



ELECTRICAL

INSTALLATION ENGINEER

NEWS LETTER

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

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JULY 2018

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EDITORIAL

Dear Members, Fellow Professionals and Friends,

Seasons Greetings to One and All!

Energy Generation and the use of Energy by the mankind and for the mankind is at the centre of all issues like Carbon Footprint, Global Warming, Environment and Pollution and Climate Change and so on, discussed nationally and globally. Looking at Indian context, there has been steady economic growth in the past 70 years which has actually galloped in the past 30 years. The growth has been in all its activities and areas of Agriculture, Industries, Services and Businesses and the growth of population by over three times during this period. The country has been able to manage and grow focusing on Energy, in particular Electrical Energy, which has helped growth in all areas like Agriculture, Industries, Transportation, comforts and standards of living and so on. The present reports that food production is achieved with exportable surplus, Electrification nearer one hundred percent is almost reached and so on and the growth of GDP continues making us as one of the fast growing economies of the World. There are reports that in order to address the issues of pollution and Energy Security, there are plans and actions to change over to Electric Vehicles for all transportation including Electric Traction for Railways. All these will require more and more of Electricity and it may soon become that in the 'End Use' mix of energy forms of Heat Fuel and Electricity, Electricity may go to become almost 80% of the energy mix. All problems and issues, therefore, have to be addressed and solved by the generation and use of Electricity.

At present, as we all know, most of the Electricity in India is produced by use of coal and many large scale generations in future are also planned with use of local and imported coal etc. We are aware that there are large activities addressing Solar and Wind Energies, but they being 'Infirm', the real 'Firm' Energy solutions lie in addressing 'Waste to Energy' using wastes of all kinds in solid and moist and liquid forms with appropriate technologies which will not contribute to pollution of any kind. These are Engineering and Technology challenges for which solutions are evolved which have to be supported employed.

With regard to Efficiency levels in the use of Energy and Electrical Energy in particular, there have been lot of measures with the introduction of Energy Conservation Act 2001, but there is still lot of scope for improvements as we still seem to use almost 3 to 4 times more Electrical Energy compared to the International bench marks and Standards of Energy Efficiencies.

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

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KNOW THY POWER NETWORK - 130

Let us continue the topic already under discussion viz. The failure of 230 KV rated current transformers in Kadapperi 230/110 KV sub-station.

Before delving deep into the possible weak spots of various components of the current transformer, let us look at the “**Genesis of the Explosion**” and how it sparked off the explosion that had shattered and blown the ceramic / porcelain enclosure of the current transformer into pieces. It is really a great experience to witness such an (astonishing) enormous force developed inside the current transformer.

I Possible Contributing Factors for the Failure of CT

Two possible causative factors stand out as the main contributors for this fragmentation.

1. Over stressed Di-electric or Hydrogen generated by partial discharge activity or dissociation of the insulating oil
2. The combination of both the factors.

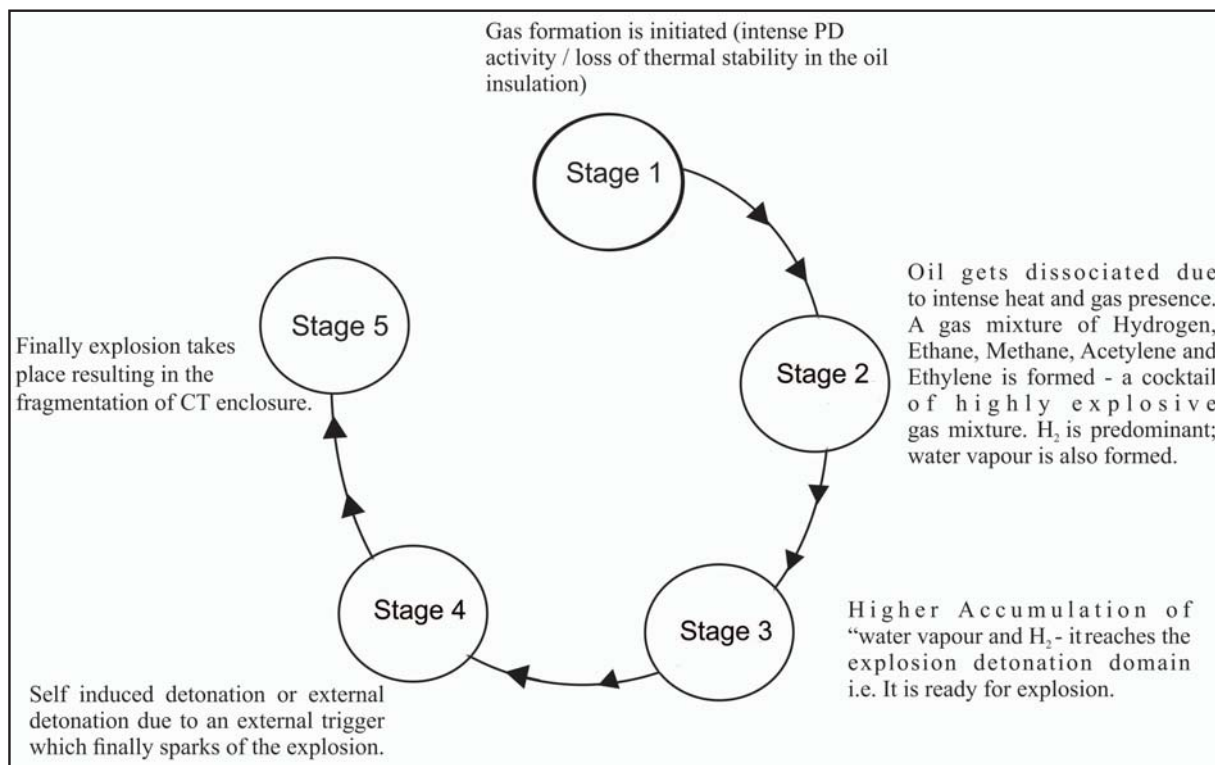
Partial discharge is most likely to occur in the oil insulation between the secondary winding leads

- Between these leads and the tank and
- In one of the bushings between the turns on the winding.

The level of partial discharge is dependent on the amplitude of the induced voltage. One such possibility is the inadvertent and sudden opening of the CT secondary winding circuit either due to a protection relay failure or any other reason leading to the no load condition on the secondary winding of the CT. As a consequence the CT behaves like an ignition oil, producing extremely high voltages.

The second causative factor viz the generation of the inflammable gases due to the result of the following processes i) Excessive current over heating paper insulation, ii) Weak lead connection over heating the oil, iii) Insulation change or damage causing partial discharge, iv) Open circuit on the secondary windings, v) Overheating and the loss of thermal stability of CT (i.e. heat generation inside the CT is more than its evacuation / transmission to the outside)

(Ageing excessive over loads, close up faults, loose terminations, Glows caused by the contamination on the outer enclosure, looseness of any other metal connections / poor crimping induce distortion at every stage and aggravate the thermal instability conditions)



II Possible Weak Spots in the CT

Now let us see the how four main constituent parts of the CT may have valuable or weak spots that finally contribute to its failure.

I	II	III	IV
Oil impregnated solid insulation	Insulating Oil	Outer porcelain / ceramic shell	Crimping terminations and other metal connections
It is the Achilles Heel of the CT. Its deterioration over the years and the formation of partial discharges may place the CT at the edge of a precipice and at anytime it may face a downhill or sliding movement and finally meet its end. It may be treated as the existential issue of CT. Anything that goes wrong with it will land the CT in trouble	Thermal instability inside arcing may lead to its dissociation and the consequential generation of a deadly mix of inflammable gases. DGAs test may help to identify this condition.	Contamination of this shell with uneven wetting may lead to dry arcs and lowering down of its PF voltage with stand level and hence its possible failure.	Looseness of these parts lead to Hot Spots and subsequent thermal instability and other issues.

III. Assignable Causes for the Failure of CT in Point – As seen from inside -Report Card

It may be treated as a part of the critical gap analysis in the protection space of the equipment which may finally safeguard the CT from its failure.

There is a strong reason to suspect / believe that the initiation of this kind of CT explosion may lie with the formation of partial discharge in the oil impregnated insulation as a consequence of thermal instability and ageing. It is not possible to pin point the exact cause of failure for want of adequate supporting evidence / data. The only available indication was provided by Tan delta test results which had shown that the CT was gradually losing its insulation characteristics since the Tan delta recording had crossed the tolerance level of 3 percent. However we cannot infer anything about the inside condition of the CT since these Tan delta values cannot be treated as a good indicator for the equipment failure.

A brief note on “Tan delta test” – It is a measure of the movement or travel of the insulation from its insulation base to the conductor region due to the accumulation of impurities or the deterioration / wear down brought by the service conditions. It occurs in a course of time - never occurs instantly. As such Tan delta test results are only “trend sothers” they do not provide absolute values. The CT insulation will be considered to touch its end of life when the Tan delta value exceeds the one prescribed by the manufacturer or crosses the recordings done at the time of commissioning by two times.

Fig 2. Movement of the insulation status from capacitance to resistance regions



IV What's next (Corrective Measures)

To start with let us not fear equipment failure. Equipment failures especially that of an aged one may be kept on par with the “Burnt Out” issue of a human being on which we have little control. All that we have to do is to listen to its distress or wailing calls before the problem turns into a crisis. Then we are certainly free from its failure. Then we can note that the distance between the failure mode of the equipment and its avoidance will be small.

In this context, it is to be stated that it is not enough to have sensitive security tools / protective devices. We have to periodically test them and secure their operation. Further timely maintenance and a close watch / monitoring of the aged equipment are the need of the hour.

Some of the suggested remedial measures to meet such unprovoked and untimely attacks on the CT are,

- Regular inspection of CT may be performed for hot spots, loose connections, Oil leaks through the joints / sealing and the leak of nitrogen gas through damaged diaphragm.
- Periodical cleaning may be carried out to avert the impact of external contamination
- Avoid continuous operation of these equipment under unfavourable operating conditions like higher harmonics level, under frequency / over frequency, PF over voltage and under voltage conditions.
- Provide modern protective / sensor system that would give a wakeup call at the initiation of the fault at its incipient stage itself.
- Wide use of thermionic images method.
- Effective sensors that are helpful in the indication of oil leak / gas leak / bellow position indicator, internal pressure and temperature.

Let me sign off here.



(To be continued...)
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EROADARLANDA

eRoadArlanda is one of several projects in the Swedish Transport Administration's pre-commercial procurement of innovation for the development of electrified roads. The techniques that have been developed in recent years are based on conductive technology that use an electric rail installed in roads to power and recharge vehicles during their journey.

The goal of the project is to generate knowledge, experience and decision data that is conducive to the creation of a platform for the electrification of larger transport routes in Sweden. The investment in the eRoadArlanda project is in line with the Swedish government's target of creating a fossil-free transportation infrastructure by 2030 and will help to boost Sweden's competitiveness.

The test track is located on a ten-kilometer section of Road 893 between Arlanda Cargo Terminal and the Rosersberg logistics area, of which two kilometers will be electrified for the demonstration project. The vehicle that are primarily planned to use the electrified road is an 18-ton truck that will be carrying goods for PostNord.

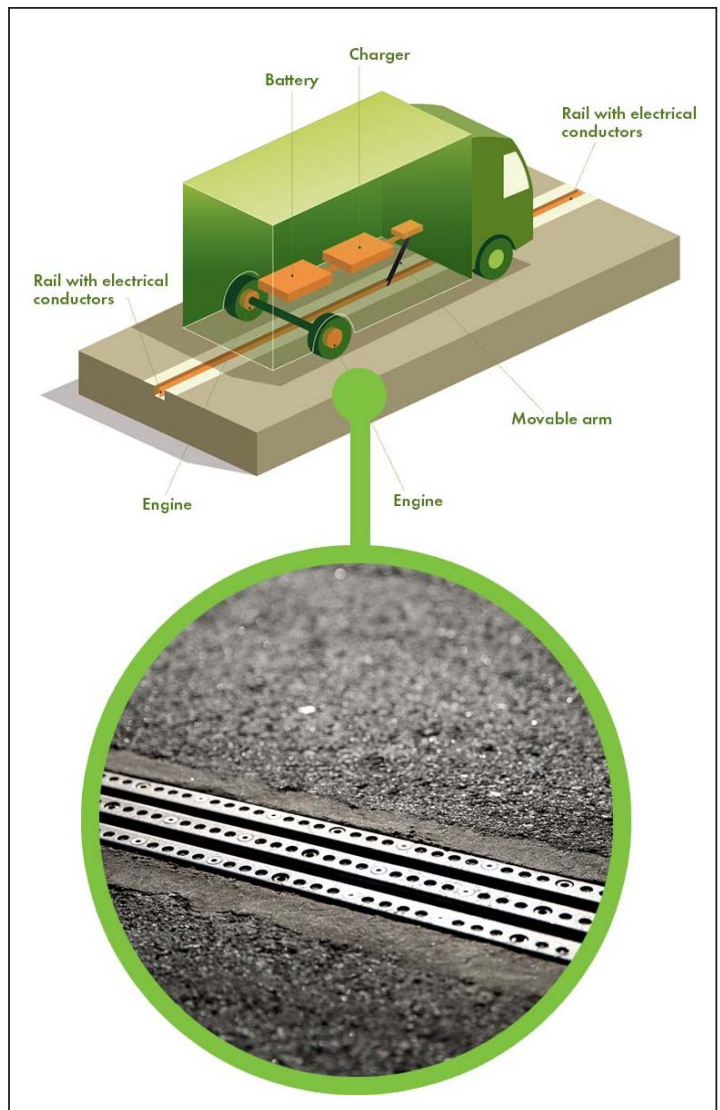
Why electrified roads?

The use of fossil fuels must be reduced, and quickly. Meanwhile, road transportation is expected to increase 59 percent by 2030.

To reduce carbon emissions, several solutions must be combined: such as biofuels, electrification and energy optimization. By electrifying roads, existing infrastructure can be utilized to reduce energy consumption and carbon emissions.

Road traffic in Sweden accounts for 33 percent of carbon emissions, one-third of which is attributable to freight traffic. It is estimated that two-thirds of truck transportation in Sweden could be carried out on electrified roads by 2030, which would reduce energy consumption by approximately 10 TWh, corresponding to three million tons of fuel.

One of the socio economic factors is that only the major routes, meaning 2 to 4 percent of the road network, needs to be electrified. Shorter journeys between these routes can be managed with battery



power. In addition to the considerable savings for the environment, electrified roads would result in a lower total cost compared with current fossil-fuel vehicles.

eRoadArlanda's technical solution transfers energy from a rail in the road to the vehicle, using a movable arm. The arm detects the location of the rail in the road and as long as the vehicle is above the rail, the contact will be in a lowered position. When overtaking, the contact is automatically raised.



The rail, which is connected to the power grid, also functions automatically. It is divided into sections and each individual section is powered only when a vehicle is above it. When a vehicle stops, the current is disconnected. The rail enables the vehicle's batteries to be recharged while powering its passage. (The system also calculates the vehicle's energy consumption, which enables electricity costs to be debited per vehicle and user.

eRoadArlanda CEO Hans Säll believes the technology is also very safe: "There is no electricity on the surface. There are two tracks, just like an outlet in the wall. Five or six centimetres down is where the electricity is. But if you flood the road with salt water then we have found that the electricity level at the surface is just one volt. You could walk on it barefoot."

With charging of electric vehicles en route, their batteries can be designed smaller in comparison with charging in fixed stations. Smaller batteries mean lighter weight, cheaper electric vehicles. And subsequently, more electric car buyers. The technology can also be applied to current vehicles and roadways through some modifications should an expansion push through.

The estimated cost for this electrifying roads technology is about •1000 per kilometer. The total distance required for electrification? Hans Säll says, "If we electrify 20,000km of highways that will definitely be enough. The distance between two highways is never more than 45km and electric cars can already travel that distance without needing to be recharged. Some believe it would be enough to electrify 5,000km."

Why use a conductive feed from the road?

- *In addition to a considerable reduction of carbon emissions, the full-scale implementation of conductive feeds is the only solution that will provide Sweden with economic savings across the board. The cost of electrification and electricity is lower than the cost for vehicle fuel.*
- *Existing infrastructure can be utilized. Up to one kilometer of rail can be installed per hour and interruptions can be minimized.*
- *Due to the shorter distance between the vehicle and contact point, a conductive feed from below works for all types of transport, including both cars and larger vehicles, such as buses and trucks.*
- *Rails embedded in the road will cause far less obstruction to the driver's field of vision, compared with roadside poles for the suspension of overhead cables.*

Never hate jealous people. They are jealous because they think you are better than them.

RESEARCH GIVES NEW RAY OF HOPE FOR SOLAR FUEL

The quest to develop the 'Holy Grail' of affordable, viable and environmentally-friendly fuels using sunlight has taken an exciting new twist.

A team of Renewable Energy experts from the University of Exeter has pioneered a new technique to produce hydrogen from sunlight to create a clean, cheap and widely-available fuel.

The team developed an innovative method to split water into its constituent parts - hydrogen and oxygen - using sunlight. The hydrogen can then be used as a fuel, with the potential to power everyday items such as homes and vehicles.

Crucially, hydrogen fuel that can be created through this synthetic photosynthesis method would not only severely reduce carbon emissions, but would also create a virtually limitless energy source.

The ground-breaking new research centres on the use of a revolutionary photo-electrode - an electrode that absorbs light before initializing electrochemical transformations to extract the hydrogen from water - made from nanoparticles of the elements lanthanum, iron and oxygen.

The researchers believe this new type of photo-electrode is not only cheap to produce, but can also be recreated on a larger scale for mass and worldwide use.

The research is published in leading journal, Scientific Reports.

Govinder Pawar, lead author on the paper and based at the University of Exeter's Environment and Sustainability Institute on the Penryn Campus in Cornwall said: "With growing economies and population, fossil fuels will not be able to sustain the global energy demand in a "clean" manner as they are being exhausted at an alarming rate.

"Alternative renewable fuels sources must be found which can sustain the global energy demand. Hydrogen is a promising alternative fuel source capable of replacing fossil fuels as it has a higher energy density than fossil fuels (more than double), zero carbon emissions and the only by-product is water."

At present, around 85 per cent of the global energy provisions come from the burning of fossil fuels. Therefore the need and desire to find a sustainable, cost-effective renewable fuel source is growing in urgency.

Perhaps unsurprisingly, the sun is earth's most abundant renewable energy source, with the potential to provide 100,000 terawatts of power each year - meaning one hour's worth of solar energy is equal to an entire year of total energy consumption worldwide.

However, efforts to produce efficient stable semiconductor material, in order to effectively convert sunlight to a storable widespread energy source, have so far proved elusive.

One of the most significant hindrances to the development of viable solar energy has been an inability to produce a semiconducting material suitable for the process.

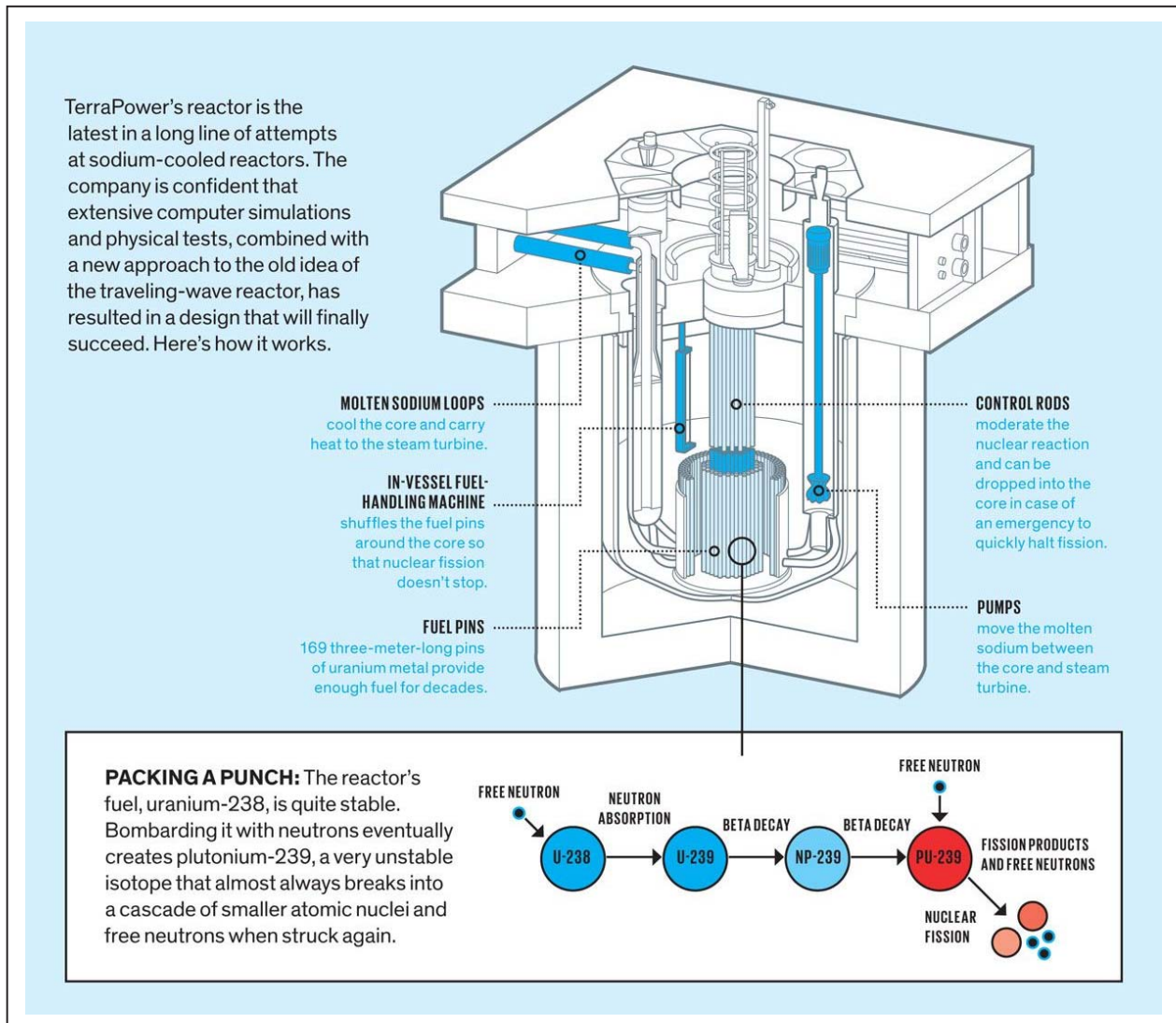
In this new research, the team utilised lanthanum iron oxide to create a semiconducting material that gave the ideal results for the production of hydrogen from water using sunlight, making it the strongest candidate yet for renewable hydrogen generation.

Govinder Pawar added: "We have shown that our LaFeO₃ photo-electrode has ideal band alignments needed to split water into its constituents (H₂ and O₂) spontaneously, without the need of an external bias. Moreover, our material has excellent stability where after 21 hours of testing it does not degrade, ideal for water splitting purpose. We are currently working on further improving our material to make it more efficient to produce more hydrogen."

***Never replay when you are angry. Never make a promise when you are happy.
Never make a decision when you are sad.***

TERRAPOWER'S NUCLEAR REACTOR COULD POWER THE 21ST CENTURY

The travelling-wave reactor and other advanced reactor designs could solve our fossil fuel dependency



The engineers at TerraPower, a startup that has designed an advanced nuclear power reactor, use a pressurized-air cannon to demonstrate that very point to visitors. The stunt vividly illustrates a key concept in nuclear fission: Small objects traveling at high speed can have a big impact when they hit something seemingly immovable.

And perhaps there is a larger point being made here, too—one about a small and fast-moving startup having a big impact on the electric-power industry, which for many years also seemed immovable.

In a world defined by climate change, many experts hope that the electricity grid of the future will be powered entirely by solar, wind, and hydropower. Yet few expect that clean energy grid to manifest soon enough to bring about significant cuts in greenhouse gases within the next few decades. Solar- and wind-generated electricity are growing faster than any other category; nevertheless, together they accounted for less than 2 percent of the world's primary energy consumption in 2015, according to the Renewable Energy Policy Network for the 21st Century.

To build a bridge to that clean green grid of the future, many experts say we must depend on fission power. Among carbon-free power sources, only nuclear fission reactors have a track record of providing high levels of power, consistently and reliably, independent of weather and regardless of location.

Yet commercial nuclear reactors have barely changed since the first plants were commissioned halfway through the 20th century. Now, a significant fraction of the world's 447 operable power reactors are showing their age and shortcomings, and after the Fukushima Daiichi disaster in Japan seven years ago, nuclear energy is in a precarious position. Between 2005 and 2015, the world share of nuclear in energy consumption fell from 5.73 to 4.44 percent. The abandonment of two giant reactor projects in South Carolina in the United States and the spiraling costs of completing the Hinkley Point C reactor in the United Kingdom, now projected to cost an eye-watering £20.3 billion (US \$27.4 billion), have added to the malaise.

There is some nuclear enthusiasm: China's 38 reactors have a total of 33 gigawatts of nuclear capacity, and the country has plans to add an additional 58 GW by 2024. At the moment, some 50 power reactors are under construction worldwide. These reactors, plus an additional 110 that are planned, would contribute some 160 GW to the world's grids, and avoid the emission of some 500 million metric tons of carbon dioxide every year. To get that kind of cut in greenhouse gases in the transportation sector, you'd have to junk more than 100 million cars, or roughly all the passenger cars in France, Germany, and the United Kingdom.

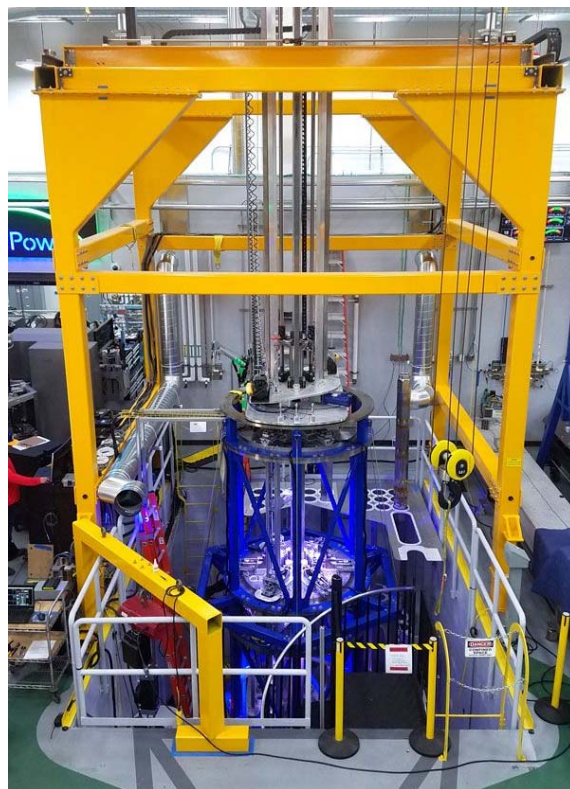
Against this backdrop, several U.S. startups are pushing new reactor designs they say will address nuclear's major shortcomings. In Cambridge, Mass., a startup called Transatomic Power is developing a reactor that runs on a liquid uranium fluoride–lithium fluoride mixture. In Denver, Gen4 Energy is designing a smaller, modular reactor that could be deployed quickly in remote sites.

In this cluster of nuclear startups, TerraPower, based in Bellevue, Wash., stands out because it has deep pockets and a connection to nuclear-hungry China. Development of the reactor is being funded in part by Bill Gates, who serves as the company's chairman. And to prove that its design is viable, TerraPower is poised to break ground on a test reactor next year in cooperation with the China National Nuclear Corp.

To reduce its coal dependence, China is racing to add over 250 GW of capacity by 2020 from renewables and nuclear. TerraPower's president, Chris Levesque, sees an opening there for a nuclear reactor that is safer and more fuel efficient. He says the reactor's fuel can't easily be used for weapons, and the company claims that its reactor will generate very little waste. What's more, TerraPower says that even if the reactor were left unattended, it wouldn't suffer a calamitous mishap. For Levesque, it's the perfect reactor to address the world's woes. "We can't seriously mitigate carbon and bring 1 billion people out of energy poverty without nuclear," he says.

The TerraPower reactor is a new variation on a design that was conceived some 60 years ago by a now-forgotten Russian physicist, Saveli Feinberg. Following World War II, as the United States and the Soviet Union stockpiled nuclear weapons, some thinkers were wondering if atomic energy could be something other than a weapon of war. In 1958, during the Second International Conference on Peaceful Uses of Atomic Energy, held in Geneva, Feinberg suggested that it would be possible to construct a reactor that produced its own fuel. To understand why the TWR stymied physicists for decades, first consider that today's reactors rely on enriched uranium, which has a much higher ratio of the fissile isotope of uranium (U-235) to its more stable counterpart (U-238) than does a natural sample of uranium.

When a passing neutron strikes a U-235 atom, it's enough to split the atom into barium and krypton isotopes with three neutrons left over (like that high-speed ping-pong ball punching through a sturdy paddle). Criticality occurs when enough neutrons hit enough other fissile uranium atoms to create a self-sustaining nuclear reaction. In today's reactors, the only way to achieve criticality is to have a healthy abundance of U-235 atoms in the fuel.



In contrast, the TWR will be able to use depleted uranium, which has far less U-235 and cannot reach criticality unassisted. TerraPower's solution is to arrange 169 solid uranium fuel pins into a hexagon. When the reaction begins, the U-238 atoms absorb spare neutrons to become U-239, which decays in a matter of minutes to neptunium-239, and then decays again to plutonium-239. When struck by a neutron, Pu-239 releases two or three more neutrons, enough to sustain a chain reaction.

It also releases plenty of energy; after all, Pu-239 is the primary isotope used in modern nuclear weapons. But Levesque says the creation of Pu-239 doesn't make the reactor a nuclear-proliferation danger—just the opposite. Pu-239 won't accumulate in the TWR; instead, stray neutrons will split the Pu-239 into a cascade of fission products almost immediately. The reactor breeds the highly fissile plutonium fuel it needs right before it burns it, just as Feinberg imagined so many decades ago. Yet the "traveling wave" label refers to something slightly different from the slowly burning, cigar-style reactor. In the TWR, an overhead crane system will maintain a reaction within a ringed portion of the core by moving pins into and out of that zone from elsewhere in the core, like a very large, precise arcade claw machine.

To generate electricity, the TWR uses a more complicated system than today's reactors, which use the core's immense heat to boil water and drive a steam turbine to generate usable electricity. In the TWR, the heat will be absorbed by a looping stream of liquid sodium, which leaves the reactor core and then boils water to drive the steam turbine.

But therein lies a major problem, says Makhijani. Molten sodium can move more heat out of the core than water, and it's actually less corrosive to metal pipes than hot water is. But it's a highly toxic metal, and it's violently flammable when it encounters oxygen.

The safety of the TerraPower reactor stems in part from inherent design factors. Of course, all power reactors are designed with safety systems. Each one has a coping time, which indicates how long a stricken reactor can go on without human intervention before catastrophe occurs. Ideas for so-called inherently safe reactors have been touted since the 1980s, but the goal for TerraPower is a reactor that relies on fundamental physics to provide unlimited coping time.

The TWR's design features some of the same safety systems standard to nuclear reactors. In the case of an accident in any reactor, control rods crafted from neutron-absorbing materials like cadmium plummet into the core and halt a runaway chain reaction that could otherwise lead to a core meltdown. Such a shutdown is called a scram.

Scramming a reactor cuts its fission rate to almost zero in a very short time, though residual heat can still cause a disaster. At Chernobyl, some of the fuel rods fractured during the scram, allowing the reactor to continue to a meltdown. At Fukushima Daiichi, a broken coolant system failed to transfer heat away from the core quickly enough. That's why the TerraPower team wanted to find a reactor that could naturally wind down, even if its safety systems failed.

TerraPower's reactor stays cool because its pure uranium fuel pins move heat out of the core much more effectively than the fuel rods in today's typical reactors. If even that isn't enough to prevent a meltdown, the company has an ace up its sleeve. As Gilleland explains, the fuel pins will expand when they get too hot—just enough so that neutrons can slip past the fuel pins without hitting more Pu-239, thereby slowing the reaction and cooling the core automatically.

Because the TWR burns its fuel more efficiently, the TerraPower team also claims it will produce less waste. The company says a 1,200-MW reactor will generate only 5 metric megatons of waste per gigawatt-year, whereas a typical reactor today produces 21 metric megatons per gigawatt-year. If that number is right, the reactor could address the ongoing storage problem by drastically reducing the amount of generated waste, which remains highly radioactive for thousands of years. More than 60 years into the nuclear age, only Finland and Sweden have made serious progress in building deep, permanent repositories, and even those won't be ready until the 2020s.

TerraPower plans to break ground on its test reactor next year in China. If all goes well, this reactor will be operational by the mid-2020s. But even if TerraPower's reactor succeeds wildly, it will take 20 years or more for the company to deploy large numbers of TWRs. Thus for the next couple of decades, the world's utilities will have no choice but to rely on fossil fuels and conventional nuclear reactors for reliable, round-the-clock electricity.

MADE IN INDIA LI-ION BATTERIES TO CUT DEPENDENCE ON CHINA

India will soon be able to manufacture lithium-ion batteries and will not be dependent on China for importing the key component used in electric vehicles as the government accords “top priority” to pushing e-mobility, Union Minister Anant Geete said today.

The minister said steps have already been taken up by the government to start manufacturing of lithium-ion batteries in India.

“At present the world needs to import lithium ion batteries from China and Rs 50-60 lakh is only the cost of the battery (for buses). If the battery cost is reduced the total cost of

electric vehicles will become affordable and commuters will also have to pay less,” Geete told reporters here on the sidelines of launch of electric bus by Goldstone-BYD.

He further said, “My ministry has made efforts in this direction and soon we will be able to manufacture lithium-ion batteries in India.”

The minister launched Goldstone-BYD’s ‘eBuzz K6’ electric feeder bus, the first made in India electric bus to be exported to Nepal.

A panel headed by Cabinet Secretary P K Sinha had recommended commercial use of ISRO’s lithium-ion battery technology under the ‘Make In India’ initiative for electric vehicles, official sources said.

Besides, the minister said a “good policy” is being formulated under the FAME II scheme to boost electric mobility in the country.

He said there is a need to migrate from petrol and diesel to electric mobility in view of rising pollution concerns.

The minister said the government has accorded top priority to convert public transport to electric mobility under FAME II.

Replying to a query on the expression of interest (EoI) floated earlier for electric buses, Geete said, “We received EoIs from 10 states and around 400 buses have been allotted to these 10 states. However, Delhi did not accept it, this is the reality and therefore we were unable to allot electric buses to Delhi.”

According to the minister, demand has to come from state government and the Centre can only provide incentives.

“Therefore the initiative has to come from the state,” Geete said.

The department of heavy industries had in December last year sanctioned Rs 440 crore to 11 states for procurement of electric buses, electric taxis and e-autos as a pilot project under FAME India scheme for public transportation.

Joint Secretary in the Heavy Industries Ministry Vishvajit Sahay said the government looks forward to value addition in India by Chinese EV major BYD so that it becomes eligible for incentives by the government.

BYD has a tie-up with Goldstone Infratech in the country.

Elaborating on the company’s plans in India, Executive Director of BYD ZyangJie said: “We are going to introduce and adopt the latest technology (in electric mobility) to India, make the product in India and export overseas.”



Technology is nothing. What’s important is that you have a faith in people, that they’re basically good and smart, and if you give them tools, they’ll do wonderful things with them. - STEVE JOBS

ROAD MAP FOR ELECTRIC VEHICLES IN INDIA

Moving forward on the path to electrifying mobility is a complex issue and requires all stakeholders to work together.

Sometime last year, the Union government suddenly announced that India would make the paradigm shift to full electric mobility by 2030. This was more a statement of intent signalling a necessary and transformative shift to ease polluting vehicular emissions on our congested roads. NITI Aayog has since suggested that 40% of personal vehicles and public transportation in the country should go completely electric by 2030. This seems a more realistic target.

There have been extensive discussions over the last few months on the way forward to increase the use of electric vehicles (EVs). A new policy announcement has been rightly shelved; Faster Adoption and Manufacturing of (Hybrid) and Electric Vehicles (FAME) II appears to have been postponed to September, and Energy Efficiency Services Ltd has also deferred its purchase of 10,000 EVs. These developments essentially underline the difficulties of proceeding on an uncharted path.

In our enthusiasm to adopt electric mobility, we should not rush into a flawed policy and implementation framework. Sober analysis and a step-by-step approach are required even as the ecosystem for electric vehicles develops gradually, alternative models are pursued, and learnings from experience accrue. Issues today relate to public vs private transportation; battery charging vs swapping models; nature and quantity of incentives; and development of storage technologies. Our initial focus must be unquestionably on public transportation—bus, taxi and auto fleets. Public transport in India is expected to double by 2030. It is the major consumer of diesel and petrol and responsible for substantial polluting emissions. Primarily, then, we must electrify vehicles which travel long distances every day. In personal transport, two-wheelers must be prioritized since India has one of the largest two-wheeler markets in the world.

Personal cars are the focus in developed countries because these are the principal means of transport. Tesla, with its high-end luxury cars, is the complete antithesis of what the Indian model should be. In India, remedies in personal transport lie elsewhere, including making the shift towards public transportation and shared transport easier. The attempt to subsidize a few cars, whether personal or government, with inadequate charging infrastructure will lead to wasteful expenditure and not reduce oil consumption and emissions.

If we opt for the charging model, traffic congestion will worsen, with lengthy queues. The battery swapping model, however, would involve no waiting time. Stations could be at bus depots or at select petrol pumps. It

Booming Electric Vehicle Sector



will take 2-3 minutes to swap, similar to the time taken to fill up and pay for petrol. This would control congestion at these points. Swapping stations would supply fully charged new batteries, allowing users to get higher range. Their storage conditions will also help enhance battery life.

There have been some concerns about previous experiences in China and Israel. But these models were meant for personal cars and were costly. Besides, lack of marketing, proper execution and mismanagement led to the failure of the promising EV start-up in Israel Better Place. The subsidy structure also became distorted, favouring large batteries.

How should we subsidize EVs? Currently, the subsidy structure for a car does not incentivise the purchase of an electric car as the capital cost is much higher. The same applies to a bus. Both models should get equivalence in subsidy support. A small group should immediately study this issue. Efficiency in terms of total cost per kilometre, not capital costs or larger batteries, should be incentivised.

Ideally, the best course would be to select five smart cities with the objective of fully electrifying their public transportation as well as 50% of their two-wheelers by 2025. This means just EVs should be registered there two years from now. Each year, five more cities should be added. Both charging and swapping models should be given space. Within five years, we will have sufficient experience to plan a further accelerated transition, including perhaps daytime charging by solar, which could prove more suitable for swapping. An expert group should lay the groundwork for these plans.

We must take small steps to make the big leap. Shenzhen in China is adopting EVs in phases. From 1 July, all ride-hailing vehicles should be EVs, and, by 31 December, all the remaining taxis should be replaced by EVs. Meanwhile, policies have to be developed to facilitate the indigenization of battery assembly, and manufacture of EVs and their basic components. We should not replace oil imports with battery imports. This is applicable to both EVs and solar energy. A road map should be drawn up. Currently, there are distortions with the goods and services tax (GST). The GST rate on batteries is 28%, while it is 12% for electric vehicles.

If we address all these issues, we can gradually acquire enough experience to develop a manufacturing ecosystem for electric mobility.

Moving forward on the path to electrifying mobility is a complex issue and requires all stakeholders to work together. When we planned the solar mission, we had intensive consultations. The roll-out was smooth. EVs require a similar effort. I hope NITI Aayog will take the lead and make the transition to electric mobility smoother and faster.

Deepak Gupta is former secretary, Union ministry of new and renewable energy.

Govt May Press Automakers To Invest In Electric Vehicles By Tightening '22 CAFE Norms (CAFE Stands For Corporate Average Fuel Economy)

In its bid to make India an electric vehicles nation by 2030, the government is **looking to tighten the '22 CAFE norms**. Reportedly, a proposal regarding the same has been made in a **report submitted by the ministry of road transport to NitiAayog**.

For the uninitiated, **CAFE stands for corporate average fuel economy norms for 2022 or 2023** and has been applied officially since April 1, 2017.

Under the CAFE norms, the **automakers are required to manufacture cars which are 30% or more fuel efficient** from 2022 and 10% or more between 2017 and 2021.

The move comes in line with the fact that the automakers in India have managed to easily achieve the 2017 CAFE norms. Also, **many automakers are already compliant with the 2022 cutoffs as well**.

“The government’s view is that with the present CAFE norms, all vehicles will run on IC engines only. If we want to have real disruption then **the norms will have to be tightened further by 2022 or 23**. That’s what Europe and many other countries have done. If we want to promote low emission vehicles then the current norms are not very tight,” said a government official.

The changes in CAFE norms are expected to compel car and SUV makers to invest more in electric and hybrid vehicle technology. However, this can leave auto entry in a perplexed state, as the electric vehicle infrastructure in the country is not yet stable.

Any such decision will also change the CAFE norms in midway which will affect the long-term strategies for the Indian automakers or the international ones who are looking to enter into Indian electric vehicle ecosystem.

As per reports, **a discussion with the automakers is yet to take place** around the aforesaid changes. India has been moving well on the electric vehicles track so far though at quite a slow pace. The lack of charging infrastructure and clear government guidelines around the ecosystem has left many big players to refrain from making big shots in the sector. However, there are startups like Ather Energy, Emflux Motors, Emotion Motors, as well as established automakers like Mahindra, Tata Motors and Maruti Suzuki amongst others, who are making their way into the Indian electric vehicle ecosystem. Companies like Ola have also shown their commitment to improving upon the state of charging infrastructure in India. But everything as of now is depending upon the developments which may come in near future. But in any case, any decision to change or update the CAFE norms may put a break to the existing strategies of the automakers for sure.

[The development was reported by TOI]

GROWING ‘DEAD ZONE’ CONFIRMED BY UNDERWATER ROBOTS IN THE GULF OF OMAN

New research from the University of East Anglia (UEA) has confirmed a dramatic decrease in oxygen in the Gulf of Oman part of the Arabian Sea. But the environmental disaster is worse than expected.

The ‘dead zone’ was confirmed by underwater robots called Seagliders - which were able to collect data in areas of water previously inaccessible due to the piracy and geopolitical tensions. The robots are about the same size as a small human diver, but can reach depths of 1000 metres and travel the ocean for months, covering thousands of kilometres.

Two gliders were deployed in the Gulf of Oman for eight months. They communicated by satellite to build an underwater picture of oxygen levels, and the ocean mechanics that transport oxygen from one area to another. Where they expected some oxygen, they found an area larger than Scotland with almost no oxygen left. The research was led by Dr Bastien Queste from UEA’s School of Environmental Sciences, in collaboration with Oman’s Sultan Qaboos University.

Dr Queste said: “Dead zones are areas devoid of oxygen. In the ocean, these are also known as ‘oxygen minimum zones’ and they are naturally occurring between 200 and 800 meters deep in some parts of the world. “They are a disaster waiting to happen - made worse by climate change, as warmer waters hold less oxygen, and by fertiliser and sewage running off the land into the seas.

“The Arabian Sea is the largest and thickest dead zone in the world. But until now, no-one really knew how bad the situation was because piracy and conflicts in the area have made it too dangerous to collect data.” “We barely have any data collected for almost half a century because of how difficult it is to send ships there.

“Our research shows that the situation is actually worse than feared - and that the area of dead zone is vast and growing. The ocean is suffocating.” Of course all fish, marine plants and other animals need oxygen, so they can’t survive there. It’s a real environmental problem, with dire consequences for humans too who rely on the oceans for food and employment.

“Another problem is that when oxygen is absent, the chemical cycling of nitrogen - a key nutrient for plant growth - changes dramatically. Nitrous oxide, a greenhouse gas 300 times more potent than CO₂ is produced,” he added. Computer simulations of ocean oxygen show a decrease in oxygen over the next century and growing oxygen minimum zones. However these simulations have a difficult time representing small but very important features such as eddies which impact how oxygen is transported.

The team combined their Seaglider data with a very high-resolution computer simulation to determine how oxygen is spread around the north-western Arabian Sea throughout different seasons and the monsoons. They found that the deadzone moves up and down between seasons, causing fish to be squeezed in a thin layer near the surface.

The first rule of any technology used in a business is that automation applied to an efficient operation will magnify the efficiency. The second is that automation applied to an inefficient operation will magnify the inefficiency. - BILL GATES

DUTCH FISHERMEN TO PROTEST WIND FARM PLANS

Upcoming demonstrations are planned in the Netherlands as fishermen will protest the Dutch government's decision to construct further wind turbines in the North Sea.



The plans involve the installment of three windfarms off the Noord-Holland coast and north of the Wadden Islands, sparking anger amongst the fishing community as they claim the turbines will disturb sea life in the area, and cause potentially permanent damage to fish and porpoise populations.

In response to the announcement, fishermen are planning to stage a protest this Saturday, with a number of vessels due to sail into Amsterdam's central station before their occupants march to the capital's Damrak canal. Here they are due to scatter bags of fish deemed too small to sell by the EU, which will then be covered in red dye. The event is being organised by the action group EendrachtMaaktKracht (EMK) – meaning Unity Brings Strength– which was formed two years ago by fishermen who were dissatisfied with the country's two main unions.

EMK chairman Job Schot told The Guardian that, “the ramming of seabeds kills everything within 6km”, with the acoustic sound created by turbines “discourag[ing] fish” possibly permanently, and deafening porpoises which then die following their loss of hearing. Additionally, the group claims that turbines will have taken over a quarter of Dutch fishing waters by 2025, making them inaccessible to larger fishing vessels.

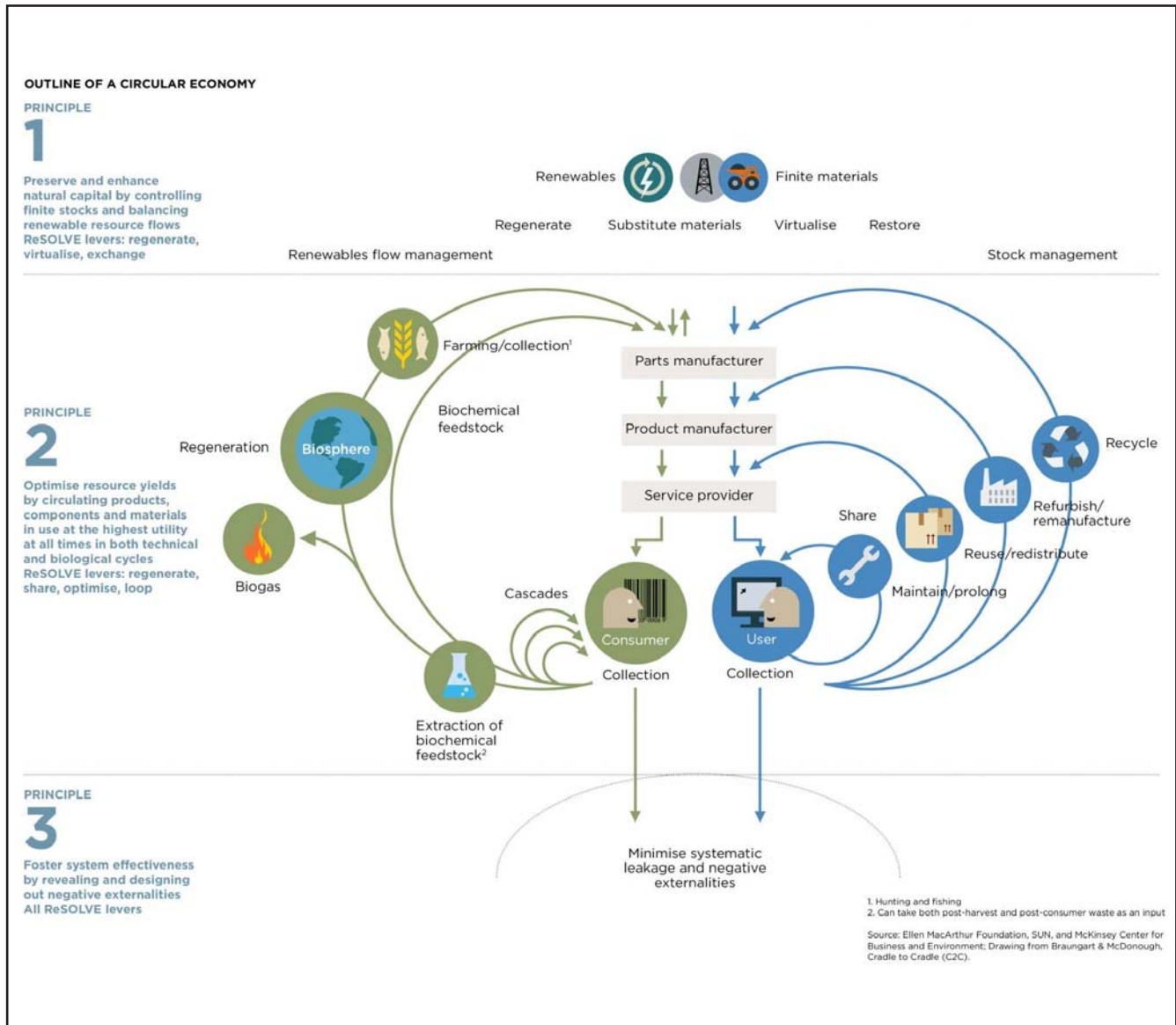
The recent announcement comes in the wake of a spate of turbine construction plans, with five new windfarms recently approved by the Dutch Government which will collectively cost around €20bn (£17.5bn) to build. This is in addition to the much-anticipated island of turbines on Dogger Bank, a patch of fishing waters 78 miles from the east Yorkshire coast, which is used by Dutch, Danish and UK fishermen.

The construction frenzy is primarily driven by the necessity to stop gas extraction from the Groningen fields, located near Slochteren in the north-eastern part of the Netherlands, due to the increased force of earthquakes in the area. It is also part of the Dutch Government's attempts to make 40% of the total energy used in the country wind generated by 2030.

Currently, government officials are accused of rushing through wind energy developments without considering or investigating potential consequences on the sea life of the waters chosen. Indeed, researchers have previously warned that the noise of constructing and operating the turbines, in addition to the electromagnetic fields around the transmission cables, does have an impact on sea life. However, others believe the new constructions will attract new species and could prove beneficial to the area's ecology.

TIME TO COME ROUND TO THE CIRCULAR ECONOMY

The benefits of the circular economy are manifold and the potential for it in Asia is huge. Here are some ways that governments and companies can start building a circular economy in the region.



As businesses and governments worldwide seek to meet the food, water and energy needs of a rapidly growing population, there are mounting concerns about environmental degradation and resource scarcity. It is especially ironic that, against this backdrop, managing waste safely and effectively remains a challenge in so many parts of the world.

For example, 8 million tonnes of plastic waste are dumped into our oceans every year, according to scientists at University of Georgia's National Center for Ecological Analysis and Synthesis. And a third of the food produced worldwide is never consumed, wasting US\$400 billion a year, says the Food and Agriculture Organization.

These trends make it increasingly clear that our current linear production and consumption model of "take, make and dispose" is simply not sustainable.

We can no longer afford to use up our limited resources and create more waste. We have to change our mode of consumption, and one alternative model that is fast gaining traction is the circular economy.

The circular economy is an industrial system that focuses on restoration and regeneration, rather than disposal and waste. This is achieved through the design of materials, products, systems, and business models.

It also promotes renewable energy use and aims to eliminate the use of toxic chemicals, which make it difficult to recycle or reuse products.

The circular economy involves two types of materials: biological materials that are usually plant-based and non-toxic and can be returned back to the environment safely; and technical materials that can be recycled and that are circulated within the economy with minimal loss of quality.

A circular flow of both these types of materials can be achieved by designing products better, adopting systems thinking – viewing individual things as part of one system and understanding how they influence one another and focusing on services and access instead of product ownership.

The benefits of the circular economy are manifold. Being able to put resources back into the supply chain at the end of a product's life eases resource scarcity, supply risks, and price fluctuations.

Unfortunately, the shift towards this business model has not been widely adopted in Asia yet. This is a missed opportunity, and there are many ways that governments and companies can start building a circular economy.

Progress in Asia

In Singapore, for example, most businesses are focused on selling more products to consumers, and there isn't any clear regulation on mandatory recycling or Extended Producer Responsibility policies – where manufacturers are accountable for the product's entire life cycle, including take-back, recycling, and disposal.

The term “zero waste” is sometimes used by the Singapore government, but this usually places more emphasis on recycling rather than redesign. There is also an absence of a government body looking at the sustainable design of products. The DesignSingapore Council, part of the Ministry of Communications and Information, largely focuses on aesthetics and functional aspects.

Hence, products are more likely to end up in the waste stream than be recovered. Biodegradable items such as plastic bags, containers, utensils and cutlery made from plant-based materials are usually incinerated at waste-to-energy plants and are not sent for composting or allowed to biodegrade.

However, there are some initial signs that circular economy principles are taking root not only in Singapore, but also in the rest of Asia.

For example, Seoul is positioning itself as the great “Sharing City”, a vision unveiled by Mayor Park Won-Soon in September 2012. Unused parking lots, empty rooms, kid's clothes, furniture and even meals are being shared by citizens of the city. The government is even lending idle spaces in public facilities to other organisations and its citizens, fuelling the sharing culture.

This is gaining traction in Singapore too, with several companies providing peer-to-peer rental of items, and Waste is not Waste providing a platform for businesses to exchange unwanted items.

The Sustainable Manufacturing Centre and the Advanced Remanufacturing and Technology Centre have been working with companies on remanufacturing in Singapore over the past few years, and the waste management and recycling industry is quite vibrant, with more than 100 companies involved in waste collection and sorting, waste treatment facilities, and recycling technologies and plants.

The circular economy is also catching on in Taiwan. It has a Cradle to Cradle Strategic Association comprising government bodies, companies and civic organisations that promotes the concept among its peers. It also gives out a certification called C2C to encourage sustainable product design, manufacturing and recycling.

Here are some key opportunities to build on these trends to achieve a full-fledged circular economy in the region:

1. Set policies on the circular economy - Currently there are no government strategies addressing the potential of the circular economy. Governments should set the direction and implement policies that would reduce incineration and landfilling of waste, build resilience on materials and resources, and create new job opportunities. Regulations such as Extended Producer Responsibility and minimum recycled content could be introduced.

2. Encourage businesses to explore the circular economy - There should be more education and training for companies to increase awareness on the need, potential and skills for the circular economy. Companies

have to rethink their business models, adopt systems thinking, redesign their products and processes, and explore reuse, remanufacturing and recycling.

3. Educate product designers and students - Tertiary institutions with courses on product design should be encouraged to include the concept of green design in their syllabus. Students should be exposed to circular economy concepts such as Cradle to Cradle, Biomimicry, and Design for Durability and Disassembly.

In addition, students could have attachment and internship opportunities to work with product manufacturers to redesign their products for circularity. There should also be more courses and workshops for product designers to learn about circular economy concepts and case studies.

4. Encourage repair, reuse, redistribute and sharing

Consumers should be educated that it is better to repair and reuse items rather than throw them away. Unwanted items should be redistributed or sent for recycling. They can also look at the sharing economy to share, rent, borrow, give or exchange items, instead of buying them.

5. Increase the use of biological materials - Food waste contains biological nutrients and should be collected and digested to produce biogas and fertilisers that can be safely returned back to the land.

Plastics are one of the most common types of waste generated in Asia, and are also commonly found as trash in waterways and coasts. Plastic disposables and packaging are usually not collected for recycling due to contamination and their low economic value. There could be opportunities to switch from plastic disposables and packaging to biodegradable ones, so that the material can be digested together with food waste in the digestion plants.

Courtesy ECO Business Mag

THIS IS HOW AIR POLLUTION ALTERS THE DNA OF NEWBORNS

Telomeres, the specialized regions of DNA found at each end of a chromosome, are discovered to be shorter for newborns that were exposed to air pollution before birth than those who were not. These telomeres are responsible for allowing the chromosomes to be copied exactly during cell division.

According to a study conducted in China, air pollution cause the telomeres to shorten every time a cell divides, and consequently, the genomic stability is progressively lost. Ultimately, this phenomenon is linked with health concerns such as cancer, heart diseases, cognitive decline, ageing, and premature death.

“An individual’s telomere length at birth is known to influence their risk for disease decades later during adulthood. Further follow-up is needed to assess the role telomere length plays in health outcomes in the context of early life exposure to air pollution,” says Deliang Tang, professor of Environmental Health Sciences at the Columbia University’s Mailman School of Public Health.

Fourteen years ago, a coal-fired power plant in Tongliang, China was shut down by the government due to its alarmingly high level of air pollution, expecting that this action would improve the community’s health. This event opened an opportunity for scientists to study the difference between babies born before and after the shutdown.

The research team, led by Deliang Tang and Frederica Perera of the Mailman School of Public Health, studied the telomere length in the umbilical cord blood of 255 newborns. They are divided into two groups – babies who were conceived and born before the shutdown and those who were conceived and born after shutdown.

The ambient polycyclic aromatic hydrocarbons (PAH) levels, biomarkers, and health outcomes of the two groups were then compared and analyzed by the researchers. PAH is a toxic chemical compound found in air pollution produced by coal plants. Babies born prior the closure had higher levels of PAH found in the cord blood than those conceived and born after the shutdown. Increased levels of PAH in cord blood were linked with shorter telomeres and lower levels of brain-derived neurotrophic factor (BDNF), a protein involved in neuronal growth. Results are published in the journal *Environment International*.

“The new study adds to the evidence that closing this coal-burning power plant was beneficial to the health and future well-being of newborns there. Moreover, we know that lowering exposure to air pollution anywhere will be beneficial to children’s health and long-term potential,” says Perera, director of the Columbia Center for Children’s Environmental Health and professor of Environmental Health Sciences at the Mailman School of Public Health.

IEEEFA UPDATE: TAMIL NADU IS ON A RENEWABLES ROLL

Market Gains and Policy Action Drive Expansion

It's been a few weeks since IEEEFA's publication of our case study of Tamil Nadu, India's leading state in terms of renewable energy capacity, and developments demand an update already.

Wind and solar tenders of 3 additional gigawatts have since been proposed; a 500-megawatt industrial solar park is under development; construction of a 660-megawatt coal plant has been cancelled; India's first offshore wind pilot project has been launched; and the reforms of discoms—national electricity distribution companies—are continuing to see progress.

As detailed in that recent IEEEFA report, "Power Industry Transition: Here and Now," variable wind and solar accounts for 15% of Tamil Nadu's total generation (including dispatchable biomass gets us to the 16% number in Figure 1). Lower renewable energy operating rates account for the much more substantial 35% of total renewable *capacity* as of March 2017 (42% when you include large hydro-electricity capacity).

Tamil Nadu Electricity Capacity and Production (2016/17)

Source	Electricity Market Composition 2016/17					
	Capacity		Generation		Capacity	YoY change
	GW	% of Total	Twh	% of Total	utilization	GW
Coal	13.4	45%	66.6	69%	62%	2.1
Gas	1.0	3%	2.2	2%	25%	0.0
Diesel	0.4	1%	0.9	1%	25%	0.0
Hydro 2.2	7%	2.4	2%	12%	0.0	
Nuclear	2.4	8%	9.7	10%	57%	1.0
Renewable	10.6	35%	15.2	16%	18%	1.8
Total	30.1	100%	97.0	100%		4.9

Source: CEA, IEEEFA Electricity Model for Tamil Nadu

Just this past month, Tamil Nadu Generation and Distribution Corporation (TANGEDCO) revealed plans to tender 3 gigawatts of renewable energy capacity soon, half in solar projects and half in wind. This expansion will build substantially on 2.4 gigawatts (GW) of solar development projects already in the pipeline (thanks largely to the 1.5-GW solar tender in July 2017 awarded at Rs3.47/kWh).

Tamil Nadu Electricity Regulatory Commission (TNERC) has indicated that reverse auctions will have an upper limit of Rs3.00/kWh (US\$46/MWh) for solar and Rs2.65/kWh (US\$40/MWh) for wind. This would be consistent with recent solar tender results across India but may prove optimistic in light of TANGEDCO's improving but still perilous financial condition and given the recent increase in imported solar module costs to US\$0.40/w from the record lows of US\$0.30/w seen in the second quarter of calendar 2017.

On the positive side, the threat of a 70 percent solar module import duty has been removed for now with the Parliamentary Standing Committee on Energy expressing opposition.

INDIA'S SOLAR EXPANSION CONTINUES APACE with the Ministry of New and Renewable Energy (MNRE) reporting in-principle approval for TANGEDCO to develop a new 500-megawatt (MW) solar park in Ramanathapuram, Tamil Nadu. The park is to be wholly owned by TANGEDCO; Tamil Nadu Transmission Corporation (TANTRANSCO) will develop the government-owned 2,000-acre site.

In March of this year, National Hydroelectric Power Corporation completed its first solar project, a 50-MW installation in Theni, Tamil Nadu, as part of a 430-MW diversification plan.

Once the data is in, India is expected to have installed 10 GW of new solar capacity over the past year. The MNRE reports 7.3 GW installed in the 11 months through February with an additional 2.7 GW expected in

March. At this rate, India will have reached 22 GW of total solar installs by the end of 2017/18, a near doubling in cumulative installed capacity in just one year, putting India in the top three nations globally in 2017. Just this month, the TNERC, in a move to provide investors better policy clarity and one that highlights renewable energy deflation trend issued a levelized generic tariff for the procurement of solar power for FY2018/19 at Rs 3.05/KWh (US \$46/MWh) net of the accelerated depreciation allowance, 31 percent lower than the previous levelized solar tariff.

Tamil Nadu: TNERC Generic Solar Tariff Order for FY 2018-19

Solar PV Projects	Previous Tariff	New Tariff	Reduction in Tariff (%)
	₹ /kWh	/kWh	
Levelized Tariff without AD	₹ 4.50 (~\$0.069)	₹ 3.11 (~\$0.069)	~31%
Levelized Tariff with AD	₹ 4.41 (~\$0.068)	₹ 3.05 (~\$0.068)	

Source: TNERC Mercom India Research

ON THE WIND-ENERGY FRONT, India's plans for offshore wind developments in Tamil Nadu and Gujarat present very promising options for longer-term zero-emissions capacity diversification.

With Vattenfall of Sweden winning yet another 750-megawatt subsidy-free tender for offshore wind in the Netherlands, the technology-learning remains extensive, suggesting that patience in terms of cost deflation will be rewarded (see Figure 2).

IEEFA modeled 1 gigawatts of offshore wind by 2027 as part of its 10-Year Plan for Tamil Nadu, and just this March, Tamil Nadu announced plans for a Rs300 crore (US\$47 million), 30-megawatt offshore wind demonstration at Arichamunai. This offshore push helps provide diversity of supply across Tamil Nadu's renewables industry.

IN OTHER NEWS OF NOTE, has cancelled plans for completion of a 660-MW import-coal-fired power plant in Ennore, a project that had reached only 20 percent completion.

Ennore may be re-tendered to a financially viable construction firm (the original contract went to LancoInfratech), but its cancellation provides an excellent opportunity for Tamil Nadu to review its power generation needs, particularly given the huge cost differential between expensive imported coal (which has doubled since 2016 to over US\$100/t) versus renewable generation, which has seen costs halve in the same time period.

Further, under India's UDAY reforms, TANGEDCO is committed to better disclosure and accountability practices and to a set of targets for financial and operational improvements. For the nine months to December 2017, TANGEDCO missed its aggressive loss reduction targets, but is still reporting a significant year-on-year improvement in its ACS-ARR gap (average cost of supply less average revenue received), from Rs0.36/kWh in 2016/17 to Rs0.24/kWh to-date (the year-to-date 2017/18 AT&C loss rate is reported at 14.04%, a small improvement over the 14.53% reported for 2016/17).

To conclude, Tamil Nadu continues to advance its electricity-system transformation even as TANGEDCO supports the expanding energy needs required to continue solid economic growth. With aggressive plans for further renewable energy developments across solar, and with onshore wind being expanded now to include a pilot offshore wind project, the benefits are evident in both expanded capacity and wholesale cost deflation. This is supporting TANGEDCO's ongoing reform from one of India's worst-performing discom profiles in 2013/14 to a potential break-even result in 2018/19, a US\$2.1 billion unsubsidized annual improvement.

Tim Buckley is IEEFA's director of energy finance studies, Australasia. Kashish Shah is an IEEFA research associate.

Technology has forever changed the world we live in. We're online, in one way or another, all day long. Our phones and computers have become reflections of our personalities, our interests, and our identities. They hold much that is important to us. - JAMES COMEY

ENERGY, ELECTRICAL ENERGY AND RENEWABLE ENERGY – 10

Sustainable Growth, Sustainable Electrical Energy and Renewable Energy

Thermo Chemical Technologies – Carbonization Technologies – To Produce Carbon Flakes or Fine Powder forms of Carbon

Carbonization Technology – Hydro Thermal Carbonization (HTC)

Torrefaction and Carbonization discussed earlier address solid biomass, woody or other kinds of materials like for example Straw, husk, dusts and dry litters etc. Hydrothermal Carbonization is a technology for addressing organic wastes and sewage sludge, wet Biogenic residues based on Cellulose, Hemi cellulose, or Protein with Energy.



Technology Basics:

Any kind of biomass, when put under heat and pressure, can be converted into a coal-like substance. This **bio coal** does not only look like brown coal, but also has a similar calorific value. In nature, carbonisation takes millions of years, whereas bio coal can be produced in a few hours. During the process water molecules are split off from carbohydrate. What remains is a carbon-rich material, the bio-coal. The process is exothermic, i.e. heat is released. These findings are not new. But only recently, in the light of rising energy prices and climate change, **hydrothermal carbonisation (HTC)** has received increased attention. HTC can make a valuable contribution to resource conservation and sustainable energy. Generally, any kind of shredded biomass or sludge can be treated, provided that the corn size is below 25 mm. The system works in continuous operation. Only at the beginning of the process a pressure of approximately 20 bar in the reactor must be built up and the input material has to be heated up to about 200°C. From the moment these parameters are reached, the process may run, as already mentioned, exothermic and thus by itself, i.e. without any further heat input. After about four hours, the bio coal is formed. At the discharge the material gets automatically pressed so that we end up with a water content in the bio coal of about 40% only. This can be achieved, because the dewatering characteristic of bio coal is much better than the one of the original biomass.

Heating Values of Bio coal is around 6 to 7000 K.cal/ Kg. Overall Thermal Efficiency of the Hydrothermal Carbonization Process is around 70% compared to Biogas Process net Efficiencies of around 48%

Biochar can also be generated through HTC Process which can be used for soil enrichment etc

Applications

There are a number of treatment methods for biodegradable wastes, such as composting, anaerobic digestion or incineration. Which technology to give the preference depends on the specific situation. Generally HTC is suitable for the treatment of any moist or even muddy biomass (dry substance 15 – 60%). Particularly preferable is a technology if alternatives are more expensive or less ecologically friendly. We therefore consider the following applications for HTC particularly suitable:

Sewage sludge treatment

The trend in this field seems to be towards thermal treatment. However, high water and low energy contents in the material are neither ideal condition for a combustion process nor for long distance transports.

By using HTC an energy intensive drying process is not necessary to get rid of water.

Since the calorific value of the resulting bio-coal depends on the energy content of the input-material, it is advisable – in the case of digested sludge – to mix in other biodegradable wastes to increase the calorific value of the final product (see example).

Treatment of anaerobic digestate

The treatment of fermentation residues from biogas plants can be a costly procedure. However, anaerobic digestate can be an suitable feedstock for HTC bio coal, because it still contains a lot of carbon and thus a lot of energy. HTC makes this energy available and can therefore be an ideal addition to the biogas technology. At the same time a number of energy intensive treatment processes – pasteurisation, sanitation, drying, composting – become unnecessary when using HTC. Finally the end-product is a renewable and valuable bio coal instead of compost, which is hardly marketable.

In both cases, problematic biodegradable wastes are processed to the valuable and renewable energy source bio-coal. Moreover residual water can be led back to the digester or fermenter, whereby the biogas output can increase because the water contains carbon and a higher temperature.

Further applications are found wherever large volumes of organic wastes occur, such as in breweries, fruit juice factories, in agriculture, in the palm oil industry, etc.

A MODEL HTC PROJECT WITH REACTOR

HTC Projects can be designed as Batch Type or Continuous Process Type depending on supply and rate of supply of 'Wet Biomass' for employing in the process.

It can be designed with single reactor or multi reactors.

Advantages of the TF.C-Carbon-5000/10-12

- minimal space requirements (8m x 7m x 5m)
- high energy-efficiency through integrated thermal feedback
- continuous operation; minimal heat loss
- minor building requirements:
- the unit gets shipped in three parts, installed on site and is immediately ready for operation
- operation fully automated
- easy to maintain

Further technical data:

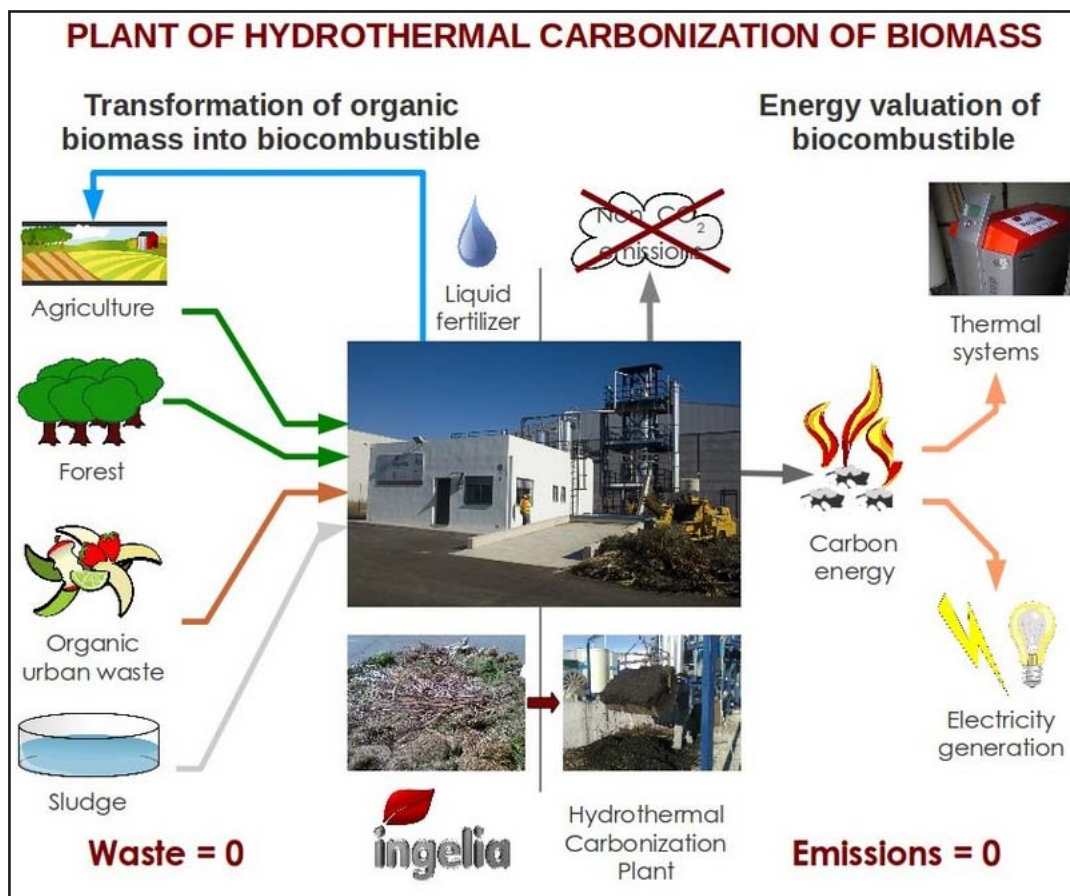
- reactor volume.....5 m³
- average retention time4 h
- throughput.....up to 10,000 t / year
- biomass-input per cycle.....150 litres
- total weight of plant.....28 t

Process parameters:

- process temperature.....200 ° C - 230 ° C
- process pressure.....20 bar - 25 bar

During one cycle the whole reactor turns once around his axis to avoid deposits on the walls through sedimentation.





HTC Process produces solid bio combustible called **Bio-coal** and the characteristics can be summed as under.

Bio Combustible or Bio Coal -

- Is **homogeneous**
- Concentrates the energy power of biomass supplied. **GPV around 24 MJ/kg**, similar to browncoal
- Bio-coal **combustion** is **uniform**, so burning equipment are easier and cheaper
- **High density**, so transportation and management costs are reduced
- Burning the bio-coal is “**CO₂ neutral**”, so there are not quotes for emissions
- It occurs in porous form under water, so it is easy to apply a pressing-drying process
- Elements such as K, Cl, etc. are dissolved in the liquid phase, resulting in a coal with low salinity and ash melting points above 1250°C
- Different post-treatments can be adapted for improving the quality of coal
- **Versatility**, as bio-coal can be used for: electrical generation, co-combustion, pelletization, selling, direct combustion in order to obtain heat, ...

In the near future HTC will play an important role in the efficient production of CO₂ neutral Energy from all kinds of ‘Wet Biomass’.

(To be continued)



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“Electricity is really just organized lightning” - GEORGE CARLIN



SUBHASH SEHGAL
Chairman & Managing Director
Ozone Group of companies



Ozone pharmaceuticals is a successful entrepreneurship with the belief: vision without action is a dream. Working smarter and harder is the way to success.

The entrepreneurs of India are creating their own business goals by creating skin care products with our knowledge of Ayurvedic medicines. Subhash Sehgal, Chairman & Managing Director, Ozone Group of companies,

started his entrepreneurial journey from being a professional with Glass as a medical representative in 1974. With his entrepreneurial vision he then became one of the pioneers using ayurvedic medicines and developed excellent products under the brand of “No Marks”. Thirty five percent of the group’s turnover comes out of No Marks. After creating a success story in the anti-marks cream category, Subhash, ventured into different variants, which are age specific. The Ozone Group is a renowned name in the health and wellness industry and possesses immense potential to rise in all their divisions. The Ozone Group comprises of the following operating companies namely – Ozone Ayurvedics, Ozone Pharmaceuticals and 4th Dimension Media Pvt. Ltd. Subhash believes that only change is constant. So under his mentorship, the company focused on introducing different variants which are for different age groups. He has set up his own R&D centre which is a part of all manufacturing process at its various plants that is Baddi, Guwahati and Bahadurgarh. He believes that the amalgamating of allopathy and ayurveda can work wonders. Ozone Ayurvedics has a 12 acre cultivation farm where plants and herbs are grown organically and managed under expert guidance of competent professionals. Subhash has plans to expand his operations abroad with his own strong marketing and distribution network, as he has gained the faith of his investors by giving them good returns. He wants the world to take notice. Since 2005, when it began exports to Dubai, Ozone now has a presence across the world, and Subhash is planning a manufacturing unit in the UK to cater to the European market. With his enterprising entrepreneurial skills, he has also focussed on Corporate Social Responsibility (CSR) since 2004, by adopting a cluster of 16 villages near Mathura and generating rural employment and better living conditions for the villagers there.

HUMOUR

Already Named

A woman was rushed into the hospital in an ambulance as she was just about to give birth to twins. At the hospital the lady was in such pain she had to be sedated. A couple of hours after the babies had been delivered, she woke up and asked to see her children.

“Doctor, could you bring my babies to me so I can name them?”

The doctor replied, “You don’t need to worry about names, your brother has already named them.”

“Why did you let him name them, he has no sense! What did he call the little girl then?”

“Denise.” replied the doctor.

“Oh that’s not too bad, I thought u were going to tell me he’d named her something awful! So what did he call the little boy?”

“De-nephew, of course!”

Driving and Signals

Two elderly women were out driving in a large car, both could barely see over the dashboard. As they were cruising along, they came to an intersection. The stoplight was red, but they just went on through.

The woman in the passenger seat thought to herself “I must be losing it, I could have sworn we just went through a red light.”

After a few more minutes, they came to another intersection and the light was red again. Again, they went right through. The woman in the passenger seat was almost sure that the light had been red but was really concerned that she was losing it. She was getting nervous.

At the next intersection, sure enough, the light was red and they went on through. So, she turned to the other woman and said, “Mildred, did you know that we just ran through three red lights in a row? You could have killed us both!”

Mildred turned to her and said, “Crap, am I driving?”

வியப்பூட்டும் இந்தியா - 7

சாளுக்கியர்களின் கலைநயம் பட்டடக்கல்



சாளுக்கிய மன்னர்கள் கி.பி. 6ம் நூற்றாண்டு வரை தென்னிந்தியாவையும் மத்திய இந்தியாவையும் ஆண்டு வந்தனர். சாளுக்கிய மன்னர்களில் தலை சிறந்த அரசராக இரண்டாம் புலிகேசி விளங்கினார். இவர் வாதாபிக்கு அருகில் உள்ள அய்ஹோல் நகரைத் தலைநகராகக் கொண்டு ஆட்சி செய்துவந்தார். பல நாட்டு மன்னர்களுடன் போரிட்டு, தனது ஆட்சி எல்லையை விரிவுபடுத்தினார். கட்டிடக் கலை மீது அளவற்ற ஆர்வம் கொண்டிருந்தார்.

சாளுக்கிய மன்னர்கள் அய்ஹோல் வாதாபி போன்ற நகரங்களைத் தலைநகராகக் கொண்டு ஆண்டாலும், அருகில் உள்ள பட்டடக்கல் நகரை மிகப் புனிதமாகக் கருதினர். மன்னர்கள் முடி சூட்டிக்கொள்வதற்காகவே இந்த நகரம் உண்டாக்கப்பட்டிருந்தது.

வட கர்நாடகாவின் பாகல்கோட் மாவட்டத்தில் உள்ள இந்த நகரம் மிகச் சிறந்த கட்டிடக் கலைக்கு

எடுத்துக்காட்டாக இருக்கிறது. திராவிடக் கட்டிடக் கலையையும் வட இந்தியக் கலையையும் சேர்த்து இங்கு கோயில்கள் கட்டப்பட்டுள்ளன.

பட்டடக்கல் யுனெஸ்கோவின் பாரம்பரியச் சின்னமாக அறிவிக்கப்பட்டிருக்கிறது. இந்த வளாகத்தில் 8 கோயில்களும் ஊருக்கு வெளியே 2 கோயில்களும் உள்ளன. இதில் ஒன்று மட்டும் ஜைனக் கோயில். மற்ற ஒன்பதும் சிவன் கோயில்கள். மன்னர்கள் பட்டம் சூட்டிக் கொள்வதற்காக இந்த நகரம் அமைக்கப்பட்டதால் செல்வச் செழிப்பு மிக்க தலைநகராகக் கட்டப்பட்டது.

கோயில்களின் வெளித் தோற்றம் மிக அழகாகக் கட்டப்பட்டிருக்கிறது. ஒவ்வொரு கல்லும் முப்பரிமாணத் தோற்றத்தில், மிக நுட்பமாகச் செதுக்கப்பட்டிருக்கிறது. கோயில் தூண்களில் உள்ள சிற்பங்களும் சுற்றுச் சுவர்களில் உள்ள சிற்பங்களும் கலைநயம் மிக்கவையாகக் காட்சியளிக்கின்றன.



மலப்பிரபா ஆற்றங்கரையில் அமைந்துள்ள பட்டக்கல்லில் இருந்து 10 கி.மீ. தொலைவில் ஐஹோல் என்ற இன்னொரு வரலாற்றுச் சிறப்பு மிக்க இடம் இருக்கிறது. இது சாளுக்கிய மன்னர்களின் முதல் தலைநகரமாக இருந்தது. இங்கு ஏராளமான கல்வெட்டுகள் இருக்கின்றன. இவற்றில் இரண்டாம் புலிகேசியின் வெற்றிகளும் பல்லவர்களுடன் இருந்த

மோதல்களும் ஆட்சி முறையும் குறிப்பிடப் பட்டிருக்கின்றன. ஐஹோலில் பலவிதமான கட்டிடக் கலைகளும் பரிசோதனை முயற்சியில் செய்து பார்க்கப்பட்டன. இங்குள்ள சிவன், துர்கை சிலைகள் மிக அழகாகச் செதுக்கப்பட்டிருக்கின்றன. பட்டக்கல்லில் இருந்து 22 கி.மீ. தூரத்தில் இருக்கிறது வாதாபி. இதுவும் சில காலம் சாளுக்கியர்களின் தலைநகரமாக இருந்தது.





குடைவரைக் கோயில்களுக்கு வாதாபி புகழ்பெற்றது. அகத்தியர் ஏரியைச் சுற்றியுள்ள குன்றுகளில் கி.பி. 6-ம் நூற்றாண்டுக்கும் 8-ம் நூற்றாண்டுக்கும் இடைப்பட்ட காலத்தில் உருவாக்கப்பட்டிருக்கிறது. சிவனுக்காக உருவாக்கப்பட்ட முதல் குடைவரை கோயில் இது என்பது குறிப்பிடத்தக்கது.

இங்கே விஷ்ணு, புத்தர், கணபதி சிலைகளும் வடிவமைக்கப்பட்டுக்கின்றன. வாதாபி குன்றிலிருந்து பார்க்கும்போது பச்சை நிற ஏரியும் சுற்றியுள்ள கிராமமும் கண்கொள்ளாக் காட்சியாக இருக்கும். முதலாம் நரசிம்மவர்ம பல்லவர் இரண்டாம் புலிகேசியை வாதாபியில் அழித்ததால், வாதாபிகொண்டான் என்ற பெயரைப் பெற்றார்.

சாளுக்கிய மன்னர்களின் வீழ்ச்சிக்குப் பின்னர் மராட்டியர்களும் இஸ்லாமியர்களும் ஆங்கிலேயர்களும் படையெடுத்த காரணத்தால் பல சிலைகள் சேதமடைந்திருக்கின்றன. ஆனாலும் சாளுக்கியர்களின் கட்டிடக்கலையின் சிறப்பை அவை எந்தவிதத்திலும் குறைத்துவிடவில்லை.

அய்ஹோலும் வாதாபியும் கட்டிடக் கலையில் சிறந்து விளங்கினாலும் பட்டடக்கல் நகர் இவை இரண்டை விடவும் பலவிதங்களில் சிறப்புப் பெற்று விளங்குகிறது.

தொடர்புக்கு: ஆம்பூர் மங்கையர்கரசி,
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Courtesy: தி இந்து, தேதி: 29.11.2017

PATRICK KILONZO MWALUA



A lone man drives into the African Wilderness with his truck of hope **Patrick Kilonzo Mwalua** is a true hero, hailing from Kenya. Every day, he wins the heart of hundreds of animals because of his heroics.

Tsavo West National Park has been cursed with harsh droughts since June last year and its animals were on the brink of death. “If we don’t help

them they will die”. Patrick thought. So every single day, he packs his truck with 3,000 gallons of fresh water and proceeds to drive his truck to help thirsty animals. As soon as the truck is heard, the animals all gather eagerly and greet Patrick with a heroes’ welcome while drinking themselves back to health. Patrick has been running the project for about a year. What started with a rental truck and as a one-man operation is now a multitude of coordinated water runs, with multiple trucks.

True heroes are hard to find, but **Patrick is truly of those rare gems.**

நோய்த் தடுப்பு மருந்து

விஞ்ஞானியும் மருத்துவருமான எட்வர்ட் ஜென்னருக்கு மனித குலம் நன்றி சொல்ல வேண்டும். நச்சு வைரஸ்களால் பெரியம்மை என்ற தொற்றுநோய் மனிதர்களை மட்டும் தாக்கிக்கொண்டிருந்தது. இதனால் 10 சதவிகிதம் பேர் உயிரிழந்து கொண்டிருந்தனர். இந்தக் கொடிய நோய்க்குத் தடுப்பு மருந்தைக் கண்டு பிடித்து, மனித உயிர்களைக் காப்பாற்றியவர் எட்வர்ட் ஜென்னர்!

18-ம் நூற்றாண்டில் பெரியம்மை மிகக் கொடிய நோயாக அச்சுறுத்திக் கொண்டிருந்தது. 1721-ம் ஆண்டு இஸ்தான்புல்லில் இருந்து லேடி மேரி வோர்ட்லே மான்டகு என்பவர் நோய்த் தடுப்பு மருந்தை இங்கிலாந்துக்குக் கொண்டு வந்தார். இந்த மருந்தால் பெரியம்மையை முற்றிலுமாக ஒழிக்க முடியவில்லை. நோய் தாக்கிய 60 சதவிகிதம் பேரில் 20 சதவிகிதத்தினர் இறந்து போனார்கள்.

அந்தக் காலத்து மக்கள் மாட்டின் மடிக்காம்புப் புண்களில் (அம்மை) இருக்கும் பால், பெரியம்மை நோயைத் தடுக்கும் என்றும் ஒருமுறை அதைப் பயன்படுத்தினால் மீண்டும் பெரியம்மை வராது என்றும் நம்பினர். மக்களின் இந்த நம்பிக்கையை வைத்து 1768-ம் ஆண்டு மருத்துவர் ஜான் ஃப்யூஸ்டர், பெரியம்மையைத் தடுக்கும் வல்லமை மாட்டின் அம்மை பாலுக்கு இருப்பதாகக் கட்டுரை வெளியிட்டார்.

ஆனால் அவரால் அதை அறிவியல் பூர்வமாக விளக்க முடியவில்லை. இவரைத் தொடர்ந்து இன்னும் 5 பேர் தடுப்பு மருந்து கண்டுபிடிப்பில் இறங்கினர். அவர்களாலும் அதை ஆதாரப்பூர்வமாக நிரூபிக்க இயலவில்லை. 1744-ம் ஆண்டு பெஞ்சமின் ஜெஸ்டி மாட்டின் அம்மைப் பாலிலிருந்து நோய்த் தடுப்பு மருந்தை உருவாக்கி, தன்னுடைய மனைவி மற்றும் குழந்தைகளுக்குச் செலுத்தி வெற்றி கண்டார். ஆனால் அந்த முறையைப் பரவலாகப் பயன்படுத்த முடியவில்லை.

ஜென்னரிடம் பெரியம்மைக்கான மருந்து கண்டுபிடிக்கும்படி இங்கிலாந்து மன்னர் கேட்டுக் கொண்டார். 20 ஆண்டுகள் மருந்து கண்டு பிடிக்கும் முயற்சியில் ஈடுபட்டிருந்த ஜென்னர், சாதாரண மக்களின் நம்பிக்கையில் உண்மை இருப்பதை அறிந்தார்.

மாடுகளைப் பராமரிக்கும் பணியாளர்களுக்குப் பெரியம்மை வரவில்லை என்பதும் அவர்களுக்கு வரும் மாட்டு அம்மை உயிர் இழப்பு ஏற்படுத்தக் கூடிய அளவுக்குத் தாக்கத்தை ஏற்படுத்தவில்லை என்பதையும் தெரிந்து கொண்டார். தன்னுடைய தோட்டக்காரரின் மகன் 8 வயது ஜேம்ஸ் பிப்லைப் பரிசோதனைக்கு உட்படுத்தினார்.

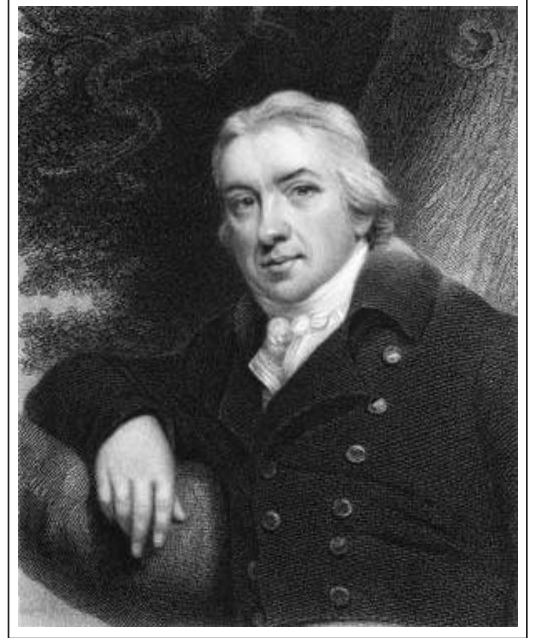
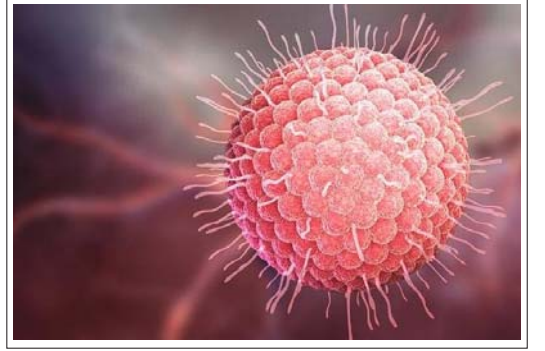
மாட்டு அம்மை வந்த ஒரு பெண்ணின் புண்ணிலிருந்து பாலை எடுத்து, ஜேம்ஸுக்குச் செலுத்தினார். குழந்தையின் உயிருடன் விளையாடுகிறார் என்று எல்லோரும் கடுமையாக எதிர்த்தனர். ஆனால் மாட்டு அம்மை வந்த ஜேம்ஸ், விரைவில் குணமானான். மீண்டும் அவரது உடலில் பெரியம்மை கிருமியைச் செலுத்தினார் ஜென்னர்.

ஜேம்ஸுக்குப் பெரியம்மை ஏற்படவில்லை. பெரியம்மை நோய்க்கான மருந்தைக் கண்டுபிடித்த ஜென்னர், 1798-ம் ஆண்டு தடுப்பு மருந்து (Vaccine) என்ற நூலையும் வெளியிட்டார்.

பெரியம்மை தடுப்பு மருந்து ஐரோப்பா முழுவதும் பரவியது. ஃபிரான்சிஸ்கோ சேவியர் டி பால்மிஸ் என்ற மருத்துவர் உலகின் பல்வேறு நாடுகளுக்கும் பயணித்து, தடுப்பு மருந்தைச் செலுத்தி, பெரியம்மை நோய் ஒழிப்பில் ஈடுபட்டார்.

மனித குலத்துக்கு மிகப் பெரிய கண்டுபிடிப்பை வழங்கிய ஜென்னர், தன்னுடைய கண்டுபிடிப்புக்கான காப்புரிமையைப் பெற மறுத்துவிட்டார். உலகம் முழுவதும் இலவசமாகவே தடுப்பு மருந்தின் உரிமையை வழங்கினார். இதனால் பெரியம்மை நோய் முற்றிலுமாக ஒழிக்கப்பட்டது. இன்று 'நோய் எதிர்ப்பியலின் தந்தை' என்று ஜென்னர் கொண்டாடப்படுகிறார்.

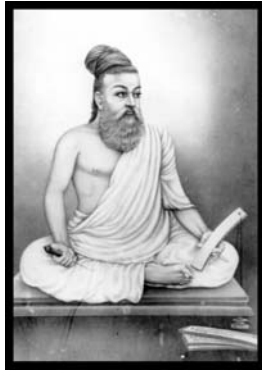
Courtesy: தி இந்து, தேதி. 22.05.2018



TIRUKKURAL AND MANAGEMENT IN A 'NUTSHELL' - 63

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

- ✓ Management of Economic Performance of Business,
- ✓ Managing the Managers and
- ✓ Managing the Work and the Workers.



In today's context, 'Work' will include all activities with regard to both "Goods and Services". The act of Managing the Work and the Workforce is the ongoing process, commencing with the Design of the Work and the Processes and execution with consciousness and conviction about Quality and Excellence.

Work: With regard to Work and planning, Tiruvalluvar lists the five elements that are important, in the following Kural.

Porulkaruvi Kaalam Vinaiida

Noduayinthum

Irultheera Ennich Cheyal Kural 675

பொருள்கருவி காலம் வினைஇட

சொடுஐந்தும்

இருள்தீர எண்ணிச் செயல் குறள் 675

"Five things should be carefully considered in the doing of all action, namely, the Resources, the instrument, the nature of the action itself, the proper time and the proper place for the execution."

Quality and excellence of work are based on the 'Skill and the Will' and the Focus and Perseverance and these concepts are brought out in the following Kurals.

Vinaiththitpam Enpathu Oruvan Manaththitpam
Matraiya Ellam Pira Kural 661

வினைத்திட்டம் என்பது ஒருவன் மனத்திட்டம்
மற்றைய எல்லாம் பிற. குறள் 661

"Greatness of achievement is nothing else but the greatness of the will that striveth; therefore all other things come not near the mark"

Enniya Enniyaangu Eithupa Enniyaar
Thinniyar Aagap Perin Kural 666

எண்ணிய எண்ணியாங்கு எய்துப எண்ணியார்
திண்ணியர்ஆகப் பெறின. குறள் 666

"That which they will, even in the manner that they will, provided they will with all their might"

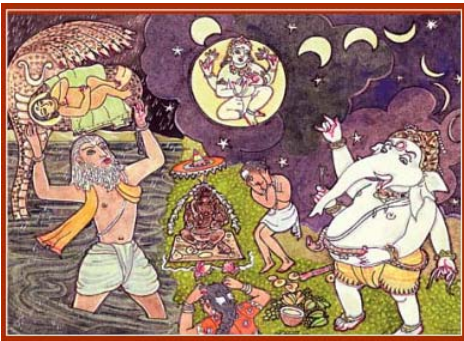
Kalangaathu Kanda Vinaikkan Thulangaathu
Thookkam Kadinthu Seyal Kural 668

கலங்காது கண்ட வினைக்கண் துளங்காது
தூக்கம் கடிந்து செயல் குறள் 668

"When thou hast resolved upon a thing with all thy wits about thee, waver not but pursue thy purpose with vigour"

HOME FESTIVALS - 8

ஆவணி - AVANI (August/September)



This is a busy month, with two major festivals celebrated both at home and at the temple. Krishna Jayanthi, the birth of Lord Krishna, comes first. In the painting at right is the rescue of the baby Krishna, who was born in a prison. His father carries him across a swollen stream while the seven-headed serpent, AdiSeshan, protects

the incarnation of Lord Vishnu from the storm. In the Home, offerings of butter and yoghurt are made to Krishna's image, and footprints made with red powder reveal his path from the home's front door to the shrine room, suggesting that Krishna has come to participate. Ganesha Chaturthi is a mammoth festival across all of India, ten days in celebration of His manifestation. Shown in the centre of the painting is a statue of Lord Ganesha and a devotee offering obeisance by pulling his ears and bobbing up and down, a practice called *thopukarnam* in Tamil, done only for Ganesha – one explanation being that it is to make the Baby Ganesha laugh. The icon of Ganesha is made by the devotees from river clay and painted and decorated. At festival's end is the Visarjana or departure, when the clay icon is placed into the river the Deity is bid farewell. In North India Visarjana is celebrated by millions of people. At far right in the art is depicted the story of Ganesha consuming so many sweet offerings that He had to tie a snake around his belly to keep it from bursting. Ganesha chastised the Moon for laughing at His predicament, and as penance the Moon has ever since waxed and waned through the month instead of remaining constantly bright. (To be continued)

HYUNDAI KONA ELECTRIC WILL BE THE COMPANY'S FIRST ALL-ELECTRIC MODEL FOR INDIA

Hyundai's first all-electric car for India will be the Kona electric plug-in crossover. This car was recently unveiled in production form at the 2018 Geneva Motor Show while a concept version was shown in India at the 2018 Auto Expo. The Indian-spec car, expected in 2019, is set to be offered with the base 135PS, 300km range electric motor. The 39.5kWh lithium-ion battery pack this motor is paired with propels the electric Kona from 0 to 100kmph in 9.3s and onto a top speed of 167kmph, mainly due to its 395Nm of torque available from standstill. At your home, the Kona will charge off of 240V AC at 7.2KW. That means its internal inverter tops out at around 32 amps.

The Hyundai IONIQ surprisingly was able to charge beyond the standard 50kW up to 70kW via CCS. The Kona takes it a step further to 70kW. That equates to a 0-80% charge in 54 minutes. The Chevy Bolt tops out at about 54kW on a CCS charger but can get close to 70kW in regen braking and claims 160 miles or 67% of charge in 1 hour of fast charging.

Reports suggest that the car could come in via the CKD route and be priced at around Rs 25 lakh.

Internationally, the Kona electric comes with another larger 64kWh battery with 211PS and 470km range but this is unlikely to be sold in India. The exterior styling of the electric Kona is similar to the combustion-engined version with the only difference being a closed-off grille, 17-inch alloy wheels and aerodynamically designed bumpers and spoiler. The interior comes with a redesigned center stack to replace the gear lever from the regular version, an all-digital instrument cluster, head up display and a 7-inch touchscreen infotainment system with an optional 8-inch unit. Heated and ventilated front seats with 8-way adjustability are available. On the safety front, the 5-star NCAP rated Hyundai Kona electric comes with adaptive cruise control, lane-keep assist, rear cross traffic alert and automatic emergency braking. But the full suite of these safety features is unlikely to make it to India.

When launched, the Kona electric will not have any direct rivals. It will instead compete in price with cars like the Jeep Compass, upcoming Honda CR-V, VW Tiguan and its own stablemate, the Hyundai Tucson. Hyundai will be hoping the Kona electric will attract buyers with its unconventional styling and due to a growth in interest in electric cars in the country.

SEMINAR PHOTOS ON 4th MAY 2018 at OOTY



(Left to Right): Mr. G. Kannan, Vice President, Coimbatore, TNEIA; Er. S. Gopalakrishnan, Secretary, TNEIA; Er. S.D. Poongundran, President, TNEIA; Mr.G. Basuvaraji, Branch Manager, Polycab Wires P Ltd., Mr.N. Sarathkumar, Engineer Marketing, I.P.L. Products, Mr. V. Rangarajan, MD, ShriVaari Electricals Pvt. Ltd.(TNEIA)



Welcome Address by Er. S.D. Poongundran, President, TNEIA



Er. S.D. Poongundran, President, TNEIA honouring Mr.N. Sarathkumar, Engineer Marketing, I.P.L. Products



Er. S.D. Poongundran, President, TNEIA honouring Mr. V. Rangarajan, MD, ShriVaari Electricals Pvt. Ltd.



Presenting Technical Papers by Mr. G. Basuvaraji, Branch Manager, Polycab Wires P Ltd., Coimbatore



Mr. A. Radhakrishnan, TNEIA honouring Mr. G. Basuvaraji, Branch Manager, Polycab Wires P Ltd., Coimbatore



Er. S.D. Poongundran, President, TNEIEA, honouring Mr. G. Basuvaraji, Branch Manager, Polycab Wires P Ltd., Coimbatore.



Presenting Technical Papers by Mr. N. Sarathkumar, Engineer Marketing, I.P.L. Products.



Mr. N. Vasu, Vice President, Vellore, TNEIEA, honouring Mr. N. Sarathkumar, Engineer Marketing, I.P.L. Product.



Mr. N. Vasu, Vice President, Vellore, TNEIEA & Er. S. Gopalakrishnan, Secretary, TNEIEA honouring Mr. N. Sarathkumar, Engineer Marketing, I.P.L. Products.



Presenting Technical Papers by Mr. Anirudha Basu, General Manager – Marketing, Infinite Electrotech Pvt. Ltd.



Presenting Technical Papers by Mr. V. Rangarajan, MD, ShriVaari Electricals Pvt. Ltd. (TNEIEA)



**Mr. N. Subramanian, TNEIEA honouring
Mr. V. Rangarajan, MD, ShriVaari Electricals Pvt. Ltd.
(TNEIEA)**



**Mr. D. Santhanam, TNEIEA honouring
Mr. G. Kannan, Vice President, Coimbatore, TNEIEA**



**Mr. S.R. Senthil Kumar, TNEIEA honouring
Mr. Anirudha Basu, General Manager – Marketing,
Infinite Electrotech Pvt. Ltd.**



**Mr. G. Kannan, Vice President, Coimbatore, TNEIEA
honouring Mr. V. Rangarajan, MD,
ShriVaari Electricals Pvt. Ltd. (TNEIEA) &
Mr. Anirudha Basu, General Manager – Marketing,
Infinite Electrotech Pvt. Ltd.**



Speech by Er. S.D. Poongundran, President, TNEIEA



Delegates at the Meeting



Speech by **Mr. S.K. Sethuraman**, TNEIEA



Mr. S. Kannan, TNEIEA honouring **Er. M. Balamurugan**, Treasurer, TNEIEA



ShriVaari Electricals Pvt. Ltd. – Display



Delegates at the Meeting



Delegates at the Meeting



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



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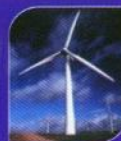
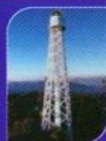


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