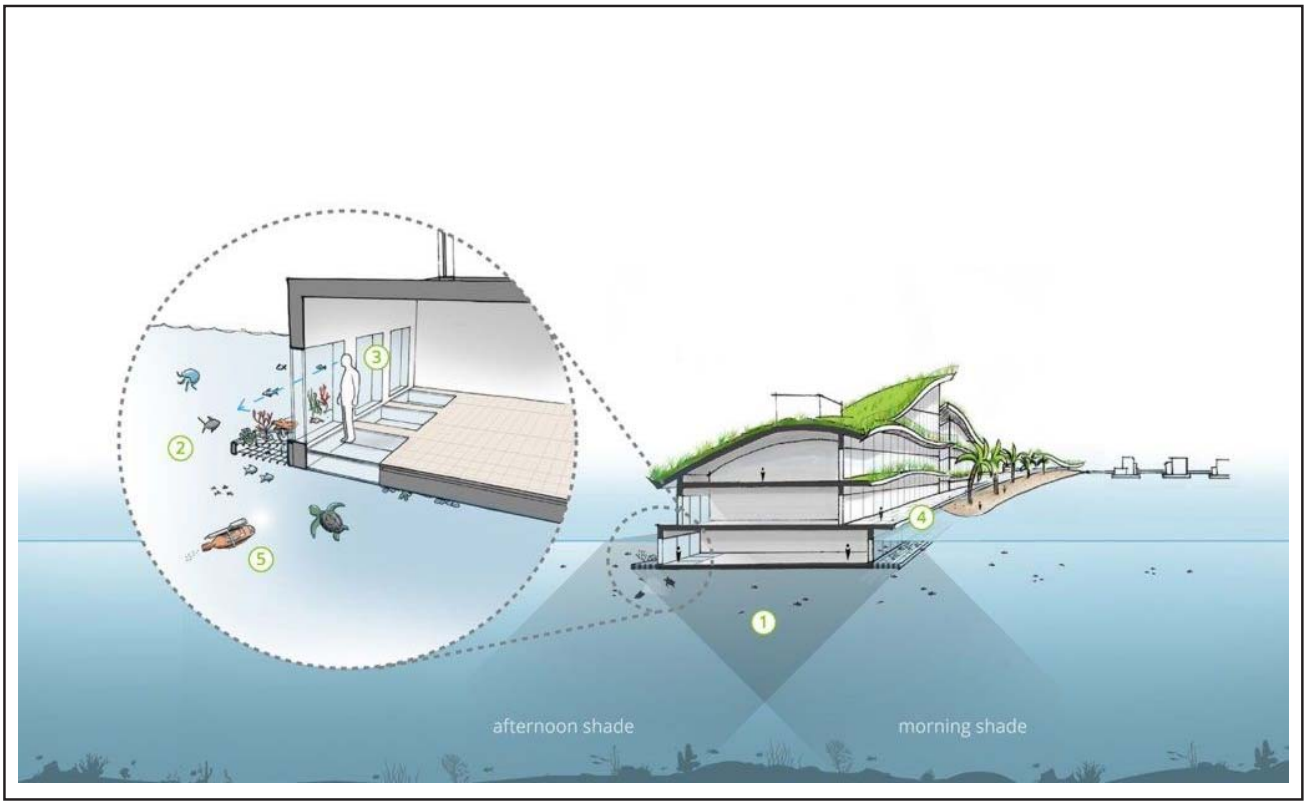
5% to the total amount. However, the former recycled an average of 35% of its waste in comparison to Africa, which recycled none of its e-waste.

There have been scores of creative initiatives to raise awareness about proper waste disposal and to encourage the average citizen to recycle, including the world's first recycled mall – ReTunaÅterbruksgalleria – in Sweden. There have also been efforts to call for a reduction in e-waste like UN-ITU's "eco-friendly universal charger," a charger that promises to reduce emissions and e-waste at the same time, but the rallying cry needs to grow louder.

While the world has focused efforts on going green with paper recycling, it has lagged on paying equal attention to e-waste. One upside to fast-paced technological advancement is that less materials are being used, taking up less space in landfills. But that does not redact the fact that more electronics are being produced altogether, meaning the global footprint of e-waste is growing at an alarming rate.

FLOATING CITY IN THE SOUTH PACIFIC OCEAN IS THE WORLD'S FIRST

The hurricane season in the Western hemisphere has come to a close, leaving many island-nations and southern United States scrambling to make repairs and cut damages. Within growing conversations about human damage to the environment and its impact on freak natural disasters, Seasteading, a non-profit organization, is working to build the first floating city that could reverse damage done to the environment.



Established in 2008 in San Francisco's Silicon Valley, The Seasteading Institute plans on building a floating city off the coast of French Polynesia in the South Pacific Ocean. The city, according to the Institute, are a pilot to test how humankind can learn to live together in environmentally-friendly dwellings. The organization's goal is to maximize entrepreneurial freedom and reverse damage accrued to the environment. Earlier this year, The Seasteading Institute signed a memorandum of understanding with the French Polynesian government to begin working on the floating island project by 2020.

The floating city, also called a "seastead," will consist of a community living at sea that is largely responsible for setting its own rules and creating its own culture. Located in a natural lagoon off the coast of French Polynesia,

the socio-economic framework of the seastead will be similar to the concept of special economic zones and will be governed under a "special government framework." Although the city's governance is yet to be determined, local French Polynesian laws and International Law may be applied to the island city in varying degrees, according to The Institute.

Coupled with homes, restaurants, offices, schools, and hotels at its core, the seastead will focus on the creation of new job opportunities for residents of the city. The Seasteading Institute emphasizes the importance of aquaculture, vertical farming & scientific and engineering research in creating new jobs, but also in maintaining a sustainable ecosystem in and around the floating city.

The seastead itself, which will be set afloat around one kilometer (~0.5 mile) from French Polynesia, is planned to be entirely self-sufficient and renewable. The panels upon which the man-made islands will be built, equipped with scores of solar panels, are also planned to help in reversing coral bleaching. Joe Quirk, co-founder of Blue Frontiers, the organization that will administer and build the seastead, believes that the floating city could help regenerate coral reefs. "[We] have devised a plan to position the platforms to create some shadows to lower the temperatures. So as the sun moves about, you get enough light on the ocean floor to spark photosynthesis, but you lower the heat just enough to have a restorative effect."

Conceptually, the floating city may seem promising, given that the organization has explicitly mentioned the importance of not interfering with local usage of the site or with the environment. In more realistic terms, however, there may be a number of hurdles that the Seastead Institute needs to overcome like piracy, affordability, and compliance with 'host nation' domestic law. The Seasteading Institute commissioned a similar project in the San Francisco Bay that was set for completion in 2010, but the project never materialized. And since the floating city project near French Polynesia is being funded through cryptocurrency, the stability of which is projected to fluctuate in coming years, this project could face similar challenges as its San Francisco sister project did.

As innovative as a floating city in the middle of the South Pacific Ocean is, the concept of seasteading itself is not novel. According to Business Insider, seasteading has, in recent years, become a symbol of the tech industry's utopian visions for the future. The Seasteading Institute has also made clear that one of the project's goals is to attract businesses and investors to French Polynesia, which may or may not have a positive impact on the island-nation's economy. All in all, while the project has many promising effects on the environment, local and international economy, and our collective understanding of communal governance, the world is yet to see how foolproof the floating city will be.

WHAT IS LEED?

LEED (Leadership in Energy and Environmental Design) is an internationally recognized green building certification system, providing third-party verification that a building or community was designed and built using strategies aimed at improving performance across all the metrics that matter most: energy savings, water efficiency, CO_2 emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts.

Developed by the U.S. Green Building Council (USGBC), LEED provides building owners and operators a concise framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions.

LEED is flexible enough to apply to all building types – commercial as well as residential. It works throughout the building lifecycle – design and construction, operations and maintenance, tenant fitout, and significant retrofit. And LEED for Neighborhood Development extends the benefits of LEED beyond the building footprint into the neighborhood it serves.

LEED provides a point system to score green building design and construction. The system is categorized in five basic areas: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, and Indoor Environmental Quality. Buildings are awarded points based on the extent various sustainable strategies are achieved. The more points awarded the higher the level of certification achieved from Certified, Silver, Gold, to Platinum.

LEED *for* **Building Design + Construction -** When designing and constructing a new building, project teams have a choice: to join the movement of global leaders producing innovative buildings from the ground up…or to maintain the status quo. We're in favour of the former. LEED for Building Design and Construction (LEED BD+C) provides a framework for building a holistic green building, giving you the chance to create a healthy, resource-efficient, cost-effective building; one that enhances the lives and experiences of everyone who walks through its doors.

WHO IT'S FOR - While you may apply the LEED BD+C rating system to any number of project types, from commercial high-rises to data centers, we've provided an array of common market sectors to give you a tailored experience that recognizes your project's specialized requirements.

NEW CONSTRUCTION & MAJOR RENOVATION - Addresses design and construction activities for both new buildings and major renovations of existing buildings. This includes major HVAC improvements, significant building envelope modifications and major interior rehabilitation.

CORE & SHELL DEVELOPMENT - For projects where the developer controls the design and construction of the entire mechanical, electrical, plumbing, and fire protection system—called the core and shell—but not the design and construction of the tenant fit-out.

SCHOOLS - For buildings made up of core and ancillary learning spaces on K-12 school grounds. Can also be used for higher education and non-academic buildings on school campuses.

RETAIL - Addresses the unique needs of retailers—from banks, restaurants, apparel, electronics, big box and everything in between.

DATA CENTERS - Specifically designed and equipped to meet the needs of high density computing equipment, such as server racks, used for data storage and processing.

WAREHOUSES & DISTRIBUTION CENTERS - For buildings used to store goods, manufactured products, merchandise, raw materials or personal belongings, like self-storage.

HOSPITALITY - Dedicated to hotels, motels, inns, or other businesses within the service industry that provide transitional or short-term lodging with or without food.

HEALTHCARE - For hospitals that operate twenty-four hours a day, seven days a week and provide inpatient medical treatment, including acute and long-term care.

HOMES & MULTIFAMILY LOWRISE - Single-family homes and multifamily residential buildings of one to three stories.

LEED *for* Building Operations + Maintenance

Meet the LEED solution for existing buildings everywhere. Existing buildings hold incredible promise. Many older buildings around the world are inefficient and resource-depleting. With some keen attention to building

operations, that can be turned around drastically by using LEED for Building Operations and Maintenance (LEED O+M). *Consider that it can take up to 80 years to make up for the environmental impacts of demolishing an existing building and constructing a new one, even if the resulting building is extremely energy efficient.* **You may have heard the phrase**, **"The greenest building is the one already built."** We believe it, and LEED can help you achieve it.

WHO IT'S FOR - While you may apply the LEED O+M rating system to any number of project types, from commercial high-rises to data centers, we've provided an array of common market sectors to give you a tailored experience that recognizes your project's specialized requirements.

RETAIL - Existing retail spaces, both showrooms and storage areas.

SCHOOLS - For existing buildings made up of core and ancillary learning spaces on K-12 school grounds. Can also be used for higher education and non-academic buildings on school campuses.

HOSPITALITY - Existing hotels, motels, inns or other businesses within the service industry that provide transitional or short-term lodging with or without food.

DATA CENTERS - Existing buildings specifically designed and equipped to meet the needs of high density computing equipment, such as server racks, used for data storage and processing.

WAREHOUSES & DISTRIBUTION CENTERS - Existing buildings used to store goods, manufactured products, merchandise, raw materials or personal belongings (such as self-storage).

EXISTING BUILDINGS - For all other existing building projects: specifically, projects that do not primarily serve K-12 educational, retail, data centers, warehouses and distribution centers or hospitality uses.

LEED *for* **Interior Design + Construction** - As humans, we spend 90% of our time indoors. That time should be spent in spaces that allow us to breathe easy, give us views of nature and daylight, and make us healthier and more productive. LEED for Interior Design and Construction (LEED ID+C) enables project teams who may not have control over whole building operations to develop indoor spaces that are better for the planet and for people.

While you may apply the LEED ID+C rating system to any number of project types, from commercial offices to standalone stores, we've provided pathways that recognize key market sectors.

SECTORS

RETAIL - Guides interior spaces used to conduct the retail sale of consumer product goods. Includes both direct customer service areas (showroom) and preparation or storage areas that support customer service.

HOSPITALITY - For existing buildings made up of core and ancillary learning spaces on K-12 school grounds. Can also be used for higher education and non-academic buildings on school campuses.

COMMERCIAL INTERIORS - For all other interior spaces dedicated to functions other than retail or hospitality.

LEED *for* **Homes**

A home is more than just shelter: homes are the most important buildings in our lives. We think that every building should be a green building—but especially homes. Why? LEED homes are built to be healthy, providing clean indoor air and incorporating safe building materials to ensure a comfortable home. Using less energy and water means lower utility bills each month. And in many markets, certified green homes are now selling quicker and for more money than comparable non-green homes.

LEED for Homes is available for building design and construction projects for single family homes and multifamily projects up to eight stories.

LEED BUILDING DESIGN + CONSTRUCTION: HOMES & MULTIFAMILY LOWRISE - Designed for single family homes and multifamily buildings between one and three stories.

LEED BUILDING DESIGN + CONSTRUCTION: MULTIFAMILY MIDRISE - Designed for midrise multifamily buildings between four and eight stories.

LEED *for* **Neighborhood Development**

Is your local grocery store within walking distance…and is there a sidewalk for you to trek there safely? Does your neighborhood boast high-performing green buildings, parks and green space? Do bikes, pedestrians and vehicles play nicely together on the road? LEED for Neighborhood Development (LEED ND) was engineered

to inspire and help create better, more sustainable, well-connected neighborhoods. It looks beyond the scale of buildings to consider entire communities.

While you may apply the LEED ND rating system to projects at any stage of the development process, from planning through construction, we've provided two certification options that reflect important project milestones.

PLAN CERTIFICATION - Certification is available to your neighborhood-scale project if it's currently in any phase of planning and design. Plan certification helps you or your developers market and fund your project among prospective tenants, financiers, public officials, etc. by affirming your intended sustainability strategies.

BUILT PROJECT CERTIFICATION - Designed for neighborhood-scale projects that are near completion, or were completed within the last three years.

ORGANIC SOLAR CELLS RECEIVE SEMICONDUCTOR BREAKTHROUGH

Organic solar cells are a step closer to widespread use thanks to a breakthrough in semiconductors by researchers at the University of Michigan.

A study published in Nature explains how it is possible to make electrons travel much further in organic solar cells than previously thought possible, improving their efficiency and opening up an array of potential applications.

Successful large-scale implementation of solar energy depends on three criteria: efficiency, life expectancy and cost. Organic solar cell materials – those made from carbon-based materials like plastic – are much cheaper than their inorganic, silicon-based counterparts.

However, organic solar cells lack the efficiency needed for commercial use compared with traditional silicon cells, requiring the surface of the cell to be covered with conductive electrodes to collect electrons at the point of generation.

The key to the breakthrough is that electrons can be collected far away from their point of origin, opening up a range of possibilities – such as photovoltaic windows.

"Think about making something that is completely transparent and yet is absorbing a substantial amount of light you don't see," said *lead researcher Stephen Forrest, the Peter A. Franken Distinguished University Professor of Engineering.* **"What you need to do is clear out all of the things that are going to make it difficult to get light through."**

The researchers, supported by the US Department of Energy SunShot Initiative and by the US Air Force Office of Scientific Research, made the initial discovery almost by accident while experimenting with organic solar cell architecture.

Using a technique called vacuum thermal evaporation, they layered a thin film of C60 fullerenes on top of an organic cell's power-producing zone, where the photons from sunlight knock electrons loose from their associated molecules. On top of the fullerenes they put another layer of fullerenes to prevent the electrons from escaping, forming what is known as an energy well.

"You can imagine an energy well as sort of a canyon—electrons fall into it and can't get back out," said Caleb Cobourn, a graduate researcher in the U-M Department of Physics and an author on the study. "So they continue to move freely in the fullerene layer instead of recombining in the power-producing layer, as they normally would. It's like a massive antenna that can collect an electron charge from anywhere in the device."

Because organic materials are built from a molecular level rather than atomic, they are far more malleable. When this improved efficiency is combined with pliability, the implications are far-reaching. An organic solar cell, for example, could be made 1,000 times thinner than those that are silicon-based, thereby offering huge savings on materials.

As well as cost reduction, the malleability means organic solar cells could be customised for a particular use in the market. Solar cells could be rolled out onto a car roof, created with different colour schemes such as military camouflage, or built into an invisible grid, for example.

The breakthrough isn't just limited to solar power, with Forrest listing its use in anything from batteries to sensors. However, he cautioned that widespread use of the discovery remains theoretical at this point. "There are too many factors that go into determining these things.

VESTAS' 2 MW PLATFORM REACHES 20,000 INSTALLED TURBINES GLOBALLY

17 years after its introduction, the 2 MW platform has reached another milestone as Vestas installed turbine number 20.000, underlining its position as the most widely installed platform in the history of wind energy. Leveraging Vestas' ability to continuously innovate and optimise, the 2 MW platform's annual energy production has increased by a staggering 40 percent since its introduction, ensuring its leading position for almost two decades. Today, more than 38 GW of 2 MW platform turbines have been installed in 45 countries on six continents.

Built on proven technology, the 2 MW platform's five turbine variants provide industry-leading performance and reliability, while maintaining the same dimensions and low-weight profile of the nacelle to secure predictability in transportation and installation.

"Installing 20.000 turbines from the same platform in 45 countries across six continents is a remarkable achievement in Vestas' history and technological leadership, underling our capability to leadership, underling our capability to stay ahead of the market with continuous product innovation and reductions in cost of energy," says Anders Vedel, Executive Vice President & CTO.

The breakthrough installation happened at a site of the 2 GW Wind XI project in Iowa with the installation of a V110-2.0 MW turbine. Developed by MidAmerican Energy Company, a subsidiary of Berkshire Hathaway Energy, Wind XI will be one of the biggest wind development projects in the US when fully operational.

The Wind XI project underlines the platform's strong fit for the US market, where the Vestas 2 MW platform alone makes up 12 percent of the total installed wind capacity – compared to 8 percent globally. With 10 GW of Vestas' 2 MW platform installed, the US – the world's second largest wind energy market – makes up around one quarter of the platform's global installed capacity.

Chris Brown, President of Vestas' sales and service division in the United States and Canada adds, "*The 2 MW platform has been instrumental in Vestas' success in the U.S., and has delivered maximum production and technology value for our customers. The continued product innovation and platform evolution have enabled incredible platform growth and we're proud of achieving this milestone here in the U.S.*".

Introduced in 2000 with the V80-2.0 MW turbine, the platform was upgraded with the new V116-2.0 MW and V120-2.0 MW turbines earlier this year.

The 20,000 2 MW turbines produce approximately 100,000 GWh annually.

About Vestas

Vestas is the energy industry's global partner on sustainable energy solutions. We design, manufacture, install, and service wind turbines across the globe, and with 87 GW of wind turbines in 76 countries, we have installed more wind power than anyone else. Through our industry-leading smart data capabilities and unparalleled more than 73 GW of wind turbines under service, we use data to interpret, forecast, and exploit wind resources and deliver best-in-class wind power solutions. Together with our customers, Vestas' more than 22,700 employees are bringing the world sustainable energy solutions to power a bright future.

Man cannot live by exchanging articles, but producing them, they live by work not trade. - JOHN RUSKIN (1819-1900) English art critic

INDIA'S HYBRID SOLAR-WIND-STORAGE PROJECTS TAKE SHAPE WITH TENDERS AND INNOVATIVE STEPS FORWARD

Plans are in place for a combined 160MW solar and wind project with up to 40MWh of energy storage in the Indian state of Andhra Pradesh, while a smaller scale demonstration project experimenting with multiple technologies is being developed for Kerala.

Bharat Reddy, deputy general manager, Solar Energy Corporation of India (SECI), told PV Tech that AP Solar Energy Corporation, AP Nedcap and AP Transco are planning to tender a project involving 120MW of solar, 40MW of wind and 20-40MWh of storage by March next year. The storage element will be technology agnostic.

SECI is providing some investment with backing from the World Bank and the plant will be located inside a new solar park in Anantpur in Andhra Pradesh. This will be the largest such system in India.

Kerala's demo project up for tender

Elsewhere, a tender for a large-scale, hybrid solar-wind-storage demonstration project in the Indian state of Kerala is due to be issued with one month, according the state nodal agency for the Ministry of New and Renewable Energy.

Speaking to our sister site PV Tech at Intersolar India 2017, Dr. HarikumarRamadas, director of the Agency for Non-Conventional Energy and Rural Technology (ANERT), said the technology demo would be located at Ramakkalmedu, including 3MW of solar, 4MW of wind, and battery storage.

Deliberately situated in a tourist zone, there are plans to launch a training centre on site, allowing the public to view the system and witness the performance evaluations and studies.

Ramadas said ANERT has already secured 40 hectares of land and a tender for project development is expected to be floated in the next month. The project, expected to require INR160 million (U$2.4 million) investment, already has administrative sanction from the government for its first phase. The whole programme is envisioned to take 2.5 to 3 years.

Rewarding innovation

Ramadas said the inverters will have an "indigenous" design from CDAC. Then Trivandrum-based Kerala government-affiliated electronics manufacturer KELTRON will be fabricating the inverter designed by CDAC.

Meanwhile, polycrystalline modules will be allocated to 2MW of the system, and 1MW will be divided into different categories of amorphous and monocrystalline module architectures.

Furthermore, an array of different module technologies will be deployed across 100kW with trackers and then again across 100kW without trackers.

On the energy storage front, ANERT will be collaborating with CECRI and most of the system will use lithium-ion batteries, with the rest dedicated to sodium sulphide (NAS), and then lithium ferro phosphate if possible.

ANERT in partnership with Kerala Renewable Energy Entrepreneurs and Promoters Association (KREEPA) will also be heading outside India to the Middle East next year to launch an investor meeting, where both organisations will campaign for investment from non-resident Indians.

G. Sivaramakrishnan, joint secretary, Kerala Renewable Energy Entrepreneurs and Promoters Association (KREEPA) said there is a huge amount of water bodies in the state, which can be used for floating solar. Pilot projects are under way, with a couple of projects are already delivered including at Wayanad.

Among others, the major initiatives of ANERT include installation of solar power plants in government buildings, arrangements with local self-governments for providing subsidy to those in need. It will also look to partner cooperative banks for providing financial support to install renewable energy systems and to give Viability Gap Funding (VGF) for innovative projects on a megawatt-scale undertaken by State public sector undertakings (PSUs).

https://www.energy-storage.news/news/indias-hybrid-solar-wind-storage-projects-take-shape-with-tenders-and-innov

HALF CUT SOLAR CELLS: NEW STANDARD IN PRODUCT?

While the overall technological design of a standard c-Si photovoltaic module is quite similar from one manufacturer to the other, there are certainly ways that manufacturers are adding features to gain an edge over competition, such as half cut solar cells.

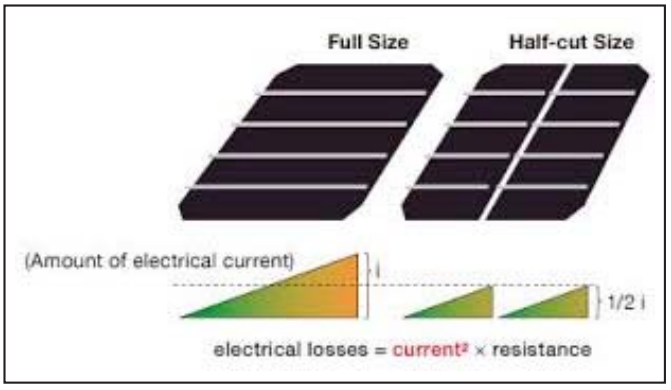
In this article we look into the technical features, advantages and possible disadvantages of solar PV modules with half cut solar cells, which are currently produced by manufacturers such as REC Solar, Mitsubishi and Solar world. Why cut solar cells in half?

Solar cells are cut in half to reduce the cell-to-module losses during assembly. Power loss is generally proportional to the square of the current times resistance. Therefore when cutting a solar cell in half, the power losses are reduced by a factor of four. As there is currently no specialized third party supply chain of half cut solar cells, the producers of such modules with half cut solar cells have to take care of the cutting step themselves.

During production it involves the additional step of cutting the solar cells with a laser and breaking them in two.

Electrical losses = current2 x resistance

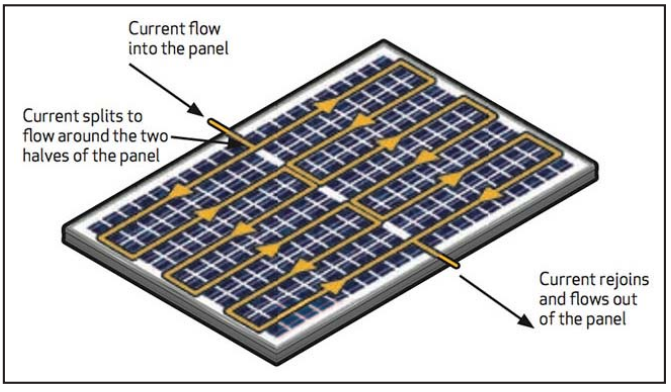
Half cut solar cells and higher efficiency: When the area of a solar cell is cut in half, the amount of electrical current that is carried by each busbar is reduced by half as well.



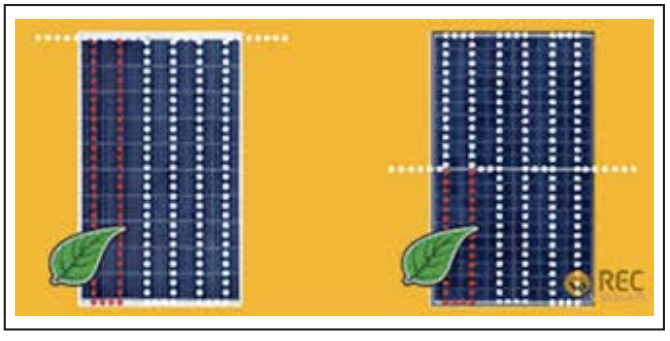
This decrease in electrical resistance within the busbars results in an overall increase in efficiency, especially during times of high irradiance, driven by significantly higher short-circuit current (Isc) and Fill Factor (FF). The actual increase in efficiency per manufacturer varies in the range of 1.5-3% efficiency increase, which is significant.

Half cut cell module design

Cutting solar cells results in half the current, and… double the voltage. Solar modules with double the voltage would be a disadvantage, as the higher string voltage would result in half the amount of modules that can be connected per string to the inverter.Therefore most manufacturers adopt the following string layout to produce voltages similar to standard solar modules:



The string layout of the REC TwinPeak series shown on the right side also helps to reduce internal resistance and ensure optimal power production when the solar module is partially shaded:



Half cut solar cells and manufacturing

One clear disadvantage of using half cut solar cells is the fact that it requires an additional step in the manufacturing process:

The solar cells need to be cut or rather 'grooved' using a **laser cutter** and are thus broken into two pieces. These half cut solar cells are typically sized 156×78 mm.

From a quality point of view, there may be potential disadvantages when it comes to half cut solar cells:

1. **twice as many soldering connections**, which increases the chances of (more) bad contacts
2. cutting solar cells into two may increase the chance of **cell-inherent defects** of course bad contacts and cell inherent defects can be prevented during manufacturing with proper quality control.

An additional step in manufacturing comes of course at an additional cost. Nowadays there are several companies that produce automated equipment for **half cut solar cell manufacturing**. The first integrated production cell cutting equipment has been developed by German **InnoLas Solutions GmbH** and another known player is **3D Micromac**.

Other ways for solar module differentiation?

Besides half cut solar cells, one trend we clearly see is the increase in the number of busbars. Similar to the use of half cut solar cells, using more busbars **reduces the inner electrical resistance**.

This decrease in inner resistance is achieved because the distances between the busbars are shorter and less current flows through each smaller electrode where resistance is the highest. Using multiple busbars certainly leads to higher efficiency, and can reduce the effects of cell inherent defects.

JinkoSolar and Halfcell Tech

Many Indian clients have placed orders for 2018 delivery, says Donald Leo, Managing Director of Asia South, JinkoSolar

JinkoSolar has been a pioneer in solar technology so as to bring maximum value to our clients. The all newhalf-cut cell technology comes with fivebusbars and offers reduced internal current loss during generation. Further they have improved stress equilibrium and subsequently shield risks of micro cracks. Opting for half-cut cell modules will be a true value proposition for the buyers.

When is JinkoSolar planning to introduce half-cut cell technology in India?

We have successfullyintroduced our new half-cut cell modules to India; ramping up our production capacities in China and Malaysia factories. Many Indian clients have expressed strong interest and several key clients have placed long firm orders for 2018 delivery.

Is it feasible to switch to halfcut cell technology in both commercial and residential sectors in India?

Half-cut module technology is very suitable for commercial and residential projects. It has good efficiency and power output. India's residential market is still at a nascent stage and has huge potential. Once demand takes off in the segment, half-cut modules will be ideal as they will consume less space, absorb more radiation and give better output.

What potential does it have to boost RE market in India?

India's solar market is gradually maturing in all aspects including capacity, technology, pricing, longevity and return on projects. Jinko is committed to the Indian market and taking efforts to bring the latest technology and best-in-class products so as to support the growth and development of the PV industry here. Half-cut cell technology, once penetrates in the region will be very fruitful in achieving the 100GW solar target of the Indian government. It's all about generation and this technology is the best for this purpose.

Will the hidden costs like transportation make half-cut cell technology an expensive commodity?

Half-cut modules have comparatively higher manufacturing cost and would eventually reflect on the final pricing of the modules. However, the additional cost is justified. These modules guarantee higher yield and generation on ground. So the extra premium paid is equivalent to the corresponding value that a customer gets on this purchase.

If the technology catches up in the market, is JinkoSolar prepared to meet the demand for half-cut modules in India?

JinkoSolar's strength lies in mass production of good quality PV modules. So far, we have shipped 4.9GW in 2017 and are currently the leading PV manufacturer globally. We are expecting to close the year with about 9GW shipment. India as market needs good quality and technologically superior modules that are reliable over their 25-year life span. This is where Jinko's expertise and products come in. We are well prepared to cater to heavy demand of Half cut modules from the Indian market.

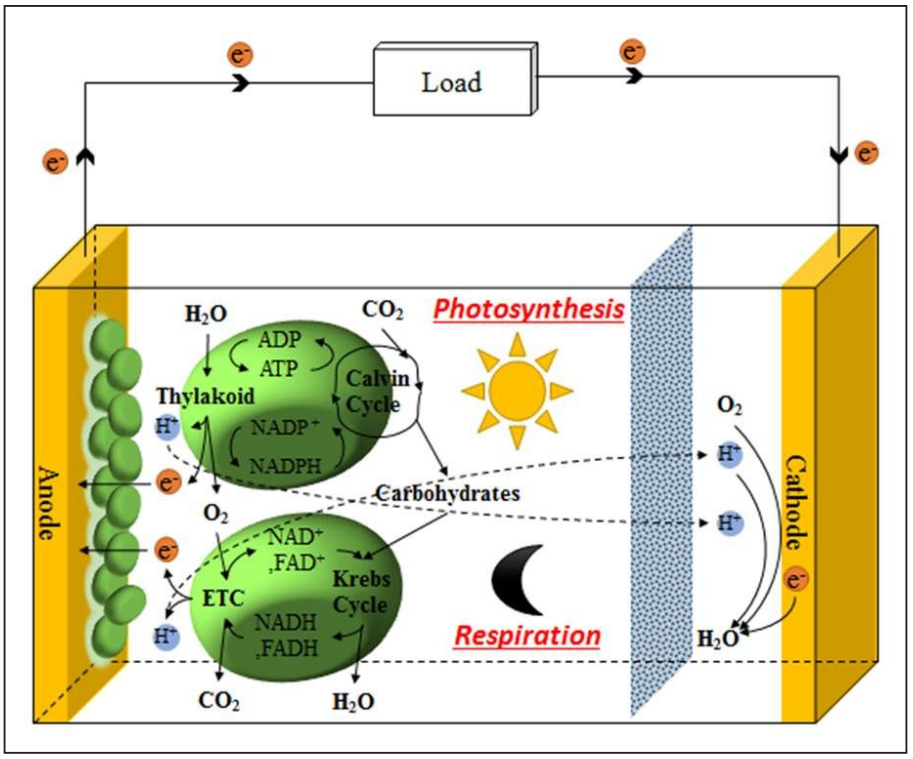
How will this technology fare in future?

Half-cut modules are set to take the global and Indian market by storm. The future of solar tech lies in higher number of busbars and half-cell presents this option to the market and also gives increased output by 5W than conventional alternatives. Solar developers have all the reasons to move to half-cell technology and maximize gains/returns from a project.

Courtesy: Energy Next

WALLPAPER BIO-SOLAR PANEL

A two-in-one solar bio-battery and solar panel has been created by researchers who printed living cyanobacteria and circuitry onto paper.



Cyanobacteria are photosynthetic micro-organisms that have been on Earth for billions of years. They are thought to be the primary reason why the Earth's atmosphere is oxygen rich. Now, a team has demonstrated that cyanobacteria could be used as an ink and printed from an inkjet printer in precise patterns onto electrically conductive carbon nanotubes, which were also inkjet-printed onto the piece of paper. The team showed that the cyanobacteria survived the printing process and were able to perform photosynthesis so that small amounts of electrical energy could be harvested over a period of 100 hours.

A bio-solar panel made in this way, the approximate size of an iPad, could power a simple digital clock, and in separate experiments, a small LED light bulb. The researchers from Imperial College London, the University of Cambridge and Central Saint Martins suggest their breakthrough could lead to new types of electrical devices that are made from paper and printed photosynthetic bacteria. These could include disposable power supplies integrated into paper-based sensors for monitoring patients with diabetes or devices that resemble wallpaper but are in fact environmental sensors for monitoring air quality in the home.

New type of renewable energy The solar bio-battery pushes forward research into a new type of renewable energy technology currently being developed by scientists globally called microbial biophotoltaics (BPV). It exploits the ability of cyanobacteria and other algae that use photosynthesis to convert light energy into an electrical current using water as the source of electrons.

One of the advantages of using BPVs to harvest energy from cells like cyanobacteria is that they can produce small amounts electricity in daylight and carry on producing it even in the dark from molecules produced in the light. Some of the current limitations that scientists have previously faced when developing BPVs are that they are expensive to make, have low power output, and a short lifespan. All these drawbacks have prevented scientists from being able to scale up the technology to an industrial level. New types of paper-based sensors The researchers suggest BPVs could be used in new forms of sensors built entirely from paper, which would mean that they are cheaper and more cost effective to make with less impact on resources and the environment.

Next steps The current paper-based BPV unit is a palm size. The next step will see the team scale up their proof-of-concept to A4 size to determine the electrical output on a larger scale. **Professor Christopher Howe,** *a co-author from the Department of Biochemistry at the University of Cambridge,* added: **"This is an exciting proof-of-concept. The challenge now is to make panels that are more powerful, long-lasting and robust."** Source and top image: Imperial College London

Read more at: https://www.energyharvestingjournal.com/articles/13111/wallpaper-bio-solar-panel

REDUCE, REUSE, RECYCLE *- Every 3000 sheets of paper costs us a tree - so consider the impact of using paper on the Environment*

ENERGY, ELECTRICAL ENERGY AND RENEWABLE ENERGY – 6

Sustainable Growth, Sustainable Electrical Energy and Renewable Energy

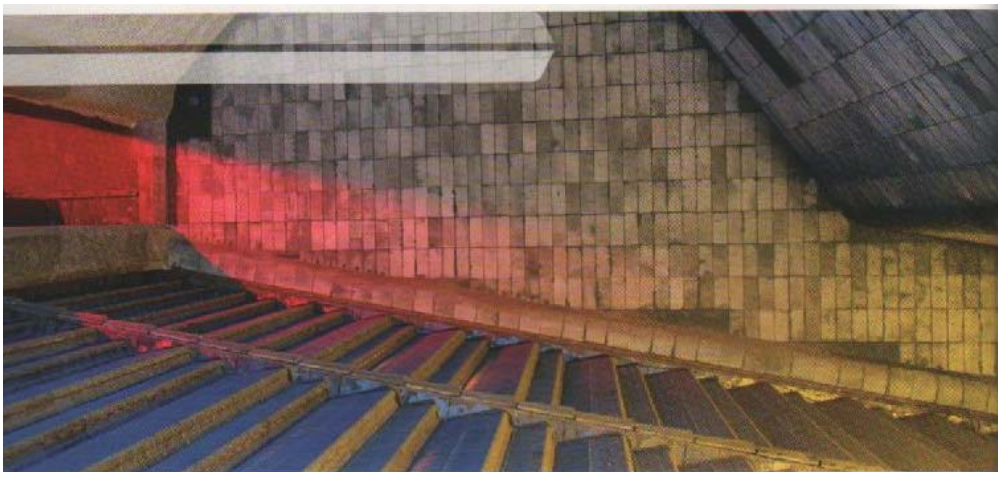
Thermo Chemical Technologies – Combustion Technology

For a country like India, with substantial availability of Biomass from large clusters of different activities, plantations, agriculture and villages and municipalities all over the country, combustion technologies for designing plants of different capacities ranging from around 5 MW to 50 MW ratings could help generate Electricity in very large measure, with the concept decentralized distributed generation. The plants with capabilities of bulk loading of biomass of different types and sizes and differing moisture contents up to around 30 to 40%, and needing least preparation of fuels (no chipping, cutting, powdering etc) could be most apt to exploit the Bio Electricity potentials.

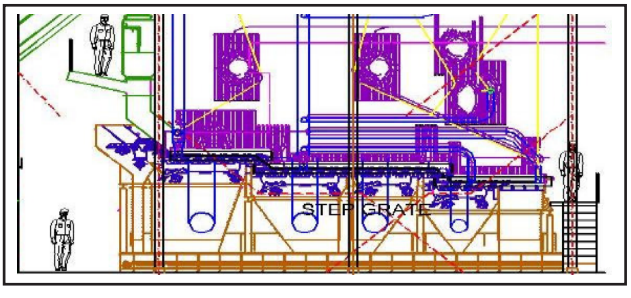
Focusing on grate designs and building the boilers around the grates are successfully done in many parts of the world and local developments and adaptations in these lines could be very relevant to our country as we seem to have substantial potentials still unexploited. Agricultural wastes being burnt in Punjab and large quantities of poultry wastes generated in Tamilnadu, plantation wastes from palmyrah and coconut are some good examples of bulk and regular availability of biomass and combustion technologies could be the solution.

We will now see some of the proven examples of Biomass combustion technologies and the concepts can help develop solutions to suit the local available biomass, the challenges and the needs.

Large spaced Grate to use Municipal Wastes



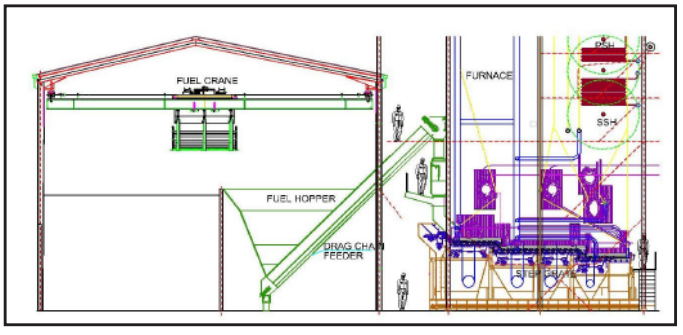
Special Grates for bulk agricultural wastes



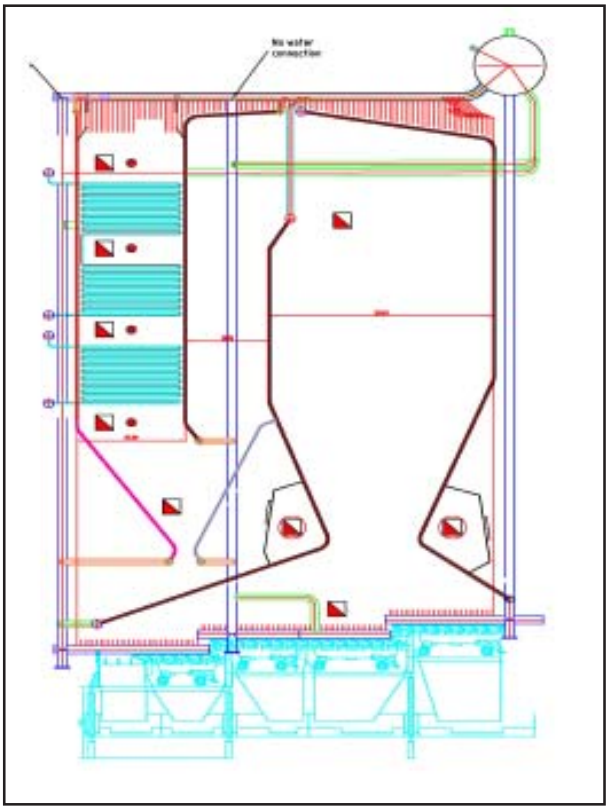
Segmented and Stepped vibrating and travelling Grate for all kinds of 'Difficult Biomass'

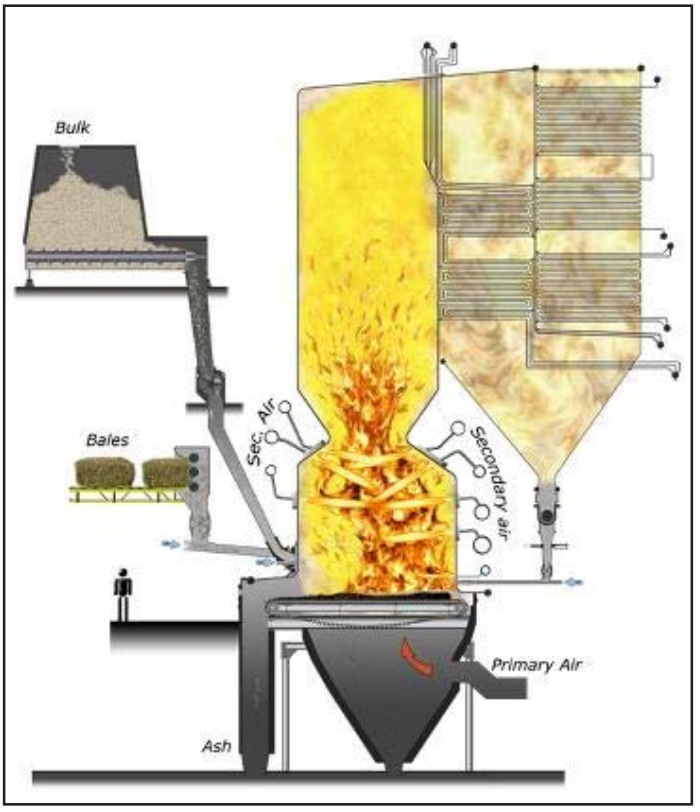
Buik Biomass loading arrangements examples

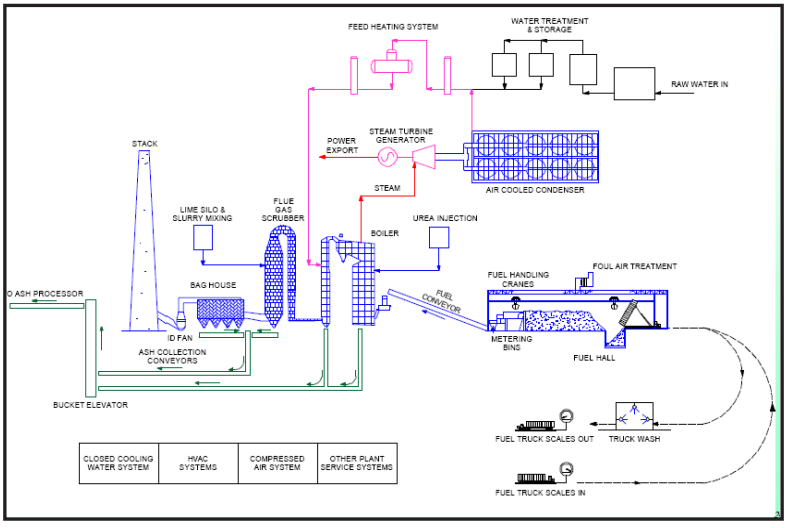
The Fuel feeding system consists of chain conveyors feeding the fuel to the weigh gates. The weigh gates feed measured quantities of fuel to the grate in a sequence.



Examples of Boilers built around the grates with 'Membrane Water Walls' built to act as heat exchangers to the water.







A typical Plant Functional Diagram of Biomass Power Plant

Poultry clusters of Tamilnadu with generation of over 5000 Tons of wastes per day, could be an excellent area to put up some plants with these technologies and planning around 10 Plants of 10MW each could be feasible.

(To be continued)

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Consultant,
Energy and Energy Efficiency,
Mobile: 98401 55209

PAWAN MUNJAL | *Hero Group* | ENTREPRENEUR

If you thought all of India's business leaders were born with a silver spoon in their mouth, you are wrong. Even those who were heirs to established business empire, made it a point to equip themselves academically to tackle the challenges posed by the winds of change and uncertain future.

Pawan Munjal, the Managing Director and CEO of Hero Corp Ltd is a graduate in Mechanical Engineering. He is on the boards of IIM Lucknow and Indian School of Business, Hyderabad.

When GM and Chrysler have gone "belly up", here is Munjal, worthy son of Brijmohan Lal Munjal, 85, who arranged all-expenses-paid trip to Macau and Hong Kong for his best 200 dealers! That is one way to bring up the loyalty factor in your dealer organization as well as bonding factor, a biggest asset for the future.

It is almost a "Believe It Or Not Story" of a family who after the partition; settled down in Ludhiana and the four Munjal brothers started as traders to start manufacturing from bicycle parts to cycles to mopeds to motor cycles. Now pawan is working on "Bottom of the Pyramid" in the rural market through his highly motivated dealer network.

Pawan is all set to steer Hero Moto Corp through the many battles ahead with his carefully laid plans. He is today deeply involved in a closely guarded project to quickly chivvy up Hero's technological capabilities. The 250 new engineers are working on acclimatizing the two-wheeler technology to Indian conditions. The main focus remains the 100 cc segment where the company has a leadership position. Despite a slowdown in the auto sector, Munjal sees Hero becoming a $10 billion (Rs.54,000 crore) company by 2017, selling 10 million motorcycles annually. By incorporating an off-shore investment subsidiary in the Netherlands and also initiating exports to South America and Africa, his company has now moved towards becoming a global company. Market studies are on and they plan to customize their offerings for each market. The Munjals signed a multi-year deal to take title sponsorship of the Hockey India League. **India Today High and Mighty power list 2013, Pawan has been marked ranked no 37.**

HUMOUR

THE 21st CENTURY

Our Phones	-	Wireless
Cooking	-	Fireless
Cars	-	Keyless
Food	-	Fatless
Tires	-	Tubeless
Dress	-	Sleeveless
Youth	-	Jobless
Leaders	-	Shameless
Relationships	-	Meaningless
Attitude	-	Careless
Wives	-	Fearless
Babies	-	Fatherless
Feelings	-	Heartless
Education	-	Valueless
Children	-	Mannerless

புரதச் சுரங்கம் - 8

பொங்கல் படையல் பயறு – மொச்சை

மொச்சை பயறுத் தாவரம், அவரைக் குடும்பத் தாவரங்களுள் (.ஃபேபேசியே) முக்கியமானது. தமிழகத்தில் புரதத் தேவையை நிறைவு செய்வதற்காக அதிகம் பயன்படுத்தப்படும் காய்கறி வகை, அவரைக் குடும்பத் தாவரங்களே. அந்த வகையில் மொச்சை மிக முக்கியமானது.

பொங்கல் பண்டிகைக்கான படையல் விருந்தில் மொச்சைப் பயறு முக்கிய இடம் பிடித்திருக்கிறது. மொச்சை கெட்டிக்குழம்பு, மொச்சைப் பிரட்டல் போன்றவையும் பிரபலமானவையே. தமிழகம் மட்டுமல்லாமல் மகாராஷ்டிரம், கர்நாடகம், தெலங்கானா உள்ளிட்ட தென்னிந்திய மாநிலங்களில் புரதத் தேவையை நிறைவு செய்யும் முக்கியப் பயறு வகை இது.

பயன்பாடு

மொச்சைப் பயறு, பயிராக்கப்பட்ட தாவரங்களில் மிகப் பழமையான ஒன்று. ஆப்பிரிக்காவில் தோன்றியதாகக் கருதப்படும் இந்தத் தாவரம், உலகெங்கும் உள்ள வெப்பமண்டலப் பகுதிகளில் உண்ணப்படுகிறது.

மொச்சையில் பல்வேறு வகைகள் உண்டு. வகைக்கு ஏற்பப் பல்வேறு வடிவம், அளவு, நிறங்களில் நெற்று இருக்கும். பொதுவாகப் பிரகாசமான கருஞ்சிவப்பு, வெளிறிய பச்சை நிறங்களில் நெற்று காணப்படும். விதைகள் வெள்ளை, பழுப்பு, சிவப்பு, கறுப்பு நிறங்களில் வருகிறது. நாட்டு மொச்சை வகையும், பாம்பு மொச்சை வகையும் பரவலாக அறியப்பட்டவை.

மொச்சையும் அவரைக்காயும் ஒரே குடும்பத்தைச் சேர்ந்தவை. மொச்சையின் மேலுறையைச் சாப்பிட முடியாது, கடினமாக இருக்கும். உள்ளிருக்கும் விதை சாப்பிடப்படுகிறது. அதேநேரம் அவரைக்காயை மேலுறையுடன் சமைத்துச் சாப்பிடலாம். ஆனால், அவரை விதை காய வைத்துச் சாப்பிடப்படுவதில்லை.

மொச்சையின் விதை பச்சையாகவும் காய வைக்கப்பட்ட பிறகும் சமைத்து உண்ணப்படுகிறது. மொச்சையில் டானின், டிரைப்சின் போன்றவை இருப்பதால் சமைப்பதற்கு முன் ஊறவைத்து, மேற்கண்ட வேதிப்பொருட்களை நீக்க வேண்டும். அவித்தே சாப்பிட வேண்டும். உப்பு, சேர்த்து அவித்தால் சுவையாக இருக்கும்.

மொச்சை பயற்றை முளைகட்டி மேல்தோல் நீக்கிச் சாப்பிட்டால். அதற்குப் பெயர் பிதுக்குப் பருப்பு. மொச்சையை ஊற வைத்து, மேல்தோலை நீக்கிவிட்டு உப்பு, காரம் சேர்த்து உலர்த்தி, நெய் விட்டு வறுத்துச் சாப்பிடுவது கிராமத்து நடைமுறை. சில இடங்களில் உப்பு, கார்ப்பு இன்றி வேறு காய்கறிகளுடன் கலந்தும் பயன்படுத்தப்படுகிறது.

மொச்சை பயற்றை உண்பதால் சிலருக்கு அரிப்பு ஏற்படும். அதைத் தவிர்ப்பதற்கு மதுரை, விருதுநகர் மாவட்ட மக்கள் நூதன முறையைப் பயன்படுத்துகின்றனர். மொச்சையை அவிக்கும்போது, முழு தும்பைச் செடியை இட்டு அவித்தால் மொச்சை சிறிது இனிப்பைப் பெறும், அரிப்பும் ஏற்படாது.

சாப்பிடும் போது தும்பையை நீக்கிவிடலாம்.

மற்றப் பயன்கள்

பொதுவாகப் பயறுக்காகக் பயிரிடப்பட்டாலும், கால்நடைத் தீவனமாகவும் அலங்காரத் தாவரமாகவும் மருத்துவத் தாவரமாகவும் கூட இது வளர்க்கப்படுகிறது. புதர் போல வளரும் இந்தத் தாவரம் கேழ்வரகு, கம்பு, சோளம், இருங்குசோளம், நிலக்கடலை, ஆமணக்கு போன்றவற்றுக்கு இடையே ஊடுபயிராகவும் பயிரிடப்படுவது உண்டு.

மண்ணில் நைட்ரஜனை நிலை நிறுத்துவதற்கு மொச்சை உள்ளிட்ட அவரைக் குடும்பத் தாவரங்களைப் பயிர் சுழற்சி முறையில் பயன்படுத்துவது வழக்கம். அது மட்டுமல்லாமல், மொச்சைத் தாவர இலைகள் மக்குவதன் காரணமாகவும் மண்ணுக்கு அதிக அளவில் நைட்ரிஜன் கிடைக்கிறது. அதனால் மூடாக்கு பயிராகவும் இயற்கை உரமாகவும் மொச்சைத் தாவரம் பயன்படுத்தப்படுகிறது. வறட்சியிலும் தாக்குப்பிடிக்கக்கூடிய திறனைக் கொண்டது.

ஊட்டச்சத்து

- மொச்சையில் 20-28 சதவீதம் புரதம், அதேபோல வைட்டமின்களும், கனிமச்சத்தும் அதிகம்.
- காய்ச்சலை மட்டுப்படுத்தும், அளவாகச் சாப்பிட்டால் வயிற்றுப் பொருமலைக் குறைக்கும், செரிமானத்தைத் தூண்டும். மலத்தைப் பெருக்கும்.

- வலிப்பு நோயை மட்டுப்படுத்தும்.
- உடலைத் தேற்றக்கூடியது.
- நமீபியாவில் மொச்சையின் வேர் இதயக் கோளாறுகளுக்கு மருந்தாகப் பயன்படுகிறது.
- பிலிப்பைன்ஸ், சீனாவில் பாலுணர்வு தூண்டியாக மொச்சை கருதப்படுகிறது.
- கேன்யாவில் உள்ள கிகுயு பழங்குடிகள் பால் கொடுக்கும் தாய்மார்களுக்கு மொச்சைப் பயற்றையும் வாழைப்பழத்தையும் காலம்காலமாகக் கலந்து கொடுத்து வருகின்றனர். எனவே, சத்து மாவுக் கலவையிலும் மொச்சையைச் சேர்த்துக்கொள்ளலாம்.
- வாயுவைக் தூண்டும் என்பதால், இதை அடிக்கடி பயன்படுத்துவதைத் தவிர்க்கலாம்.

தாவரவியல் பெயர்: Lablab purpureus

ஆங்கிலப் பெயர்: Lablab-bean / Indian bean

நவதானியங்களில் ஒன்று

- உடலை வளர்க்கும் இனிப்பு சுவை கொண்டது மொச்சை. உடலுக்குக் குளிர்ச்சித் தன்மையைக் கொடுக்கக் கூடியது. **'கோர உட்டிணம் தணிக்கும்'** என்ற சித்தர் அகத்தியரின் பாடல் வரியின் மூலம், மிகுதியான உடல் சூட்டை மொச்சை குறைக்கும் என்பது தெளிவாகிறது.
- பாலுண்ணி (Molluscum contagiosum) மீது மொச்சையை உரைத்து வெளிப்பிரயோகமாகத் தொடர்ந்து பூசிவர, பாலுண்ணி மறையும் என்கிறது சித்த மருத்துவக் குறிப்பு.

Courtesy: ஆதி வள்ளியப்பன், தி இந்து, 20.08.2016

விழித்திரை: நோய் காட்டும் கண்ணாடி

கணினி நிறுவனம் ஒன்றில் பணிபுரியும் இளம் பெண் தன்னுடைய கண் திடீரென மங்கலாகத் தெரிந்ததால், கண்ணை பரிசோதனை செய்துகொள்ள மருத்துவமனைக்குச் சென்றுள்ளார். அவர் கண்களைப் பரிசோதித்த கண் மருத்துவர் அவருடைய விழித்திரையில் ரத்தக் கசிவு உள்ளதாகவும் அதனால்தான் பார்வை மங்கலாக இருப்பதாகவும் தெரிவித்தார்.

இளம் வயதில் இப்படி விழித்திரை ரத்தக் கசிவு ஏற்படுவதற்கு நீரிழிவு நோய், ரத்தக்கொதிப்பு போன்றவை காரணமாக இருக்கலாம் எனக் கருதப்பட்டது. விழித்திரை ரத்தக் கசிவு ஏற்பட்டதற்கான காரணங்களைக் கண்டறிய ரத்தப் பரிசோதனை செய்து பார்த்தபோது, அவருக்கு சிறுநீரகம் செயலிழந்து காணப்பட்டது.

இரண்டாவது சம்பவம்

விழித்திரையை பார்த்து சிறுநீரக பாதிப்பை எப்படிக் கண்டுபிடிக்க முடியும் என ஆச்சரியத்துடன் மனதுக்குள் முணுமுணுக்கும் உங்களுக்கு இன்னொரு ரகசியமும் சொல்கிறேன். அரசு மருத்துவமனைக்கு ஒரு நாள் நடந்துவந்தால் இழுப்பு வாங்குகிறது. களைப்பாக இருக்கிறது. முகம் வீங்கிக்கொள்கிறது. பார்வை மங்கலாக இருக்கிறது என்று வந்த 46 வயதுப் பெண்மணியின் விழித்திரையை கண் மருத்துவர் பரிசோதித்தார். அந்த பெண்ணுக்கு புற்றுநோய் இருக்கலாம் எனக் கருதி ரத்தப் பரிசோதனை செய்து பார்த்தபோது, அவருக்கு ரத்தப் புற்றுநோய் இருப்பது உறுதிசெய்யப்பட்டு மேல்சிகிச்சைக்காக அனுப்பி வைக்கப்பட்டார். எப்படி இதைக் கண்டுபிடிக்க முடியும்?

அந்த பெண்ணின் விழித்திரையை பரிசோதித்தபோது அந்த விழித்திரையில் ரத்தக் கசிவு இருந்தது. அந்த ரத்தக் கசிவின் மையத்தில் வெள்ளையாக இருக்கும். அதற்கு பெயர் தான் ரோத் ஸ்பாட் (Roth spot).

அது இருந்தால் இதய வால்வு பாதிப்பு (infective endocarditis), ரத்தப் புற்றுநோய், உடலில் மற்ற பகுதிகளில் உள்ள புற்றுநோய் இருப்பதைக் கண்டுபிடிக்கலாம்.

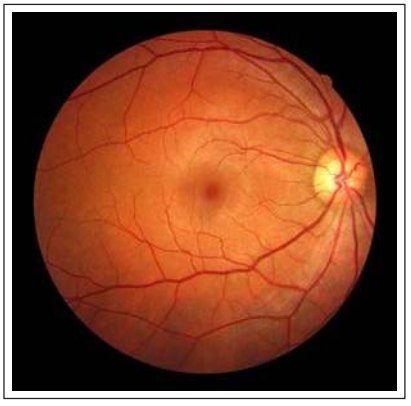
மூன்றாவது சம்பவம்

கல்லூரியில் படிக்கும் தன் மகளை அழைத்துக் கொண்டு பிரபல கண் மருத்துவமனைக்கு ஒரு தாய் சென்றார். தன் மகளுக்கு ஓராண்டாக பார்வை மங்கி இருப்பதாகவும், ஓராண்டுக்கு முன் பார்வைக் குறைபாடு காரணமாக கண்ணாடி அணிந்ததாகவும், தற்போது கண்ணாடி அணிந்தாலும் பார்வை சரியாகத் தெரியவில்லை என்றும் தெரிவித்தார்.

அவரை பரிசோதித்த கண் மருத்துவர் பார்வை நரம்பு வீங்கி இருந்த காரணத்தால் தலைக்கு எம்.ஆர்.ஐ. ஸ்கேன் எடுத்துப் பார்த்ததில் அவருடைய மூளையில் பிட்யூட்டரி சுரப்பியில் கட்டி இருப்பது கண்டுபிடிக்கப்பட்டது. பின் மூளைப் பகுதியில் அறுவைசிகிச்சை செய்யப்பட்டது. சரியான நேரத்தில் கண்டுபிடிக்கப்படாமல் இருந்திருந்தால் அவருக்கு பார்வை பறிபோயிருக்கும். மூளைக் கட்டி ஆபத்தை ஏற்படுத்தியிருக்கும்.

எப்படிக் கண்டுபிடிக்கலாம்?

ஆயிரக்கணக்கான சிலந்தி வலைகளை ஒன்றின் மேல் மற்றொன்று அடுக்கிவைத்தால் எப்படி இருக்குமோ அப்படித்தான் சிறுசிறு நரம்புக்கற்றைகள் அடுக்கப்பட்ட ஒரு அமைப்பு நம் விழித்திரை.



கேமராவில் உள்ள மெமரி கார்டு போலத்தான் மனிதனின் விழித்திரை உயிரோட்டமாக இருக்க சிறுசிறு ரத்த நாளங்கள் விழித்திரை நரம்புக்கற்றைகளிடையே படர்ந்திருக்கும். அந்த விழித் திரை நரம்புக்கற்றைகள் ஒன்றுகூடி பார்வை நரம்பாகவும், அந்த சிறுசிறு ரத்த நாளங்கள் ஒன்றுகூடி ரத்தக் குழாயாக மாறி பார்வை நரம்பின் மையக் பகுதி வழியாக மூளைக்கும் செல்லும்.

நம்முடைய மூளை பயா, அரக்கினாய்டு, டியூரா என்ற மூன்று சவ்வுகளால் சூழப்பட்டுள்ளது. முதல் இரண்டு சவ்வுகளுக்கு இடையில் சென்ரல் சீரஸ் திரவத்தில்தான் மூளை மிதக்கிறது.

அந்த திரவம் மூளையிலிருந்து கண் நரம்பு நுணிப் பகுதிவரை பரவியிருக்கும். மூளையில் எந்த பாதிப்பு ஏற்பட்டாலும். அதாவது கட்டி ஏற்பட்டு சி.எஸ்.எப். திரவத்தின் சுரப்பு தடைபட்டாலோ அல்லது கிருமி பாதிப்பில் அதிகமாகச் சுரந்தாலோ, மூளை நீர் அழுத்தம் அதிகமாகி அது மூளை நரம்பை வீக்கம் அடையச் செய்யும்.

ஆண்டுக்கு ஒரு முறை விழித்திரை பரிசோதனை செய்துகொள்வதன் மூலம் நமது மூளையில் ஏதாவது பிரச்சினை இருந்தால் முன்கூட்டியே கண்டுபிடித்துவிடலாம்.

ரத்தக்கொதிப்பு பாதிப்பு

ஒரு நாள் திருமண நிகழ்ச்சியில் போட்டோ எடுத்துக்கொண்டிருந்த ஒரு போட்டோகிராபர் திடீரென ஒரு கண்ணில் பார்வை சுத்தமாகத் தெரியவில்லை என மருத்துவரை சந்தித்தபோது, அவரைப் பரிசோதித்த கண் மருத்துவர் அவருடைய விழித்திரையில் உள்ள முக்கியமான பகுதியான மேக்குலாவில் ரத்தக் கசிவு ஏற்பட்டு, அந்த பகுதி வீங்கி இருப்பதைக் கண்டுபிடித்தார். இது கண்ணில் ஏற்படும் ஸ்டிரோக் (Stroke).

இளம் வயதில் ரத்தக் கசிவு ஏற்பட்டதால் சந்தேகமடைந்து அவருடைய ரத்த அழுத்தத்தைப் பரிசோதித்தபோது 200/100 இருந்தது. உடனடியாக அதற்கான சிகிச்சை அளிக்கப்பட்டது.

ரத்த அழுத்தம் அதிகமாகிக் கண்ணில் ரத்தக் கசிவு உண்டாகிறது. கண் ரத்தக் குழாயில் தற்போது ஏற்பட்ட கசிவு மூளையில் உள்ள ரத்தக் குழாயில் ஏற்பட்டிருந்தால், ஒரு கை, ஒரு காலை இயக்க முடியாமல் பக்கவாதம் ஏற்பட்டிருக்கும். கண்ணில் ஏற்பட்டதால் சிகிச்சை மூலம் சரி செய்யப்பட்டது.

உடல் நலனை மீட்கலாம்

நமது உடலில் உள்ள சிறுசிறு ரத்தக் குழாய்களை நேரடியாகப் பார்க்கும் வாய்ப்பு கண் விழித்திரையில் மட்டுமே சாத்தியம்.

அந்த ரத்தக் குழாயின் தன்மையும் கிட்னி, இதயம், மூளையில் உள்ள சிறுசிறு ரத்தக் குழாயின் தன்மையும் ஏறக்குறைய ஒரே தன்மையுடன் இருப்பதால் கண்ணில் இருக்கும் ரத்த குழாயில் பாதிப்பை காணும்போது அதற்கு இணையான பாதிப்பு இதயம், சிறுநீரகம், மூளையில் உள்ள சிறுசிறு ரத்த குழாய்களிலும் பாதிப்பு இருக்க வாய்ப்புள்ளது.

அதனால் நீரிழிவு நோயாளிகளை பொறுத்தவரை கண் விழித்திரை பரிசோதனை ஒரு முழு உடல் பரிசோதனையை செய்வதற்குச் சமம்.

ஆண்டிற்கு ஒரு முறை அனைவரும் கண் பரிசோதனை செய்துகொள்ள வேண்டும். குறிப்பாக நீரிழிவு நோயாளிகள், ரத்தக் கொதிப்பு உள்ளவர்கள், கண்ணாடி அணிந்திருப்பவர்கள், கண் அறுவைசிகிச்சை செய்துகொண்டவர்கள், குழந்தைகள் அனைவரும் வருடத்துக்கு ஒருமுறை விழித்திரை பரிசோதனை செய்துகொள்ள வேண்டும்.

அதன்மூலம் விழித்திரையில் பதிந்திருக்கும் நம் உடல்நலம் சார்ந்த ரகசியங்களைக் கண்டு, உடல் நலத்தை மீட்கலாம்.

கட்டுரையாளர்:
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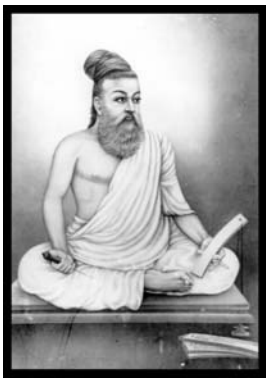
அரசு கண் மருத்துவர்
தொடர்புக்கு:
kpranganathan83@gmail.com

Courtesy: தி இந்து,
தேதி: 10.02.2018

TIRUKKURAL AND MANAGEMENT IN A 'NUTSHELL' - 59



We are coming across lot of frauds in recent times involving Business Organizations, Financial Institutions and the Management personnel operating in all these places. Tiruvalluvar has dealt with the necessity for all persons to abstain from fraudulent activities of any kind in their functioning and 'Transactions' in order to live a 'Noble and Blissful Life' without any blemish.

Some of the Kurals below bring out the essence of Value, Name and Fame and the importance of abstaining from frauds.

"Ellamai Venduvaan Enbaan Enaiththuondrum ullamai Kakkathan Nenju Kural 281

எள்ளாமை வேண்டுவான் என்பான் எனைத்துஒன்றும்
உள்ளாமை காக்கதன் நெஞ்சு குறள் 281

"Whoso wanteth not to be held in contempt, let him guard himself against every thought of fraud"

"Kalavinaal Aagiya Aakkam Alavuirandu Aavathu Polak Kedum Kural 283

களவினால் ஆகிய ஆக்கம் அளவுஇறந்து
ஆவது போலக் கெடும் குறள் 283

"The fortune that is built up by fraud may appear to thrive; but it is doomed forever"

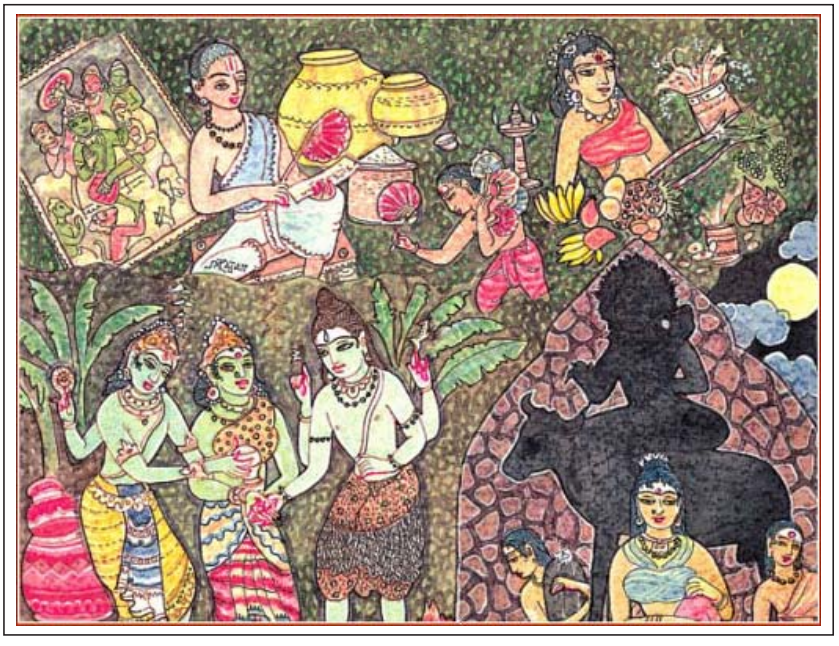
"Kalvarkkuth Thallum Uyirnilai; Kallaarkkuth Thallathu Puththe Ulagu Kural 290

கள்வார்க்குத் தள்ளும் உயிர்நிலை; கள்ளார்க்குத்
தள்ளாது புத்தே ளுலகு குறள் 290

"He that deceiveth others is not master even of his own body; but the world of Gods itself is an ever failing inheritance unto those that are upright"

HOME FESTIVALS - 4

சித்திரை - Chitrai (April/May)



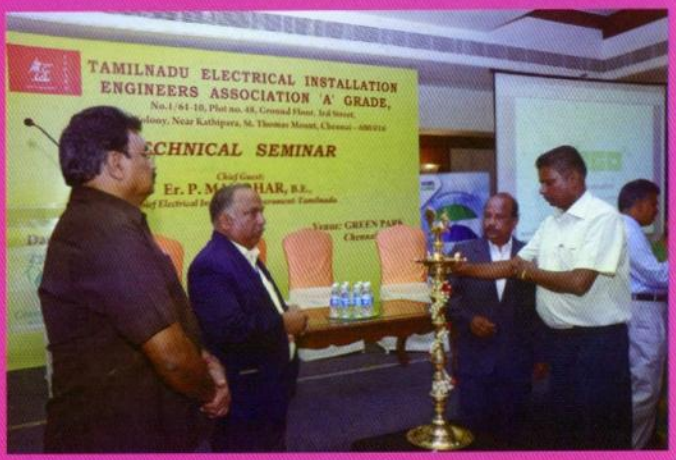
This month begins with the completion of Ram Navami, the nine days of celebration of Lord Rama's birth ages ago, which started in the previous month. At the upper left we see a decorated picture of Lord Rama's coronation. Next (Proceeding clock wise) comes a Vaisnava priest telling the stories of Lord 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)***

TECHNICAL SEMINAR PHOTOS – 31.01.2018

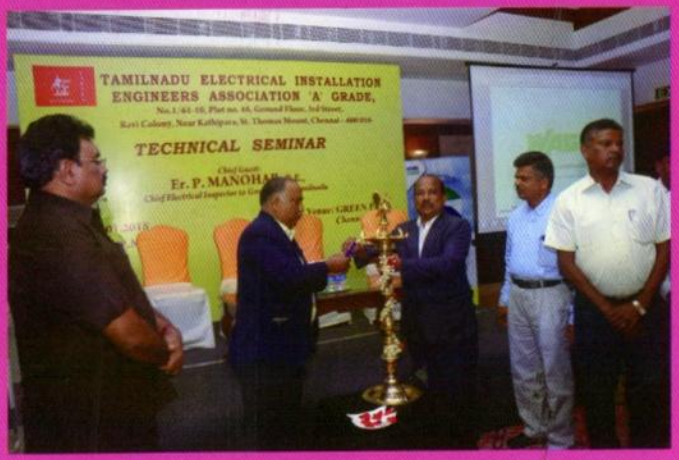
Lighting the Kuthuvilakku by
Mr. P. Manohar, *CEIG*

Lighting the Kuthuvilakku by
Mr. C. Karthikeyan, *Electrical Inspector*

Lighting the Kuthuvilakku by
Mr. D. Karthikeyan, *Electrical Inspector*



Lighting the Kuthuvilakku by
Mr. M. Sakthivel, *Electrical Inspector*

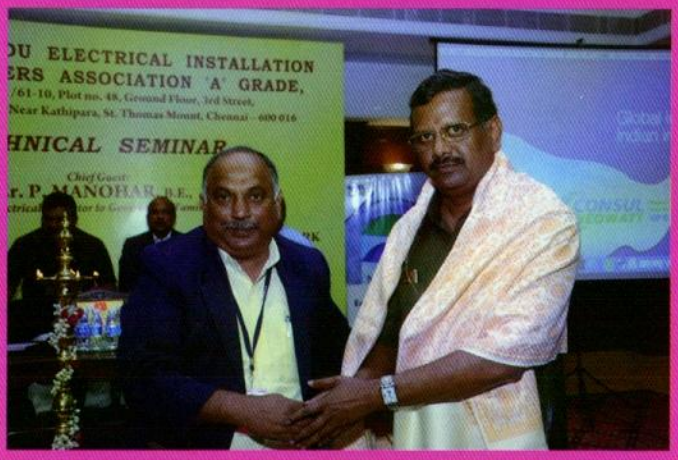


Lighting the Kuthuvilakku by
Er. S. Gopalakrishnan, *Secretary, TNEIEA*

Welcome Address by
Er. S.D. Poongundran, *President, TNEIEA*

Inaugural Address by **Mr. P. Manohar**, *CEIG*

Er. S.D. Poongundran, *President, TNEIEA* honouring **Mr. P. Manohar**, *CEIG*



Er. S. Gopalakrishnan, *Secretary, TNEIEA* honouring **Mr. C. Karthikeyan,** *Electrical Inspector*

Mr. M. Balamurugan, *Treasurer, TNEIEA* honouring **Mr. D. Karthikeyan,** *Electrical Inspector*

Mr. V. Rangarajan, *TNEIEA* honouring **Mr. M. Sakthivel**, *Electrical Inspector*

Mr. K. Buththan, *Chennai VP, TNEIEA* honouring **Mr. M. Murugan**, *Asst Electrical Inspector*

Er. S.D. Poongundran, *President, TNEIEA*
honouring **Mr. D. Santhanam,** *TNEIEA*

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Presenting Technical Papers by
Mr. K.G. Deenathayalan, *VP-Sales, Consul Neowatt Power Solutions Pvt. Ltd.*

Presenting Technical Papers by
Mr. Lohithasan Potti, *GM – Product Management, Consul Neowatt Power Solutions Pvt. Ltd.*

Mr. J. John, *Tirunelveli VP*, TNEIEA
honouring **Consul Neowatt Power Solutions Pvt. Ltd. Team**

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Mr. G. Rajagopalan, *TNEIEA* honouring,
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Mr. S. Karthikeya Pandiyan,
Joint Secretary, *TNEIEA* honouring
Sunbeam Generators Pvt Ltd Team

Vote of Thanks by
Er. S. Gopalakrishnan, *Secretary*, *TNEIEA*

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