ELECTRICAL INSTALLATION ENGINEER

NEWS LETTER

TAMILNADU ELECTRICAL INSTALLATION ENGINEERS' ASSOCIATION 'A' GRADE (Regn. No. 211/1992)
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EDITORIAL

Dear Members, Fellow Professionals and Friends,

SEASONS GREETINGS TO ONE AND ALL!

June month is marked by observance of "World Environment Day" on the 5th by all people of the World to remind ourselves of the Dangers if we do not ensure a Safe and Healthy Environment. Engineers from all over India and from all over the World observe this day as they certainly have a greater responsibility than all the other Professionals. The Government and all the Professional and people bodies observe the **World Environment Day** this year on theme **"Beat Plastic Pollution".**

It is a matter of pride that India is the global host of 2018 World Environment Day. Mr. Erik Solheim, United Nations Under-Secretary-General and Head of UN Environment, said that India has demonstrated tremendous global leadership on climate change and the need to shift to a low carbon economy, and India will now help galvanize greater action on plastics pollution. It's a global emergency affecting every aspect of our lives.

Energy is one of the very fundamental and very necessary area in functioning of the world today and Science, Engineering and Technology play the important role of both providing Energy and use of Energy. It is basically, provision of Energy in the form of Fuel and Electricity and use of it in all spheres of activities, be it Agriculture or Homes or Townships or Transportation or Commercial and Industrial activities. With the advancement of civilization and comforts, the World, particularly the advanced countries have all become very high Carbon Economies, as mostly the sources of Energy are "Fossils" like Coal and Petroleum and the uses have become enormous. In-Efficient use of Energy contributes further to increased use of Energy and increase of 'Carbon'. Basically the World can march towards low carbon economy only through Reduction in use of Energy, Use of Energy with highest levels of Efficiency and Switching over to Renewable Sources of Energy instead of Fossils. Science and Engineering and Technology clubbed with the attitude and behavior of people can only help correct the course and save the situation. "Waste to Energy" is the basic concept, be it Bio Energy or Solar or Wind Energy or Energy from flowing waters and lot of Technologies are being developed continuously which need to be supported even at higher costs, to drastically reduce dependence on fossils.

'**BEAT PLASTIC POLLUTION**' is the theme of the year which should become an all time concern and the solution will also come under 'Waste to Energy' technologies and presently solutions are available to convert it to Heat or Electricity or Oil. Any process, be it Textiles or Leather or Chemicals and Pharma or smelting for metals or many other processes, they are all associated with generation of pollutants as well and Engineering and Technology can address all these to achieve '0' pollution. This can be achieved only through enforcement of norms strictly and through self imposed commitments by all involved in the processes.

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

EDITOR

"The environment is everything that isn't me". – ALBERT EINSTEIN

ELECTRICAL INSTALLATION ENGINEER

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KNOW THY POWER NETWORK - 129

From this month, let us deal with some interesting topics that are useful to the understanding the performance of our Electrical Power supply system. Significant among them are the vital equipment failures in the networks with the consequential longer interruption of supply. As a policy, the Electricity Board never reveal the reasons for such equipment failure with its attendant stoppage of power supply for long duration. Invariably they never made public the proposed corrective measures also to avert its recurrence. Everything is generally kept secret or under wraps. To the common consumers, it may be difficult to understand the factors responsible for such events; yet as end users we have an inalienable right to get the details of such happenings. With this end view, this article has been brought out. It may be treated as a part of the learning curve of the readers.

On 07.05.2018 (Sunday) around 8 pm, the oil filled Current Transformer provided on 230 KV Sriperumbudur Kadapperi. No: 1 Transmission circuit at kadapperi 230 KV sub-station located (near Tambaram) had met with a disruptive failure. As it exploded, the ceramic parts of external insulator were blown to pieces and spread over to larger areas with the attendant risk of causing injuries to nearby operating personnel or damages to other equipment in the vicinity.

The current transformers are critical links in an electrical supply network. These high accuracy instrument transformers transform the high current of the transmission circuits to the standardised low and easily measurable values providing the vital link for protection and energy. They just mirror / transmit all that happen in the bulb power system.

These transformers, virtually the passive components of the transmission part of the electricity grid, represent a vital safety link in the protective chain. They lie at the interface between the large transmission circuit, which carries a massive flow of electrical energy and the low power sensitive protection and control system. This low power system provides the critical signals for Circuit Breaker Operation and maintains the network reliability and security. To meet the present day demands of highly reliable and maintenance – free operation, these transformers are manufactured with much care for quality and precision. They are subjected to a continuous process of evaluation and testing. Very high levels of efficiency, trouble-free performance, safety and reliability are ensured by the manufacturers.

Normally these transformers render service with the desired efficiency and complete their assigned service lives without major deviation or disordered. Yet at times pre-mature failure of these transformers do occur. In addition, and helpfully, the operating and maintenance wing of the department also fail to understand its importance and vitality and take it for granted that sustained functioning. This kind of sort focus at times may create gaps in the loop between the vital bulk power systems and its sensitive controls, endangering all the connected equipment with the possible costly disturbances in the net work. The recent trend in the failure of these transformers is an indication of this fact.

I. Construction, Testing and Maintenance of these Transformers.

In this kind of transformers, the oil impregnated insulation paper constitutes the main compounded of the system. The active parts are mounted inside a porcelain enclosure to ward off the entry of moisture ingress. Oil minimum types are generally used and they are invariably hermeneutically sealed. An expansion room is provided for the sealed transformer oil and it is normally filled with Nitrogen gas. All the joints are normally kept below the oil level.

The primary winding consists of several parallel conductors (Aluminium / Copper) and enclosed with condenser types layer. These layers of the primary winding provide the required port for capacitor voltage divider and a tap is brought out through a small bushing for performing the periodical diagnostic "Tan delta test" for the insulation. Brass metal bellows are used for providing the required space for the expansion of inside current transformers during its service life.

It is a maintenance – free equipment. Its life span is 25 – 40 years (Designed) but the present level is 15 – 20 years. Hence there is no need for its periodical maintenance except for its cleaning and inspection for any hot spot / glow / oil leakage / breakage, loose connections and contamination. Inspite of these advantages, certain maintenance / diagnostic tests (Health Checks) are periodically conducted to ensure its trouble-free service life.

Amongst them are,

- Periodical inspection for oil level, oil leaks, fall in the gas pressure, gas leaks, contamination / cracks in the porcelain housing, defects in the pressure diaphragm, gaskets and loose connections (by adopting thermal imaging methods)
- Periodical checks on the characteristic features of the "main insulation". Insulation resistance, Tan delta measurement and voltage with stand levels. Limiting values for Tan delta – a trend setter test - 3 percent; (May) capacitance 50 to 400 PF or 2 times the reading recorded at the time of its consuming.
- Periodical checks on the characteristics of the oil impregnation used. (Dissolved Gas Analysis, Breakdown Voltage, Water Content, Interfacial Tension, Acidity and other cleaning tests).
- Check for the leakage of Nitrogen gas; replace or refill the bushings with dry Nitrogen gas (once in 5 years)

To repeat in a nut shell the recommended diagnostic test for an in service current transformer

S. No	Stress	Diagnostic Techniques
1	Mechanical	Gas / oil Pressure in the enclosure, bellow position, oil level indicator. Inspection for oil and water content in the oil.
2	Thermal	Thermo vision checking the gases in oil by performing oil chromatographic DGAs test.
3	Chemical	Acidity, IFT, Viscosity and other prescribed screening tests on oil
4	Dielectric	Insulation, Resistance, Tan delta and Capacitance, voltage withstand levels

These health checks may be systematically included in the diagnostic programmes as prescribed for other sub-station equipment. These diagnostic lists should not interfere the normal operation of the CTs under any circumstances. These off-line tests may be carried out held periodically and on special occasions only.

Among the diagnostic tests as out lined above, the detection of hot spots (using Thermal Imaging Techniques) DGAs tests on oil and Tan delta and insulation resistance measurements on the solid oil impregnated insulation assume greater significance because they provide vital and valuable information about a health status of the CT (Current Transformer). More over these special checks may be required when any incident of "over

stress" occurred in the station concerned or the equipment are nearing very closed to end of its service life (aged equipment) and other events related to higher electric stress may be related to the events like electrical stress (over voltages brought by close up lightning strikes, switching surges or over current / short circuits close up feeder faults or bus faults, abnormal thermal stress brought by high ambient temperature, over loaded operation, poor ventilation, contamination, blocking of oil / air cooling and ventilation paths and finally excess mechanical and seismic stresses. Now it is time for us to turn our attention on the causation factors for insulation deterioration and finally its failure. To begin with, just a peep through of factors responsible for the failure of these current transformers is attempted. These factors and the corrective methods to face them will be discussed in detail in the forth coming articles.

Let me sign off here.

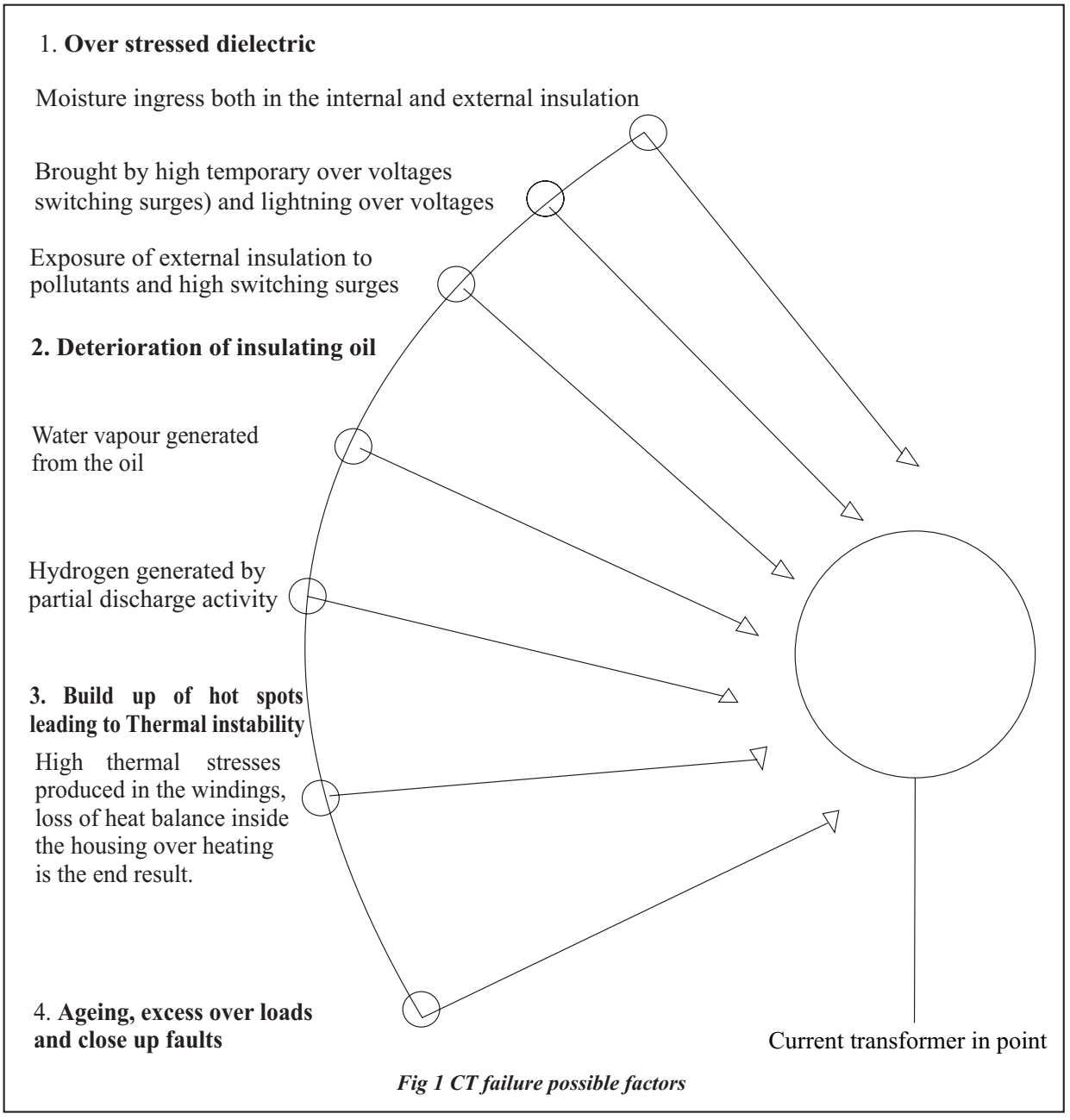

Fig 1 CT failure possible factors

(To be continued…)
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INDIA TO HOST WORLD ENVIRONMENT DAY 2018

- India is the global host of 2018 World Environment Day which will take place on June 5, 2018.
- With "Beat Plastic Pollution" as the theme for this year's edition, the world is coming together to combat single-use plastic pollution.
- In the time it takes Hardik Pandya to bowl an over in a cricket match, four garbage trucks worth of plastic get dumped into the ocean.

New Delhi, 19 February 2018 – Today, Dr. Harsh Vardhan, Minister of Environment, Forest and Climate Change, and Erik Solheim, United Nations Under-Secretary-General and Head of UN Environment, jointly announced that India will be hosting the global World Environment Day celebrations on 5 June 2018.

"Beat Plastic Pollution", the theme for World Environment 2018, urges governments, industry, communities, and individuals to come together and explore sustainable alternatives and urgently reduce the production and excessive use of single-use plastic polluting our oceans, damaging marine life and threatening human health.

"India is excited to host the World Environment Day this year on June 5. Indian philosophy and lifestyle has long been rooted in the concept of co-existence with nature. We are committed to making Planet Earth a cleaner and greener place", said Dr. Harsh Vardhan.

He added: "If each and every one of us does at least one green good deed daily towards our Green Social Responsibility, there will be billions of green good deeds daily on the planet."

The Government of India has committed to organizing and promoting the World Environment Day celebrations through a series of engaging activities and events generating strong public interest and participation. From pan-Indian plastic clean-up drives in public areas, national reserves and forests to simultaneous beach clean-up activities – India will lead the initiative by setting an example.

"India will be a great global host of 2018's World Environment Day celebrations," said Erik Solheim at the announcement on Monday.

He added: "The country has demonstrated tremendous global leadership on climate change and the need to shift to a low carbon economy, and India will now help galvanize greater action on plastics pollution. It's a global emergency affecting every aspect of our lives. It's in the water we drink and the food we eat. It's destroying our beaches and oceans. India will now be leading the push to save our oceans and planet."

India is emerging as a leader, given it has one of the highest recycling rates in the world. It can be instrumental in combating plastic pollution. By hosting World Environment Day 2018, the Indian government is accelerating its leadership on an issue of tremendous magnitude.

World Environment Day is a UN Environment-led global event, the single largest celebration of our environment each year, which takes place on June 5 and is celebrated by thousands of communities worldwide.

Since it began in 1972, it has grown to become a global platform for public outreach that is widely celebrated across the globe.

Most of all, World Environment Day is a day of everyone around the world to take ownership of their environment and to actively engage in the protection of our earth.

Plastic Pollution facts:

- Every year the world uses **500 billion** plastic bags
- Each year, at least 8 million tonnes of plastic end up in the oceans, the equivalent of a full garbage truck every minute.
- In the **last decade**, we produced more plastic than in the whole **last century**
- 50 percent of the plastic we use is **single-use** or disposable
- We buy 1 million plastic bottles **every minute**
- Plastic makes up **10% of all of the waste** we generate

For more information about World Environment Day and Plastic Pollution, visit: www.worldenvironmentday.global

"Environmental concern is now firmly embedded in public life: in education, medicine and law; in journalism, literature and art". – *BARRY COMMONER*

A CHANGING ENERGY MIX: TRENDS IN THE POWER GENERATION MARKET

The way we generate electricity is rapidly changing, and this change has been prompted by concerns related to climate change and the cost of power generation.

These concerns will result in natural gas and non-hydro renewable energy sources such as wind and solar power becoming the preferred sources of power generation worldwide. Though hydropower generation will continue to be used in certain parts of the world such as South America, Canada, and Eastern Europe, growth will not be significant as most of the potential has been exploited already, and because of concerns regarding the environmental fallout of constructing large barrages.

The growth of renewables around the world

In the North American and European regions, the change in the generation mix is already visible in the switch from coal to gas and the expansion of wind and solar power generation. These are being prompted by the availability of abundant natural gas from newly discovered shale gas deposits in the US as well as governmental regulations restricting carbon emissions.

The Asia-Pacific (APAC) region will lead the global additions in solar power capacity, mostly through contributions from China and India. Countries such as Japan that until recently depended on nuclear power generation too are turning to renewables. Japan is even creating its renewable certificate trading market in 2018 to promote a robust environment for the growth of renewables.

The expansion in renewable power generation in these countries will be mostly favoured by a rapidly plummeting cost of installations, further accentuated by government policy that favours reverse bidding mechanisms over feed-in tariffs (FiTs). The fall will bring solar power generation costs almost to the same level as thermal power generation. However, this region will also lead global additions in coal-based generation due mainly to its need for cheap energy resources for base load generation.

In the US and Canada, factors central to the change in the generation mix are governmental regulations and the cost of generation. In both these countries, the current and future increase in gas-based generation is aided by favourable economics related to operation of gas-based power plants, confidence in long-term fuel supply, and government regulations that favour lower carbon emissions. Over the past decade, more efficient combined-cycle gas plants are being constructed. A study by the US Energy Information Administration (EIA) concluded that the cost of building natural gas generators declined by 28% between 2013 and 2015 (Geuss, 2017).

Cheap coal isn't everything

Coal-based generation in the APAC region has witnessed a higher growth rate compared to other regions largely due to the availability of cheaper coal in the region. Countries such as China, Australia, and Indonesia are the largest producers of high-grade coal in the world. India, which has witnessed high demand for electricity in the last decade, produces as well as imports coal from Indonesia, Australia, and some Central Asian countries such as Kazakhistan. Access to cheap coal in these countries as well as fewer restrictions on the use of coal for power generation has allowed coal-based generation to flourish.

While the above factors have encouraged utilities to construct new gas-based facilities, old coal-based facilities are also being converted to gas-based power generation. Providing impetus to these conversions are government regulations. For example, in Canada in 2015, the government of Alberta announced the mandatory phase-out of coal-based power plants by 2030.

Adoption of solar and wind power has been aided by the rapidly declining costs of power generation from these technologies. Initially, governments sought to encourage solar and wind installations through FiT schemes. The decrease in costs has made it possible for these schemes to be replaced by reverse bidding mechanisms, leading to a boom in the construction of utility-scale power projects. Such booms have been more evident in the APAC region in countries such as China and India and in South American countries such as Brazil and Chile. Auctioning or reverse bidding of renewable energy capacity has been facilitated by the fall in equipment costs in solar and wind power technologies.

The substitute: Coal-to-biomass

The move away from coal is leading to another emerging trend, the conversion of coal-to-biomass. Wood pellets are being more extensively used in North American and European markets where this conversion has mostly occurred, while in Japan, where utilities have taken up biomass firing to substitute for nuclear power generation, palm kernel shell is mostly being used.

Coal-to-biomass conversion in the coming years will be more pronounced in countries such as Japan, South Korea, and Canada. Public resistance to nuclear energy and a rapidly increasing market for renewables will be the main driver for the biopower market in Japan, while in South Korea a scandal-hit nuclear power sector and environmental concerns will be the main movers for biomass. South Korea is the largest importer of wood pellets needed for power and heat generation in the APAC region. The recent announcement by the Canadian government to decommission coal-fired power plants by 2030 will drive conversion to biomass in the future.

The expansion of renewable power generation, particularly solar and wind power, and their associated intermittency has led to the emergence of the energy storage sector. The deployment of advanced energy systems has mostly happened in the US, and North America accounts for nearly half of all deployments in the world. The APAC region accounts for another 25% of deployments while around 20% of deployments have happened in Europe.

It is therefore concluded that environmental concerns and the rapidly falling price of renewable equipment will provide the impetus for faster growth of natural gas and non-hydro renewable power generation. Although, in many parts of the world, lawmakers are still constrained by the notion that renewables cannot provide base load power due to their intermittency, growth in the manufacturing capacity of energy storage devices will drive prices down making the adoption of even this technology economically viable, and thus nullifying the intermittency rationale. This will perhaps pave the way for non-hydro power generation technologies to dominate the power generation scenario in the future.

For more insight and data, visit the GlobalData Report Store – Power Technology is part of GlobalData Plc.

"Earth provides enough to satisfy every man's needs, but not every man's greed".
– MAHATMA GANDHI

WHAT ARE THE MOST EFFICIENT SOLAR PANELS ON THE MARKET?

For those looking for the most efficient solar panels for their PV system, the first thing you need to know is how to compare efficiency metrics for different manufacturer brands. Simply put, efficiency (expressed as a percentage) quantifies a solar panel's ability to convert sunlight into electricity. Given the same amount of sunlight shining for the same duration of time on two solar panels with different efficiency ratings, the more efficient panel will produce more electricity than the less efficient panel.

In practical terms, for two solar panels of the same physical size, if one has a 21% efficiency rating and the other has a 14% efficiency rating, the 21% efficient panel will produce 50% more kilowatt hours (kWh) of electricity under the same conditions as the 14% efficient panel. Thus, maximizing energy use and bill savings is heavily reliant on top tier solar panel energy efficiency.

The High Efficiency Solar Panel Brands

Many consumers and people in the solar industry consider efficiency to be the most important criterion when assessing a solar panel's quality. While it is an important criteria, its not the only one to consider while you evaluate whether to install a particular solar panel. Solar panel efficiency relates to the ability of the panel to convert energy at a low cost and high supply rate.

The most efficient commercially available solar panels on the market today have efficiency ratings as high as 22.5%, whereas the majority of panels range from 15% to 17% efficiency rating. **SunPower panels are known for being the most efficient solar panel brand available on the market. Though they will come with a higher price tag, SunPower will often be the consumer favourite for anyone concerned with efficiency as a primal metric of interest.** However, check out Exhibit 1 (below) to learn about all the top brands and the most efficient solar panels you can get your hands on.

The cost of solar is dropping across the nation. See prices in your area and get free solar quotes on the EnergySage Marketplace.

Maximum Production or Maximum Offset: If your goal is to maximize the amount of electricity your system produces or want to ensure you buy the least amount of electricity from the utility, but the amount of roof space you have available to install solar panels is limited in size, you may choose to install higher efficiency solar panels. This will ensure you get the maximum production from your solar panel system.

Cost vs. Value: More efficient solar panels tend to cost more than their less efficient cousins. You may want to analyze whether that upfront cost difference is justified by the increased saving achieved by generating more electricity over the lifespan of your solar energy system. Increased electricity production means you have to buy less power from your utility and in some states, may also generate higher SREC income. The EnergySage Solar Marketplace makes it easy for you to easily compare your savings from solar panels that vary in their efficiency ratings and if their premium price is justified.

How Efficient are Solar Panels? Efficiency Comparison Table

The two tables below present different views of the efficiency characteristics of the leading manufacturers who sell solar panels in the United States. Most panel manufacturers produce several solar panel models which range in efficiency ratings. The leading brands in this category will be those that utilize high efficiency solar cells such as LG and SunPower (who have battled back and forth for the world solar efficiency record) who are widely considered to be the top panel brand on the market for solar efficiency. However, it's important to understand the difference between setting a maximum efficiency record and maintaining strong and consistent average solar energy efficiency ratings. Therefore, the following two solar efficiency tables (Exhibit 1 and Exhibit 2) break down the best ways to compare different solar panel options by module efficiency metrics.

Exhibit 1 illustrates the range of each manufacturer's offerings from the standpoint of panel efficiency whereas Exhibit 2 lists the average, minimum and maximum solar panel efficiency for the solar panels within each manufacturer's portfolio.

Exhibit 1

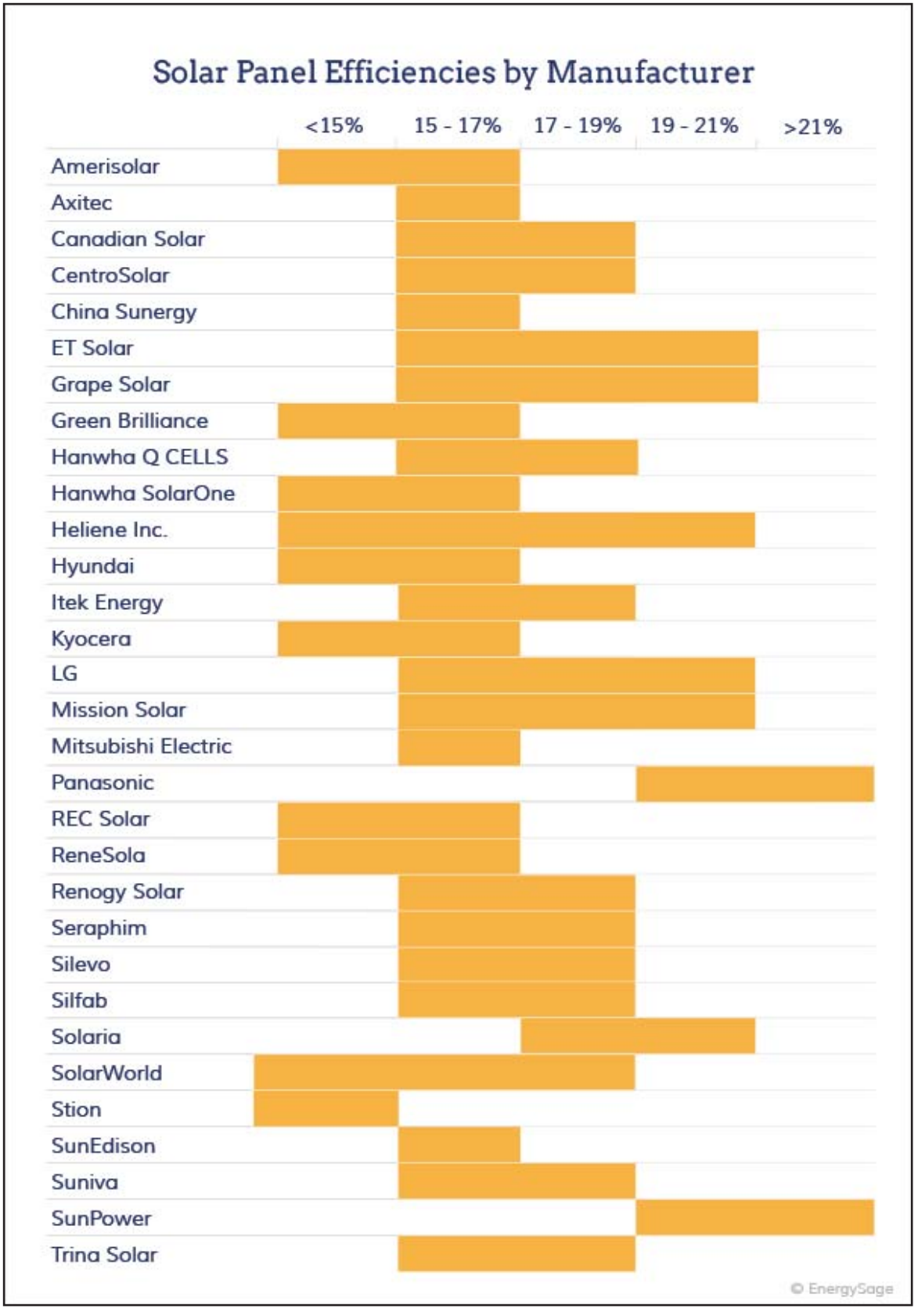
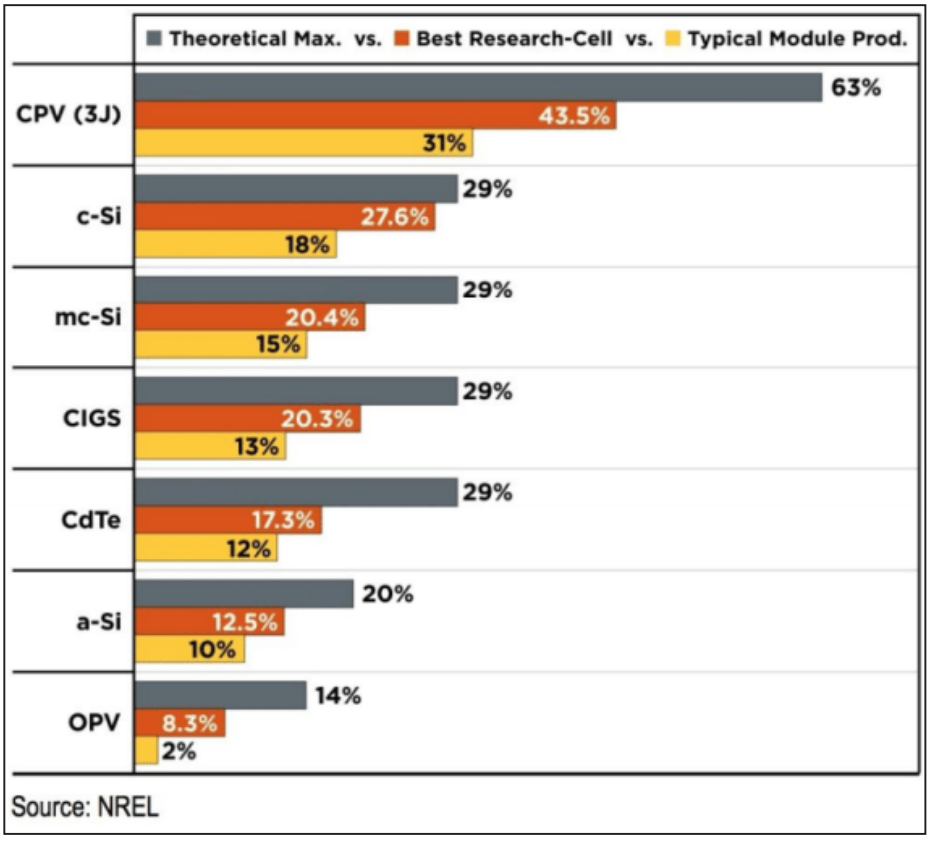


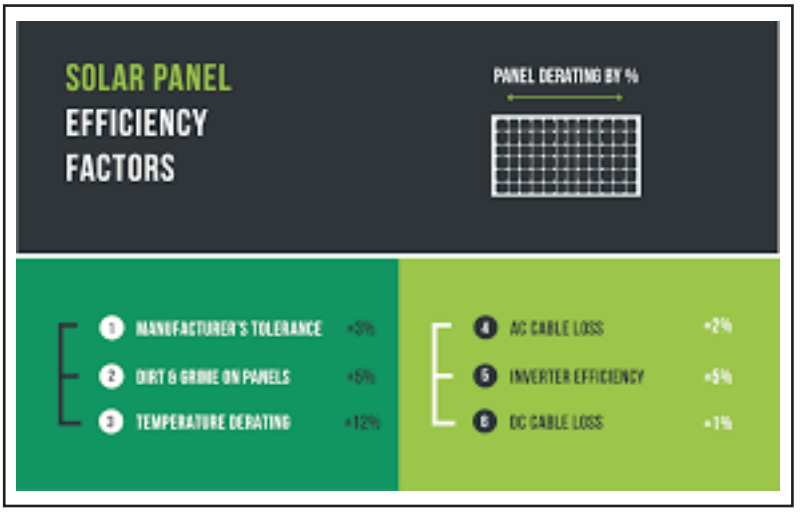
Exhibit 2: Efficiency Rating of PV Models by Solar Panel Manufacturer

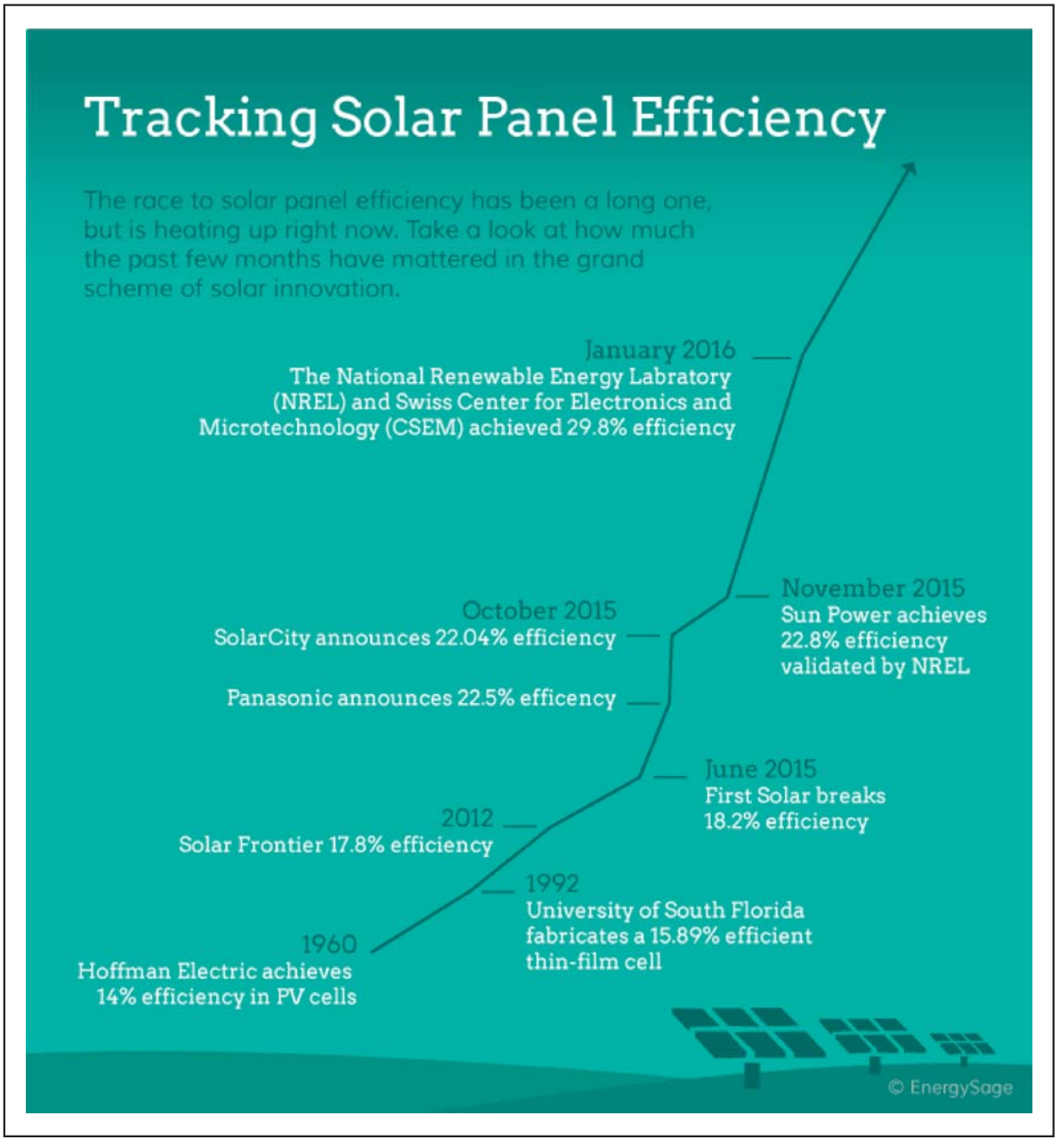
Solar Panel Manufacturer	Minimum Efficiency (%)	Maximum Efficiency (%)	Average Efficiency (%)
Amerisolar	14.75	17.01	15.97
Axitec	15.37	16.9	16.1
Canadian Solar	15.88	17.72	16.58
CentroSolar	15.3	17.8	16.21
China Sunergy	14.98	16.53	15.78
ET Solar	15.37	17.52	16.51
Grape Solar	16.21	17.64	16.75
Green Brilliance	14.24	15.58	15.03
Hanwha Q CELLS	15.9	18.3	16.97
Hanwha SolarOne	14.7	16.2	15.45
Heliene Inc.	15.6	19.3	17.31
Hyundai	14.2	16.5	15.37
Itek Energy	16.49	18.94	17.71
JinkoSolar	15.57	18.57	16.95
Kyocera	14.75	16.11	15.42
LG	16.8	19.5	18.28
Mission Solar	15.98	18.36	17.18
Mitsubishi Electric	16.3	16.9	16.6
Panasonic	19	21.6	20.3
REC Solar	14.5	17	15.62
ReneSola	14.9	16.9	15.91
Renogy Solar	15.3	18.5	17.3
Seraphim	15.67	17.52	16.55
Silevo	16.9	18.5	17.7
Silfab	15.3	18.4	16.75
Solaria	18.7	19.3	19
SolarWorld	14.91	17.59	16.64
Stion	12.4	14	13.2
SunEdison	15.5	16.8	16.12
SunivaInc	16.66	17.65	17.14
SunPower	19.1	22.2	20.58
SunSpark Technology	15.2	16.1	15.65
Trina Solar Energy	15.2	17.8	16.3

by Vikram Agarwal in News.energysage

Tier	Efficiency	Percent of all Panels	Laymen Terms
1	>=16%	~Top 5%	**Most Efficient Tier**
2	>=15%	~Top 20%	**Above Average Efficiency**
3	>=14%	~Top 55%	**Average Efficiency**
4	>=13%	~Top 85%	**Below Average Efficiency**
5	>=13%	~Bottom 15%	**Least Efficient Tier**




SOLAR PANEL
EFFICIENCY
FACTORS
PANEL DERATING BY %
1 MANUFACTURER'S TOLERANCE +3%
2 DIRT & GRIME ON PANELS +5%
3 TEMPERATURE DERATING +12%
4 AC CABLE LOSS +2%
5 INVERTER EFFICIENCY +5%
6 DC CABLE LOSS +1%


Tracking Solar Panel Efficiency
The race to solar panel efficiency has been a long one, but is heating up right now. Take a look at how much the past few months have mattered in the grand scheme of solar innovation.
January 2016
The National Renewable Energy Labratory (NREL) and Swiss Center for Electronics and Microtechnology (CSEM) achieved 29.8% efficiency
November 2015
Sun Power achieves 22.8% efficiency validated by NREL
October 2015
SolarCity announces 22.04% efficiency
Panasonic announces 22.5% efficency
June 2015
First Solar breaks 18.2% efficiency
2012
Solar Frontier 17.8% efficiency
1992
University of South Florida fabricates a 15.89% efficient thin-film cell
1960
Hoffman Electric achieves 14% efficiency in PV cells
© EnergySage

AUDI ETRON

Audi is preparing to launch an all-electric SUV in the Indian market by 2020. The Audi E-tron that has already garnered pretty much attention across the world is all set to be launched globally in 2020. Apart from the rest of the world, Audi is also aiming to roll out the car here. Audi plans to launch three fully electric cars in global market by the end of this decade.

However, lack of charging infrastructure for the electric vehicles remains a concern for the Volkswagen AG owned luxury car brand. Despite Indian government's aim to introduce zero emission pure electric mobility across the country by 2030, charging infrastructure is not adequate for the expansion of electric vehicle market in India. In that case, by launching the E-tron here, Audi will have a chance to assess the situation before introducing more zero emission products here. Apart from the E-tron, the Audi e-tron Sportback coupe styled SUV and the Audi e-tron GT gran turismo are the two other models expected to be launched in global market by 2020. Interestingly, Volkswagen owned German luxury car brand Porsche too has announced that it will roll out an electric car in India by 2020.

Considering the fact that India could become a global giant in terms of electric mobility, several auto manufacturers are aiming to grab a large chunk of the pie. Audi too doesn't want to stay behind in the race as other luxury carmaker like Mercedes-Benz has already revealed its plan to launch EV in India.

Generating 102 hp of electric power, a 75 kW power rating and nearly instantaneous torque, the liquid cooled, permanent-magnet-driven electric motor delivers the kind of impressive acceleration that drivers will envy. Along with the 1.4-litre turbocharged TFSI® engine, the 2018 Audi A3 Sportback e-tron® has all it needs to provide low-end torque and high-end power. With available Audi active lane assist along with standard Audi pre sense® basic, Audi pre sense® rear view camera, the 2018 Audi A3 Sportback e-tron® can be equipped to help as you go.n addition to its hybrid technologies, the 2018 Audi A3 Sportback e-tron® is full of impressive, driver-centric technology features. Available MMI® Navigation plus and MMI® touch, a unique suite of available Audi connect PRIME and connect PLUS features and the available Audi virtual cockpit enhance the drive of the A3 Sportback e-tron®. Audi has worked with energy programs to make driving the Audi A3 Sportback e-tron® as easy, convenient and efficient as possible. With 3Degrees®, Audi has developed a more holistic approach to offsetting some greenhouse gas emissions associated with the A3 Sportback e-tron®. Through a collaboration with SunPower®, A3 Sportback e-tron® owners can help recharge their vehicles with available home solar panels.The Audi A3 Sportback e-tron® battery can be fully replenished in about two hours and fifteen minutes with the included 240-volt charging unit. The charging port is discreetly located behind the iconic four rings of the Singleframe® grille for easy access from either side of the vehicle.

BYD PLANS 50% LOCALISATION FOR EBUSES IN 2 YEARS

Chinese e-vehicles giant BYD, which has won major orders in India, does not get any subsidy in its country, its Indian partner Goldstone InfratechNSE 0.68 % has said, refuting Indian rivals' claims that they face unfair competition.

Additionally, a Goldstone Infratech spokesperson told ET, the company will be able to localise half the components for electric buses being built for India, in the next two years. "BYD is a global company, widely held and backed by marquee investors like Warren Buffett and Samsung Electronics, with manufacturing facilities across the globe.

There are no export subsidies given on Chinese electric vehicle (EV) manufacturers. Such concerns are unfounded," he said. "Goldstone-BYD buses comply with all localisation norms under Faster Adoption and Manufacturing of Hybrid & Electric Vehicles (FAME) policy and Make in India. We expect to ramp up localisation component above 50% in next two years," the spokesperson said. A government official said Ashok Leyland has localisation of 37%, while Tata Motors is at 35%.

Batteries that comprise a major cost of EVs are not manufactured in India and companies import them from the likes of China, Japan and South Korea.

On March 23, ET reported that BYD's entry into India by bagging large tenders for electric buses has started worrying the domestic auto industry. Indian companies questioned the government's decision to allow a company of the size of BYD to participate in the recent tenders and also said the move is a spoiler to Make in India. "It's conjecture. We don't have facts and figures to support that they (BYD) are receiving subsidies.

BYD, like any Chinese company, has very deep pockets and obviously, it is heavily backward integrated, as we understand. They will have a price advantage. Any company which wants to make a mark, looks at very predatory pricing. So everybody wants to be there and get the first mover's advantage. Predatory pricing is anybody's prerogative. How much is subsidised, one doesn't really know," said an industry player who did not wish to be quoted.

Tata Motors and Goldstone-BYD bagged nine of 10 contracts, partfunded by the Centre, leaving competitors such as Mahindra & Mahindra, Eicher Motors and JBM Solaris empty-handed. Winning bids placed by the duo were nearly 30% lower than market price. Tata Motors bid as low as Rs 77 lakh per e-bus in some tenders. However, some of the tenders bid on supply-operate basis have been put on hold by the government as it is figuring out ways to evaluate the exact cost of e-buses.

Indian companies said BYD has access to low-cost funds and subsidies from China that pose threat in terms of competition and scaling up manufacturing. "It's what we call Chinese dumping with home benefits," said an industry player on condition of anonymity. The e-bus tenders were part of a pilot scheme of the Department of Heavy Industries that had, in December 2017, sanctioned Rs 440 crore to 11 states for procurement of 390 electric buses, taxis and autos under FAME that offers up to 60% subsidy on e-bus procurement.

EESL EXPLORES GAS TECH TO CUT POWER COSTS

Energy Efficiency Services Ltd (EESL), which is leading government campaigns for electric vehicles, LED bulbs and smart meters, is preparing the ground for a new $20 billion market that will include gas engines to produce cooling, heat and electricity to halve power costs for establishments like hotels, hospital and malls, its managing director said.

"It's a technology that has existed for a very long time. This is something that EESL is now going to venture into in a very, very big way. Same service model. Currently, we have completed energy audits in two hotels and we also have an industrial client on board," Saurabh Kumar said in a media briefing.

The technology has a potential of 20,000 megawatts in the country. In 2010, a study conducted by the Bureau of Energy Efficiency (BEE) had estimated a potential of 10,000 MW from this technology without taking into account industrial customers.

EESL also plans to float a global tender for 3-4 MW capacity of tri-generation units.

"What we will do is a complete service. You just have to enter into a power purchase agreement (PPA) with us. We give you electricity, we give you cooling, we give you hot water.

All measured with a metre. We will provide the entire service, as we do in any other project that we do," he explained.

The duration of the PPA will be between 10 and 15 years, and any changes in the price of gas will be taken into account in due course of time. "The only contingent part here is gas price." The model is most suited for operations where there is a 24-hour requirement of all three — electricity, hot water and cooling. While tri-generation can be used for meeting electricity needs, grid power can always remain a backup, he said.

The tender, which will be floated around first week of March, will need three parties — gas engine manufacturer, vapour absorption machine (VAM) manufacturer and an integrator — to act in a consortium. Since there are only a handful of players globally and in India who do VAM and gas engines, it could involve names such as General Electric, Caterpillar and Kirloskar.

EESL has earlier taken the lead to issue tenders for LED bulbs, helping the prices of the energy-efficient devices fall steeply. It is also actively involved in the government's initiative to procure electric vehicles for use by official departments and state-run firms.

Don't waste your time on revenge.
Those who hurt you will eventually face their own karma.

AMAZON INSTALLS SOLAR PANELS AT FULFILMENT CENTRES, TO GENERATE 8,000 KW OF SOLAR POWER

Amazon India has launched a new initiative to generate clean energy through installation of solar panels on the rooftops of its fulfillment centres and sortation sites in India. The company said it has already installed close to 1600-kilo watts (kW) of solar power panels at its two fulfillment centres in Delhi and Hyderabad.

Amazon plans to further deploy large-scale solar panel systems on rooftops of an additional five fulfillment centres and two sortation sites located in Bengaluru, Mumbai and Chennai while further expanding existing capacity in Delhi. With this deployment, by the end of 2018, Amazon India will be able to generate solar energy close to 8,000 kW, the company said. Installations at these fulfillment and sort centres would cover an area of approximately 1 million square feet, reduce CO_2 emission by around 9000 tons a year and provide energy to support the building's annual energy needs.

"The investment in solar energy systems in India is in line with Amazon's vision to deploy solar systems on 50 fulfillment and sortation centers globally by 2020," AkhilSaxena, Vice President, Customer Fulfillment, Amazon India, said in a statement. "We are committed to and invested in this work because it's a triple win – it's good for business, good for the planet, and good for our customers and communities. The installation of the solar panels at fulfillment centres in Hyderabad and Delhi reinstates this commitment and by the end of 2018, we plan to expand this installation to an additional 7 Amazon Operations sites in India. "

Amazon has also has set up solar energy systems in four Amazon Cares Community and Resource Centres in Haryana, which provide solar power to support the community programmes in these centres all year round. The company has also donated solar energy systems to 19 government schools and 1 mini-planetarium in Bhiwandi, Maharashtra.

USE THE SOLAR ENERGY - SAVE THE PLANET

WAAREE ENERGIES' LAUNCHES PRONTO, A DO-IT-YOURSELF ROOFTOP SOLAR KIT

The first of its kind solar kit will make clean energy available across the country. The kit can be installed in 30 minutes and is available in the range of 1-5 KW. Pronto benefits to also extend to small-scale industries. It aims to revolutionize rooftop solar in India.

Waaree Energies Ltd, one of India's largest solar panel manufacturers, recently launched the first of its kind do-it-yourself solar kit – Pronto. the company believes that this product is set to transform the renewable energy sector in the country by making clean energy accessible to all.

According to Waaree, the unique product not only saves time, but also requires comparatively less manpower. Pronto is available in the range of 1-5 KW, and requires only two people and 30 minutes to be installed. It comes with a patented rooftop non-penetrating racking system, with a focus on a design that embodies simplicity and is sturdy to withstand any weather.

Adding to that, with a solar PV based power generating system, Pronto can deliver at least 30% savings on electricity bills. It also provides, by bypassing numerous sourcing and logistics steps, the same cost benefits as large rooftop solar systems. In addition, since it can be used for any net-metering based application, consumers can get credits for excess generation gains.

The company also mentioned that with state of the art technology, Pronto is also beneficial for small-scale industries. With the solar kits, all critical components like solar modules, solar inverter, and structure are included and backed by warranty.

On the launch, Sunil Rathi, Director, Waaree Energies said, *"Pronto is a result of the continued commitment of Waaree to make renewable energy accessible across the country. It brings together the best in technology and innovation, to a product that can be used across residential, industrial and commercial sectors. We hope Pronto marks the beginning of a new chapter and encourages people across demographics to opt for green energy."*

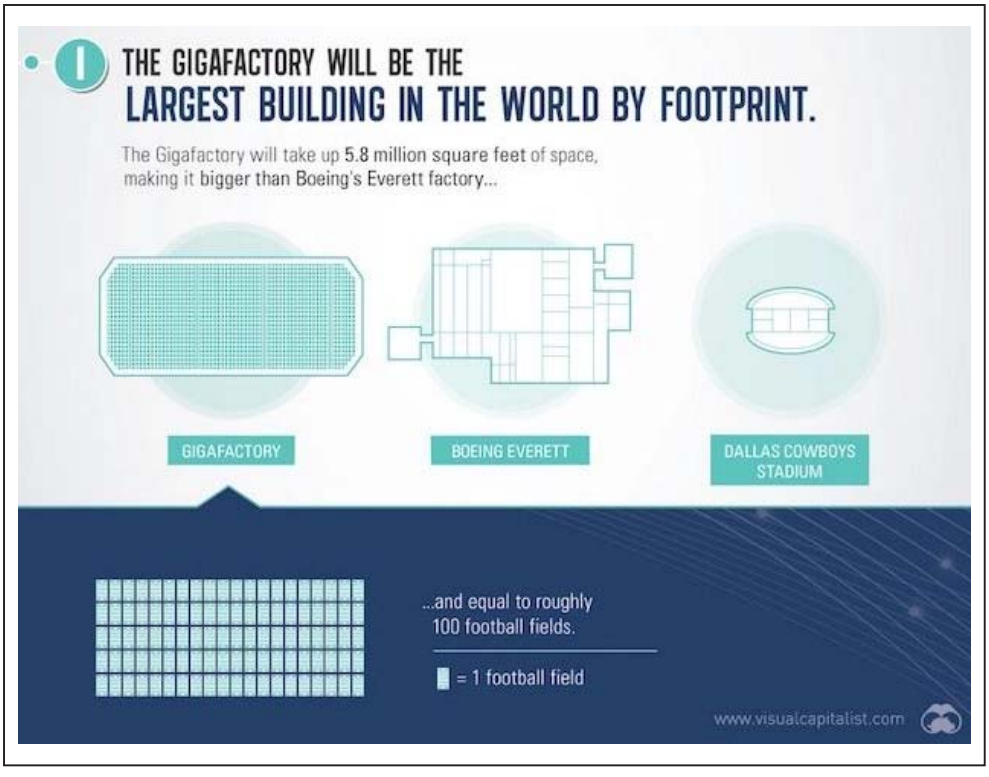
Moreover, with an optimum design for maximum power generation, the product also comes with an inverter with latest MPPT technology with remote monitoring and is available in both single phase and 3 phase inverters.

Product Specifications

Model *		Pronto-1K	Pronto-2K	Pronto-3K	Pronto-4K	Pronto-5K
Solar Panel	Mono - Solar Panel	WS-335 x 3	WS-335 x 6	WS-335 x 9	WS-335 x 12	WS-335 x 15
Inverter	Inverter Single Phase Inverter	1KW	2KW	3KW	4KW	5KW
	Max. Power Output	1100W	2000W	3200W	4600W	4999W
	Inverter Efficiency	97.1%	97.1%	97.6%	97.8%	97.8%
	MPPT Efficiency	99.9%	99.9%	99.9%	99.9%	99.9%
	Output AC Voltage	220/230/240 V; (180-280V)				
	Output Frequency	50/60 Hz				
	Noise Emission	<30 dB	<30 dB	<30 dB	<25 dB	<25 dB
	Installation Type	Wall Hanging				
	Communication	RS485/Wifi/DRM/USB				
Solar Panel Structure	Structure Kit	Complete Set with accessories				
	Mounting Type	Flat Surface				
Monitoring	Application	Energy Mangement using PC and Mobile App				

TESLA GIGAFACTORY

Tesla's mission is to accelerate the world's transition to sustainable energy through increasingly affordable electric vehicles and energy products. To achieve its planned production rate of 500,000 cars per year by 2018, Tesla alone will require today's entire worldwide supply of lithium-ion batteries. The Tesla Gigafactory was born out of necessity and will supply enough batteries to support Tesla's projected vehicle demand.



Tesla broke ground on the Gigafactory in June 2014 outside Sparks, Nevada. The name Gigafactory comes from the word "Giga," the unit of measurement representing "billions." The factory's planned annual battery production capacity is 35 gigawatt-hours (GWh), with one GWh being the equivalent of generating (or consuming) 1 billion watts for one hour. This is nearly as much as the entire world's current battery production combined.

The Gigafactory is being built in phases so that Tesla can begin manufacturing immediately inside the finished sections and continue to expand thereafter. Already, the current structure has a footprint of more than 1.9 million square feet, which houses more than 4.9 million square feet of operational space across several floors.

Still, the Gigafactory is less than 30 percent done. Once complete, Tesla expects the Gigafactory to be the biggest building in the world – and entirely powered by renewable energy sources, with the goal of achieving net zero energy.

With the Gigafactory ramping up production, Tesla's cost of battery cells will significantly decline through economies of scale, innovative manufacturing, reduction of waste, and the simple optimization of locating most manufacturing processes under one roof. By reducing the cost of batteries, Tesla can make products available to more and more people, allowing us to make the biggest possible impact on transitioning the world to sustainable energy.

Facts about GIGAFACTORY

The Gigafactory will be the biggest building in the world

The Gigafactory measures in at 5.5 million square feet, easily making it the biggest building in the world in terms of its physical footprint. The closest building to the Gigafactory is Boeing's Everett factory in Washington state with a square footage of 4.3 million.

The Gigafactory cost $5 billion to construct

When the dust settles, it's believed that the amount of capital invested into the Gigafactory will come out to a cool $5 billion. Construction began in earnest in mid-May of 2014.

Battery production levels will be "faster than bullets from a machine gun"

Once the Gigafactory is finished and operating at 100% capacity, Tesla boasts that it will churn out more lithium-ion batteries in one year "than were produced worldwide in 2013."

Speaking to this point, Elon Musk during an earnings conference call last year said: "Cells will be going through [the Gigafactory] like bullets from a machine gun. In fact, the exit rate of cells will be faster than bullets from a machine gun."

Construction workers are on the clock 24/7

Per a recent report in *The Wall Street Journal*, Tesla now employs 1,000 workers who are on the job "seven days a week on two shifts in an effort to start churning out lithium-ion cells by late 2016."

The Gigafactory will run on 100% renewable energy

Hardly a surprise, the Gigafactory will be completely powered by renewable energy. As Tesla notes on its website, "the Gigafactory will also be powered by renewable energy sources, with the goal of achieving net zero energy."

The Gigafactory roof is white for environmental reasons

Tesla, a green company if there ever was one, is planning to outfit the entire Gigafactory roof with solar panels. In turn, the roof of the structure will be painted white in order to better reflect light, keep things cool, and ensure that the solar panels are as efficient as possible.

The building was designed to be earthquake proof

You ever spend a few billion on building a gigantic battery factory only to have an earthquake come along and mess things up? Yeah, Tesla would like to avoid that at all costs. According to a recent report in *Fast Company*, the massive structure is actually comprised of "four distinct structures with four different foundations so that an earthquake can't tear it apart."

The Gigafactory foundation itself costs millions of dollars

The cost of the Gigafactory's foundation alone set Tesla back $16 million

Tesla spent millions on steel

The steel structure underlying the Gigafactoryitself reportedly cost $15 million.

Fireproofing + Electrical wiring

Fireproofing the Gigafactory cost an estimated $5 million while the electrical infrastructure reportedly set Tesla back $300,000

The Gigafactory will employ 6,500 employees by 2020

The Gigafactory won't run itself, which is why the company anticipates that it will employ upwards of 6,500 at the Gigafactory once construction is fully finished.

TUTICORIN INDUSTRIES, THERMAL PLANTS FUEL POLLUTION FEARS

Activists and environmentalists fear that pollution which has been the scourge of Tuticorin city for decades may have taken a turn for the worse. Recently, **Tuticorin stood 21st in a list of 94 polluted cities in the country identified by Central Pollution Control Board based on a five-year study ending in 2015. It was also the only city from the state on the list**.

With heavy industries and thermal power stations mushrooming in the coastal city, many people working in the factories here prefer to reside in nearby Tirunelveli and spend hours shuttling to and from Tuticorin. Environmentalist M Krishnamurthi, who is among the prominent leaders spearheading the anti-Sterlite protests, expressed the need for a holistic study on the impact of environmental pollution in Tuticorin. “Most of the thermal power stations in the state are within a 14 km radius from the city centre. The extent of damage caused by industrialisation is immeasurable,” he lamented. Krishnamurthi observed that thermal power plants and industries in and around the city had caused immense damage to people’s health, natural resources, environment and salt pans. “Polluting industries should be closed down or shifted at the earliest,” he said.

Activist NithyanandJayaram suggested a three-stage approach to reduce the impact of air pollution. “Pollution becomes an issue when it is affecting the people. Industries should not be set up close to a place where there are residential localities or agriculture is taking place,” he said. Safety measures should be carried out after

sighting the right place to reduce the impact of unavoidable effects. "It is no use carrying out safety measures after establishing a hazardous industry established in a thickly populated place," he said. According to him next comes pollution control.

Stating that no industry could operate without polluting, he said that the problem worsened with the size of the factory. Controlling the chemical substances from being dispensed in the air and effectively converting them into usable by-products in another form (liquid or solid) was the next big step. "Pollution mitigation is the next stage. Despite all measures some particles will be discharged in the air. Industries should ensure that its effect is minimized. Shape of the chimney should be such that the suspended particles are dissolved and become harmless when they reaches the ground," he said. He expressed the need for a thick green belt around the factory to filter them from affecting the common man.

District collector N Venkatesh said that the district administration was working on a project to improve the green cover to bring down the impact of air pollution. "Also this year we have a target of 2.7 lakh trees to be planted across the district. Most of these saplings will be planted on government and waste land near industries and urban areas," he added.

Government and private thermal power plants in the city accounted for a major share of its visible air pollution. Vishnu Mohan Rao, an expert on environment and power associated with a citizen consumer and civic action group said that the ministry of environment and forests had issued a notification to all thermal power plants to take measures to bring down emission to a large extent by 2022.

"One of the effective measures is installation of 'flue gas desulphurisation' in the plants. This method of absorbing sulphur and other chemical pollutants from getting discharged into the air is in implementation for close to 40 years. But not one thermal plant in India has it as it would cost Rs 300 crore to install it in a plant," he said and added that the cost could go up based on the capacity of the plant.

He added that flue gas method also required a sizable share of energy generated by the plant to be operated. The expert also pressed for larger regional impact assessment to be conducted before establishing such plants as a futuristic solution. According to him, there was a need to monitor compliance by existing plants to check pollution as a solution to keep air pollution by thermal plants under check.

Courtesy: Energy Economic Times

About Tuticorin…

Thoothukudi is well known as a pearl diving and fishing centre. It is one of the oldest seaports in the world and was the seaport of the Pandyan kingdom after Korkai, near Palayakayal. It was later taken over by the Portuguese in 1548, captured by the Dutch in 1658, and ceded to the British in 1825. The lighthouse built in 1842 marked the beginning of the history of harbour development in the city. Thoothukudi was established as a Municipality in 1866 with Roche Victoria as its first chairman. Thoothukudi anchorage port with lighter age facilities has had flourishing traffic for over a century. The first wooden jetty of this port was commissioned in 1864.The 21 islands between Thoothukudi and Rameswaram shores in the Gulf of Mannar are notified as the first Marine Biosphere Reserve of India. About 36,000 species of flora and fauna exist in the region covered with mangroves, sandy shores, sea grass beds that are conducive for turtle nesting.

The Tuticorin Thermal Power Station has five 210 megawatt generators. The first generator was commissioned in July 1979 and the newly built thermal power plant of 1000 MW by NLC and TANGEDCO, the NTPL Thermal Power Station. In addition to this there are several private power plants like IndBarath Power Limited, Coastal Energen, Sterlite Industries Captive power plant. Southern Petrochemical Industries Corporation, Tuticorin Alkali Chemicals, Heavy Water Board Plant, Sterlite Industries, Venus Home Appliances, PSSKrishnamurthi Exports P Ltd, Madura Coats and Mills, Dhrangadhra Chemical works, Kilburn Chemicals, Nila Sea foods, Diamond Sea foods Maris Associates, VVD Coconut oil mill, AVM oil mill, Ramesh flowers, Agsar Paints, Tuticorin Spinning Mills Ltd and KSPS Salts are some of the small scale and large scale industries in the city. Thoothukudi City is the headquarters of Tamilnad Mercantile Bank Limited.

If you're helping someone and expecting something in return, you're doing business, not kindness.

ENERGY, ELECTRICAL ENERGY AND RENEWABLE ENERGY – 9

Sustainable Growth, Sustainable Electrical Energy and Renewable Energy

Thermo Chemical Technologies – Waste to Energy – Plasma Gasification for conversion of Plastic Wastes to Electricity.

Gasification:

Gasification is one of the important **'Thermo Chemical Process'** for conversion of Biomass to Heat and Electricity. There are a number of types and technologies in Gasification, which will be taken up in more detail in coming parts of this series.

"Beat Plastic Pollution", being the theme for **World Environment Day on 5th June, 2018**, this part will deal with an indigenous technology developed to address conversion of Plastic wastes to Energy without any toxic gases pollution, and toxic gases are normally associated with burning of plastics.

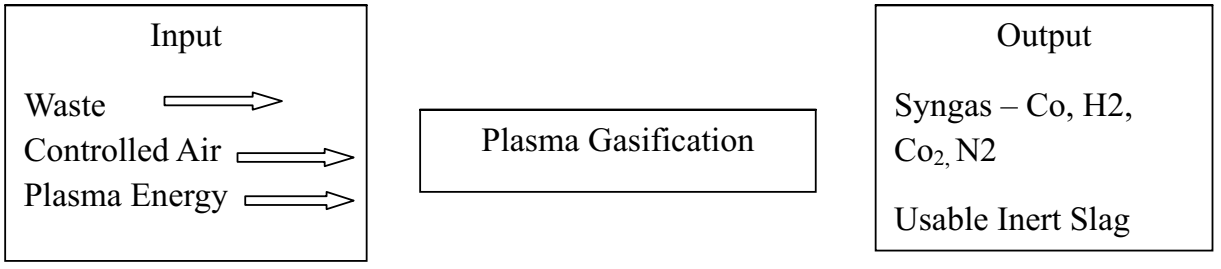
Plastic have been one of the materials with the fastest growth because of their wide range of applications due to versatility and relatively low cost. Since the life of plastic products is relatively small, there is a vast plastic waste stream that reaches each year to the final recipients creating a serious environmental problem. Again, because disposal of post consumer plastics is increasingly being constrained by legislation and escalating costs, there is considerable demand for alternatives to disposal or land filling. To alleviate part of our energy crisis and environmental degradation, it has become imperative to make use of appropriate technologies for recovery of resources from plastic waste.

Petroleum Conservation Research Association (PCRA), Council of Scientific and Industrial Research (CSIR) and Central Mechanical Engineering Research Institute (CMERI) are all involved in putting together an indigenous technology for safe conversion of Plastic Wastes to Energy and the technology is offered as Plasma Disposal of Plastic Waste and Generation of Syngas for Power Generation. Most of the technical details given are taken from CSIR/ CMERI along with other Technical details of 'Plasma Gasification' and the processes.

What is Plasma?

Plasma is the fourth state of nature, by far the most common form of matter. Plasma in the stars and in the tenuous space between them makes up over 99% of the visible universe and perhaps most of that which is not visible. In physics and chemistry, plasma is a state of matter similar to gas in which a certain portion of the particles are ionized. The basic premise is that heating a gas dissociates its molecular bonds, rendering it into its constituent atoms. Further heating leads to ionization (a loss of electrons), turning it into a plasma: containing charged particles, positive ions and negative electrons. In Plasma, the temperatures and densities range from relatively cool and tenuous to very hot and dense (like the central core of a star). Ordinary solids, liquids, and gases are both electrically neutral and too cool or dense to be in a plasma state. Plasma consists of a collection of free-moving electrons and ions - atoms that have lost electrons. Energy is needed to strip electrons from atoms to make plasma. The energy can be of various origins: thermal, electrical, or light (ultraviolet light or intense visible light from a laser).

With insufficient sustaining power, plasmas recombine into neutral gas.



What is Syngas?

Syngas or synthesis gas comprises primarily of Carbon Monoxide (CO), Hydrogen (H2) and other traces of gases. Its composition and calorific value depends on the feedstock characteristics.

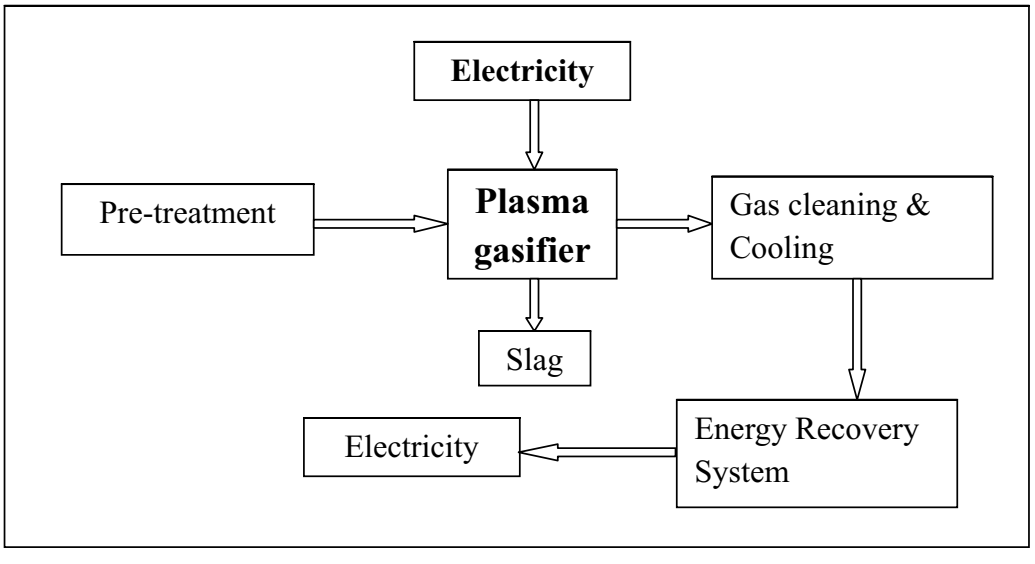
Is Gasification the same as Incineration?

No, there are key differences between Gasification and Incineration that make gasification a much cleaner and efficient process:

- Incineration is designed to maximize the conversion of waste to Carbon Dioxide (CO_2) and Water (H2O). Whereas Gasification is designed to maximize the conversion of waste to pure Carbon (CO) and Hydrogen (H2). Therefore, the outputs of gasification are clean compared to the outputs of Incineration.
- Incineration uses large quantities of excess air. Gasification uses limited quantities of oxygen (O).
- Incineration is a highly oxidizing environment. Gasification is a reducing environment.
- Incineration operates at temperatures below the ash melting point. Mineral matter is converted to bottom ash and fly ash. Gasification operates at temperatures above the ash melting point. Mineral matter is converted to glassy slag and fine particulate matter (char).
- In Incineration the Flue gas cleanup is done at atmospheric pressure. In Gasification the Syngas cleanup is done at high pressure.
- In Incineration treated flue gas is discharged to atmosphere. In Gasification treated syngas is used for chemical production and/or power production (with subsequent flue gas discharge). This makes gasification a cleaner and efficient process.
- In Incineration fuel sulfur is converted to SOx and discharged with the flue gas. In Gasification the recovery of reduced sulfur species is in the form of a high purity elemental sulfur or sulfuric acid byproduct.
- In Incineration the Bottom ash and fly ash is collected, treated, and disposed as hazardous wastes. In Gasification Slag is non-leachable, nonhazardous and suitable for use in construction materials. Fine particulate matter recycled to gasifier or processed for metals reclamation.

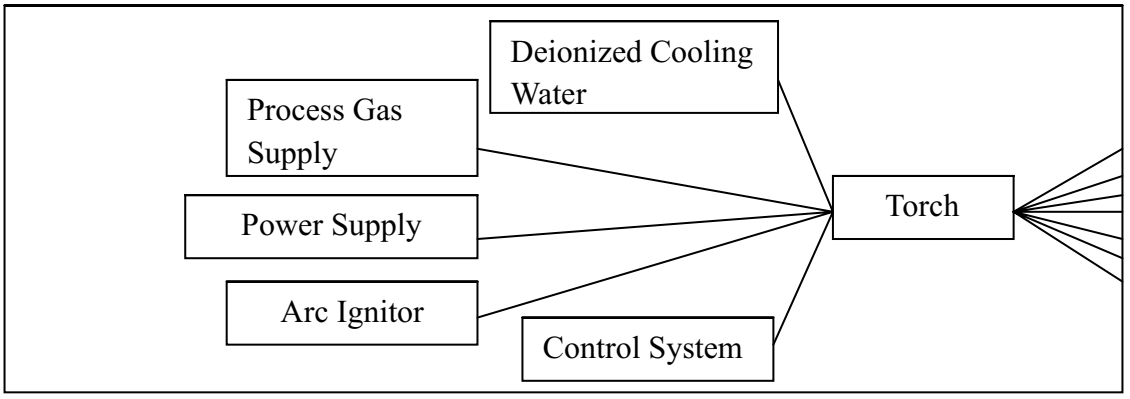
Plasma Gasification

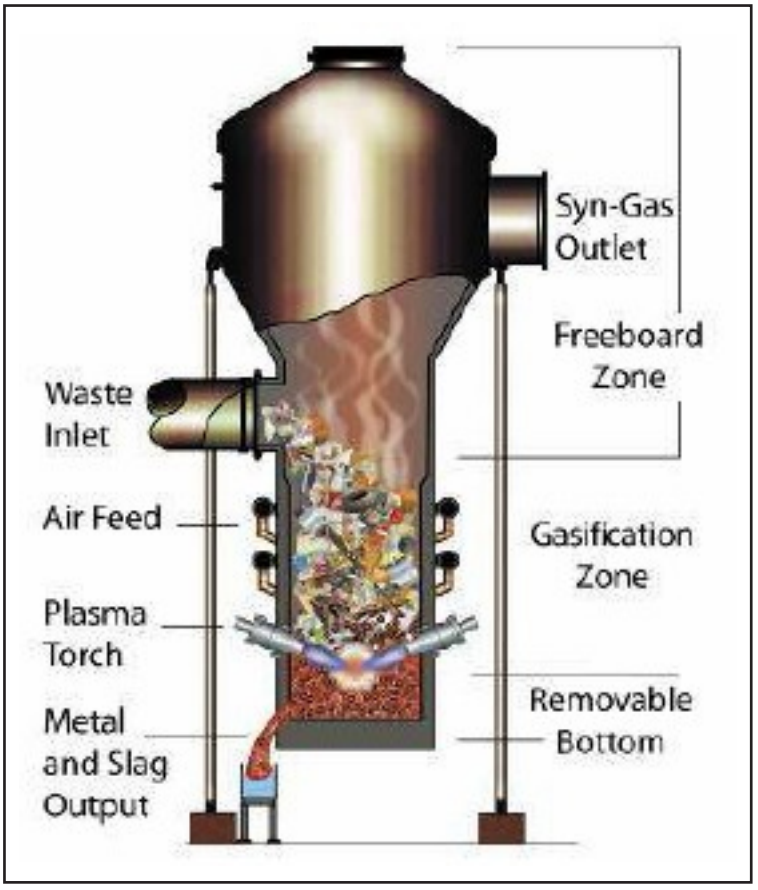
Plasma pyrolysis or Plasma Gasification is an innovative technology for transforming high calorific plastic waste into a valuable synthetic gas (syngas) by means of thermal plasma. The process developed is a drastic non-incineration thermal process, which uses extremely high temperature in an oxygen-starved environment to completely decompose input plastic waste into syngas, composed of very simple molecules viz: H2, Hydrocarbons and CO. A 20 kg/hr. capacity plasma arc pyrolyser for treatment of plastic waste as well as energy recovery options from plastic waste has been indegeneously designed, developed, installed and studied its performance at the CSIR-Central Mechanical Engineering Research Institute, Durgapur. Research results and techno-economic study indicated that the developed plasma pyrolyser may be a useful way of plastic waste treatment for energy recovery.



Process flow diagram

Plasma Torch System





Process:

Plastic waste plasma gasification process is a process to gasify the plastic waste in an oxygen starved environment and generation of synthetic natural gas called syngas. A high temperature plasma arc is created inside the gasifier through adjustment of graphite & carbon electrode gap and the arc current.

The plastic wastes are fed into the gasifier through screw feeder to pass through the plasma arc. The high temperature (>3000°C) plasma arc disintegrates the plastic waste into simple gas molecules to generate high calorific value syngas containing CO, H2 and CxHy. The syngas thus generated is passed through a water scrubber for cleaning and quenching. An ID fan is used to draw the syngas from the gasifier and deliver the same, after cleaning, to the IC engine-generator assembly for generation of electric power.

There is no ash produced in the Plasma Gasification process. Inert and inorganic material including ash content of the feedstock forms the molten slag which is removed and vitrified. In addition, any suspended particles in the Syngas stream will be filtered in the gas cleaning process stream and returned to the Plasma Gasification reactor to be vitrified.

The extremely high temperature present within the Plasma Gasification reactor (5,000 to 10,000ºC) does not promote the formation of dioxins and furans. In fact, it destroys the dioxins and furans.

Plasma Gasification is environmental friendly in the sense that generates a lot less CO_2 and other harmful gases in the process of recovering the energy from the Plastics/ garbage and at the same time can produce new materials that have commercial applications or use and thus generate profit.

Plasma Gasification is the closest application of the first law of thermodynamics that state that mass and energy is neither created nor destroyed but transformed.

Specification of 20 kg/hr. Plastic waste plasma gasifier:

Input	
Raw materials:	Plastic waste
Feed rate:	20 Kg/hr.
Feed size:	6-8 mm
Power requirements:	20 kW
At voltage:	70V
Current:	130 Amp

Output	
Reactor temp.:	1600°C at wall
Gas composition (%):	
H2:	13-17%
CxHy:	26-51%
CO:	4-6%
Net power generation:	40 kW (Gross 60KW – Torch Consumption of 20Kw

The innovation provides the following advantages:

- Volume reduction of the waste streams
- Byproduct Syngas is a clean fuel
- The extreme conditions of plasma kill stable bacteria
- Reduce the need for landfill
- Supply excess electricity for sale

Market and Use of Syngas:

Performance study of the developed plasma pyrolyser has been carried out with the plastic waste as feeding material. The major gas components of the product gas are hydrogen, carbon monoxide, methane, acetylene, ethylene and other hydrocarbons, which are combustible in nature. This plasma process should be of significant advantage over other conventional pyrolysis methods. The product gas from plasma may be suitable for syngas applications. In this present innovation, syngas has been utilized to run two gas engines of 15 KW capacity with alternator (capacity 15 KVA-3 ph) assembly for electric power generation.

It is observed from the experimental study that 1 kg/hr plastic requires roughly 1 kWe power in a plasma gasifier. The calorific value of plastic is 43.5 MJ/kg. If the overall efficiency of conversion is 30 % then the output electrical energy is 13.05 MJ which is equivalent to 3.6 kWe for 1 kg/hr plastic conversion. Considering 1.2 kWe for auxiliary power requirement the net recovery is 2.4 kWe .

The present study reveals that there is a great potential for development of thermal plasma pyrolysis technologies applicable to plastic waste disposal management with energy recovery. This process gives an insight into the potential of this technology to not only become the most preferred method of solid waste management, but also a significant game changer in the field of energy economy.

(To be continued)

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GREEN COVER ALONG HIGHWAYS: NGT ISSUES SHOW CAUSE NOTICE TO NHAI

The National Green Tribunal has issued show cause notice to the National Highways Authority of India (NHAI) asking why action should not be initiated against it for not maintaining the mandatory green cover along national and state highways.

A bench headed by acting NGT Chairperson Justice Jawad Rahim sought responses from the NHAI, Ministry of Road Transport, Environment Ministry, besides the governments of Delhi, Haryana and Rajasthan.

"Issue notice in the nature of show cause to NHAI and the other to show cause why action should not be initiated in the nature of coercive action under the provisions of the NGT Act and the rules made thereunder for the non-compliance of the direction contained in the order dated September 5, 2017.

"If any steps have been taken, they are permitted to file status report supported with sufficient material in the nature of photographs as also work orders if any. This shall be done within a period of 15 days," the bench said.The matter is posted for next hearing on May 20.

The tribunal was hearing a plea filed by NGO Society for Protection of Culture, Heritage, Environment, Traditions and Promotion of National Awareness seeking execution of the September 5, 2017 order of the NGT where the NHAI had assured the tribunal that it would follow the Green Highways (Plantation, Transplantation, Beautification and Maintenance) Policy, 2015 in true spirit and substance.

The plea said that the tribunal had directed the Delhi, Haryana and Rajasthan to ensure plantation on government land which are adjacent to the national highway and state highways but no action has been taken by them.

In a detailed order, the NGT had directed the state governments and all local authorities to encourage plantation in public parks and other places wherever it is possible to plant additional trees to ensure better environment and provide greater protection to the ambient air quality prevailing in that area.

"The state governments and all local authorities shall also issue directions to all group housing societies, commercial plots and land that is allotted by the state government for any office, residential block, that they would plant trees along their boundaries and raise green belts around buildings," the tribunal had said.

The Indian road network of 33 lakh kms is the second largest in the world and stretches to about 96,000 kms of NHs, which constitutes only 1.7 per cent of the road network but carries about 40 per cent of the total road traffic.

SUBRATA ROY	*Sahara India Pariwar*	ENTREPRENEUR

Started in 1978 with an initial capital of Rs. 2,000, Sahara Pariwar is now a Rs. 2.75 lakh crore group.

Subrata Roy was born in a village in Bihar, he began his journey with Rs. 2,000 in 1978 when he founded Sahara India Pariwar with three workers as a small deposits Para-Banking business. From there, it went on to become the largest conglomerate of India with a diversified range of business interests. Today he has created an empire of Rs. 275 lakh Crore.

Over 6 crore + deposition through 1700 + establishments; across the nation and still growing fast because of the trust of the Aam Aadmi in the brand name of Sahara. Subrata has propounded the corporate philosophy of "Collective Materialism', that advocates collective growth through collective sharing and caring.

Subrata's largest venture Sahara City Homes proposes to develop a chain of townships in 217 cities across India. The high profile Amby Valley Project in the Western Ghats, is perhaps the world's finest hill city. In London he has enquired the iconic Grosvenor House and a fashionable expensive retail space on Oxford Street.

He expanded Sahara's sports portfolio from sponsoring the Indian Cricket Team and 50 percent stake in F1 to with Sahara Warriors. More recently the IPL Pune Cricket Team was brought for $370 million. **Sahara India's retail venture Q shop entered the Guinness World Records after it opened a record 315 outlets across 10 states at one go on April 1**.

Recently Sahara India Pariwar gathers at Ramabai Ambedkar Sthal, Lucknow where over 11 Lakh Sahara India Pariwar workers across 4512 offices sand our Rashtragaan together. Subroto is working towards health, education and nutrition programs for children and women, adult literacy and vocational training initiatives. He recently got Indian Business Icon of the Year Award at Power brands Hall of Fame Awards function at Lucknow for his entrepreneurship and achievements in various fields. He was also awarded with Businessmen of the Year Award in the year 2002, the Best Industrialist Award in the year 2002 and the National Citizen Award in the year 2001 for his entrepreneurship skills. On India Today's High & Mighty Power List 2013 he has been ranked no. 22.

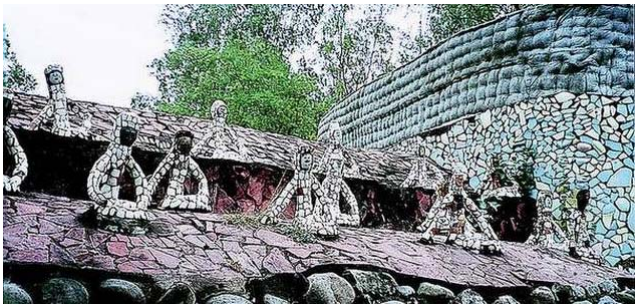
HUMOUR - HAVE FUN – In lighter (serious too) vein

1. Regular naps prevent old age, especially if you take them while driving.
2. Having one child makes you a parent; having two you are a referee.
3. Marriage is a relationship in which one person is always right and the other is the husband!
4. I believe we should all pay our tax with a smile. I tried – but they wanted cheque.
5. A child's greatest period of growth is the month after you've purchased new school uniforms.
6. Don't feel bad. A lot of people have no talent.
7. Don't marry the person you want to live with, marry the one you cannot live without, but whatever you do, you'll regret it later.
8. You can't buy love, but you pay heavily for it.
9. Bad officials are elected by good citizens who do not vote.
10. Laziness is nothing more than the habit of resting before you get tired.
11. Marriage is give and take. You'd better give it to her or she'll take it anyway.
12. My wife and I always compromise. I admit I'm wrong and she agrees with me.
13. Those who can't laugh at themselves leave the job to others.
14. Ladies first. Pretty ladies sooner.
15. A successful marriage requires falling in love many times, always with the same person.

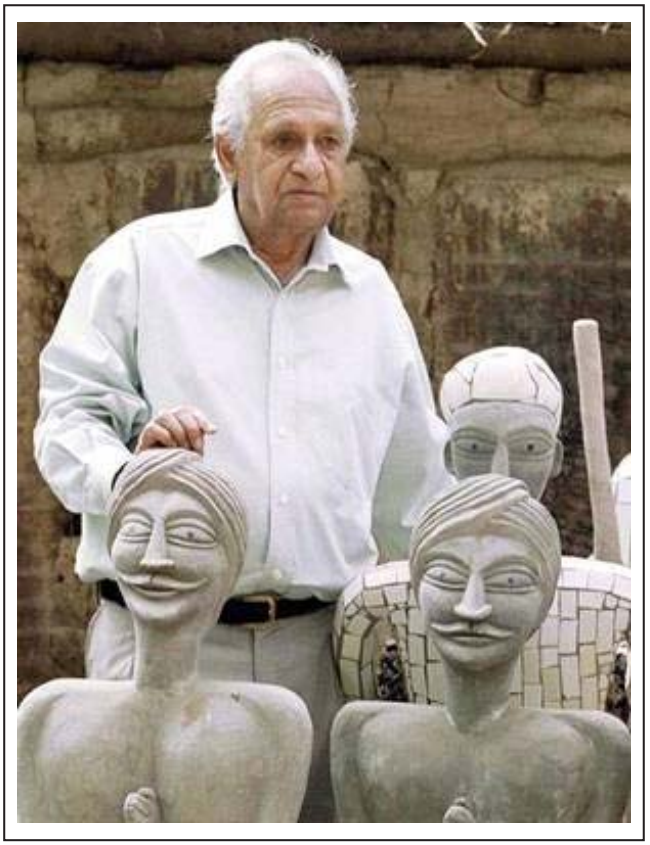
வியப்பூட்டும் இந்தியா - 6

நேக் சந்தின் பாறைப் பூங்கா

ஹரியானாவின் தலைநகர் சண்டிகரில் அமைந்திருக்கிறது நேக் சந்த் பாறைப் பூங்கா. 40 ஏக்கர் பரப்பளவில் அமைந்துள்ள இந்தப் பூங்காவில் உள்ள சிற்பங்கள் அனைத்தும் வீணாகத் தூக்கி எறியப்பட்ட பொருட்களைக் கொண்டு உருவாக்கப்பட்டவை.



உடைந்த பீங்கான் கோப்பைகள், தட்டுகள், மின்சார உதிரி பாகங்கள். குழல் விளக்குகள், மிதி வண்டியின் பாகங்கள், பாட்டில்கள், பானைகள், குழாய்கள், கண்ணாடி வளையல்கள், மொசைக் கற்கள் என்று குப்பையில் எறியப்பட்ட பொருட்களைச் சேகரித்து கலை நயத்துடன் உருவங்களை இங்கே படைத்திருக்கிறார்கள்.



கோட்டைகள், நீர்வீழ்ச்சிகள், ஆளுயர மனிதர்கள், அரசர்கள், அரசிகள், இசைக் கலைஞர்கள், போர் வீரர்கள், விலங்குகள், பறவைகள் என்று விதவிதமாக இருக்கும் சிற்பங்களை நாள் முழுவதும் பார்த்துக்கொண்டே இருக்கலாம்.

இந்த அழகிய பாறைப் பூங்கா **நேக் சந்த் சைனி** என்ற தனி மனிதரால் உருவாக்கப்பட்டது என்பதை அறியும்போது ஆச்சரியமாக இருக்கிறது. 1950களில் சண்டிகர் நகரம் சுவிட்சர்லாந்து கட்டிடக்கலை நிபுணர் லீ கார்பூசியர் என்பவரின் தலைமையில் வடிவமைக்கப்பட்டது. நேக் சந்த் சண்டிகரின்

பொதுப்பணித்துறையில் சாலை ஆய்வாளராக இருந்தார். புது நகர் நிர்மாணித்ததால் பழைய கட்டிடங்கள் உடைக்கப்பட்டன.

தினமும் வேலை முடிந்தவுடன் பயன்படாத, உடைந்த பொருட்களைத் தன்னுடைய மிதிவண்டியில் எடுத்துச் சென்று, காட்டுப் பகுதியில் சேகரித்தார். மக்களின் பார்வைக்கு எளிதில் தெரியாத பகுதி அது. விடுமுறை நாட்களில் தான் சேகரித்த பொருட்களைக் கொண்டு விதவிதமான உருவங்களைச் செய்ய ஆரம்பித்தார்.

சுமார் 13 ஆண்டுகள் தனி மனிதராக கோட்டைகள், நீர்வீழ்ச்சி, பஞ்சாப் கிராமத்தின் வளைந்து செல்லும் பாதைகள், அரண்மனை, மனிதர்கள், விலங்குகள் என்று உருவாக்கியிருந்தார். நேக் சந்தின் பாறைப் பூங்கா ஒருநாள் அரசு அதிகாரிகளால் கண்டு பிடிக்கப்பட்டது.

அது சட்டத்துக்குப் புறம்பான செயலாக இருந்தாலும் அவருடைய படைப்பாற்றலைக் கண்டு வியந்தனர்.

அவரை அந்தப் பாறைப் பூங்காவின் மேற்பார்வையாளராக நியமித்து. அவருக்குக் கீழ் 50 பணியாளர்களையும் அமர்த்தினர். அவர்களுக்கு நேக் சந்த் பயிற்சி கொடுத்து, தோட்டத்தை விரிவுபடுத்தினார். 18 ஏக்கரில் இருந்த இந்தப் பூங்கா, இன்று 40 ஏக்கர் அளவுக்குப் பரந்து விரிந்துள்ளது. விரிவாக்கப் பணி இன்றும் தொடர்ந்து கொண்டிருக்கிறது.

நேக் சந்தின் இந்தப் படைப்பாற்றலுக்குக் காரணம் என்ன தெரியுமா? அவரது அம்மா கூறிய ராஜா, ராணி கதைகள், தேவதைக் கதைகள், மந்திரவாதி கதைகள்தான். கதைகளைக் கேட்கும்போது அவற்றைக் காட்சிகளாகக் கற்பனை செய்து கொள்வார். இதனால் அவரது கற்பனைத் திறனும் படைப்பாற்றலும் பெருகின. இந்தப் பாறைப் பூங்காவை உருவாக்கவும் வைத்தன.

1976-ம் ஆண்டு இந்தப் பூங்கா பொதுமக்கள் பார்வைக்குத் திறந்துவிடப்பட்டது. தினமும் 5 ஆயிரம் பேர் இந்தப் பூங்காவைப் பார்வையிட்டுச் செல்கிறார்கள்.

1983-ம் ஆண்டு பாறைப் பூங்காவைச் சிறப்பிக்கும் வகையில் தபால் தலை ஒன்று வெளியிடப்பட்டது. நேக்சந்தின் சேவையைப் பாராட்டி, பத்மஸ்ரீ விருது வழங்கப்பட்டது. சர்வதேச அளவிலும் நேக் சந்த் புகழ் பரவியது. பாரிஸ், பெர்லின் போன்ற நகரங்களில் அவருடைய படைப்புகள் வைக்கப்பட்டுள்ளன.

1986-ம் ஆண்டு வாஷிங்டனில் உள்ள தேசியக் குழந்தைகள் பூங்காவை வடிவமைத்தார் நேக் சந்த். இன்று நேக் சந்த் இல்லாவிட்டாலும் அவரது படைப்புகள் உலகம் முழுவதும் அவரது புகழைச் சொல்லிக் கொண்டிருக்கின்றன.

தொடர்புக்கு: ஆம்பூர் மங்கையர்கரசி,
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Courtesy: தி இந்து, தேதி: 01.11.2017

பேட்டரி சைக்கிள் தயாரிப்பில் ஜெர்மன் நிறுவனம்

ஆட்டோமொபைல் உதிரி பாகங்கள் தயாரிப்பில் ஈடுபட்டுள்ள ஜெர்மனியின் ஷேப்ளர் நிறுவனத்தின் துணை நிறுவனமான ஷேப்ளர் இந்தியா நிறுவனம், பேட்டரி சைக்கிள் தயாரிப்பில் ஈடுபட்டுள்ளது.

பேட்டரியில் இயங்கும் வகையிலான இந்த சைக்கிள் நான்கு சக்கரங்களைக் கொண்டதாக, சைக்கிள் ரிக்ஷாவைப் போலிருக்கும் என்று நிறுவனத்தின் தலைமைச் செயல் அதிகாரி தர்மேஷ் அரோரா கூறியுள்ளார். இணையதள பொருள்களை டெலிவரி செய்யும் ஆன்லைன் நிறுவனத்தினருக்காக இது வடிவமைக்கப்படுகிறது.

தற்போது ஆன்லைன் நிறுவனங்களான ஸ்விகிஸ், பிளிப்கார்ட் ஆகியவற்றின் டெலிவரி பணியாளர்கள் தங்களது மோட்டார் சைக்கிளில் மிகப் பெரிய பைகளை எடுத்தச் செல்ல வேண்டியிருக்கிறது.

இதற்கு மாற்றாக இந்த பேட்டரி சைக்கிள் இருக்கும். சுற்றுச் சூழலை பாதிக்காத வகையிலான இந்த பேட்டரி வாகனங்களை ஆன் லைன் நிறுவனங்களும் தங்கள் பணியாளர்களுக்காக வாங்கும் என்று எதிர்பார்க்கிறது. இந்தியாவில் போக்குவரத்துக்கு தீர்வு காணும் நடவடிக்கைகளையும் ஷேப்ளர் நிறுவனம் ஆராய்ந்து வருகிறது. அதன் ஒரு பகுதிதான் இது. நிறுவனம் ஏற்கெனவே இத்தகைய சைக்கிளுக்கான உதிரிபாகங்களை தருவித்துவிட்டது. இவற்றை அசெம்பிள் செய்து விற்பனைக்கு விட வேண்டியது தான் எஞ்சியுள்ளதாகத் தெரிகிறது.

Trust means everything but once it's broken, sorry means nothing.

இதை தினமும் ஒரு ஸ்பூன் சாப்பிட்டா எலும்புகள் வலிமையாகும் தெரியுமா?

உடலில் எலும்புகளின் ஆரோக்கியம் என்பது மிகவும் முக்கியம். எலும்புகள் ஆரோக்கியமாகவும, வலிமையுடனும் இருந்தால் தான், நம்மால் நடக்கவோ, நகரவோ முடியும். பொதுவாக எலும்புகளின் ஆரோக்கியத்திற்கு கால்சியம் சத்து அவசியமானது. இத்தகைய கால்சியம் வயது அதிகரிக்கும் போது குறைய ஆரம்பிக்கும். தற்போதைய உலகில் ஏராளமானோர் எலும்பு சம்பந்தப்பட்ட பிரச்சனைகளால் கஷ்டப்படுகிறார்கள். இதற்கு போதிய கால்சியம் எலும்புகளுக்கு கிடைக்காதது என்று கூட சொல்லலாம். அதிலும் இளம் தலைமுறையினர் எலும்பு பிரச்சனைகளால் அதிகம் கஷ்டப்படுகிறார்கள். இப்படி இளமையிலேயே எலும்பு பிரச்சனைகளை சந்தித்தால், முதுமை காலத்தில் நடக்க முடியாமல் போக வாய்ப்புள்ளது.

எலும்புகளின் வலிமைக்கு ஒரு நாளைக்கு 700 மி.கி. கால்சியம் அவசியமானது. இந்த கால்சியத்தை உறிஞ்சுவதற்கு வைட்டமின் டி சத்து தேவை. அதோடு பொட்டாசியம், வைட்டமின்கள், பீட்டா-கரோட்டீன் மற்றும் புரோட்டீன்கள் போன்ற இதர சத்துக்களும் இன்றியமையாதவையாகும். எலும்புகள் ஆரோக்கியமாகவும் வலிமையுடனும் இல்லாவிட்டால். ஆஸ்டியோபோரோசிஸ் மற்றும் ரிக்கட்ஸ் போன்றவற்றால் அவஸ்தைப்படக்கூடும். இக்கட்டுரையில் எலும்புகளின் வலிமையை அதிகரிக்கும் சூப்பர் உணவுகள் பட்டியலிடப்பட்டுள்ளது. அதைப் படித்து அவற்றை அன்றாட உணவில் சேர்த்து பயன் பெறுங்கள்.

பால்:

கால்சியம் நிறைந்த பொருளான பாலில் பாஸ்பரஸ், ரிபோ.்ப்ளேவின், வைட்டமின் டி மற்றும் மக்னீசியம் போன்ற பல்வேறு அத்தியாவசியமான சத்துக்கள் அடங்கியுள்ளன. ஒரு டம்ளர் பாலில் 300 மி.கி. கால்சியம் அடங்கியுள்ளன. வயது வந்தவர்கள் குறைந்தபட்சம் 2 டம்ளர் பால் குடிக்க வேண்டியது அவசியம். குழந்தைகள் மற்றும் டீன்-ஏஜ் வயதினர், இன்னும் அதிகமான அளவில் பாலைக் குடிக்க வேண்டும். பொதுவாக ஒரு சிறுமியின் எலும்புகளின் வளர்ச்சி மற்றும் நீளம் 18 வரை தான், சிறுவர்களுக்கு 20 வரையாகும். அதன்பின் எலும்புகள் வலிமையாகி இறுக ஆரம்பித்துவிடும்.

தயிர்:

பாலில் இருந்து நொதிக்க வைத்து தயாரிக்கப்படும் தயிரிலும், பாலுக்கு இணையான அளவில் கால்சியம் நிறைந்துள்ளது. கொழுப்பு நீக்கப்பட்ட தயிரைத் தேர்ந்தெடுப்பது மிகவும் சிறந்தது. லாக்டோஸ் சகிப்புத்தன்மை உள்ளவர்கள் தயிர் சாப்பிட அச்சம் கொள்ள வேண்டாம். ஏனெனில் இதில் லாக்டோஸானது காலக்டோஸ் மற்றும் க்ளுக்கோஸாக மாறிவிடும். மேலும் தயிரில் எலும்புகளை வலிமையாக்கும் சத்துக்களான வைட்டமின் பி6, 12, கால்சியம் மற்றும் புரோட்டீன்களும் அடங்கியுள்ளது.

டோ.்பு:

எலும்புகளின் வலிமைக்கும் ஆரோக்கியத்திற்கும் சோயா உணவுகள் உதவி புரியும். ஏனெனில் இதில் ஏராளமான அளவில் கால்சியம் மற்றும் தாவர வகை ஐசோப்ளேவோன்கள் உள்ளன. மேலும் இந்த டோ.்பு உணவுப் பொருளும் லாக்டோஸ் சகிப்புத்தன்மை உள்ளவர்களுக்கு ஏற்ற ஒன்று. ½ கப் சோயா உணவில் அன்றாடம் உடலுக்கு தேவையான கால்சியம் கிடைக்கும்.

எள்ளு:

விதைகள்-எள்ளு விதைகளில் மக்னீசியம், கால்சியம், பாஸ்பரஸ், வைட்டமின்களான பி 1, கே மற்றும் டி போன்ற அத்தியாவசிய சத்துக்கள் அடங்கியுள்ளது. மேலும் இந்த உணவுப் பொருள் அனைத்து உணவுகளின் மீதும் தூசி சாப்பிட ஏற்ற ஒன்று. உங்களுக்கு பால் பொருட்கள் பிடிக்காவிட்டால், இந்த

எள்ளு விதைகளை அன்றாட உணவில் சேர்த்துக் கொள்ளுங்கள். மேலும் எள்ளு விதைகளில் எலும்புகளின் அடர்த்திக்கு தேவையான ஜிங்க் சத்து அடங்கியுள்ளது. ஒருவரது உடலில் ஜிங்க் சத்து குறைவாக இருந்தால், ஆஸ்டியோபோரோசிஸ் வரும். மேலும் எள்ளு விதைகளில் எலும்பு மற்றும் இரத்த நாளங்களின் ஆரோக்கியத்திற்குத் தேவையான காப்பர் உள்ளது. ஒரு ¼ கப் எள்ளு விதைகளில் 351 மி.கி. கால்சியம் அடங்கியுள்ளது.

கொலார்டு கீரை:

கொலார்டு கீரைகளில் எலும்புகளின் ஆரோக்கியத்திற்குத் தேவையான அத்தியாவசிய ஊட்டச்சத்துக்கள் வைட்டமின் கே. ஒமேகா-3 கொழுப்பு அமிலங்கள், மக்னீசியம் போன்றவை உள்ளது. இச்சத்துக்கள் அனைத்தும் ஒட்டுமொத்த மனித உடலுக்கும் மிகவும் இன்றியமையாத சத்துக்களாகும். கொலார்டு கீரைகளில் ஆன்டி-பாக்டீரியல், ஆன்டி-டயாபெடிக் மற்றும் ஆன்டி-டியூமர் போன்றவை அடங்கியுள்ளது. மற்றும் இதில் சிறிது கொழுப்பு மற்றும் சோடியமும் உள்ளது.

பசலைக் கீரை:

பசலைக்கீரையில் கூட கால்சியம் சத்து அதிக அளவில் நிறைந்துள்ளது. மேலும் அதில் இரும்புச்சத்து. நார்ச்சத்து. வைட்டமின்கள் மற்றும் மக்னீசியம் போன்றவைகளும் உள்ளது. இவை அனைத்துமே எலும்புகளின் வலிமையை விட, மனித உடலின் ஆரோக்கியத்திற்கும் அவசியமான சத்துக்களாகும். அதோடு இதில் உடலினுள் ப்ரீ-ராடிக்கல்களால் ஏற்படும் காயங்களைத் தடுக்கும் ஆன்டி-ஆக்ஸிடன்ட்டுகளும் அதிகம் நிறைந்துள்ளது.

வெள்ளை பீன்ஸ்:

பருப்பு வகைகள் என்று வரும் போது, வெள்ளை பீன்ஸில் எலும்புகளை இறுக்கும் கால்சியம் மட்டுமின்றி, வளமான அளவில் புரோட்டீன், நார்ச்சத்து, பொட்டாசியம், பாஸ்பரஸ் மற்றும் மக்னீசியம் சத்துக்களும் அடங்கியுள்ளது.

சால்மன்:

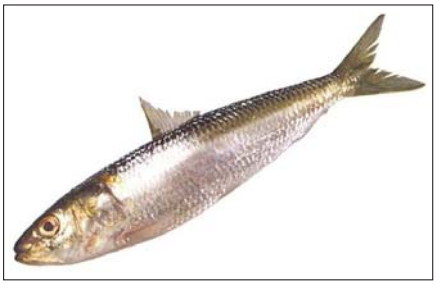
சால்மன் மீன்களில் எலும்புகளின் ஆரோக்கியத்திற்குத் தேவையான சத்துக்களான புரோட்டீன், வைட்டமின் டி. ஒமேகா-3 கொழுப்பு அமிலங்கள், கால்சியம் போன்றவை உள்ளது. இதில் உள்ள ஒமேகா-3 கொழுப்பு அமிலங்கள். எலும்புகளின் வலிமைக்குத் தேவையான சத்தான கால்சியத்தை உறிஞ்சுவதற்கு உதவுகிறது. இந்த சால்மன் மீனை ஒருவர் அடிக்கடி உணவில் சேர்த்து வந்தால். எலும்பு சம்பந்தமான பிரச்சனைகள் வராமல் தடுக்கலாம்.

ஈரல்:

நம் அனைவருக்குமே ஈரல் மிகவும் சிறப்பான உணவுப் பொருள் என்பது தெரியும். பலருக்கும் ஈரல் இரத்தத்தின் அளவை அதிகரிக்க உதவும் என்று தான் தெரியும். ஆனால் இந்த ஈரலை ஒருவர் சாப்பிட்டு வந்தால், அது எலும்புகளின் வலிமையை அதிகரிக்கும் என்பது தெரியுமா? ஏனெனில் ஈரலில் வைட்டமின் ஏ, டி போன்ற சத்துக்கள் அதிகம் உள்ளன. இதில் உள்ள வைட்டமின் டி கால்சியத்தை உறிஞ்சுவதற்கு உதவியாக இருக்கும். ஆகவே எலும்புகள் ஆரோக்கியமாகவும், வலிமையாகவும் இருக்க வேண்டுமானால், ஈரலை சாப்பிடுங்கள்.

மத்தி மீன்:

மத்தி மினில் ஓமேகா – 3 கொழுப்பு அமிலங்கள் அதிகம் உள்ளது. இது இதய நோய், ஆர்த்ரிடிஸ் மற்றும் புற்றுநோய் போன்றவற்றைத் தடுக்கும். மத்தி மீனில் பாஸ்பரஸ். கால்சியம், வைட்டமின் டி போன்ற எலும்புகளை வலிமையாக்கும் சத்துக்கள் உள்ளது. ஆகவே உங்கள் எலும்புகளை வலிமையாக்க நினைத்தால், மத்தி மீன்களை அடிக்கடி வாங்கி சாப்பிடுங்கள்.



வால்நட்ஸ்:

வால்நட்ஸில் உள்ள ஓமேகா – 3 எலும்புகளின் ஆரோக்கியத்திற்கு உதவியாக இருக்கும். இந்த ஓமேகா – 3 சிறுநீரின் வழியே கால்சியம் வெளியேறுவதைக் குறைத்து, எலும்புகளில் கால்சியத்தை தங்க வைத்து, உடலின் முக்கிய பாகங்களை வலிமைப்படுத்தும் (எலும்புகள்) கொலாஜன் தொகுப்பை ஊக்குவிக்க உறுதிப்படுத்தும்.

Courtesy: Pesod, March 2018

புரதச் சுரங்கம் - 11

பட்டாணியில் பொதிந்திருக்கும் பேரூட்டம்

கடற்கரைக்குப் போனால் பட்டாணி சுண்டல், ரோட்டுக் கடைகளில் மாலை நேர நொறுவையாக மசாலாவில் தளபுளவென குதித்துக்கொண்டிருக்கும் பட்டாணி, ஸ்டார் ஹோட்டல்களில் பீங்கான் பாத்திரத்தில் தளும்பாமல் வரும் சூப்பில் மிதந்துவரும் பட்டாணி, சப்பாத்திக்கான தொடுகறியாகப் பட்டாணி மசாலா... இப்படி எளிமையான உணவு முதல் நாகரிக மோஸ்தர் ஏறிய உணவுவரை பச்சைப் பட்டாணிக்கு முக்கிய இடம் உண்டு.

நாட்டின் வடமேற்கில் உள்ள இமயமலை சமவெளிப் பகுதியைத் தாயகமாகக் கொண்டது பட்டாணி. அதேநேரம் மத்திய ஆசியா, மத்திய கிழக்கு நாடுகளின் வழியாக உலகம் முழுவதும் வேளாண் பயிராக இது பரவியிருக்கலாம் என்று கருதப்படுகிறது. வேளாண்மையின் ஆரம்பகாலத்தில் பயிரிடப்பட்ட உணவுப் பயிர்களில் பட்டாணியும் ஒன்று. அதனால், ஆயிரக்கணக்கான ஆண்டுகளாக இது பயிரிடப்பட்டு வருகிறது.

∴பேபேசியே குடும்பத்தைச் சேர்ந்த கொடி வகைத் தாவரமான பட்டாணி, தோட்டங்களில் சாதாரணமாக வளர்க்கப்பட்டது. பச்சைப் பட்டாணி இனிப்பானது. அதேநேரம் காய்ந்த பிறகு இளம்பச்சை நிறத்தில் இருந்து மஞ்சள் நிறத்துக்கு மாறிவிடும், இனிப்புச் சுவையும் குறைந்துவிடும். ஆரம்பக் காலத்தில் பட்டாணியைக் காய வைத்தே சாப்பிட்டிருக்கிறார்கள். பிறகுதான் பச்சையாகவும் சாப்பிடலாம் என்பதைக் கண்டறிந்திருக்கிறார்கள்.

தற்போது உலகின் முதன்மை பட்டாணி உற்பத்தியாளர் மற்றும் ஏற்றுமதியாளர் கனடாதான். அதற்கடுத்ததாக ∴பிரான்ஸ், சீனா, ரஷ்யா, இந்தியா போன்ற நாடுகள் வருகின்றன. இந்தியாதான் பச்சைப் பட்டாணியை அதிக அளவில் இறக்குமதி செய்கிறது.

பயன்பாடு

பட்டாணியை வேக வைப்பதற்கு முன், கொஞ்ச நேரம் ஊற வைத்தாலே போதும். இதை அதிகம் சாப்பிடுவது வயிற்றுப் பொருமலை ஏற்படுத்தலாம், சிலருக்கு நன்றாகச் செரிமானம் ஆகாமல் போகலாம். இதைத் தவிர்ப்பதற்கு ஊற வைத்து முளைகட்டுவது ஒரு நல்ல வழி.

பட்டாணிக் கொடியின் பற்றுக்கம்பியும் கூட சில பகுதிகளில் உண்ணப்படுகிறது. கிழக்கு, தென்கிழக்கு ஆசிய நாடுகளில் சாலட்களிலும் சமையலிலும் இது பயன்படுத்தப்படுகிறது.

சந்தையில் கிடைக்கும் சாயம் பூசப்பட்ட பச்சைப் பட்டாணியைத் தவிர்ப்பது நல்லது. பட்டாணியைச் சிறிது நேரம் நீரில் ஊற வைத்தால், நீர் பச்சை நிறமாக மாறுவதைக் கொண்டு சாயம் சேர்க்கப்பட்டதைக் கண்டுபிடிக்கலாம்.

ஊட்டச்சத்து

- பட்டாணியில் கரையும் நார்ச்சத்து, கரையாத நார்ச்சத்து அதிகம் உண்டு. ஒரு கோப்பைப் பட்டாணியில் 19 கிராம் நார்ச்சத்து இருக்கும். நார்ச்சத்து குடலைத் தூய்மைப்படுத்தக்கூடியது.
- ஒரு கோப்பைப் பட்டாணியில் 16 கிராம் புரதச் சத்து இருக்கிறது. விலங்குப் புரதம் கிடைக்காதவர்கள் பட்டாணியை மாற்றாகப் பயன்படுத்தலாம்.
- பட்டாணியில் கால்சியம், இரும்புச்சத்து, செம்பு, துத்தநாகம், பொட்டாசியம், பாஸ்பரஸ், மாங்கனீஸ், மக்னீஷியம் போன்ற கனிமச்சத்துகள் உண்டு.
- பட்டாணியில் கொழுப்பு குறைவு. அதுவும் பெரும்பாலும் நல்ல கொழுப்பு.
- இதிலுள்ள பைட்டோஸ்டீரால் உடலின் கெட்ட கொழுப்பு அளவை குறைத்து எலும்பை வலுப்படுத்தக்கூடியது. எலும்பு வலுவிழப்பு நோயை (ஆஸ்டியோபோரோசிஸ்) குறைக்கும். நரம்புச் சிதைவை குறைத்து அல்சைமர் நோயையும் மட்டுப்படுத்தும்.
- செரிமானத்தை மேம்படுத்துவதாலும், விரைவாகச் சாப்பிட்ட நிறைவைத் தருவதாலும் எடை குறைப்புக்கும் பட்டாணி உதவும்.
- இரும்புச்சத்து குறைபாடு உடையவர்களுக்கு இது நல்ல ஊட்டத்தைக் கொடுக்கும். அதனால் குழந்தைகள், கருவுற்ற தாய்மார்கள், மாதவிடாய் பிரச்சினை இருப்பவர்களுக்கு இதைப் பரிந்துரைக்கலாம்.
- ரத்தச் சர்க்கரை அளவை சீர்ப் படுத்தும் என்பதால், நீரிழிவு நோயைக் குறைக்கும் தன்மையும் உண்டு.

- உடல் வீக்கத்தைக் குறைக்கும் Pisumsaponins, pisomosides போன்ற தாவர நுண்ணூட்டச் சத்துகள் (ஃபைட்டோநியூட்ரியன்ட்ஸ்) இதில் அதிகம். அதன் காரணமாகவே அதன் அறிவியல் பெயர் pisum என்று வந்தது.
- இதில் இருக்கும் coumestrol என்ற பாலிபீனால் வயிற்றுப் புற்றுநோயைத் தடுக்கும் என்று கூறப்படுகிறது.
- பட்டாணியில் வைட்டமின் சத்துகளும் அதிகம். வைட்டமின் ஏ, வைட்டமின் பி (ஃபோலேட்), வைட்டமின் கே, நியாசின், தயமின் போன்றவை உள்ளன.
- இதில் வைட்டமின் சி மிக அதிகம். ஒரு நாளைக்குத் தேவையான வைட்டமின் 'சி'யை இதிலிருந்தே பெறலாம். வைட்டமின் சி, அஸ்கார்பிக் அமிலத்தைத் தருகிறது. நீரில் கரையக் கூடிய இந்த வேதிப் பொருள் நோய்த்தொற்றை எதிர்த்துப் போராடச் கூடியது. நோய் தடுப்பாற்றலைப் பெருக்கும்.
- வைட்டமின் கே எலும்பை வலுப்படுத்தி, எலும்பு வளர்ச்சியை அதிகரிக்கும் தன்மை கொண்டது.
- கண்பார்வைக்கு உதவும் Lutein, zeaxanthin போன்ற பொருட்கள் பட்டாணியில் அதிகம் இருப்பதால், சிறுவயது முதலே குழந்தைகளுக்குக் கொடுத்து வரலாம்.
- பச்சை பட்டாணியில் 'சாப்போனின்' (Saponin) அதிகமாக உள்ளது. இதற்கு வீக்கமுறுக்கி (Anti-inflammatory) செய்கை இருப்பதால் வாத நோய்களுக்குச் சிறந்தது.
- உடலுக்கு நன்மை தரும் ஒமேகா 3 கொழுப்பு அமிலம், பீட்டா கரோட்டீன் பட்டாணியில் பொதிந்து கிடக்கின்றன.

பட்டாணி

ஆங்கிலப் பெயர்: Green Pea / White Pea / Matter

தாவரவியல் பெயர்: Pisum sativum

(நிறைவடைந்தது)

தொடர் உருவாக்கத்தில் உதவியவர்கள்:
இயற்கை வேளாண் நிபுணர்கள் - பாமயன், அனந்து,
அரசு சித்த மருத்துவர்கள் - டாக்டர் ஜெ. ஸ்ரீராம்,
டாக்டர் வி. விக்ரம்குமார்.

Courtesy: ***ஆதி வள்ளியப்பன், தி இந்து, 10.09.2016***

சுற்றுச் சூழலை மாசுபடுத்தாத விலை குறைந்த இண்ட் டீசல்

தலைநகர் டெல்லியில் சுற்றுச் சூழல் மாசுபாடு காரணமாக 2,000 சிசிக்கு அதிகமான திறன் கொண்ட டீசல் வாகனங்கள் புதிதாக விற்பனை செய்வதற்கு தடை விதிக்கப்பட்டது. ஒரு கட்டத்தில் காற்றின் மாசு அளவு அதிகரித்ததால் பள்ளி, கல்லூரிகளுக்கு விடுமுறை விட வேண்டிய அளவுக்கு நிலைமை மோசமடைந்தது. காற்று மாசுபாட்டுக்கான முக்கிய காரணங்களில் வாகன புகையும் பிரதானமாகும்.

டீசல் வாகனங்கள் அதிக அளவில் புகையை வெளியிடுகின்றன என்பது யதார்த்தம். சூழலை பாதிக்காத பயோ டீசலை **(Pune)** புணேயைச் சேர்ந்த மை எகோ எனர்ஜி (எம்இஇ) எனும் நிறுவனம் உருவாக்கியுள்ளது.

புணே – மும்பை நெடுஞ்சாலையில் இதற்கான விற்பனையகத்தையும் இது அமைத்துள்ளது. இந்நிறுவனம் பயோ டீசல் விற்பனைக்காக அமைக்கும் இரண்டாவது விற்பனையகம் இதுவாகும். அடுத்த இரண்டு ஆண்டுகளில் 500 பயோ டீசல் விற்பனையகங்களை அமைக்கப் போவதாகவும் இதற்கான ரூ.250 கோடியை முதலீடு செய்ய உள்ளதாக நிறுவனம் அறிவித்துள்ளது,

தாவர எண்ணெய், வேளாண் கழிவுகள், உணவில் பயன்படுத்த முடியாத எண்ணெய் வித்துகள் உள்ளிட்டவை மூலம் இந்த பயோ டீசல் தயாரிக்கப்படுகிறது. இது அனைத்து டீசல் என்ஜின் வாகனங்களுக்கும் ஏற்றது. இந்நிறுவன ஆலை நாளொன்றுக்கு 25 லட்சம் லிட்டர் பயோ டீசலை தயாரிக்கும் திறன் பெற்றுள்ளது.

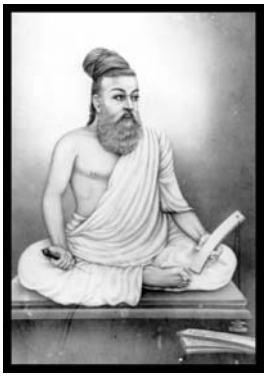
வழக்கமாக வாகனங்களில் பயன்படுத்தப்படும் டீசலுக்கான தர அளவீட்டின்படி இஎன் 590 தரத்தைக் கொண்டதாக பயோ டீசல் உள்ளது. இதனால் டீசல் என்ஜினில் எவ்வித மாறுதலும் செய்யத் தேவையில்லை என்று எம்இஇ நிறுவனத்தின் இணை நிறுவனர் சந்தோஷ் வர்மா தெரிவித்துள்ளார்.

இண்ட் டீசல் விலை தற்போதைக்கு லிட்டர் ரூ.64க்கு விற்கப்படுகிறது. மேலும் இந்த டீசல் ஜிஎஸ்டி வரம்புக்குள் வருவதால் ஜிஎஸ்டி-யில் பதிவுபெற்ற சரக்கு போக்குவரத்து நிறுவனகங்கள் இண்ட் டீசலை பயன்படுத்தினால் லிட்டருக்கு ரூ. 8 வரை சலுகை பெறலாம்.

இது தற்போதைக்கு அல்ட்ரா டீசல் விலைக்கு நிகராக நிர்ணயிக்கப்பட்டுள்ளது. இதற்கு 12 சதவீத ஜிஎஸ்டி விதிக்கப்படுகிறது. ஒரு விற்பனையகம் அமைக்க 18 மாதம் முதல் 24 மாதம் வரையாகிறது. இதனால் விற்பனையகங்களை பெருமளவில் அமைக்க முடியவில்லை என நிறுவனம் தெரிவித்துள்ளது. அடுத்த 5 ஆண்டுகளில் 80 லட்சம் வாடிக்கையாளர்களை எட்டிவிடுவோம் என இந்நிறுவனம் உறுதியாக நம்புகிறது.

இண்ட் டீசலை பயன்படுத்துவதால் சுற்றுச் சூழல் மாசுபடுவதும் குறையும். ஏனெனில் இதில் வழக்கமான டீசலில் உள்ளதைப் போன்ற கந்தக அளவு கிடையாது. இது அதிக அளவில் புழக்கத்துக்கு வரும்போது நாட்டின் இறக்குமதியும் கணிசமாகக் குறையும். இண்ட் டீசல் பெருமளவு விற்பனைக்கு வந்தால் சூழல் காப்பதோடு, டீசலுக்கான செலவும் குறையும்.

TIRUKKURAL AND MANAGEMENT IN A 'NUTSHELL' – 62



As we saw earlier, Peter Drucker, sums up all the jobs of Managers as;

Management of Economic Performance of Business,

Managing the Managers and Managing the Work and the Workers.

In the aspect of 'Management of Managers', Tiruvalluvar deals with three important aspects of Selection, Testing and Entrusting the tasks with unshakable confidence. The following Kurals bring out the messages clearly.

Atraraith Theruthal õombuga; Matruavar
Patrilar Naanaar Pazhi Kural 506

அற்றாரைத் தேறுதல் ஓம்புக; மற்றுஅவர்
பற்றிலர் நாணார் பழி. குறள் *506*

"Beware of selecting men who have no 'Relationship' capability; for they will have no attachment (to organization or people) and they will be callous to shame."

Theraan Piranaith Thelinthaan Vazhimurai
Theera Idumbai Tharum Kural 508

தேரான் பிறனைத் தெளிந்தான் வழிமுறை
தீரா இடும்பை தரும். குறள் *508*

"Behold the man that trusteth another without trying him; he createth endless evils even unto his posterity."

Theraan Thelivum Thelinthaankan Iyuravum
Theeraa Idumbai Tharum Kural 510

தேரான் தெளிவும் தெளிந்தான்கண் ஐயுறவும்
தீரா இடும்பை தரும் குறள் *510*

"To trust a man whom thou has not tried and to suspect a man whom you has to found worthy lead alike to endless ills."

HOME FESTIVALS - 7

ஆடி - Aadi (July/August)

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

(To be continued)

Be happy for this moment. This moment is your life - OMAR KHAYYAM

GBK MAIN STADIUM JAKARTA

Jakarta's Gelora Bung Karno sports facilities complex dates from the early 1960s when it was built in preparation of the fourth Asian Games held in 1962. In preparation of the eighteenth Asian Games this year, the buildings needed to undergo renovation to adapt to the requirements of the Olympic Council of Asia (OCA). Meanwhile, as a cultural heritage property, the restoration of the historical legacy of its architecture needed to be properly handled.

The stadium, which can accommodate 80,000 spectators, equipped with an 80,000-watt sound system and an energy-saving LED lighting system.

Here are the details of the lighting solution installed in this project:

- Philips Vaya Tube RGB 1220mm, around 1200pcs
- Philips Vaya Tube RGB 305mm, around 100pcs
- Philips Vaya Linear RGB 28x84deg 610mm, around 900pcs
- Philips Vaya Flood MP RGB (combination of 10, 20 and 40 deg), around 400pcs
- Philips Color Kinetics Archi Point Powercore RGB, around 100pcs
- Controller: Pharos LPC X 100 Universe + Creston
- Enttec Storm 8 and Storm 24, Ethernet to DMX converter
- Cisco Ethernet Switch
- Fiber Optic connection

Color Rendering Index (CRI):

CRI is a measurement of a light's ability to reveal the actual color of objects as compared to an ideal light source (natural light). High CRI is generally a desirable characteristic (although of course, it depends on the required application). If your goal is to illuminate a scene such that the colors all reveal as they would naturally (typically an important requirement in the cinematography business for example) then you want a high CRI lightbulb. If, conversely, you're lighting an underground tunnel and you don't particularly care whether the shapes are black and white or in color, CRI might not be as important. We tend to think, however, that high quality color rendering is a benefit in almost every situation.

The value for CRI that is typically advertised on commercially available lighting products is known as the CIE Ra value (a standard set by the International Commission of Illumination based in Vienna, Austria). Another standard for determining the color rendering ability of a particular bulb is the Color Appearance Model (CAM). Various Color Appearance Models are preferred to CRI as a viable way to measure color (particularly for color temperatures below 5000K; a range that encompasses most light bulbs). One of the most popular models is the CIECAM02 (the Color Appearance Model that was published by the CIE in 2002). That said, CRI is still by far the most widely published index by which everyday consumers can make a judgment on the color rendering ability of a particular light.

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