



ELECTRICAL INSTALLATION ENGINEER

NEWS LETTER

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

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NOVEMBER 2017



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EDITORIAL

Dear Members, Fellow Professionals and Friends,

Seasons Greetings To All!

India is on the path of economic growth to attain the position as one of the top economic powers of the World. We all remember that India being an Economic Power is not new and we were the **'Super Power'** a few hundred years ago and the process of regaining the position is in progress. Many inherent and natural advantages are attributed to our Great Country and at the present times **'Demographic Advantage'** of composition of our population with a sizable percentage of **'Youth'** is certainly a very positive point and advantage compared to many countries of the World. It is appropriate that during the month of November, not only we in India celebrate **'Children's Day'** on the 14th in memory of our great leader of the past, **Pandit Jawaharlal Nehru**, the **World celebrates International Children's Day on the 20th**.

We are witnessing the all round scenario of Engineering and Technological Developments, Industrialization, Growth of demands of all kinds of goods and services due to growth of civilization, automation and comforts and we can sense the immense opportunities thrown open. The Best Way to make use of demographic advantage is to step up the spread of knowledge and technologies among the growing youth and more importantly, to provide opportunities and facilities for Skill Development and Training for all the youth. This can only help utilize the advantage, not only to speed up economic growth but also to provide wide spread employment opportunities. Skill development is very important in areas of work, particularly in all areas of Engineering and Technology and more particularly in the sphere of Electrical and Electronics. The Government of India is very rightly focusing in these areas and is planning a very large scale activity for imparting knowledge and facilitates skill development in tune with the size of our country and the urgency of the need. It is necessary that all round co operation is extended by one and all for success of this important mission.

The Law and the Courts are very much in the news all the time these days, not only due to growing disputes but also due to people trying to take law in their hands in the name of **'Rights'** and resorting to all sorts of protests to paralyze normal life. Very appropriately both **World Legal Services Day** and **National Law Day** are observed on the 9th and the 26th of November. We are aware that Judiciary and the Legal System in the Country is one of the important pillars of Democracy which increases the confidence and faith of the people in Democracy. Serious efforts to establish the Fairness of Law and Legal Functioning and the strict implementation of Law and Legal Provisions to demonstrate that **'Nobody is above Law'** are very important to create confidence in people about Law and Order in the Country. This will help people to focus on working towards betterment of their own lives and the Country through Fair Ways.

We thank all those members who have helped us by participating in the advertisement appearing for the issue October 2017 – Dehn India Pvt. Ltd., Alfa Switchgear (I) Pvt. Ltd., Universal Earthing Systems Pvt. Ltd., Galaxy Earthing Electrodes (P) Ltd., Supreme Power Equipment Pvt. Ltd., Consul Neowatt Power Solutions Pvt. Ltd., Power Cable Corporation, K Dhanadapani & Company (Chennai) Pvt. Ltd., Ashlok Safe Earthing Electrode Ltd., Elmetlerr, Wilson Power and Distribution Technologies Pvt. Ltd.

EDITOR

	PARTICULARS	PAGE NO.
President : S.D. POONGUNDRAN	Events	4
	Editorial	5
	Contents	6
Secretary : S. GOPALAKRISHNAN	Members Details	7
	Know Thy Power Network – 122	7-8
Treasurer : M. BALAMURUGAN	Delivery of the first pre-tact Bullet – Resistant Transformer - Siemens	9
	Google wants Asia to get serious about renewable Energy	10-12
Editor : G. VENKATESH	Biofuels reduce Jet Engine pollution by 50 percent: NASA study	12
	Cheap New alloy may double the storage of Lithium batteries	15
Advisor: S. MAHADEVAN	Dubai green lights World's tallest Solar tower for World's largest Solar Park	16
Printer: M. VENKATARAMAN	5-Minute extreme fast charge battery technology for Electric vehicles	17
	This Swiss facility is sucking Carbon Dioxide out of the Air for growing veggies	18
No part of the material protected by this copyright notice may be reproduced or utilised in any form or by any means, the electronic or mechanical including photocopying, recording, or by any information storage and retrieval systems, without prior written permission from the copyright owner.	The 10 biggest Hydroelectric Power Plants in the World	19-22
	Annual General Body Meeting 05.08.2017-Photos	23-26
	New Electric Vtol Aircraft seats two & offers Autonomous flying	27
	Toshiba's new fast-charging battery could triple the range of Electric vehicles	28
	Energy, Electrical Energy and Renewable Energy – 2	29-32
	Skill India	33
	மிதக்கும் காற்றாலைகள்...	33
	Cummins Aeon concept beats Tesla to the all-Electric semi punch	34-35
	Entrepreneur – Madan Dodeja	37
	10 Fantastic words	37
	Top 10 Major Dams of India – 5	38
	இஸ்திரி எந்திரம்	39
Humour	39	
வியப்பூட்டும் இந்தியா: வளரும் பாலம்!	40	
என்றும் இளமையோடு வாழ திருமூலர் கூறும் வழி!	41	
புரதச் சுரங்கம் – 4	42	
கேஸ் சிலிண்டர் அபாயம்	43	
Tirukkural and Management in a 'Nutshell' – 55	44	
Home Festivals – 12	44	
	ADVERTISEMENTS	PAGE NO.
	Alpha Associates	47
	Ashlok Safe Earthing Electrode Ltd.	14
	Consul Neowatt Power Solutions Pvt. Ltd.	36
	Dehn India Pvt. Ltd.	46
	Elmettlerr	3
	Galaxy Earthing Electrodes Pvt. Ltd.	48
	Power Cable Corporation	45
	Supreme Power Equipment Pvt. Ltd.	2
	Universal Earthing Systems Pvt. Ltd.	1
	Wilson Power and Distribution Tech. Pvt. Ltd.	13

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48.	The Ganga Consultants and Contractors	Chennai	044-23633849, 98410 68818	ESA 158
49.	Ganga Foundations P. Ltd	Chennai	044-26701029, 98412 68320	EA 3074
50.	George Associates	Chennai	044-65375422, 98400 72836	EA 1999
51.	Godrej & Boyce Mfg. Co. Ltd	Chennai	044-66544414, 98840 54138	EA 2494
52.	Goms Electricals P. Ltd	Chennai	044-24611648, 94457 50016	ESA 231
53.	Grenel Powers P. Ltd	Chennai	044-42772491, 94453 92961	ESA 432
54.	Guru Engineers	Chennai	044-22471252, 94447 82802	EA 2762
55.	Henry and Farad P. Ltd	Chennai	96861 90888, 95662 84411	ESA 360
56.	Immanuel Electricals	Chennai	044-24986566, 94440 38369	EA 2568
57.	Inel Power System Engineers (P) Ltd.	Chennai	044-23712710, 98410 99221	ESA 263
58.	J.L. Electricals	Chennai	98408 65021, 98841 36717	EA 2270
59.	Jayaam Power Electricals	Chennai	99621 42199, 94442 26802	EA 2865
60.	Jayram Electricals P. Ltd	Chennai	044-24993700, 98400 33840	EA 1490

KNOW THY POWER NETWORK - 122

Before proceeding further on our regular topic, kindly spend a few moments of your time on the details furnished below

(i) In a “Culture”, where there is no discipline, disorder will always take place and in no time it can turn the “Lethal” quite easily in wrong circumstances. Presently we are the victims of this culture where safety is disregarded. A good example is the recent collapse of a foot bridge in Mumbai, with the attendant deaths of nearly 50 people. Another illustration is the death of large number of people in road accidents – the highest in the world. This unpleasant event is akin to the crashing of large passenger plane every day. Deaths due to electrical accidents and lightnings are no less inferior to it. Its toll is one of the highest in the world. That is why it warrants higher attention or zoomed focus.

*At present the investment on the activities leading to the prevention of electrical accidents like conducting regular awareness and training programmes to the common people and students is negligible. Much attention needs to be focused on this aspect and adequate / systematic investment needs to be placed for students / public training and inculcate a culture of zero tolerance to any electrical leakage (from HT or LT Networks) and make periodic risk and vulnerability assessment. It needs to be noted that “**Electrical Protection is not an one time investment but a recurring one**”.*

These steps will lead us to “**Modernity**” (Modern Society) where this is a respect for “**Safety Rules**”. This measure will surely ensure safety and security to all of us and other beings as well. All these create a pressing need to change our culture or mindset to a “**Safety Related Culture**”. Though these concepts may be alien to us, we have no other go except to accept them and implement them in our day to day routines. Will it be possible?

Now let us revert to our regular topic. The role of 4" blue metals in a substation needs more elaboration. Addition of a relatively high resistance surface layer (Crushed Rock) increases the resistance in series with the

body. However the exact value of this layer in reducing the electrical shock currents has not yet been fully established. It is noticed that a few layers of 4 to 6 inches Blue metals lower the danger factor ratio of body to short circuit current by a ratio of 10 to 1. A notable point in this regard is that weeds grass or other plants should never be allowed in between these rock materials. Their presence will impair the effective insulation brought by the crushed rock layers. Further the crushed rock serves several other functions; among them significant are,

- (i) It tends to channel more current flow from the earth grid downward through the natural ground. This property of the rocky layers help reduces the potential difference if any, occurs between the earth grid and the surface i.e. it acts as a **“Buffer”** between them.
- (ii) It provides a high series resistance to persons who are exposed to electrical shocks in the switchyard i.e. it restricts / blocks the flow of shock currents through the body.
- (iii) It helps conserve moisture in the soil beneath and thus helps to bring down the soil resistivity.
- (iv) It prevents the growth of plants that may decrease the resistance below the feet of the operating personnel.
- (v) It clearly demarcates the safer area for the operating personnel to work i.e. the protected area where one can safely execute his / her jobs.
- (vi) It makes it difficult to steal the components of the earth mats by unscrupulous persons. Thus the crushed stone layers offer greater protection to the switchyard operators, who may step off the earth mat after the occurrence of a fault, during switch operations.

In this case the step potentials experienced by them will be less lethal.

Now let us understand what are the factors that lead to accidents and also the tolerable levels of current by a human body.

Factors responsible for an accident in a switchyard

- (i) Relatively higher fault currents flow through the ground in relation to the size of the grounding systems and the ground resistivity. (Inadequacies in the grounding arrangements)
- (ii) Soil resistivity and the distribution of ground current flow may be in a favourable position to cause high potential gradients at one or more points.
- (iii) Presence of the individual at such a vulnerable point which may place his / her body in a position that bridges two points of high potential differences.
- (iv) Absence of adequate contact resistance or other series resistance which may help to restrict the shock current through the body of the affected person to a safer value.
- (v) The duration of the fault and body contact (and hence the flow of current through the body) may be adequate enough to bring the injuries at the given current intensity.

But one point may be noted in this regard. That is there is low probability of the coincidence of all these unfavourable conditions. Nevertheless many fatalities are still experienced due to the said voltage gradient. Hence we have to keep the probability of these accidents always at a lower level by adopting various safety measures.

Let me sign off here. In my forth coming article, I would like to proceed with Body Currents.



(To be continued...)
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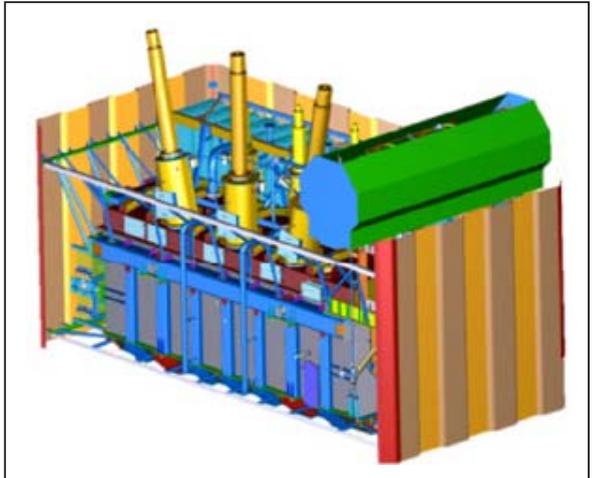
Economic growth without social progress lets the great majority of people remain in poverty, while a privileged few reap the benefits of rising abundance.

- JOHN F. KENNEDY (1917-1963) *Thirty-fifth President of the USA*

DELIVERY OF THE FIRST PRETACT® BULLET - RESISTANT TRANSFORMER - SIEMENS

As a foremost innovative supplier of power transformer solutions, Siemens has once again proved its capabilities to be unparalleled by sealing a historic deal for an industry premier: the first bullet-resistant power transformer unit.

Siemens will supply the 970 MVA three-phase generator step-up transformer with a voltage level of 345 kV to a US-based utility, and will play a major role in increasing the customer's powerhouse safety as well as the reliability for end consumers. The modular combination possibility of approved technologies and latest innovation is the key characteristic of Pretact. Thus, the concept allows for a versatile unit with 970 MVA at 345kV $\pm 2 \times 2,5\%$ – 24.8/21.1/17.3 kV with a link board to reconnect the low voltage side and voltage regulation at the high voltage side. Based on this the bullet-resistant transformer has been designed to fit five different generating stations in nine locations (with the same generator bus duct) and will be delivered to the customer in January 2017.



As with all innovations, an important first step is transforming fundamental research into solutions that provide real added value for customers. With bullet-resistant transformers, technology from external noise reduction systems was adapted to develop the bullet-resistant casing. The covering design consists of tank-mounted panels that protect the tank, cooling equipment, conservator, turrets, and the bottom of the bushings without additional foundations. The panels are supported by steel brackets, which allows for easy installation onto critical new or existing transformers and reactors. Some of the panels can slide to access pumps and fans for maintenance purposes.

The panels also reduce acoustic emissions during transformer operation. The offset of the bullet-resistant shielding allows movement of air for cooling purposes, as well as maintenance work to be carried out on the equipment.

Why bullet resistant?

Power transformers are essential in the effective and reliable transmission and distribution of electricity. Serving as critical nodes, transformers have been engineered over decades to withstand operational risks such as lightning strikes, severe weather events, seismic activity, and power fluctuations. However, up until now transformers have still been vulnerable to human impacts, especially those carried out with high-powered ballistics. Siemens has taken significant steps to develop and test new materials and designs that enable our transformers and reactors to withstand ballistic attacks, ensuring their physical security. Bullet-resistant transformers are part of the Siemens Transformers Pretact concept, which helps transformer operators to prevent failures, protect their assets from harm, and react rapidly in case of an emergency. "With this order, Siemens demonstrates its ingenuity and pioneering qualities for the benefit of the customers. We are delighted to assist our partners not only in grid expansion, but also when it comes to facing risks and threats to their business," said Rick Boyd, vice president of Siemens Transformers USA.

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91058 Erlangen, Germany

siemens.com/transformers

In economics, hope and faith coexist with great scientific pretension and also a deep desire for respectability - JOHN KENNETH GALBRAITH (1908-2007) Canadian-American economist.

GOOGLE WANTS ASIA TO GET SERIOUS ABOUT RENEWABLE ENERGY

As the world's largest technology company with a near monopoly over how we search the internet, Google is no stranger to criticism for everything from denying us choice online to invading our privacy.

But in recent years the company have been trying to use its immense economic clout and huge share of the computing market for good. Or, as its corporate slogan urges, **'Do the right thing. Don't be evil'**.

ENERGY

'Half of Southeast Asia's renewable energy projects are unbankable'

Read now

One area where the US\$90 billion tech giant has devoted much time and resources to doing good is the environmental footprint of its operations.

Moving IT functions such as email out of dusty office server rooms and into the cloud can dramatically reduce the footprint of computing, as there is no longer the need for businesses to operate their own servers. Google argues in a study named *It's cooler in the cloud* that using its cloud-based email service Gmail instead of an in house email system is up to 80 times less polluting.

Google's own footprint is also a super-sized challenge for the company. Google's servers, which power about 3.5 billion searches a day and billions more video streams and social media accounts, are responsible for an estimated 2 per cent of global greenhouse gas emissions, and its energy demand is growing by 20 per cent a year. The California-based firm wants to rein in its monster footprint, and the man to do it is the global director of data center energy and location strategy Gary Demasi, who led Google's delegation at the Paris climate talks in 2015.

Gary Demasi at the Asia Clean Energy Summit 2017

Demasi, who has been with Google for the last 12 years, is in charge of Google's vast army of data centres, which are responsible for most of the company's emissions. Though Google has been carbon neutral since 2007, it wants to go a step further by cutting fossil fuels out of its energy supply altogether and becoming 100 per cent renewable-powered.

This year is Google's deadline for becoming fully renewable-dependent, Demasi told *Eco-Business* on the sidelines of the Asia Clean Energy Summit on 24 October.

The company is investing US\$2.5 billion in renewable energy projects, and currently procures about 2.6 gigawatts of renewable energy making it the biggest corporate buyer in history. But buying clean energy in Asia—where Google has two large data centres sites—is not easy, Demasi points out.

In this interview with *Eco-Business*, Demasi talks about how Google saves energy, the rise of the global corporate energy buyer, and the battle to persuade Asian policymakers to embrace renewables.

How much electricity does Google use?

We've been carbon neutral as a company for 10 years now. Our biggest area of focus is our data centres, as they use the most electricity. Alphabet [Google's holding company] uses 6.2 terrawatt hours a year, according to the latest data. To put that in perspective, the city of San Francisco uses about 5 terrawatt hours a year. And Google's electricity consumption is growing by 20 per cent year on year.

What is driving that increase?

The footprint of our data centres, and that's driven by the growing use of our products, such as Gmail, YouTube and Google Cloud. All of that computing is done within 17 large industrial complexes filled, wall to wall, with data centres.

How do you ensure Google's systems are as efficient as possible?

We design our data centres from the ground up, and we think they're about 50 per cent more efficient than the average data centre you'd see in the market.

The greatest way to reduce your footprint is simply to reduce the amount of electricity you use. We've seen a big increase in the efficiency of our computing technology. Now, we can do three times the amount of computing with the same amount of energy as we could in 2010.

What are the most effective ways you've found to curb electricity consumption?

We very carefully control the way that hot and cold air are circulated in our data centres, to ensure that we're using as little additional energy as possible to cool our systems.

We run our data centres warm. It's not true that you need to refrigerate data centres. We run ours at 80 degrees Fahrenheit (26 degrees Celcius).

We also use free cooling—that is, natural forms of cooling that do not require extra energy, such as outside air, re-used air, and canal water.

Google has been using machine learning to increase the efficiency of its data centres. How is that project coming along?

We have looked at all of the operating variables for our data centres, and ran an analysis using machine learning to work out how to run them more efficiently.

We worked out that Google's power usage effectiveness (PUE)—that is, the overhead electricity used for ancillary functions such as cooling—is 1.12. That means we use 12 per cent more energy for ancillary functions than we do for data centres. Using machine learning, we were able to drive down the PUE by 40 per cent. The project is in the pilot phase, but it's looking very promising.

What is your take on Asia's renewable energy outlook, and how is Google looking to influence its development?

Most of the [renewable energy] programmes in Asia are nascent, or certainly less developed than other parts of the world. For instance, there are no renewable energy credit programmes to signify that a megawatt hour of energy that you're buying is genuinely green.

We have large data centre facilities in Singapore and Taiwan, and we're looking to influence how policy around renewable energy is structured. For example, Taiwan is going through the process of deregulation, so we're working with policymakers to structure corporate buying programmes at the same time. Deregulation should allow you to go directly to a developer to buy your power.

What does Google want to communicate about its energy efforts to stakeholders in Asia?

We want to make folks aware of some of the structures and processes we use in other parts of the world; to introduce the concept of the corporate power purchase agreement [where companies buy power directly from developers], and show that businesses are passionate about this [using renewable energy], because it makes good business sense—costs are being driven down over time.

The [energy] providers need to wake up to that, especially as businesses become more global, and bring global principles and ambitions with them. Companies want to fight climate change, be good stewards of the environment, and make the right long-term decisions for their companies.

Despite its huge renewable energy potential, coal-fired power stations continue to be built across Southeast Asia. How can even a big multinational like Google hope to have an influence on policymakers in this region?

I believe in the power of the buyer. There are many companies—not just Google—who have the same ambitions and needs as us, and want to use renewables. That demand needs to be aggregated and we need to find suppliers that are sensitive to that demand.

We're talking about a huge investment from these companies that will have a big impact in terms of job creation, economic development and emissions reduction in this region.

Who is Google looking to aggregate its energy demands with in Asia?

There are many options. Other tech companies and big industrial players, maybe even with the residential energy market, but we can't talk about specific projects at the moment.

How confident are you that Asian governments will wake up to the potential of the corporate energy buyer?

Even in Southeast Asia, things are changing. In Vietnam and the Philippines, for the first time we're hearing about corporate power purchase agreements, and corporations are seen as financeable partners—previously it was just the utilities.

Right now, Japan is going through its first auction [Japan introduced a reverse auction system for large-scale solar energy projects this year; companies submit bids and compete to supply a fixed amount of power to utilities. The system was brought in to complement a feed-in tariff, which remains in place for smaller projects]. And we're very excited, because we believe that that type of competitive market drives down cost.

A feed-in tariff drives the wrong sort of behaviour, and it's very difficult for a company like Google to compete against the FIT plus the cost of the underlying energy.

What is your biggest ambition for the next five years?

What we really want, particularly with respect to Asia, is the ability for any company of any size to be able to buy renewables. That will require new energy regulation mechanisms, the ability to negotiate deals directly with developers, and green energy credit programmes that verify that green energy actually is green.

BIOFUELS REDUCE JET ENGINE POLLUTION BY 50 PERCENT: NASA STUDY

Compared to using conventional fuels, using biofuel blending jet engines can reduce particle number and mass emissions in their exhaust trails by as much as 50 to 70 percent, a new study from U.S. space agency NASA found.

Worldwide, flights produced 781 million tonnes of CO₂ in 2015, according to the Air Transport Action Group (ATAG).

The cooperative international research, published in the journal Nature, was led by NASA and involving agencies from Germany and Canada.

The study shows that aviation-related aerosol emissions contribute to the formation of contrail cirrus clouds that can alter upper tropospheric radiation and water budgets, and therefore climate.

Data was gathered during flight tests in 2013 and 2014 near NASA's Armstrong Flight Research Center in Edwards, California, looking at the impact of alternative fuels on the performance of engines, emissions, and aircraft-generated contrails seen at altitudes that commercial airliners fly at.

The test series were part of the Alternative Fuel Effects on Contrails and Cruise Emissions Study (ACCESS). NASA described the contrails as being produced by hot aircraft engine exhaust mixing with the cold air that is typical at cruise altitudes several miles above Earth's surface, and are composed primarily of water in the form of ice crystals.

"Soot emissions also are a major driver of contrail properties and their formation," Bruce Anderson, ACCESS project scientist at NASA's Langley Research Center in Hampton, Virginia, said in a statement.

"As a result, the observed particle reductions we've measured during ACCESS should directly translate into reduced ice crystal concentrations in contrails, which in turn should help minimize their impact on Earth's environment."

The benefits come not just from reducing carbon emitted directly into the atmosphere but by also cutting down the chance of contrails forming, which can have an even bigger impact on the Earth's atmosphere.

The results from research aircraft that sampled the exhaust of engines onboard a NASA DC-8 aircraft as they burned conventional Jet A fuel and a 50:50 (by volume) blend of Jet A fuel and a biofuel derived from Camelina oil.

"This was the first time we have quantified the amount of soot particles emitted by jet engines while burning a 50-50 blend of biofuel in flight," said Rich Moore, lead author of the Nature report.

Researchers plan on continuing these studies to understand and demonstrate the potential benefits of replacing current fuels in aircraft with biofuels. It's NASA's goal to demonstrate biofuels on their proposed supersonic X-plane, according to the agency.

CHEAP NEW ALLOY MAY DOUBLE THE STORAGE OF LITHIUM BATTERIES

Lithium-ion batteries are at the heart of all kinds of devices, from smartphones and laptops to the ever-growing contingent of electric cars. So there is interest from many quarters in boosting their performance with advanced materials that make them lighter, more compact and able to hold more energy. A new tin-aluminum alloy developed by engineers in Texas might deliver on all three aspects, and it might even make them faster and cheaper to produce at the same time.



For years, mass-produced lithium-ion batteries have relied on graphite and copper for their anodes, the component that stores the energy as the battery charges. And for years, researchers have sought out alternative materials that could overcome the limitations of those materials, which include a high cost of production and limited storage capacity (silicon, for example, **could store 10 times** as much energy, although it poses another set of problems).

Creating current-day anodes is a laborious, multi-step process where graphite is powder-coated onto copper foil. But as Karl Kreder, a material scientist at the University of Texas at Austin and lead author of the new study explains, this is kind of inefficient in terms of both the manufacturing process and the battery itself.

“So the active material (graphite) is coated on top of the inactive current collector (copper),” he tells New Atlas. “This adds volume and inactive material mass to the system. By combining the current collector and active material together, a higher capacity active material can be used while simultaneously using less inactive current collecting material.”

Kreder and his team achieved this with a simplified manufacturing approach that skips a complicated step, the fastidious coating process. The tin is able to be added directly into the aluminum as it is cast into blocks, creating an alloy that can then be mechanically rolled (a relatively cheap and common metallurgical alloying process) into nanostructured metal foils. And this last step, where the particles within the material are reduced, is critically important.

“Tin is known to alloy with lithium,” Kreder explains. “Unfortunately, if tin foil is used or even micrometer-sized tin particles are used, the tin will break apart when cycled due to volume expansion when it alloys with lithium. This means that if you make a battery with large tin particles it will only last for tens of charge-discharge cycles. However, if you make nanometer-sized tin particles the particles will not break apart during alloying.”

The researchers call the resulting material an interdigitated eutectic alloy (IdEA) anode, which they say is one quarter the thickness and half the weight of traditional anode material. They tested it by working it into complete smaller versions of lithium-ion batteries, and then charging and discharging them to measure performance. They found that it demonstrated twice the charge storage capacity of a typical copper-graphite anode.

“The reason that this works so well is that one of the elements is active, tin, and the other one is inactive, aluminum,” says Kreder. “The aluminum creates a conductive matrix in which the tin is held. The aluminum provides the structure and electrical conduction, while the tin is alloyed and de-alloyed with lithium when the battery is cycled.”

A more compact anode, and in effect battery, could mean big things for manufacturers of smartphones, cars, laptops and myriad other devices. And that’s to say nothing of the improved performance and cheaper manufacturing process. In their material, the researchers believe they have an early proof-of-concept for new and improved lithium-ion batteries.

“It is exciting to have developed an inexpensive, scalable process for making electrode nano materials,” says Arumugam Manthiram, a professor and the director of the Texas Materials Institute, who led the team. “Our results show that the material succeeds very well on the performance metrics needed to make a commercially viable advance in lithium-ion batteries.”

The research was published in the journal ACS Energy Letters.

DUBAI GREEN LIGHTS WORLD'S TALLEST SOLAR TOWER FOR WORLD'S LARGEST SOLAR PARK

What is set to be the world's largest single-site solar park is getting a little larger, with the government of Dubai approving a 700-MW extension to the Mohammed bin Rashid Al Maktoum Solar Park. The new addition will give the facility a capacity of 5,000 MW by 2030, with a 260-m (853-ft) solar tower to take center stage.

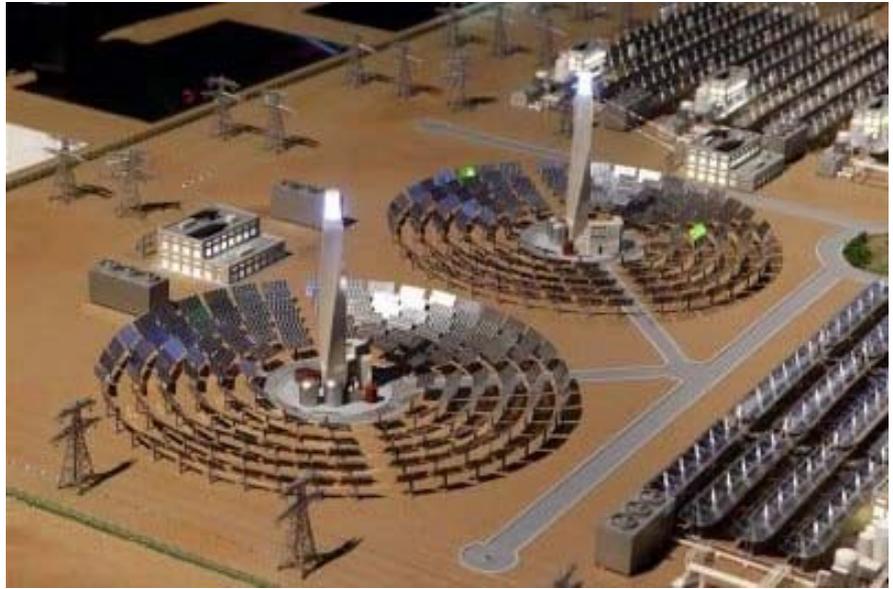
Mohammed bin Rashid Al Maktoum Solar Park sits around 50 km (31 mi) south of Dubai and its first phase was inaugurated back in 2013. It has since expanded to include 2.3 million photovoltaic solar panels and a capacity of 200 MW. The planned capacity is expected to grow to 5,000 MW by 2030, with the park eventually covering 214 sq km (83 sq mi) and reducing carbon emissions by 6.5 million tons per year.

The contract for a 700-MW extension built around what will be the world's tallest solar tower at 260 meters was awarded to a consortium consisting of Saudi Arabia's ACWA Power and China's Shanghai Electric, who bid a Levelized Cost of Electricity (LCOE) of 7.3 US cents per kW/h. This is described by the CEO of Dubai's electricity and water authority as the lowest LCOE in the world.

With construction to kick off in 2020, the extension will actually form the world's largest single-site **concentrated solar power (CSP)** project. These facilities generate solar power by using lenses and reflectors to concentrate sunlight and use it to heat fluids, which can in turn produce steam to drive a turbine.

One advantage of this approach is that the system can store some of the energy as heat and dispatch it as needed, making for a more flexible option than typical photovoltaic solar plants. One downside is that the **energy is more expensive**, though the newly announced agreement appears a step in the right direction.

"Our focus on renewable energy generation has led to a drop in prices worldwide and has lowered the price of solar power bids in Europe and the Middle East," said HE Saeed Mohammed Al Tayer, Managing Director and CEO of Dubai Electricity and Water Authority (DEWA). "This was evident today when we received the lowest CSP project cost in the world."



5-MINUTE EXTREME FAST CHARGE BATTERY TECHNOLOGY FOR ELECTRIC VEHICLES

Enevate Corporation, a lithium-ion (Li-ion) battery technology company, announces HD-Energy® Technology for Electric Vehicles (EVs) which features extreme fast charging in only 5 minutes with high energy density and long driving range that adds up to 240 miles (390 km)—or up to 50 miles (80 km) range with a 60-second charge. This fast charge and very short charging times are better than any other Li-ion technology available today, while meeting automotive requirements for energy density, range, and cost. Enevate licenses its silicon-dominant HD-Energy® Technology to battery and EV automotive manufacturers and suppliers worldwide.

This new extreme fast charge technology breaks down the barriers to electric vehicle adoption. EVs have been challenged primarily due to their limited range and drivers' "range anxiety," long charge times, and high cost. Now, Enevate's groundbreaking silicon Li-ion battery technology in EV cells (NCM-based) can be charged in 5 minutes at up to a tested 10C charging rate to 75% capacity with uncompromised range and energy densities of over 750 Wh/L, where conventional graphite cells suffer significant degradation with extreme fast charging.

This 5-minute charging allows flow-through charging stations where EV drivers wait just a few minutes to "fill up" just as they would with regular gas stations. In addition, with such short charging times, smaller batteries can be used in some EVs making them much more affordable.

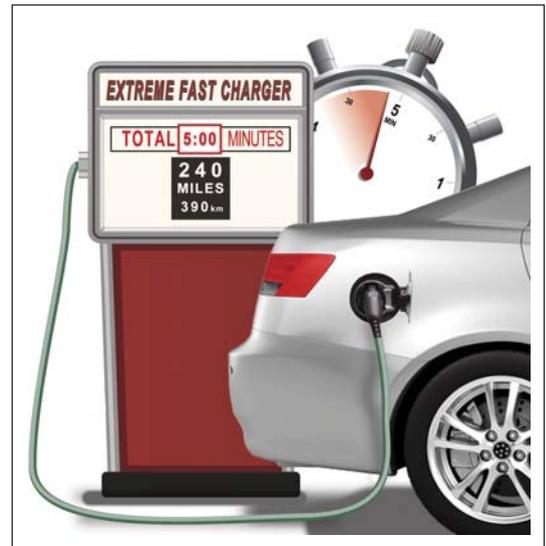
"The benefits of Enevate's silicon-dominant HD-Energy Technology enable next-generation features that take EVs to the next level," says Founder & Chief Technology Officer Dr. Benjamin Park. "Extreme fast charges for very short and convenient charging times, higher energy density leading to longer driving ranges, and cold temperature operation with inherent safety advantages make this technology ideal for electric vehicles."

Enevate's HD-Energy battery technology can safely charge and discharge down to -40°C and capture more energy during regenerative braking, extending their range in cold climates. A key safety benefit is that Enevate's HD-Energy Technology is inherently resistant to lithium-plating during fast charge and also during charging in low temperatures, which is a major challenge for conventional graphite Li-ion cells.

Lithium-ion battery pioneer Dr. John Good enough at University of Texas in Austin agrees, saying "Enevate's film-based silicon-dominant anode and cell is a truly novel approach and great practical fit for use in EVs addressing the major barriers to EV adoption."

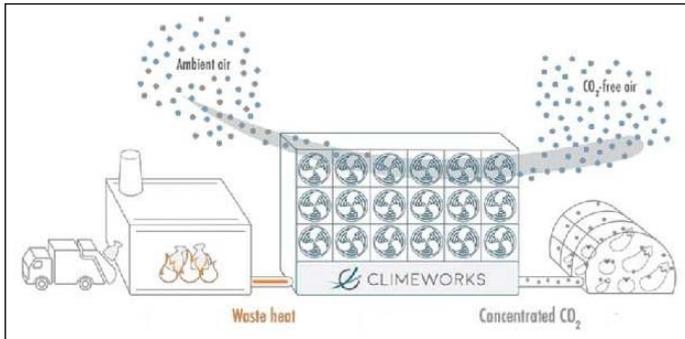
About Enevate

Enevate Corporation, with global headquarters in California USA, develops and licenses advanced silicon-dominant Li-ion battery technology that revolutionizes the electric vehicle (EV) market by breaking down barriers to EV adoption. Enevate's pioneering work on silicon-dominant anodes and cells has resulted in its breakthrough HD-Energy® Technology featuring extreme fast charging with uncompromised high energy density, excellent low-temperature operation for cold climates, and safety advantages over conventional graphite Li-ion batteries.



THIS SWISS FACILITY IS SUCKING CARBON DIOXIDE OUT OF THE AIR FOR GROWING VEGGIES

For years, experts have been debating whether sucking greenhouse gases out of the air using carbon capture technologies are a viable and effective way of curbing emissions on a large scale. Well, we may find out soon, at least on a smaller scale, thanks to the world's first commercial plant for capturing carbon dioxide directly from the air, now operating near Zurich, Switzerland.

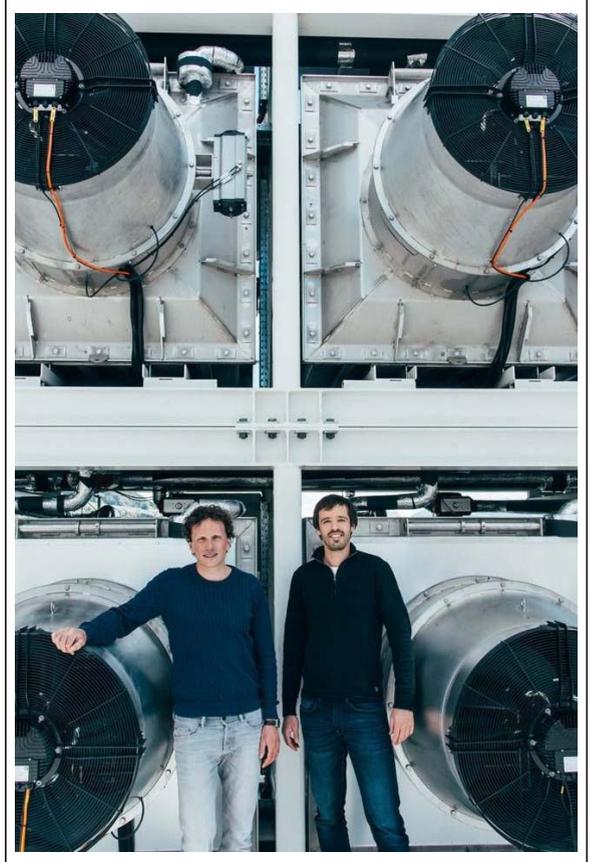


The facility run by Climeworks is the first to extract CO₂ from the air and sell it directly to buyers, such as companies that run greenhouses growing vegetables, or for producing carbonated drinks and carbon-neutral fuels. While the amount that the plant will be able to take in is not much — only 900 tons annually or about the equivalent emissions from 200 cars — it may be the first step in a larger roll-out in the future, says Climeworks co-founder Christoph Gebald.

18 huge fans suck in ambient air, which is filtered and goes through a process of adsorption and desorption to extract the CO₂. The cleaner air is then blown out, and the captured CO₂ piped over to a nearby greenhouse farm to help grow tomatoes and cucumbers. The fans also sit on top of a municipal waste disposal company, where the incineration process produces a lot of heat. This heat is recovered and is used to heat up the saturated filters to release and capture the CO₂ for use elsewhere. These filters are reusable and can be used several thousand times.

Climeworks was started by Gebald and Jan Wurzbacher, both engineers, who got the idea back in 2008 as graduate student when they first observed a greenhouse farm actually ordering tanks of CO₂ to be trucked in and used for agricultural production. Gebald and Wurzbacher realized that CO₂ could be directly filtered from air and used instead. They found funding have since developed the process into its current form, though they acknowledge that in order to reach the company's goal of capturing 1 percent of global carbon emissions by 2025, they will have to build 250,000 similar plants. Such carbon capture facilities would be most cost-effective and efficient when placed right beside fossil fuel power plants, but this option is still costly compared to solar and wind power.

Nevertheless, with the broader goal of reducing global carbon emissions, a variety of possible solutions will be needed. Curbing deforestation, restoring marshes and peatlands, and utilizing sustainable agricultural techniques are other vital carbon-reduction strategies. Whether more carbon capture facilities such as this one will be built remains to be seen, but it's encouraging to see that it can be one of many that are being explored. For more information, visit [Climeworks](https://www.climeworks.com).



THE 10 BIGGEST HYDROELECTRIC POWER PLANTS IN THE WORLD

Hydropower is one of the oldest and most widely-used renewable sources of energy. China, the world's largest producer of hydroelectricity, operates two of the 10 biggest hydroelectric power plants in the world, including the world's largest Three Gorges project. Power-technology.com profiles the world's ten biggest hydroelectric power production facilities based on installed capacity.

1. Three Gorges, China

The 22,500MW Three Gorges hydroelectric power plant in Yichang, Hubei province, China, is the largest hydropower station in the world. It is a conventional impoundment hydropower facility exploiting the water resource of the Yangtze River. The project is owned and operated by China Three Gorges Corporation through its subsidiary China Yangtze Power.

Construction of the CNY203bn (\$29bn) power project was started in 1993 and completed in 2012. A 181m tall and 2,335m long gravity dam was built as part of the Three Gorges project.

The power plant consists of 32 turbine / generator units rated 700MW each, and two 50MW power generators. Six foreign groups were involved in the supply of equipment for the project, including Alstom, which supplied 14 Francis turbine units.

The generating units of the Three Gorges power station were commissioned between 2003 and 2012. **Annual power output of the plant is estimated at 85TWh. The generated power is supplied to nine provinces and two cities, including Shanghai.**

2. Itaipu, Brazil & Paraguay

The Itaipu hydroelectric power plant with an installed capacity of 14,000MW ranks as the world's second largest hydropower plant.

The project is located on the Parana River, at the border between Brazil and Paraguay. The facility is operated by ItaipuBinacional.

Construction of the \$19.6bn plant began in 1975 and was completed in 1982. A consortium of US-based IECO and Italy-based ELC Electroconsult carried out the construction. Power production at Itaipu started in May 1984.

The Itaipu hydro-electric facility

supplies about 17.3% of Brazil's energy consumption and 72.5% of the energy consumed in Paraguay. It consists of 20 generating units with a capacity of 700MW each. **It produced 98.2TWh in 2012, which made it the biggest generating hydropower plant in the world.**



Three Gorges, China



Itaipu, Brazil & Paraguay

3. Guri, Venezuela

The Guri power project, also known as the Simón Bolívar hydroelectric power station, ranks as the world's third biggest hydroelectric power station, with an installed capacity of 10,200MW. The Venezuelan power facility is located on the Caroni River in the Bolívar State of southeastern Venezuela. CVG Electrificación del Caroni owns and operates the plant. Construction of the power project started in 1963. It was carried out in two phases, with the first phase completed in 1978 and the second phase in 1986. The power plant consists of 20 generating units of different capacities ranging between 130MW and 770MW.

Alstom was awarded two contracts in 2007 and 2009

to refurbish four 400MW units and five 630MW respectively. Andritz received a contract to supply five 770MW Francis turbines for the powerhouse II of Guri in 2007. **The Guri power station supplies around 12,900GW/h of energy for Venezuela.**

4. Tucuruí, Brazil

The Tucuruí Hydropower Complex situated on the lower Tocantins River in Tucuruí, Pará, Brazil, ranks as fourth largest hydroelectric power plant in the world. The 8,370MW power plant was built in two phases and has been producing since 1984.

Construction of the \$5.5bn Tucuruí hydropower project started in 1975. The first phase was completed in 1984. It involved construction of a concrete gravity dam 78m in height and 12,500m in length, 12 generating units with a capacity of 330MW each and two 25MW auxiliary units.

Construction of the second phase to add a new powerhouse was started in 1998 and completed in late 2010. It involved installation of 11 generating units with 370MW capacity each. A consortium of Alstom,

GE Hydro, Inepar-Fem and Odebrecht supplied the equipments for this phase. **The power station delivers electricity to the Belém town and the surrounding area.**

5. Grand Coulee, United States of America

The 6,809MW Grand Coulee hydropower project located on the Columbia River in Washington, US, is currently the world's fifth biggest hydroelectric power station. The project, built in three phases, is owned and operated by the US Bureau of Reclamation. The power facility commenced operation in 1941. The annual generating capacity of the plant is more than 24TWh.

The Grand Coulee hydro-power station consists of three power plants and a concrete gravity dam 168m high and 1,592m in length. Construction was started in 1933. The left and right power houses, consisting of total 18 Francis turbines rated 125MW and three 10MW additional units, were operational by 1950. The third power plant consists of three 805MW units and three 600MW units. Construction of the third power plant began in 1967 and the six units of the plant were commissioned between 1975 and 1980. The overhaul of three 805MW units at the third station began in 2013 and is expected to be completed in September 2017. The overhaul of the rest three 600MW units is set to start in 2018.



Guri, Venezuela



Tucuruí, Brazil



Grand Coulee, United States of America

6. Sayano-Shushenskaya, Russia

The Sayano-Shushenskaya hydropower plant located on the Yenisei River in Sayanogorsk, Khakassia, Russia, ranks as sixth biggest hydroelectric power station in the world. The power facility, operated by RusHydro, has an installed capacity of 6,400MW.

Construction of the power station started in 1963 and was completed in 1978. An arch-gravity dam 242m in height and 1,066m in length was constructed as part of the project. The power plant consists of 10 Francis generating units with a capacity of 640MW each. **It generates 23.5TWh of energy annually, of which 70% is delivered to four aluminum smelters in Siberia.**

The plant was shut down in 2009 following an accident which caused damage to nine to 10 turbines. It was reopened in 2010. Ten new units with 96.6% efficiency are planned to be installed at the plant. The upgrades are estimated to cost \$1.4bn.

7. Longtan, China

The Longtan hydropower project located on the Hongshui River in Tian'e County, Guangxi, China, is the seventh largest hydroelectric facility in the world and sixth biggest in Asia. The installed capacity of the plant is 6,300MW.

The hydroelectric power station consists of nine Francis 700MW generating units. The Longtan dam is a roller-compacted concrete gravity dam 216.5m in height and 832m in width. The power station is owned and operated by Longtan Hydropower Development. The power project was designed by HydrochinaZhongnan Engineering and built by Sinohydro. Construction of the Longtan hydropower project started in May 2007. The first generating unit was commissioned in May 2007. The project became fully operational in 2009. The turbine generators for the plant were supplied by Voith, Dongfang, Harbin and Tianjin. **The annual generating capacity is estimated at 18.7TWh.**



Sayano-Shushenskaya, Russia



Longtan, China



Krasnoyarsk, Russia

8. Krasnoyarsk, Russia

The Krasnoyarsk Hydroelectric Power Plant located on the Yenisei River in Divnogorsk, Russia, is currently the eighth largest hydroelectric power station in the world. The 6,000MW power facility is operated by JSC Krasnoyarsk HPS.

Construction of the power project started in 1956 and was completed in 1972. Krasnoyarsk Dam is a 124m high and 1,065m long concrete gravity dam. The power plant comprises of 12 Francis generating units with a capacity of 500MW each.

Turbines and generators for the plant were supplied by LeningradskyMetallicheskyZavod (LMZ) and Electrosila. Hidroenergoproek was the engineering, procurement and construction (EPC) contractor. **The power station's annual generating capacity is 18.4TWh.**

9. Robert-Bourassa, Canada

The 5,616MW Robert-Bourassa generating station located on the La Grande River in northern Quebec, Canada, ranks as the world's ninth largest hydroelectric power plant. The power station is owned and operated by Hydro-Québec.

Construction of the C\$3.8bn power project started in 1974. It involved construction of an embankment dam 162m in height and 2835m in length. The generating station comprises of two power plants installed with total 16 Francis turbines rated at 351MW each. The generating units were commissioned between 1979 and 1981.

A major rehabilitation project is underway at the Robert-Bourassa generating station since 2012 to improve its operational reliability energy performance. It is expected to be completed in 2020. Alstom was awarded a contract in January 2012 to upgrade the power station's efficiency as part of the rehabilitation project.



Robert-Bourassa, Canada

10. Churchill Falls, Canada

The 5,428MW Churchill Falls Generating Station located on the Churchill River in Newfoundland and Labrador, Canada, ranks as tenth largest hydroelectric power plant in the world. The power project is owned by Churchill Falls Labrador Corporation and operated by Newfoundland and Labrador Hydro, a subsidiary of Nalcor Energy.

Construction of the \$C946m hydropower station started in 1967. The project did not involve construction of any large dam. The water reservoir is, rather, contained in 88 rock-filled dikes. The underground power house consists of 11 Francis turbines rated at 493.5MW each.

The generating units of the hydroelectric power station were commissioned between 1971 and 1974. **The annual generating capacity of the power plant is 35,000GWh. It is one of the largest power facilities in North America.**



Churchill Falls, Canada

“Obstacles are those frightful things you see when you take your eyes off your goal.” - HENRY FORD

ANNUAL GENERAL BODY MEETING 05.08.2017 AT COURTALLAM



Er. S.D. Poongundran, President, TNEIEA
briefs steps taken during 2016-2017



Er. S.D. Poongundran, President, TNEIEA honouring
Er. S. Gopalakrishnan, Secretary, TNEIEA



Er. S.D. Poongundran, President, TNEIEA honouring
Er. M. Balamurugan, Treasurer, TNEIEA



Er. S.D. Poongundran, President, TNEIEA honouring
Mr. V. Rangarajan, M/s. Shri Vaari Electricals, Chennai,
Committee Member, TNEIEA



Er. S.D. Poongundran, President, TNEIEA honouring
Mr. G. Kannan, Vice President, TNEIEA



Er. S. Gopalakrishnan, Secretary, TNEIEA
briefs steps taken during 2016-2017



Er. M. Balamurugan, Treasurer, TNEIEA briefs steps taken during 2016-2017



Memento given to the member Mr. S. Ramachandran, M/s. Blue Power Solutions P. Ltd., Salem, completed 25 years of 'A' Grade Membership, by Er. S.D. Poongundran, President, TNEIEA



Memento given to the member Mr. R. Pandiaraj Prabhu, M/s. Devishree Electricals, Coimbatore, completed 25 years of 'A' Grade Membership, by Mr. G. Kannan, Vice President, Coimbatore



Memento given to the member Mr. G.M. Vishnuram, M/s. Emaar Electricals, Chennai, completed 25 years of 'A' Grade Membership, by Mr. J. John, Vice President, Tirunelveli & Er. S.D. Poongundran, President, TNEIEA



Memento given to the member Mr. D. Chandran, M/s. Hopes Engineering, Madurai, completed 25 years of 'A' Grade Membership, by Mr. S. Ponnambalanathan, Vice President, Madurai



Memento given to the member Mr. K. Vinothbabu, M/s. Vinoth Electricals, Chennai, completed 25 years of 'A' Grade Membership, by Mr. S. Manivannan, Vice President, Salem



Memento given to the member **Mr. S. Manivannan**, *M/s. Mani Engineering, Salem*, completed 25 years of 'A' Grade Membership, by **Mr. S. Kalyana Venkataraman**, *Vice President, Trichy* & **Er. S.D. Poongundran**, *President, TNEIEA*



Memento given to the member **Mr. S. Dellibabu**, *M/s. Delhi Electrical Constructions, Chennai*, completed 25 years of 'A' Grade Membership, by **Er. M. Balamurugan**, *Treasurer, TNEIEA*



Memento given to the member **Mr. C. Selvaraj**, *M/s. Geethanjali Electricals, Coimbatore*, completed 25 years of 'A' Grade Membership, by **Mr. G. Kannan**, *Vice President, Coimbatore* & **Er. S.D. Poongundran**, *President, TNEIEA*



Memento given to the member **Mr. N. Subramanian**, *M/s. Hindustan Electromech Engg. Co., Coimbatore*, completed 25 years of 'A' Grade Membership, by **Er. S. Gopalakrishnan**, *Secretary, TNEIEA*



Memento given to the member **Mr. P. Jayasingh**, *M/s. Jayam Bros., Thanjavore*, completed 25 years of 'A' Grade Membership, by **Mr. D. Santhanam**, *Member, TNEIEA*



Memento given to the member **Mr. V. Sabarivasan**, *M/s. Sabari Electricals Enterprises, Salem*, completed 25 years of 'A' Grade Membership, by **Mr. J. John**, *Vice President, Tirunelveli* & **Er. S.D. Poongundran**, *President, TNEIEA*



Memento given to the member **Mr. A. Radhakrishnan**, M/s. Krishna Bharathy Power Systems, Coimbatore, completed 25 years of 'A' Grade Membership, by **Mr. G. Kannan**, Vice President, Coimbatore



Memento given to the member **Mr. U. Baskar**, M/s. Balaji Electrical, Chennai, completed 25 years of 'A' Grade Membership, by **Mr. S.K. Sethuraman**, Member, TNEIA & **Er. S.D. Poongundran**, President, TNEIA



Memento given to the member **Mr. V. Lourthu**, M/s Transclean Electricals, Chennai, completed 25 years of 'A' Grade Membership, by **Er. M. Balamurugan**, Treasurer, TNEIA



Memento given to the member **Mr. J. John**, M/s Gopi Electricals, Rajapalayam, completed 25 years of 'A' Grade Membership, by **Mr. G. Venkatesh**, Committee Member, TNEIA & **Er. S.D. Poongundran**, President, TNEIA



Memento given to the member **Mr. A. George Muthunayagam**, M/s. Justin & Company, Coimbatore, completed 25 years of 'A' Grade Membership, by **Mr. K. Kannan**, Member, TNEIA & **Er. S.D. Poongundran**, President, TNEIA



Mr. R. Bhashyam, M/s. Sree Switchgears & Controls, Coimbatore, honoured by our Committee members

NEW ELECTRIC VTOL AIRCRAFT SEATS TWO & OFFERS AUTONOMOUS FLYING



Although many of us may have dreamed of a future full of flying cars by now, it's still not very likely that we'll see a vehicle that can both drive and fly proficiently anytime soon. What's more likely to happen is that the technologies of electric propulsion and unmanned aerial vehicles (drones) will be applied to the personal mobility space, and we'll start seeing more small electric aircraft being developed, especially those that can be remotely or autonomously operated. Advanced software combined with plenty of processing power can take the place of lengthy flight training and remove the need for having a qualified human operator at the controls, making these human-scale drones a potentially good fit for short commutes and local transport (with Dubai leading the race to be the city with the first flying taxis).

The latest news in the autonomous electric aircraft sector comes from quite possibly the most appropriately named company, PassengerDrone, which recently released some information about its own flying machine. Although it is way too early to know enough about it to say for sure, the company, in keeping with the trend of using superlatives for every tech news release, called it **“the world's most advanced, state-of-the-art, autonomous manned aerial vehicle”** and predicts that it could **“revolutionize traditional notions of transport.”**

The vehicle is “slightly larger than a compact car” and seats two, uses 16 independently powered electric motors to spin the rotors, and can be operated autonomously, remotely piloted, or manually piloted. One of its claims for innovation is about the use of fiber optics instead of wiring for all of the PassengerDrone's controls, which it says enables fast and efficient transmission of data within the aircraft, while also reducing the weight of the vehicle. Another is its Autopilot software that “allows passengers to input their destination quickly and fly there precisely,” which is billed as a way to eliminate the stress and time of long commutes.

The vehicle currently has a maximum payload of 270 pounds, which means two full-grown adults might be too heavy, and has a top speed of 45 mph and a flight time per charge of just 20-25 minutes. There's no mention of the charging time for the batteries.

TOSHIBA'S NEW FAST-CHARGING BATTERY COULD TRIPLE THE RANGE OF ELECTRIC VEHICLES

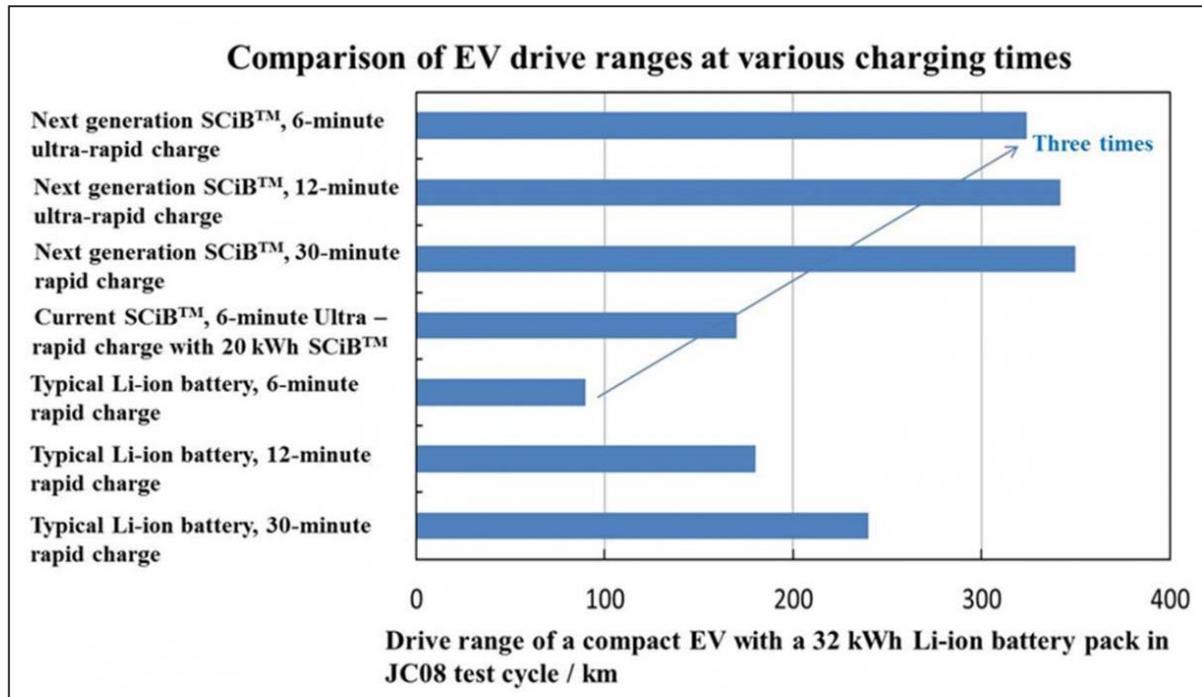
A key focus of electric vehicle (EV) makers is maximizing the range users can get from each charge, and for that reason new battery technologies are poised to play a huge part in driving their adoption. **Toshiba has developed a new fast-charging battery it claims could allow EVs to travel three times as far as they do now, and then be fully recharged again in a matter of minutes.**



Toshiba's SCiB (Super Charge ion Battery) has been around in various forms since 2007, with its chief claim to fame an ability to charge to 90 percent of capacity in just five minutes. It also boasts a life-span of 10 years and high levels of safety, and has found its way into a number of notable EVs, including Mitsubishi's i MiEV and Honda's Fit EV.

The current SCiB uses lithium titanium oxide as its anode, but Toshiba says it has now come up with a better way of doing things. The next-generation SCiB uses a new material for the anode called titanium niobium oxide, which Toshiba was able to arrange into a crystal structure that can store lithium ions more efficiently. So much so, that the energy density has been doubled.

Toshiba has tested out a 50-Ah version of the new battery and reckon that it too boasts excellent safety and a long life cycle, retaining more than 90 percent of its capacity after 5,000 charge cycles. It says that if incorporated into a compact EV, it would allow for a range of 320 km (186 mi) after just a six minutes of ultra-rapid charging, which is around three times the range offered by a standard, similarly charged lithium-ion battery.



“We are very excited by the potential of the new titanium niobium oxide anode and the next-generation SCiB™,” says Dr. Osamu Hori, Director of Corporate Research & Development Center at Toshiba Corporation. “Rather than an incremental improvement, this is a game changing advance that will make a significant difference to the range and performance of EV. We will continue to improve the battery’s performance and aim to put the next-generation SCiB™ into practical application in fiscal year 2019.”

Source: Toshiba

ENERGY, ELECTRICAL ENERGY AND RENEWABLE ENERGY – 2

Sustainable Growth & Sustainable Energy

We have seen that the growth of Economy has to be supported by growth of Energy Sector which has been happening all over the World and in India through enormous exploitation of “**Fossil Resources of Coal, Oil and Gas**” for providing secondary Energy Forms of Electricity, Fuel and Heat”. The World has realized in the past few decades about the dangers of using Fossils leading to ‘Global Warming’ and all associated dangers to the World and its future. The World has also realized about the finite and ‘Non Renewable’ nature of the Fossils and in order to counter the dangers and to sustain the needs for Energy, ‘Renewable Energy Sources’ were used more and more and Technologies are constantly under development, up gradation and improvements of efficiencies. The potential and important renewable energy sources of Solar, Wind, Biomass and Hydel are being addressed in all the countries of the World and India has also been pursuing this for a few decades and much more vigorously in the past one decade or so.

Initiatives to step up Clean Energy and Green Energy

The following recent News items are reproduced, just as examples and there are many more, to illustrate the bold initiatives to go with more and more of Clean and Green Energies.

Piyush Goyal to Electrify Indian Railways by 2020; plans to remove diesel engines in three years

If the railway ministry has its way, thousands of diesel-guzzling locomotives could be a thing of the past in the country. In a move to expedite the complete electrification of rail network, Indian railways has advanced the deadline by two years to 2020. This means the railways would remove diesel engines in the next three years and all 19,000 trains will run only on electric locomotives, a senior railway official said.

Railway minister Piyush Goyal has issued directions to speed up the electrification process of rail routes. Railway officials said this will not only contain greenhouse emission but also save cash-strapped railways at least Rs11,000 crore annually on fuel expenses. At present, Indian Railways spends Rs18,000 crore annually on purchase of diesel. On the other hand, its electricity purchase bill is pegged at Rs9,000 crore.

As per estimates, if railways run all its trains on electricity, the expenditure on purchase of power will be Rs16,000 crore and thus saving Rs11,000 crore every year. “We are giving a relook to the ways of speeding up the electrification process of rail lines across the country. The cost on account of power is quite less and so we can do a lot of savings in that,” Goyal said recently.

Senior officials also maintained that shifting train operations to electric mode will drastically reduce import of diesel from foreign countries that will also be beneficial for the country’s economy. At present, Indian railways has a fleet of 19,000 passenger and goods trains. Of these, about 5,000 trains run on diesel consuming nearly 300 crore litre of fuel every year. Sources said railway’s power purchase cost has also gone down significantly over the past few years.

A number of states have allowed railways to purchase electricity from alternate sources and thus its procurement cost has reduced from Rs9 per unit to Rs5 per unit. Earlier, railways had to purchase electricity only from state-owned power utilities. It is to be noted that Goyal, during his previous stint as power minister, had offered the railway ministry help to expedite the electrification process. The power ministry had offered to bear the entire cost of electrification at one go as the process involved no land acquisition. Officials said the entire electrification would cost approximately Rs35,000 crore.

“The savings from not using diesel alone will be around Rs18,000 crore and the cost will be recovered in seven years. Railways will stop production of diesel locomotives in the country if we achieve the target of complete electrification,” a senior official said. The railway ministry has stepped up efforts to electrify 4,000-km route in the current fiscal, a quantum jump from the last year’s target of 2,000km. Railway also has rolled out an action plan to drastically decrease the use of diesel in order to reduce energy cost and greenhouse gas emission.

Currently, only 42 per cent of total track network is electrified, rest section is operating on fossil fuel. Railways energy bill is touching about Rs32,000 crore a year, of which diesel is about Rs18,000 crore. During the last three financial years (2014-2017) and for 2017-18, total number of 93 railway electrification projects consisting of 16,815 kilometre at an estimated cost of Rs17,165 crore have been included in the Budget.

The pace of electrification has been increased from present average of 1,700km route per annum to 4,000km in 2017-18, a senior railway ministry official said. According to the action plan, about 22,000km route has to be electrified by 2021.

Watch: Electric vehicle push — Can India go from 1 to 100 in 13 years?

The Modi government wants only electric vehicles to ply on Indian roads by 2030. Road transport minister Nitin Gadkari says he will bulldoze carmakers into the change.

The government wants only electric vehicles to ply on Indian roads by 2030 and road transport minister Nitin Gadkari says he will bulldoze carmakers into the change.

The authorities have a difficult task on their hands given that at present, less than 1 percent of vehicles sold in India are electric and more than 95 percent of these vehicles are low-speed electric scooters. In addition, there are several infrastructure roadblocks like expensive batteries and lack of charging stations.

So how are the government and automakers going about the quest to go electric?

Dalmia Cement (Bharat) becomes first cement firm to join RE100 initiative

Cement giant Dalmia Cement (Bharat) Ltd is the first cement company to join RE100, a global collaborative initiative of the world's most influential companies committed to 100 per cent renewable power, it was announced.

Cement giant Dalmia Cement (Bharat) Ltd is the first cement company to join **RE100**, a global collaborative initiative of the world's most influential companies committed to 100 per cent **renewable** power, it was announced on Friday.

It's the third Indian business to join the RE100 initiative after Infosys and Tata Motors.

After adding 8 MW solar PV capacity for its captive use, Dalmia Cement has set an ambitious interim target to increase four-fold its percentage of **renewable energy** consumption by 2030 compared to 2015, a company's statement said.

"Being one of the greenest cement companies in the world, we are committed to decarbonising our operations in a way that makes business sense," Dalmia Cement Group Chief Executive Officer Mahendra Singhi said.

"We are scaling up our ambition to double our energy productivity and make a long-term transition to 100 percent renewable power, achieving a four-fold increase in the percentage of renewable energy in our electricity consumption by 2030," he said.

Currently, about seven per cent of the electricity sourced by Dalmia Cement is based on renewable energy.

LEADING COMPANIES PLEDGE TO 'USE BETTER ENERGY, BETTER'

MARRAKECH: Leading companies **Dalmia Cement, Swiss Re** and **Helvetia** have today made new and bold energy commitments for their global operations that will help to cut costs, lower emissions, and drive zero-emissions economies.

The news comes on Energy Day at COP22 in Marrakech, where world governments and non-state actors are gathered to increase ambition and action on climate change. It is a week to the day that the landmark Paris Agreement entered into force, and more businesses than ever before are committing to bold actions, to help ensure that global warming stays well below two degrees.



India's Dalmia Cement, self-branded as the world's greenest cement company, and Swiss insurer Helvetia, have committed to 100% renewable electricity through **RE100**; a global, collaborative initiative of influential businesses working to massively increase demand for – and delivery of – renewable energy. RE100 is led by The Climate Group in partnership with **CDP**.

Also today, (re)insurance company Swiss Re has committed to doubling its energy productivity through **EP100**, a global effort by The Climate Group, in partnership with the **Global Alliance for Energy Productivity**, to help companies maximize the economic benefits of every unit of energy they consume.

The two initiatives are designed to provide the least-cost decarbonization pathway for business. Dalmia Cement and Swiss Re are the first companies to sign up to both – Dalmia Cement joined EP100 at Climate Week NYC in September, while Swiss Re was a founding partner of RE100 in 2014.

The new additions to RE100 take the total number of members to 83, and the total demand for renewable electricity being created to over 100 TWh – more than enough to power Morocco three times over.

Mahendra Singhi, Group CEO and Whole Time Director at Dalmia Cement (Bharat) Limited, said: “Being one of the greenest cement companies in the world, we are committed to decarbonizing our operations in a way that makes business sense. Our presence as the first cement company in RE100 and EP100 illustrates our commitment on this issue. We are scaling up our ambition to double our energy productivity and make a long term transition to 100% renewable power, achieving a fourfold increase in the percentage of renewable energy in our electricity consumption by 2030.”

Vincent Eckert, Head of Internal Environmental Management, Swiss Re, said: “Improving energy productivity is key in our company's efforts to achieve greenhouse gas neutrality. We have joined EP100 to demonstrate that a strong commitment to a sustainable energy future is good for business.”

The newcomers were welcomed by **Damian Ryan, Acting CEO of The Climate Group**: “Right now, we're seeing greater corporate action on climate than ever before, thanks to the leadership of the world's most influential companies. No matter the sector or where your operations lie, if you're a major company that understands the importance of renewable power and energy productivity, it makes sense to join RE100 and EP100. ‘Using better energy better’ brings cost savings, lowers emissions, and enhances corporate reputations.”

He added: “But to deliver net-zero emissions economies and keep global warming well below two degrees, we've got to go further still. Businesses have enormous influencing power over their suppliers, customers, and peers - they need to look vertically along their supply chains and encourage others to act. And governments at all levels must implement supportive policies – most urgently carbon pricing.”

The new members of RE100 and EP100 were announced at Energy Day by EP100 Advisory Board member Rachel Kyte, Special Representative of the UN Secretary-General and CEO of SEforALL.

Energy Day is one of twelve thematic days comprising the UNFCCC's Global Climate Action Agenda, convened under the leadership of the high-level champions, H.E. Minister Hakima El Haité, and Ambassador Laurence Tubiana.

RE100 members Mars and Formula E will be speaking at today's event, and sharing their experiences of working towards 100% renewable power.

ABOUT RE100

RE100 is a global, collaborative initiative of influential businesses committed to 100% renewable electricity, working to massively increase demand for – and delivery of – renewable energy. This will accelerate the transformation of the global energy market and aid the transition towards a low carbon economy. RE100 shares the compelling business case for renewables and showcases business action, while working with others to address barriers and develop transparent reporting mechanisms. RE100 is brought to you by The Climate Group in partnership with **CDP**, as part of the **We Mean Business** coalition. Members of RE100 set their own strategy for achieving their 100% goals, but are strongly encouraged by RE100 to work to the shortest possible timeline.

The 83 members of RE100 include: Adobe, Alstria, Amalgamated Bank, Apple, AstraZeneca, Autodesk, Aviva, Bank of America, Biogen, Bloomberg, BMW Group, BROAD Group, British Land, BT Group, CaixaBank,

Coca-Cola Enterprises, Colruyt Group, Commerzbank, Crédit Agricole, Dalmia Cement, Dentsu Aegis Network, Diageo, DNB, Elion Resources Group, Elopak, Equinix, Facebook, Formula E, General Motors, Givaudan, Goldman Sachs, Google, H&M, Helvetia, Hewlett Packard Enterprise (HPE), HP Inc., IFF, IKEA Group, Infosys, ING, Interface, J. Safra Sarasin, Johnson & Johnson, Kingspan, KPN, La Poste, Land Securities, Marks & Spencer, Mars, Nestlé, Nike, Nordea, Novo Nordisk, Pearson, Philips, Procter & Gamble, Proximus, Rackspace, RELX Group, Royal DSM, Salesforce, SAP, SAVE S.p.A, SGS, Sky, Starbucks, Steelcase, Swiss Post, Swiss Re, Tata Motors Limited, TD Bank Group, Tetra Pak, UBS, Unilever, Vaisala, VF Corporation, VMware, Voya Financial, Walmart, Wells Fargo, Workday and Yoox Group.

ABOUT EP100

EP100 is global initiative led by The Climate Group in partnership with the Global Alliance for Energy Productivity, showcasing the world's most influential businesses committed to doubling their energy productivity. Energy productivity is about getting more economic output from each unit of energy; research suggests that doubling energy productivity in the US by 2030 could save US\$327 billion a year in energy costs while reducing CO₂ emissions by 33% below 2005 levels. EP100 offers a forum for sharing best practices and showcasing the leadership of companies making progress toward bold, public commitments on energy productivity. Current EP100 members include Covestro, Dalmia Cement, Danfoss, Hongbo Group, Johnson Controls, Mahindra Holidays and Resorts Ltd., Mahindra & Mahindra and Swiss Re.

ABOUT THE COMPANIES

Dalmia Cement has set a goal to power all its operations with 100% renewable electricity, and an interim target to increase fourfold the renewable/carbon-neutral share of its electricity use by 2030 (2015 baseline). The company currently sources around 7% of its electricity use from renewables (FY 2015-16), including solar PV. Dalmia Cement is also committed to doubling its energy productivity by FY 2029-30 (2010-11 baseline), which is significant given that most of its energy use is through heat. An exclusive interview with Mr. Prashant Tripathy, Group Manufacturing Head at Dalmia Cement, will be live **here** from 09:00hrs WET Friday November 11.

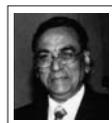
Helvetia is a Swiss insurance company, already 100% renewable via Renewable Energy Guarantees of Origin (REGOs). It achieved this milestone in 2015, five years ahead of its original goal of 2020. It is now adding its voice to the coalition of companies signalling to policy makers and investors to further increase supply of renewable power.

The Swiss Re Group is a leading provider of reinsurance to insurance companies, and insurance to mid-to-large-sized corporations and public sector clients. Swiss Re has committed to doubling its energy productivity by 2020 (2005 baseline). The company has a goal to use 100% renewable electricity by 2020 and is currently 87% of the way there (2015).

Electrical Energy and Renewable Energy

The present mix of 'End Use' energy forms of Heat, Fuel and Electricity are approximately 20% 20% and 60% respectively in India and as we can see, the percentage of Electricity will rise more and more.

As we illustrated in the last part, the Global potential, in particular Indian potentials of all renewable sources of energy are substantial. Solar, Wind and Hydel Energy sources are mostly used to generate Electricity, but they are "INFIRM" in nature with dependence on seasonal and time of the day factors. The Plant Load Factors of these sources of Energy range from 10 to 30%. The other important source namely "Bio Energy", with sizable potentials particularly in India, can play a very important role in future years providing "FIRM" Energy and Energy in all the three end use forms.



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

But while they prate of economic laws, men and women are starving. We must lay hold of the fact that economic laws are not made by nature. They are made by human beings
- FRANKLIN D. ROOSEVELT (1882-1945) Thirty-second President of the USA.

SKILL INDIA

Skill India is a campaign launched by **Prime Minister Narendra Damodardas Modi** on 15 July 2015 which aim to train over 40 crore (400 million) people in India in different skills by 2022. It includes various initiatives of the government like “**National Skill Development Mission**”, “**National Policy for Skill Development and Entrepreneurship, 2015**”, “**Pradhan Mantri Kaushal Vikas Yojana (PMKVY)**” and the “**Skill Loan scheme**”.

The National Skill Development Mission was approved by the Union Cabinet on 01.07.2015, and officially launched by the Hon’ble Prime Minister on 15.07.2015 on the occasion of World Youth Skills Day. The Mission has been developed to create convergence across sectors and States in terms of skill training activities. Further, to achieve the vision of ‘Skilled India’, the National Skill Development Mission would not only consolidate and coordinate skilling efforts, but also expedite decision making across sectors to achieve skilling at scale with speed and standards. It will be implemented through a streamlined institutional mechanism driven by Ministry of Skill Development and Entrepreneurship (MSDE). Key institutional mechanisms for achieving the objectives of the Mission have been divided into three tiers, which will consist of a Governing Council for policy guidance at apex level, a Steering Committee and a Mission Directorate (along with an Executive Committee) as the executive arm of the Mission. Mission Directorate will be supported by three other institutions: National Skill Development Agency (NSDA), National Skill Development Corporation (NSDC), and Directorate General of Training (DGT) – all of which will have horizontal linkages with Mission Directorate to facilitate smooth functioning of the national institutional mechanism. Seven sub-missions have been proposed initially to act as building blocks for achieving overall objectives of the Mission.

They are:

(i) Institutional Training, (ii) Infrastructure, (iii) Convergence, (iv) Trainers, (v) Overseas Employment, (vi) Sustainable Livelihoods, (vii) Leveraging Public Infrastructure.

More Details from the Ministry of Skill Development Entrepreneurship, GOI



National Skill Development Mission

மிதக்கும் காற்றாலைகள்...

கடலில் மிதந்தபடி அலை ஆற்றலில் இருந்து மின்சாரம் உற்பத்தி செய்யும் விதவிதமான கருவிகள் பல் வேறு நாடுகளில் பயன்பாட்டில் உள்ளன. உலகில் முதன் முறையாக ஆழ்கடலில் தரையில் நிற்கும் ராட்சத காற்றாலைகள் போல மிதக்கும் காற்றாலையை நிறுவி உள்ளது ஸ்காட்லாந்து நிறுவனமான ஹைவிண்ட். இவை அலையாற்றல் அல்லாமல் கடலுக்குள் வீசும் காற்றின் ஆற்றலை மின்சாரமாக சேமிக்கக்கூடியது. ‘அபர்டின்சைர்’ என்ற நகரில் இருந்து கடலில் சுமார் 25 கிலோமீட்டர் உள்ளே இந்த திட்டம் முதற்கட்டமாக செயல்படுத்தப்பட்டுள்ளது.



253 மீட்டர் உயரம் கொண்ட ராட்சத காற்றாலைகள் மூலம் 30 மெகாவாட் மின்சாரம் உற்பத்தி செய்யப்படுகிறது. இது 22 ஆயிரம் குடும்பங்களுக்குப் போதுமானது.

Courtesy: தினத்தந்தி, dt. 23.10.2017

CUMMINS AEON CONCEPT BEATS TESLA TO THE ALL-ELECTRIC SEMI PUNCH

While the world waits for a Tesla long-haul truck, Cummins has swooped in with the Class 7 Urban Hauler EV concept demonstrator. The all-electric Urban Hauler, which also paves the way for range-extender hybrid long-haul vehicles, hints at a cleaner, greener future for heavy haulers. The new Class 7 Urban Hauler EV, also known as the Aeos, eschews the usual diesel engine for a 140-kWh battery pack and electric motors. That means peak range is about 100 mi (160 km) and gross vehicle weight (GVW) is capped around 75,000 lb (34,020 kg). Extra battery packs could extend that to around 300 mi (483 km).

According to Cummins, the base battery and electric motors weigh about the same as the engine, gearbox, emissions treatment system and fuel tank in a conventional tractor. The company hasn't said how much the battery packs weigh individually, but logic would suggest adding extra cells to boost the range will also add some serious weight.

Like electric cars, the truck has regenerative braking, and the trailer roof can house solar panels for a bit more range on sunny days. The wing mirrors have been replaced with small cameras for better aerodynamics, and the sealed body and under-floor section should also smooth things out. With no engine to cool, it doesn't need a radiator either. Just how clean the truck is will depend on where the energy it's charged with comes from, but you'll get no local emissions from the concept regardless.

Electric power is one path to a cleaner future in trucking, but the internal combustion engine has plenty to offer as well. Cummins unveiled two new diesel engines, dubbed X15 and X12, alongside the Aeos that promise better airflow management and more precise fuel delivery for better long-haul efficiency. Both engines use a fully-integrated after treatment system for cheaper maintenance.

Finally, Cummins used its latest event to unveil a range of natural gas engines. Compressed natural gas (CNG) has grown in popularity in trucks recently, with offerings from Skoda and Scania using the technology entering service in Europe. Cummins hasn't been particularly forthcoming with details about the powertrain, other than suggesting they offer similar performance to their diesel options.

Cummins wants to put have an electric powertrain in production in 2019, including battery electric and plug-in hybrids, and plans to produce the electric internals while outsourcing vehicle bodywork.



MADAN DODEJA
Vashi Electricals



Vashi Electricals Pvt. Ltd. (VEPL) has become synonymous with Industrial products Trading in India. The company was started in 1978 by two brothers, Madan Dodeja and Mohan Dodeja, who had extra-ordinary commitment towards Customer Service. The company has grown manifold over the last 3.5 decades and today boasts of an annual turnover in excess of Rs. 500 crore and a customer base in excess of 10,000 customers. Now the Second Generation, Suraj & Ameet have joined the enterprise to take it to its next level. VEPL has PAN India presence – Regional offices at Navi-Mumbai, Nashik, Gurgaon, Vadodara, Ahmedabad, Bangalore. Joint Ventures at Kolkata, Chennai, Jaipur & Virtual offices at Pune, Nagpur & Hyderabad.

Madan was an employee of Finolex at a monthly salary of Rs. 165 per month – from 1970 to 1978 he learnt a lot by doing and observing and how to get along well with people. He developed business relationships with large corporations like Siemens, Finolex, Bonfiglioli, polycab, Legrand, Hindustan, Panasonic, Omron, Castrol, Bosch, Philips, Emerson, Connectwell & Unistar.

The customers are given effective and efficient service from their own Warehouse and Logistic Centre and a motivated staff of 300 team members, including 30 engineers. The company has obtained ISO 14001: 2004 certification, and also membership of professional bodies such as EMA, ECAM, IEEM, MEDC, TAIT and so on. VEPL has achieved **“Entrepreneur of the year – 2013”** award in Customer Retail Service Category.

The company has diversified by continuously adding products in their basket. It has diversified into the Automobile Spares Logistics with Authorised Distributorship for Castrol Lubricants; Maruti Spare Parts & Hero Moto Corp and Polymers PVC Resin; Stabilizers etc.

It takes 20 to 30 years to become what you want to be, by working 24 x 7 x 365 – “9 to 5” Focus + Passion + Positive Attitude + Luck, in that order. There is no other way!

This is an entrepreneurial success story of an employee to a successful entrepreneur. In India, today it is possible to keep on going up and up when we manufacture positive attitude, learn to love what we do for a living and work sincerely and passionately.

10 FANTASTIC WORDS

- | | |
|---|--|
| 1. The most Selfish one letter word “I”
– Avoid it | 6. The fastest Spreading six letter word “Rumour”
– Ignore it |
| 2. The most Satisfying two letter word “We”
– Use it. | 7. The hard Working seven letter word “Success”
– Achieve it |
| 3. The most Poisonous three letter word “Ego”
– Kill it | 8. The most Envidable eight letter word “Jealousy”
– Distance it |
| 4. The most Used four letter word “Love”
– Value it | 9. The most Powerful nine letter word
“Knowledge”
– Acquire it |
| 5. The most Pleasing five letter word “Smile”
– Keep it | 10. The most Divine ten letter word “Friendship”
– Maintain it.... |

The first panacea for a mismanaged nation is inflation of the currency; the second is war. Both bring a temporary prosperity; both bring a permanent ruin. But both are the refuge of political and economic opportunists - ERNEST HEMINGWAY (1898-1961) American Writer.

TOP 10 MAJOR DAMS OF INDIA - 5

9. TungaBhadra Dam, Karnataka

TungaBhadra dam is constructed across river Tungabhadra, a tributary of River Krishna, located approximately five km from Hospet town in Karnataka, which is also the largest dam in Karnataka. It offers a majestic sight, along with a Japanese garden, musical mountain and a beautiful scenery of nature.

Height: 49.38 meters

Length: 2441 meters

Type: Earthen Gravity Dam

River: Tungabhadra River

Location: Karnataka

Installed capacity: 72 MW



10. Bhavanisagar Dam, Tamil Nadu

The Bhavani Sagar Dam constructed across Bhavani river, is located 80 Km away from Coimbatore city, Tamil Nadu. This dam looks very beautiful and one of the important tourist place in the district of Erode. The Bhavanisagar dam is 8 km. long and it is the longest masonry dam in the world.

Height: 105 ft

Length: 1700 meters

Type: Earthen dam

River: Bhavani River

Location: Tamil Nadu

Installed capacity: 1,920 MW



இஸ்திரி எந்திரம்

வாஷிங்மெஷின் இயந்திரம் துணிகளைத் துவைத்தும், உலர்த்தியும் தந்துவிடுகிறது. ஆனால் இதுவரை இஸ்திரி செய்வதற்கு நாம்தான் நேரம் செலவழிக்க வேண்டும், அல்லது வெளியே காசு கொடுத்து இஸ்திரி செய்ய வேண்டும். இப்போது இஸ்திரி செய்யவும் நவீன எந்திரம் வந்துள்ளது. 'எப்பி' என்ற இந்த எந்திரம் இங்கிலாந்தில் தயாரிக்கப்பட்டுள்ளது. நிற்கும் பெட்டிபோல உள்ள இதன் கைப்பிடயில் ஹேங்கருடன் இஸ்திரி செய்ய வேண்டிய துணியை தொங்கவிட்டு பொத்தானை அழுத்தினால் போதும். மறுபக்கம்



இஸ்திரி செய்யப்பட்ட துணிகளை தந்துவிடும். பாலியெஸ்டர், பருத்தி, பட்டு, டெனிம், என அனைத்து வகை துணிகளையும் இஸ்திரி செய்ய முடியும். ஒரு துணியை இஸ்திரி செய்ய 3 நிமிடம் எடுத்துக் கொள்கிறது. ஒரே நேரத்தில் 12 துணிகளை இதில் தொங்கவிட்டு பொத்தானை அழுத்தினால், அரைமணி நேரம் கழித்து வந்தால் அனைத்தும் இஸ்திரி செய்யப்பட்டு வெளியே வந்திருக்கும். அடுத்த மார்ச் மாதம் விற்பனைக்கு வருகிறது இந்தக் கருவி. விலை 699 இங்கிலாந்து பவுண்டுகள்.

Courtesy: தினத்தந்தி, dt. 23.10.2017

HUMOUR

Not just HUMOR, but facts of life

Signs that you are Living in present times

1. You just tried to enter your password on the microwave.
2. You have a list of 15 phone numbers to reach your family of three.
3. You call your son's beeper to let him know it's time to eat. He emails you back from his bedroom, "What's for dinner?"
4. Your daughter sells Girl Scout Cookies via her web site.
5. You chat several times a day with a stranger from South Africa, but you haven't spoken with your next door neighbour yet this year.
6. You check the ingredients on a can of chicken noodle soup to see if it contains Echinacea.
7. Your grandmother asks you to send her a JPEG file of your newborn so she can create a screen saver.
8. You pull up in your own driveway and use your cell phone to see if anyone is home.
9. Every commercial on television has a website address at the bottom of the screen.
10. You buy a computer and 6 months later it is out of date and now sells for half the price you paid.
11. Leaving the house without your cell phone, which you didn't have the first 20 or 30 years of your life, is cause for panic and turning around to go get it.
12. Using real money, instead of credit or debit, to make a purchase would be a hassle and take planning.
13. Cleaning up the dining room means getting the fast food bags out of the back seat of your car.
14. Your reason for not staying in touch with family is that they do not have e-mail addresses.
15. You consider second-day air delivery painfully slow.
16. Your dining room table is now your flat filing cabinet.
17. Your idea of being organized is multiple-coloured Post-it notes.
18. You hear most of your jokes via e-mail instead of in person.
19. You get an extra phone line so you can get phone calls.
20. You disconnect from the Internet and get this awful feeling, as if you just pulled the plug on a loved one.
21. You get up in morning and go online before getting your coffee.
22. You wake up at 2am to go to the bathroom and check your E-mail on your way back to bed.
23. You start tilting your head sideways to smile.
24. You're reading this.
25. Even worse; you're going to forward it to someone else.

வியப்பூட்டும் இந்தியா: வளரும் பாலம்!

ஆற்றைக் கடந்து செல்ல பாலங்களைப் பயன்படுத்தி வருகிறோம். இரும்புக் கம்பிகள், சிமெண்ட், மரப்பலகைகளால் இவை கட்டப்பட்டிருக்கும். ஆனால் வேர்களாலேயே உருவான பாலம் பற்றிக் கேள்விப்பட்டிருக்கிறீர்களா? அதை **உயிரிப் பாலம்** என்று கூட சொல்லலாம். ஏனென்றால் அது உயிருடன் இருக்கிறது, வளர்ந்துகொண்டே இருக்கிறது!

வேர்ப் பாலத்தைப் பார்க்க வேண்டும் என்றால் வடகிழக்கு மாநிலங்களில் ஒன்றான மேகாலயாவுக்குச் செல்லவேண்டும். உலகில் அதிக மழை பெய்யும் இடம் என்று முன்னர் சொல்லப்பட்ட சிரபுஞ்சியிலிருந்து 12 கி.மீ. தூரத்தில் இருக்கிறது தைரினா கிராமம். இங்கிருந்து சுமார் 4 மணி நேரம் நடந்தால் இந்த வேர்ப் பாலத்தைப் பார்த்துவிடலாம்! சமதளமான சாலைகள் கிடையாது. அடர்ந்த காட்டுக்கு நடுவே மலைப் பிரதேசத்தில் மேடுகளிலும் பள்ளங்களிலும் ஏறி இறங்கவேண்டும்.

சில இடங்களில் படிக்கட்டுகள் உள்ளன. சில இடங்கள் செங்குத்தாக உள்ளன. இரண்டு இடங்களில் இரும்புக் கம்பிகளால் ஆன தொங்கு பாலங்கள் இருக்கின்றன. கீழே குனிந்து பார்த்தால் பெரிய பெரிய பாறைகளுக்கு நடுவே தண்ணீர் காட்டாற்று வெள்ளமாக ஓடிக் கொண்டிருக்கும். இதையும் கடந்தால் 20 மீட்டர் நீளத்தில் ஓர் ஒற்றை வேர்ப் பாலம் வருகிறது.

சுமார் 3000 படிக்கட்டுகள் ஏறி இறங்கினால் **நாங்கிரியாட்** என்ற கிராமம் வரும். **இங்குதான் இரட்டை அடுக்கு வேர்ப் பாலம் இருக்கிறது.** வேறு எங்கும் காண முடியாத இந்த அதிசயம் இந்தியாவுக்குப் பெருமை சேர்க்கும் இடங்களில் ஒன்று. நம் மலைவாழ் மக்களின் அறிவுக்குச் சிறந்த எடுத்துக்காட்டு இது!

இங்கு வசிக்கும் மலையக மக்கள் 'காசி' என்னும் பழங்குடி வகுப்பைச் சேர்ந்தவர்கள். அதிக மழையால் ஆறுகளும், நீர்வீழ்ச்சிகளும் ஏராளம் உண்டு. அவற்றைக் கடந்து ஷில்லாங், சிரபுஞ்சி போன்ற இடங்களுக்குப் பொருட்களை விற்க, வாங்க சிரமமாக இருந்திருக்கிறது. அந்தத் தேவையின் அடிப்படையில் உண்டானவைதான் வேர்ப் பாலம்.

அங்குள்ள ரப்பர் மரங்களின் வேர்கள் நீளமாகவும் வலிமையாகவும் இருப்பதை மக்கள் அறிந்திருக்கின்றனர். ஆற்றின் இரு பக்கங்களிலும் அந்த மரங்களை வளர்த்து, அவற்றின் வேர்களைப் பிணைக்கிறார்கள். அங்கு நெடிந்துயர்ந்த பாக்கு மரங்கள் நிறைய உண்டு. அவற்றைப் பிளந்து, நடுவில் இருக்கும் சதைப் பகுதியை எடுத்துவிட்டு, அதை ஆற்றின் குறுக்கே வைத்துவிடுகிறார்கள். ரப்பர் மரத்தின் வேர்களை இந்தப் பாக்கு மரங்களின் தண்டில் வைத்து, அடுத்த பகுதிக்குச் செல்லும் வரை கவனமாக வளர்க்கிறார்கள்.

இரண்டடி அகலத்துக்கு இந்தப் பாலத்தைக் கட்டுகிறார்கள். 15 வருடங்கள் வளர்த்த பிறகே, இந்தப் பாலத்தைப் பயன்படுத்த ஆரம்பிக்கிறார்கள். நடக்க வசதியாகப் பாலத்தின் நடுவில் தட்டையான கற்களையும் வைத்திருக்கிறார்கள். இரு பக்கங்களிலும் பிடித்துக்கொள்வதற்கு வசதியாக, வேர்களாலேயே கயிறுபோல் அமைத்திருக்கிறார்கள். இந்த வேர்கள் ஆண்டுகள் செல்லச் செல்ல வலிமை பெறுகின்றன. இது போன்ற சில வேர்ப் பாலங்கள் 500 ஆண்டுகளைக் கடந்தும் நல்ல நிலையில் இருக்கின்றன.



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என்றும் இளமையோடு வாழ திருமூலர் கூறும் வழி!

நமது உடலில் நோய் தோன்றக் காரணம் என்னவெனில், உஷ்ணம், காற்று, நீர் ஆகியவை தன்னளவில் இருந்த மிகுதல் அல்லது குறைவதால்தான். இதனாலேயே நோய் தோன்றுகிறது.

உஷ்ணத்தால் பித்த நோய்களும், காற்றினால் வாத நோய்களும், நீரால் கப நோய்களும் உண்டாகின்றன.

நமது தேகத்தை நீட்டித்து. ஆயுளை விருத்தி செய்ய திருமூலர் சித்தர் எளிய வழியை கூறுகிறார்.

ஒருவனுடைய உடல், மனம், ஆன்மா ஆகிய மூன்றையும் தூய்மை செய்யும் வல்லமை கடுக்காய்க்கு உண்டு என்று குறிப்பிடுகிறார் திருமூலர்.

கடுக்காய்க்கு **அமுதம்** என்றொரு பெயரும் உண்டு.

தேவர்கள் பாற்கடலைக் கடைந்த போது தோன்றிய அமிர்தத்திற்கு ஒப்பானது கடுக்காயாகும்.

“பெற்ற தாயைவிட கடுக்காயை ஒருபடி மேலானது” என்று கருதுகின்றனர் சித்தர்கள்.

கடுக்காய் வயிற்றில் உள்ள கழிவுகளையெல்லாம் வெளித்தள்ளி, அவனுடைய பிறவிப் பயனை நீட்டித்து வருகிறது.

கடுக்காயின் சுவை துவர்ப்பாகும். நமது உடம்புக்கு அறுசுவைகளும் சரிவரத் தரப்பட வேண்டும். எச்சுவை குறைந்தாலும் கூடினாலும் நோய் வரும். நமது அன்றாட உணவில் துவர்ப்பின் ஆதிக்கம் மிகவும் குறைவு. துவர்ப்பு சுவையே ரத்தத்தை விருத்தி செய்வதாகும். ஆனால் உணவில் வாழைப்பூவைத் தவிர்த்து பிற உணவுப் பொருட்கள் துவர்ப்புச் சுவையற்றதாகும். பின் எப்படி ரத்த விருத்தியைப் பெறுவது?

அன்றாடம் நமது உணவில் கடுக்காயைச் சேர்த்து வந்தால், நமது உடம்புக்கு தேவையான துவர்ப்பைத் தேவையான அளவில் பெற்று வரலாம். கடுக்காய் அனைத்து நாட்டு மருந்துக் கடைகளிலும் கிடைக்கும். இதில் தினசரி ஒரு ஸ்பூன் அளவு இரவு உணவுக்குப்பின் சாப்பிட்டு வர, நோயில்லா நீடித்த வாழ்க்கையைப் பெறலாம்.

கடுக்காய் குணப்படுத்தும் நோய்கள்:

கண் பார்வைக் கோளாறுகள், காது கேளாமை, சுவையின்மை, பித்த நோய்கள், வாய்ப்புண், நாக்குப்புண், மூக்குப்புண், தொண்டைப்புண். இரைப்பைப்புண். குடற்புண், ஆசனப்புண், அக்கி, தேமல், படை, தோல் நோய்கள், உடல் உஷ்ணம், வெள்ளைப்படுதல், மூத்திரக் குழாய்களில் உண்டாகும் புண், மூத்திர எரிச்சல், கல்லடைப்பு, சதையடைப்பு, நீரடைப்பு, பாத எரிச்சல், மூல எரிச்சல், உள்மூலம், சீழ்மூலம், ரத்த மூலம், ரத்தபேதி, பௌத்திரக் கட்டி, சர்க்கரை நோய், இதய நோய், மூட்டு வலி, உடல் பலவீனம், உடல் பருமன், ரத்தக் கோளாறுகள், ஆண்களின் உயிரணுக் குறைபாடுகள் போன்ற அனைத்துக்கும் இறைவன் அருளிய அருமருந்தே கடுக்காய்.

இதை பற்றி சித்தர் கூறும் பாடல்...

“காலை இஞ்சி

கடும்பகல் சுக்கு

மாலை கடுக்காய்

மண்டலம் உண்டால்

விருத்தனும் பாலனாமே”.

காலை வெறும் வயிற்றில் இஞ்சி- நண்பகலில் சுக்கு- இரவில் கடுக்காய் என தொடர்ந்து ஒரு மண்டலம் (48 நாட்கள்) சாப்பிட்டுவர, கிழவனும் குமரனாகலாம் என்பதே இந்தப் பாடலின் கருத்தாம். எனவே தொடர்ந்து கடுக்காயை இரவில் சாப்பிட்டு வர நோய்கள் நீங்கி இளமையோடு வாழலாம். கடுக்காய் வீடுகளில் கண்டிப்பாய் இருக்க வேண்டிய பொக்கிஷமாகும்.

“ஆரோக்ய வாழ்வுக்கு நாட்டு வைத்தியம் அவசியம்”.

“இதை அனைவருக்கும் பகிர்வோம்”.

“ஆரோக்ய பாரதத்தை உருவாக்குவோம்”

தகவல் சித்த மருத்துவம்

(நண்பர்களே இப்பதிவை சாதாரண பதிவாக எண்ணிவிடாமல் அனைவரும் முக்கியத்துவத்துடன் பகிருமாறும் நம் குழந்தைகளையும் தீர கவனிக்குமாறும் பணிவன்புடன் கேட்டுக்கொள்கிறேன்).



பெண்கள் போற்ற வேண்டிய பருப்பு -
வெள்ளைக் கொண்டைக்கடலை

ரோமானியர்களுக்கும் வெள்ளைக் கொண்டைக்கடலைக்கும் தொடர்பு உண்டு. இதன் தாவரவியல் பெயரின் முன்பகுதியான 'Cicer' என்ற பெயரைப் பரிந்துரைத்தவர் ரோமானிய இயற்கையியலாளர் பிளினி. கறுப்புக் கொண்டைக் கடலையைவிட இது அளவில் சற்றுப் பெரிது. சற்று நெகிழ்வானதும் கூட.



இது முதன்முதலில் மத்தியகிழக்கு நாடுகளில் பயிரிடப்பட்டதாகக் கருதப்படுகிறது. இப்போதும் காட்டுப் பயிராக உள்ளது. இது கறுப்புக் கொண்டைக்கடலையின் வழித்தோன்றல்தான். ஆயிரக்கணக்கான ஆண்டுகளாகப் பயிரிடப்பட்ட பிறகு, பயிரிடும் முறைகளில் ஏற்பட்ட மாற்றம் காரணமாக மேல் தோலின் நிறம் வெளுத்தது மட்டுமல்லாமல், கடலையின் அளவும் பெரிதாக மாறிவிட்டது. ஆப்கானிஸ்தான் வழியாக இந்தியாவுக்கு வந்ததால், 'காபூலி கொண்டைக்கடலை' எனப்படுகிறது. சென்னா என்று பொதுவாக அறியப்படுகிறது. தமிழில் வெள்ளை கொண்டைக்கடலை.

ஆப்கானிஸ்தான், பாகிஸ்தான், தெற்கு ஐரோப்பா, வட அமெரிக்கப் பகுதிகளில் இது பயிரிடப்படுகிறது. மத்தியகிழக்கு நாடுகளில் :.பிளா.:பெல், ஹம்மூஸ் எனப்படும் ரொட்டிக்கான தொடுகறி போன்ற கொண்டைக்கடலை உணவு வகைகள் பிரபலம்.

பயன்பாடு

கறுப்பு கொண்டைக் கடலையைப் போல் பல வகைகளில் இது பயன்படுத்தப்படாவிட்டாலும் சுண்டலாகவும் குருமாவிலும் அதிகம் பயன்படுத்தப்படுகிறது. 'சோளா பட்டுரா' என்ற மெகா சைஸ் பூரியுடன் தொடுகறியாக வருவது வெள்ளைக் கொண்டைக்கடலை மசாலாதான். சில நேரம் குழம்பிலும்

சேர்க்கப்படுவது உண்டு. புரதம் நிறைந்த இந்தப் பருப்பை, சில மணி நேரம் ஊற வைத்துப் பயன்படுத்த வேண்டும்.

ஊட்டச்சத்து

- கரையக்கூடிய மற்றும் கரையாத நார்ச்சத்தைக் கொண்டிருப்பதால், செரிமானக் கோளாறுகளைச் சீர்செய்ய உதவியாக இருக்கிறது.
- எலும்பு, தசை. குருத்தெலும்பு, தோல், ரத்தம் போன்றவற்றை வளர்த்தெடுக்கும் புரதத்தை இது அதிகம் தருகிறது.
- நோய் எதிர்ப்பாற்றலை உருவாக்க அடிப்படைத் தேவையாக இருக்கும் மாங்கனீசு இதில் அதிகமாக இருக்கிறது.
- ஒரு கப் கொண்டைக்கடலையை உட்கொண்டால் அன்றாட தேவையில் 84.5% மாங்கனீசு கிடைக்கும்.
- இரும்புச்சத்தைக் கொண்டிருப்பதால், பெண்களுக்கு மிகவும் நல்லது.
- சாப் போனின் என்ற ஆன்டி ஆக்சிடண்டை அதிக அளவு கொண்டிருப்பதால் மார்பகப் புற்றுநோய் ஏற்படாமல் தடுக்க உதவுகிறது.
- பைட்டோ நியூட்ரியன்ட்ஸ், பைட்டோ ஆஸ்டிரோஜன்ஸ் எனப்படும் தாவர ஹார்மோன்களைக் கொண்டிருப்பதால் பெண்களின் ஹார்மோன் அளவை சீராகப் பராமரிக்க உதவுகிறது.
- குறைந்த சர்க்கரை அளவை கொண்டிருப்பதால், மெதுவாகச் செரிமானம் அடையும். எடைகுறைப்புக்கும் உதவும். கரையக்கூடிய நார்ச்சத்து இருப்பதால், உடலின் ரத்தச் சர்க்கரை அளவை நிலைப்படுத்த உதவுகிறது. உயர் ரத்த அழுத்தத்தைக் குறைக்க உதவுகிறது.

தெரியுமா?

கொண்டைக்கடலை, மத்தியக் கிழக்கு நாடுகளில் 7,500 ஆண்டுகளுக்கு முன் கண்டறியப்பட்டது.

Courtesy: ஆதி வள்ளியப்பன், தி இந்து, 23.07.2016

கேஸ் சிலிண்டர் அபாயம்

தனது திருமணத்திற்காக எடுத்த விடுமுறைகள் முடிந்து, தனது காவல் நிலையத்திற்கு சென்று மகிழ்ச்சியுடன் வேலை செய்ய தொடங்கினார் அந்த சப்இன்ஸ்பெக்டர்.

காவல்நிலையத்திற்கு அருகே வீடு.

இனி சரியான வேளையில். சரியான உணவை உண்ணலாம் என கனவில் மிதந்து கொண்டு இருக்கிற வேளையில், அவன் முன் இருந்த போன் அலற தொடங்கியது.

போனை எடுத்த சில நொடிகளில், பதற்றத்துடன் “உடனே அந்த இடத்துக்கு வந்துரேன்” எனக் கூறி இணைப்பினை துண்டித்து, உடனே தடயவியல் நிபுணர் குழுவிற்கு தகவல் தெரிவித்தார். அடுத்த 10 நிமிடத்தில் தீ சூழ்ந்த அந்த இடத்தை காவல் குழுவினரும், தடயவியல் நிபுணர் குழுவினரும் அடைந்த போது, அங்கே தீயணைப்பு வீரர்கள், தீயை அணைக்க போராடி கொண்டு இருந்தனர். சைரன் ஒலியுடன், ஆம்புலன்ஸ் தயார் நிலையில் இருந்தது. சில நிமிட போராட்டத்திற்கு பிறகு அந்த வீட்டில் எரிந்த தீ அணைக்கப்பட்ட உடன், சப்இன்ஸ்பெக்டர், தடயவியல் நிபுணர் குழுவுடன், புகை மண்டலத்துடன், நிசப்தமாக இருந்த வீட்டினுள் நுழைந்தார்.

வீட்டினுள் யாரேனும் உள்ளனரா என கவனமாக பார்த்து கொண்டு இருக்கும் வேளையில், சமையலறை பகுதியில் இருந்து, “என்னங்க, என்னங்க” என மெல்லிய குரல் கேட்க தொடங்கியது. பதற்றத்துடன் சப்இன்ஸ்பெக்டர், சமையல் அறை பகுதியை அடைந்ததும், அவரின் கை கால்கள் நடுங்கியது. முழுவதும் தீயினால் பாதிக்கப்பட்டு, உயிரிழந்த கணவனின் உடலருகே, 90% தீயினால் பாதிக்கப்பட்ட மனைவி. கணவனை அழைத்தவாறு கிடந்தாள். அடுத்த சில நொடிகளிலே, இருவரும் ஆம்புலன்சில் ஏற்றப்பட்டனர். அவர்களுடன் சப்இன்ஸ்பெக்டரும், ஆம்புலன்சில் ஏறினார். வாழ்வில் முதல் முறையாக, ஒருவர் உயிருக்கு போராடுவதை காண முடியாமல் தவித்தார். காவல் துறை வாக்குமூலம் பெற வேண்டிய கட்டாயத்தில், மனவேதனையுடன், உயிருக்கு போராடி கொண்டு இருந்த பெண்ணிடம் தீ விபத்து எப்படி நடந்தது, என கேட்க தொடங்கினார்.

அதற்கு அப்பெண், “எங்களுக்கு கல்யாணம் ஆகி மூன்று மாதம் தான் ஆகது. நேத்து தான் இந்த வீட்டுக்கு குடி வந்தோம். நேத்து பால் காச்சன போது, எதிர்பாராத விதமா, சூடான பால் கையில் கொட்டிடுச்சு. எனக்கு சிரமம் கொடுக்க வேணாமனு நெனச்சு என் கணவர், இன்னைக்கு சமையல், அவரே பண்ணுறேனு சொன்னாரு. நான் சமையலுக்கு தேவையான பொருட்களை வாங்கிட்டு வீட்டுக்குள்ள நுழையறப்ப தான் அந்த கோர சம்பவம் என் கண் முன்னாடி நடந்துச்சு. பெரிய வெடி சத்தத்துடன் வந்த

தீ, என் கணவர் மேல பட்டு எரிய ஆரம்பிச்சு நான் அவர காப்பாத்த போனப்ப, என் மேலயும் தீ பரவிடுச்சு. எங்க வீட்டுல இருந்த கேஸ் ஸ்டவ்வு, கேஸ் ட்யூபு. ரெகுலேட்டரு எல்லாமே புதுசுதான். எல்லாமே சரியா இருந்தும் எப்படி வெடிச்சதுனு தெரியல. தயவு செஞ்சி என் நைய காப்பாத்திடாதீங்க. “என கூறிய சில நிமிடங்களில். அவள் தன்னுடைய கணவனை சொர்க்கத்தில் சந்தித்தாள்.

ஆம்புலன்ஸ் மருத்துவமனையை அடைந்தது. விபத்து தொடர்பாக, உயர் அதிகாரியை சந்திக்க, காவல் நிலையம் வந்த போது சப்இன்ஸ்பெக்டர் மொபைலுக்கு, தடயவியல் நிபுணரிடம் இருந்து போன் கால் வந்தது. போனில் தடயவியல் நிபுணர், விபத்துக்கான காரணம் கண்டறியப்பட்டதையும், எவ்வாறு நடந்தது என விவரித்ததும் பீதியுற்றார். காலண்டரில் தேதியை பார்த்தார். 10, அக்டோபர் 2016. உடனே மனைவிக்கு கால் செய்தார். அவள் போனினை எடுக்கவில்லை. பதற்றத்துடன் வீட்டை நோக்கி ஓடினார்.

வீட்டை அடைந்ததும், சமையலறைக்குள் வேகமாக சென்று, சிலிண்டரின் மேல் பகுதியினை பார்த்தார். அதில் B – 16 என எழுதப்பட்டு இருந்தது. உடனே, அந்த சிலிண்டரை அப்புறப்படுத்தி, சம்பந்தப்பட்ட நிறுவனத்திடம், போன் செய்து, காலாவதியான சிலிண்டரை திரும்ப பெற்று கொள்ளுமாறு கூறி நிம்மதி அடைந்தார்.

நம் வீட்டில் உபயோகிக்கும் சிலிண்டர்களுக்கு “Expiry Date” உள்ளது. அது cylinder bodyஐயும், Top ring பகுதியையும் இணைக்கும் மூன்று Metal Stripஇல், ஏதாவது ஒன்றில், உட்புறமாக, A to D எழுத்தில், ஏதேனும் ஒரு எழுத்தில். ஏதாவது ஒரு எண்ணுடன் சேர்க்கப்பட்டு, பெயின் டில் எழுதப்பட்டிருக்கும்.

அதை புரிந்து கொள்ளும் முறை

* A – January to March B – April to June

 C – July to September D – October to December

எண்கள் - வருடத்தை குறிக்கும்

B – 16 என்றால் June 2016 கழித்து அந்த சிலிண்டரை நாம் உபயோகிக்க கூடாது.

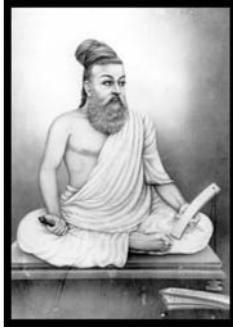
ஒரு வேளை காலாவதியான கேஸ் சிலிண்டரை உபயோகித்தால், அந்த சிலிண்டரில் இருந்து, எந்த நேரத்திலும், கேஸ் கசிவு ஏற்பட்டு, நம் உயிரை அது பறிக்கும். கேஸ் சிலிண்டர் வாங்கும் போது

***Expiry Date* ஐ சரி பார்த்து வாங்கினால், சமையல் மட்டும் அல்ல. நமது வாழ்க்கையும் இனிமையாக அமையும்.**

(இன்றே உங்களது வீட்டில் உள்ள சிலிண்டரின் *Expiry Date* ஐ சரி பார்த்துக் கொள்ளவும்)

TIRUKKURAL AND MANAGEMENT IN A 'NUTSHELL' - 55

There are a number of Dimensions and ways of looking at and understanding Management and Leadership and one of the important dimensions is judgement of the Right Time and Opportunity for appropriate action. Tiruvalluvar deals with this in a number 'Kurals' and a few of them bringing out the essence and importance are given below:



*Gnaalam Karuthinum Kaikoodum Kaalam
Karuthi Idathhaal Seyin Kural 484*

ஞாலம் கருதினும் கைகூடும் காலம்
கருதி இடத்தால் செயின். குறள் 484

“Thou canst conquer the whole world if thou choose the proper time and the proper objectives”

*Pollena Aange Puramverar; Kaalampaarthu
Ulverppar Ollie Yavar Kural 487*

பொள்ளென ஆங்கே புறம்வேரார், காலம்பார்த்து
உள்வேர்ப்பர் ஒள்ளி யவர். குறள் 487

“The wise show not their anger on the spot: they will nurse within their hearts and wait for their opportunity.”

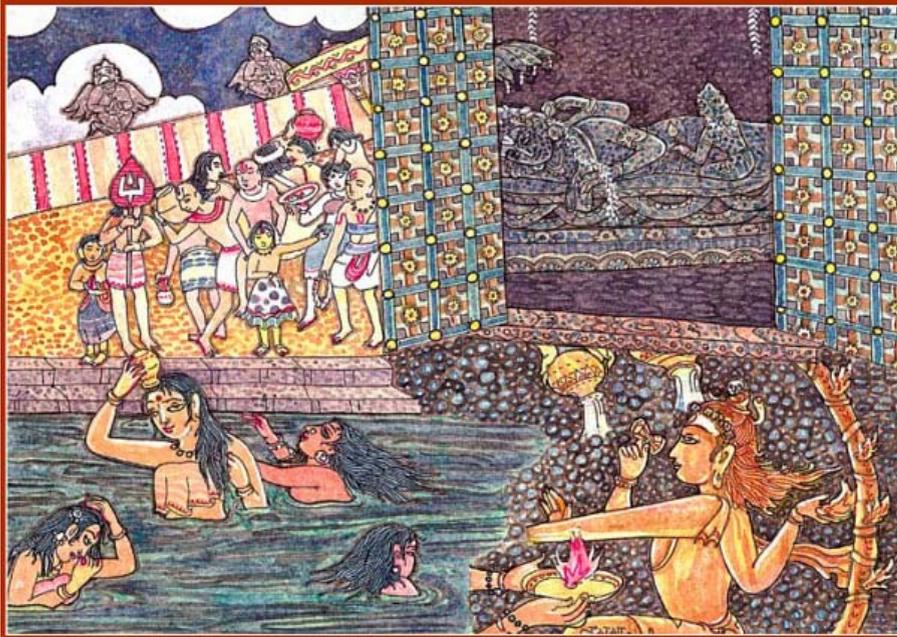
*Serunaraik Kaanin Sumakka; Iruvarai
Kaanin Kizhakkam Thalai Kural 488*

செறுநரைக் காணின் சுமக்க; இறுவரை
காணின் கிழக்காம் தலை குறள் 488

“Bend down before thy adversaries when they are more powerful than thyself: they can be easily overthrown when thou attackest them at the moment that their power is on the decline.”

HOME FESTIVALS - 12

மார்கழி – Markali (December/January)



During Tirupuval (below, in upper left of painting), people bathe (lower left) and gather in the early morning to go on procession singing devotional Vaishnava songs (upper left). Especially popular are those of the 9th century lady saint Andal, venerated as one of South India's greatest devotional poets. On Vaikunth Ekadasi, the 11th day of the lunar month, the doors of the huge

temple of Srirangam are opened to devotees from morning to night for darshan of Rangam, an aspect of Lord Vishnu, sleeping on Adishani, the serpent king (upper right). Another famed festival is Ardra Darshana, when Siva Nataraja is decorated and taken from the temple in procession throughout the community (lower right). Especially the ill and those of old age seek to have a glimpse of Nataraj. A renowned sweet, aurudra kalli, is made with vegetables on this day.

“All of these festivals are earnestly conducted. People wait for the day with their mind on God. The purpose is to gather in the home and worship for the prosperity of the family and of all mankind.” (To be continued)

There is only one difference between Dream and Aim.
Dream requires **Effortless Sleep** and Aim requires **Sleepless Efforts.**
Sleep for Dreams and wake up for Aims...!

- Swami Vivekananda



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