



ELECTRICAL INSTALLATION ENGINEER

NEWS LETTER

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

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EVENTS



Events Profile: Biomass Supply Chain, themed *"Organized the Feedstock Market"* - Push for Green & BioEnergy in South East Asia - Incentive for Localized

Energy Generation; Biomass Trade & Demand Markets Dynamics (Wood Pellets, Palm Agri Biomass, PKS, etc); Upgrading Palm Agri Biomass to Energy Products; Structural Development of Forestry to Pellet Projects; Importance for Organised Logistics Chain; Pelletizing & Torrefaction and **Biofuels World Asia** themed *"Driving & Flying with Sustainable Biofuel... Making it Possible!"* Opportunities in Asia's Biofuels Mandate in Land Transport & Aviation; Sustainable Aviation Fuels for 2020 in Japan; Impact of Crude oil & Feedstock Market on Biofuels' Production & Prices; Logistics & Blending Infrastructure for Sustainable Usage; Next Generation Biofuel Solutions

Date: 26th – 28th January 2016

Venue: Sofitel Bangkok Sukhumvit, Bangkok, Thailand

Website: <http://www.cmtevents.com/aboutevent.aspx?ev=160102>

3rd Myanmar Electric Power Convention 2016

Events Profile: Myanmar focusing on the power generation and T&D sector. The 4th Annual event is the perfect occasion for participants to grasp the pulse of Myanmar's new power development plans in the coming years under the leadership of the new government. The event also serves as a deal-making platform for participants to identify new partners and to conclude new deal.

Date: 13-15 January 2016

Venue: Sule Shangri-La, Yangon, Myanmar

Website: <http://www.neoventurecorp.com/events/mepc/>



GRIHA

7th The Griha Summit

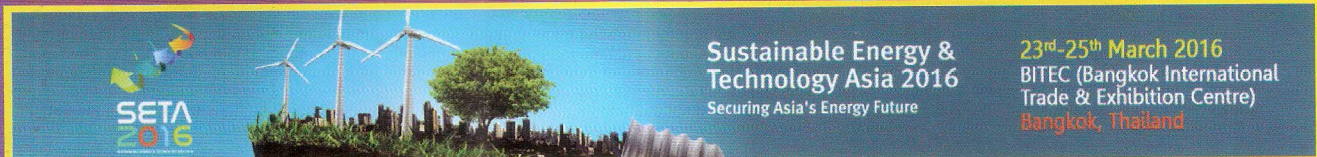
Events Profile: The GRIHA Summit 2016 will be a landmark event, involving hundreds of community members. The conference theme would be 'Cities of the Future' and the sessions would be designed around enhanced efficiency of built environment both at city

and building scale.

Date: 16th – 20th February 2016

Venue: India Habitat Center (IHC), New Delhi

Website: <http://grihaindia.org/grihasummit/index.php#home>



Events Profile: Sustainable Energy & Technology Asia exhibition & conference, developed specifically for international, governmental and industry discussions and collaboration on developing sustainable energy policies for the region's future economic development.

Date: 23rd – 25th March 2016

Venue: BITEC (Bangkok International Trade & Exhibition Centre), Bangkok, Thailand

Website: <http://www.seta.asia/about-seta/seta-2016/>

L&T Training Programme

Industrial Electrician Training Programme
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Venue: L&T Ltd., Switchgear Training Centre, Nilgiris

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EDITORIAL

Dear Members, Fellow Professionals and Friends

Seasons Greetings To One And All!

Greetings For Happy Christmas!!

Advance Greetings For A Happy And Prosperous 2016!!!

A general 'Proverb' to convey that when nature wants to give, it gives tearing 'The Roof', is there in all the languages and regions. This was proved beyond doubt by the recent pouring rains all over Tamilnadu including a heavy down pour in Chennai. Water is the basis for life, but abundance in a short spell disturbs and dislocates and teaches lessons for the future (which we seem to forget every time). Let us hope that the Grand Plans of 'Smart Cities' take care of the 'Basics' so that the life is Safe, Smooth, Secure and Enjoyable for every citizen in cities and the National Plans take more care for adequate storage and distribution of 'Waters' all over the Country from all the abundance of Rains and Rivers. One study shows that on an average, the cultivable acreages in India is utilized for only one crop per year and with adequate availability of water, this can easily go up to 2 or 3 crops per year. As we are all aware, after the Green Revolution in our country in the 70's and 80's, present level of food grain production is about 280 Million Tons per year with exportable surplus, which can go up substantially with "WED" (Water Equitable Distribution) programs and measures.

Water, Energy and Infrastructure are the three essential things that decide the Economics, Growth and Prosperity of a Country providing sound base for Agriculture, Industries and Service Industries. ENERGY is the concern of our Profession and in this regard, the basic questions continue to remain as:-

- a) Are we able to tap all our Energy and Renewable Energy Resources sufficiently and
- b) Are we able to Generate, Distribute and Utilize the Energy Efficiently?

The answers continue to remain far from satisfactory, but we are striving continuously to improve. In the area of Renewable Energy, lot of Wind Energy Programs have been implemented with fair amount of success, with more potential in store. Presently the focus on Solar Energy is encouraging and one more area that deserves attention is "Bio Energy" with a huge potential in India. The Technological advancements in recent years and employed successfully in many parts of the world can help harness the Bio Energy potential in India to derive energy in all secondary forms like 'Heat', 'Fuel' and 'Electricity' steadily. Technologies revolve around the concept of 'Waste to Energy' producing Energy as well as other Bi Products usable for Agriculture and other applications.

Energy Efficiency is another area of great concern providing tremendous scope, though there has been substantial improvements in the past few decades. Our country's initiatives through Bureau of Energy Efficiency with Standards and Labeling Program, Auditing norms, Energy Efficient Building Codes etc have been contributing to steady improvements, but focused efforts are still needed to address both Industries and Agriculture as well as Commercial and Domestic consumptions, as India's consumption of Energy per unit of GDP is still considered very high compared to many countries of the world.

The month of December is marked by Celebration of Energy Conservation Day on the 14th and the Farmers Day on the 23rd. Both are of very vital importance for the stability and the growth of our Economy and they can enable activities towards Energy Security as well.

Let us all wish to ourselves Best of Times with Best of Economy and the Best of Opportunities and resolve to work and contribute towards the same.

We thank all those members who have helped us by participating in the advertisements appearing for the issue November 2015 – FLIR Systems India Pvt. Ltd., Faith Power Solutions, Faith Power Solutions - I.P.L. Products, Power Links, Elektrotec 2016, Wilson Power and Distribution Technologies Pvt. Ltd., OBO Bettermann India Pvt. Ltd., Abirami Electricals, Universal Earthing Systems Pvt. Ltd., Sun Sine Solution Pvt. Ltd., Cape Electric Pvt. Ltd., P2 Power Solutions Pvt. Ltd., Supreme Power Equipment Pvt. Ltd., Galaxy Earthing Electrodes Pvt. Ltd., JL Seagull Power Products, Ashlok Safe Earthing Electrode Ltd., Dehn India Pvt. Ltd., Electrotherm India Ltd.

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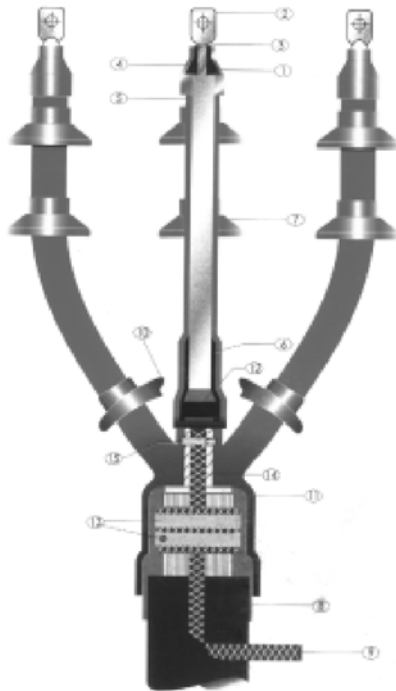
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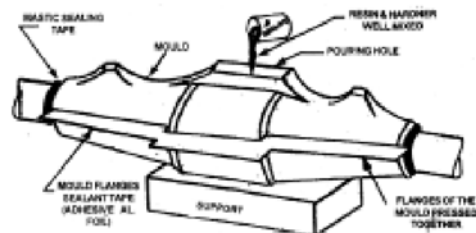
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SCIENTISTS DISCOVER HOW TO GENERATE SOLAR POWER IN THE DARK

Meet ‘photoswitches,’ a breakthrough set of materials that act as their own batteries, absorbing energy and releasing it on demand.

The next big thing in solar energy could be microscopic.

Scientists at MIT and Harvard University have devised a way to store solar energy in molecules that can then be tapped to heat homes, water or used for cooking. The best part: The molecules can store the heat forever and be endlessly re-used while emitting absolutely no greenhouse gases. Scientists remain a way’s off in building this perpetual heat machine but they have succeeded in the laboratory at demonstrating the viability of the phenomenon called photoswitching.

“Some molecules, known as photoswitches, can assume either of two different shapes, as if they had a hinge in the middle,” MIT researchers said in statement about the paper published in the journal Nature Chemistry. “Exposing them to sunlight causes them to absorb energy and jump from one configuration to the other, which is then stable for long periods of time.” To liberate that energy all you have to do is expose the molecules to a small amount of light, heat or electricity and when they switch back to the other shape they emit heat. “In effect, they behave as rechargeable thermal batteries: taking in energy from the sun, storing it indefinitely, and then releasing it on demand,” the scientists said.

The researchers used a photoswitching substance called an *azobenzene*, attaching the molecules to substrates of carbon nanotubes. The challenge: Packing the molecules closely enough together to achieve a sufficient energy density to generate usable heat. It appeared that the researchers had failed when they were only able to pack fewer than half the number of molecules needed as indicated by an earlier computer simulation of the experiment. But instead of hitting a projected 30 percent increase in energy density, they saw a 200 percent increase. It turned out that the key was not so much packing azobenzene molecules tightly on individual carbon nanotubes as packing the nanotubes close together. That’s because the azobenzene molecules formed “teeth” on the carbon nanotubes, which interlocked with teeth on adjacent nanotubes. The result was the mass needed for a usable amount of energy storage. That means different combinations of photoswitching molecules and substrates might achieve the same or greater energy storage, according to the researchers.

So how would molecular solar storage work if the technology can be commercialized? Timothy Kucharski, the paper’s lead author and a postdoc at MIT and Harvard, told The Atlantic that most likely the storage would take a liquid form, which would be easy to transport.

“It would also enable charging by flowing the material from a storage tank through a window or clear tube exposed to the sun and then to another storage tank, where the material would remain until it’s needed,” Kucharski said in an email. “That way one could stockpile the charged material for use when the sun’s not shining.” The paper’s authors envision the technology could be used in countries where most people rely on burning wood or dung for cooking, which creates dangerous levels of indoor air pollution, leads to deforestation and contributes to climate change.

“For solar cooking, one would leave the device out in the sun during the day,” says Kucharski. “One design we have for such an application is purely gravity driven – the material flows from one tank to another. The flow rate is restricted so that it’s exposed to the sun long enough that it gets fully charged. Then, when it’s time to cook dinner, after the sun is down, the flow direction is reversed, again driven by gravity, and the opposite side of the setup is used as the cooking surface.”

“As the material flows back to the first tank, it passes by an immobilized catalyst which triggers the energy-releasing process, heating the cooking surface up,” he adds.

Other versions of such device could be used to heat buildings.

Kucharski said the MIT and Harvard team is now investigating other photoswitching molecules and substrates, “with the aim of designing a system that absorbs more of the sun’s energy and also can be more practically scaled up.”

“Coal, oil and gas are called fossil fuels, because they are mostly made of the fossil remains of beings from long ago. The chemical energy within them is a kind of stored sunlight originally accumulated by ancient plants. Our civilization runs by burning the remains of humble creatures who inhabited the Earth hundreds of millions of years before the first humans came on the scene. Like some ghastly cannibal cult, we subsist on the dead bodies of our ancestors and distant relatives.”

– CARL SAGAN, Billions & Billions: Thoughts on Life and Death at the Brink of the Millennium

KNOW THY POWER NETWORK - 99

Let us restart and move further. Now let us understand some important points relating to the selection of Megger for our tests.

The output voltage of an insulation tester like Megger depends on the resistance it is going to measure i.e. the insulation connected across its terminals. When a low resistance or an insulation with very low resistance is connected across its terminals, its output voltage will be in the order of a few volts. If the connected resistance load is of comparatively high value, the test voltage will increase till it reaches a steady and required voltage. ie. we have to ensure that adequate voltage is always produced over the resistance range of our requirement. This voltage will always be higher than the nominal / name plate voltage of the Megger. When a 5000V Megger is used for the test, the required output voltage will be in the order of 5100V. This point has to be kept in view while preparing specification for the purchase of Meggers. That is we have to stress that the insulation testers quoted by the Suppliers should provide a “load graph” that indicates output voltage characteristics against load resistance. This graph shows the terminal voltages obtained while measuring various load resistances. Because of this we have to approximately access the possible value of the resistance of the equipment insulation prior to the test.

The next point to be noted is that for a good quality Megger, the load curve (voltage vs resistance curve) should exhibit a sharp rise in voltage upto a certain value of resistance that normally commensurates with good insulation and then becomes steady or constant. To elaborate it further, it is stated that the voltage should rise sharply from one to five Mega ohms, depending on the rated voltage of the Megger selected and then it should remain steady / constant at all higher values of resistance. In the case of low or poor quality Meggers, this voltage ramp or rise will be “far slower and do not build up the rated voltage at the required range of resistances. It will build-up the required output voltage only at very high resistances and not at the resistances under our measurement. Such meters will provide false “test results / pass levels of insulation. It will not provide a true insulation value of the test piece, since the test pieces are subjected to half the “desired test voltage” or less only when they are under test.

II Interpretation of results

Now let us move on to the topic-interpretation of test results. My first question in this regard is what do you mean by “infinity” value when the test meter employed shows “infinity”? You may agree when I say that “infinity” is not a number; it simply conveys that it is a number beyond our comprehension. Then how can you get the correct IR measurement of your equipment? It is not possible with the available Megger, which has Mega ohms scale only so we have to interpret that the “infinity” is not the actually measured value; it simply indicates / conveys the insulation resistance value of the test piece under our consideration is beyond or exceeds the testing capabilities of the insulation tester used and we have to go for higher capacity tester to determine the actual IR value of the test piece. In other words it simply shows that the insulation is “Good”. If you don’t have the facility to go for higher capacity testers, then simply record the test results as very high resistance value or greater than 1000 Mega ohms or the highest available number on the tester in your maintenance register. Never record the measurements as infinity since it has no meaning or value at all. If you are really interested in getting the actual value of the IR of equipment then go for “Tera ohm Meggers” and record the actual IR values of the test piece or equipment from the time of its installation till the date of current testing. Such a long time records of the equipment insulation will reflect the broad trend of the changes in its IR values and help to provide the maintenance officials the much needed breathing space to go for corrective action in the event of development of any problem. Further usage of such higher range Meggers will facilitate the recording of certain valuable data about the insulation health condition. This includes the rate of decline in the recorded IR values of equipment insulation over the years. Normally the use of Giga ohm or Mega ohm testers will not measure this decline and the graph concerned will simply plateaued (remains steady and constant) but the Tera ohm meter will show the dip or fall in the insulation resistance values over the years. This trend will be helpful for the maintenance personnel to schedule their routine off line maintenance works, when they are hard pressed for scheduled shut down / down time. Kindly see Fig 1.

In this context it may be of interest to learn that the problems in a single layer of a multi layer insulation will be revealed only by Dielectric Discharge test. Likewise polarization index test is one of the notable / valuable tests to find out the presence of moisture, oil and other contaminants in the insulation of a rotating machine. Step voltage tests are useful in finding out the localized physical damage areas like pin holes, dry / brittle insulation in an aged equipment. We shall study these tests in the forth coming paras.

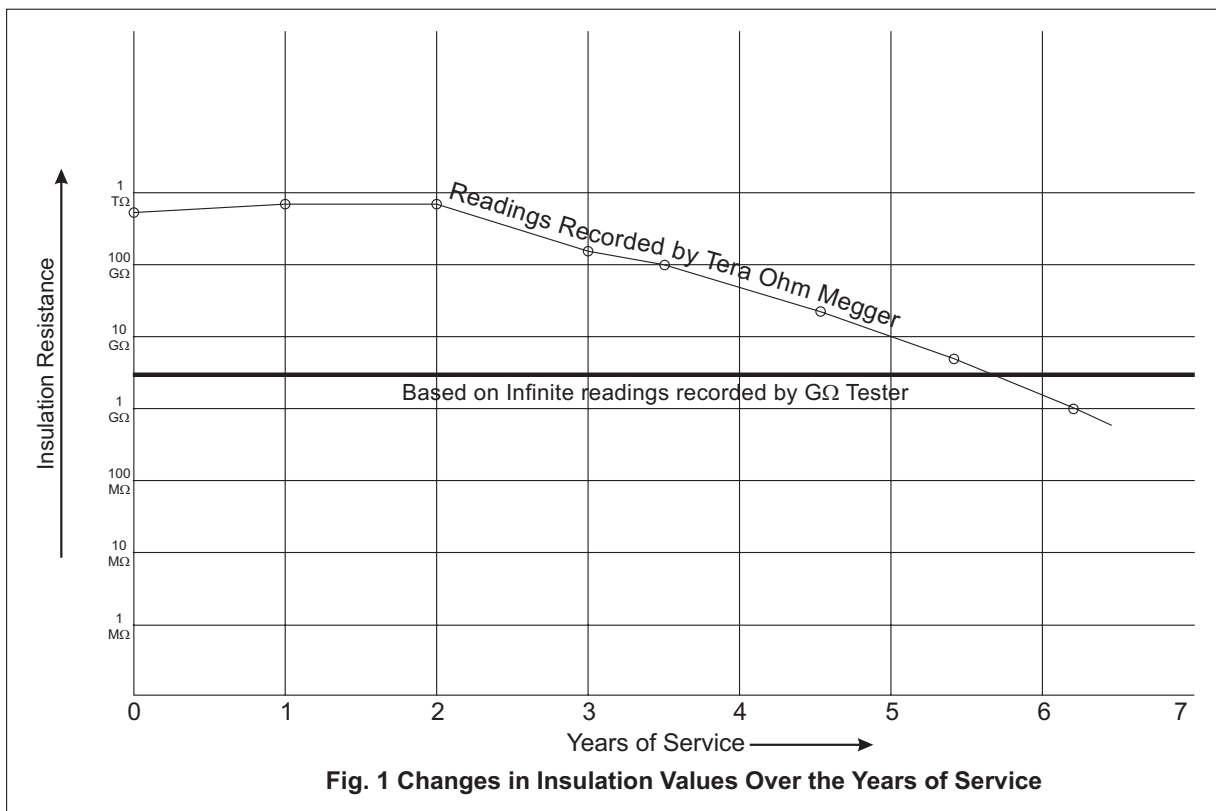


Fig. 1 Changes in Insulation Values Over the Years of Service

III Diagnostic Tests

The possible diagnostic tests that can be carried out with the aid of a Megger are listed out as follows. The results of these tests are nothing but reactions response from the equipment insulation when they are simulated by these tests. These tests help us to get an inner view of an equipment insulation structure and its health status.

- Trending spot test
- Time constant test
- Polarization Index (PI) test
- Step Voltage test (SV test)
- Dielectric discharge test

I Spot reading test (Trend analysis test)

It is a simple test that is normally associated with low voltage applications. Here, the test voltage is pressed / applied for a short period (60 sec) and then reading is taken. The minimum time of one minute is required for the dying down of capacitor charging current. The results thus obtained are compared with the earlier test results to get the “trending”. This comparison helps to assess the present health status of the insulation and its ageing as well. The only point that needed to be noted in this connection is that these test readings are temperature dependent. (The standard temperature is 40°C) and necessary temperature corrections are to be applied for the test results. When consistently or repeated low IR value is obtained in this primary test, the equipment insulation warrants immediate attention. There may be some problems developed in it and its may need immediate rectification. This preliminary test helps to identify the problems when they are in incipient stage itself. This test has to be performed at regular intervals and the test results are to be well maintained for comparison. The importance of this test lies in the information furnished by the “trend” of IR values. In this context, we have to take certain precautions. We have to apply the same test connections and the same test voltage for the same length of line. These steps will help to get good results. If possible conduct this test at the same temperature as was done earlier and avoid the testing when the surrounding temperature falls below the dew point.

“Earth provides enough to satisfy every man’s needs, but not every man’s greed.”

– MAHATMA GANDHIJI

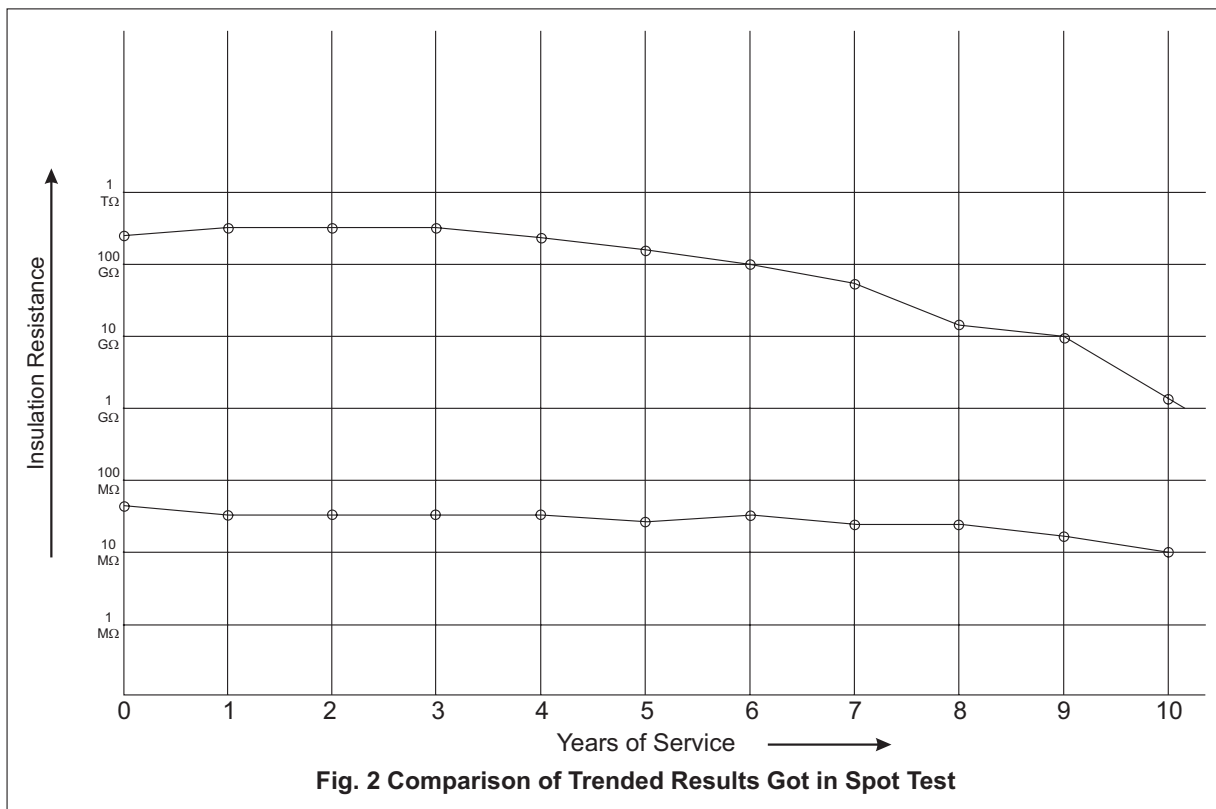


Fig. 2 Comparison of Trended Results Got in Spot Test

Equipment ‘A’ – It has much higher absolute insulation resistance values but the trend shows that its health status needs immediate attention.

Equipment ‘B’ – Though its absolute IR values are low when compared with that of equipment ‘A’, the IR curve is consistently flat and its health condition is good.

The table below shows how to interpret the results obtained in this spot test.

Sl. no.	Test results	Remarks
1	Consistently fair to high IR values	No action is needed
2	Fair to higher IR values but there is a tendency to move towards lower values over the years	Problem exists; check the downward trend; locate and remove the cause
3	Low but consistent	Condition is good; check the cause for such IR values
4	Low / very low IR values	Moisture ingress may be the cause; dry out; test the wet equipment before placing it service. This will help to assess whether the drying out is effective.
5	Previously fair / good IR values: suddenly IR values show lower trend	Find out the reason for such lower IR values and correct it. Keep a constant watch on its operation. When the IR values become so low for further operation (it becomes “unsafe”); Keep it “switched off” and examine the equipment insulation for problems.

Now it’s time for me to get “off”.
Please stay tuned till we meet again.

(To be continued...)



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SODIUM-ION BATTERIES ARE POTENTIAL POWER TECHNOLOGY OF FUTURE

The high cost and scarcity of lithium are driving research to develop alternatives to lithium-ion batteries, especially to meet future needs in energy storage, say researchers from Purdue University in an article about a potential replacement. Sodium-ion batteries represent a possible alternative, in large part because of sodium's low cost and natural abundance. However, critical advances are needed for sodium-ion technology to fulfill its promise, said Vilas Pol, an associate professor of chemical engineering.

Lithium-ion batteries are used widely in products from

consumer electronics to electric vehicles. However, the need for alternatives is being driven by new and expanding applications including batteries to store power from sources such as solar and wind energy for use on the power grid. "If everybody wants to start using lithium-ion batteries for multiple purposes, we don't have enough lithium on the planet to sustain that, so we have to find alternatives," Pol said. Researchers are working to replace lithium-ion batteries' standard internal components with functioning sodium counterparts.

Batteries have two electrodes, called an anode and a cathode. The anodes in most of today's lithium-ion batteries are made of thin layers of stacked graphene called graphite. In lithium-ion batteries, lithium ions can easily fit between graphene layers due to their small size. In sodium-ion batteries, *sodium ions* cannot pass between the graphitic layers reversibly due to their larger size and bulkier nature. The sodium ions go inside the graphitic layers during charging but do not come back during discharging process. On the cathode side, new materials have to be developed to replace lithium-containing materials. One option is to replace lithium cobalt oxide cathodes with sodium cobalt oxide cathodes. One drawback to sodium-ion batteries is that they are slightly heavier than *lithium-ion* batteries. However, their low cost and abundant nature compared to *lithium-ion batteries* may outweigh this concern.

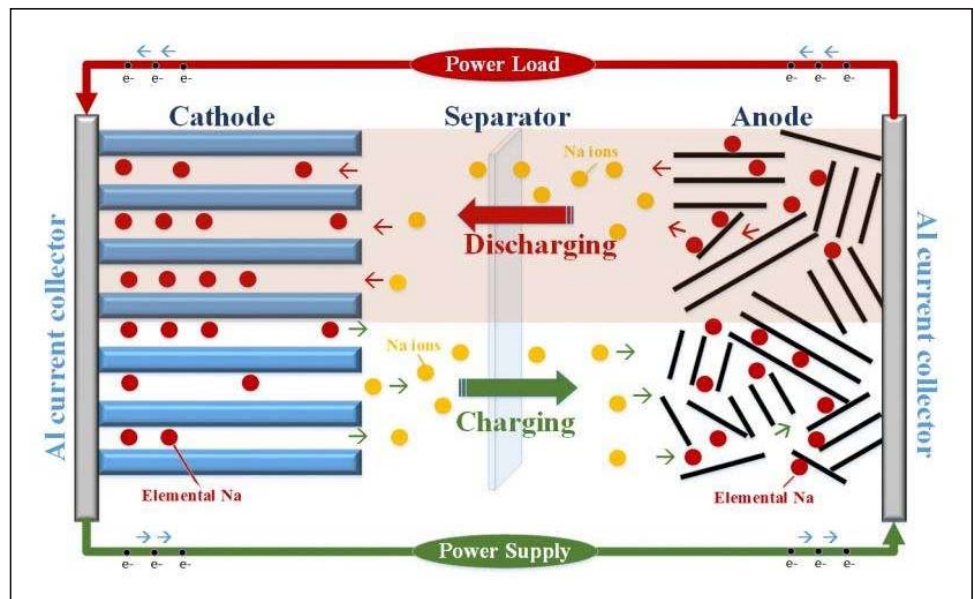
"The main advantage of sodium-ion batteries is the potential financial benefit," Dysart said. "Lithium is a very scarce element in the world. We could actually experience a lithium shortage in coming years." Pol added: "Sodium is more abundant and a thousand times cheaper than lithium. It's even in seawater." He is leading research at Purdue to improve *sodium-ion batteries* by using a variety of tailored carbons and their combinations with sodium-alloying materials such as tin and antimony to potentially double the capacity of the anodes, making possible smaller anodes and reducing the size and weight of the batteries.

The challenge with sodium-alloying materials is the great volumetric expansion effect once sodium ions form a high-energy chemical bond. "It will expand more than 300 percent, and then it shrinks when the *battery* is discharged as the sodium is taken out," said Pol, also an associate professor of materials engineering. "This great degree of expansion and contraction will cause the anode to fail over time, so we are working on alternative materials breathing architectures to mitigate the expansion."

Tang said, "Perhaps we can confine the expansion locally, similar to breathing lungs. When we breathe our lungs expand and contract quite a bit, but we don't expand."

The sodium alloying materials in combination with carbon could bring higher performance anodes that overcome limitations in conventional carbon anodes.

Read more at: <http://phys.org/news/2015-09-sodium-ion-batteries-potential-power-technology.html#jCp>



"Here is your country. Cherish these natural wonders, cherish the natural resources, cherish the history and romance as a sacred heritage, for your children and your children's children. Do not let selfish men or greedy interests skin your country of its beauty, its riches or its romance." – THEODORE ROOSEVELT

RESEARCHER SUGGESTS STORING SOLAR ENERGY UNDERGROUND FOR A CLOUDY DAY

Over the last few years, Mark Jacobson, a Stanford professor of civil and environmental engineering, and his colleague, Mark Delucchi of the University of California, Berkeley, have produced a series of plans, based on huge amounts of data churned through computer models, showing how each state in America could shift from fossil fuel to entirely renewable energy.

In a new study published today in *Proceedings of the National Academy of Sciences*, they use the data from those single-state



calculations of the number of wind, water and solar generators potentially needed in each state to show that these installations can theoretically result in a reliable, affordable national grid when the generators are combined with inexpensive storage and “demand response” – a program in which utilities give customers incentives to control times of peak demand.

An underground effort

The proposed system relies on the ability to store and retrieve heat, cold and *electricity* in order to meet demand at all times. Summer heat gathered in rooftop solar collectors could be stored in soil or rocks and used for heating homes in winter. Excess or low-cost electricity could be used to make ice, which would be used for later cooling when the price of electricity is high. Excess electricity could also be used to make more electricity, by supplementing the energy-producing mechanisms that drive concentrated *solar power plants* and pumped hydroelectric facilities. Utilities would also provide incentives to reduce energy use during times of peak demand.

In Jacobson’s plan, hydrogen would also be used as a storage medium; during low-demand hours, excess electricity would be used to create hydrogen, which could be stored in fuel cells and used to power some vehicles. Jacobson’s new model foresees, and is dependent upon, an all-electric country, with virtually everything running 100 percent on electricity: cars, trains, buses, industry, heating and cooling, and with the electricity originating from wind, water and sunlight. There would be no need for coal, *natural gas*, biofuels, nuclear power or enormous battery farms for storing electricity. Such a world, which would be 100 percent clean by 2050, can result in a stable grid, he said.

Jacobson’s previous studies have drawn wide attention, but critics have argued that a national electric grid without power plants powered by coal for background power and natural gas to fill in gaps of supply would not be reliable. The wind doesn’t always blow and the sun doesn’t always shine, and batteries for the grid are not yet affordable enough for storing and managing the nation’s electricity. “The utilities and others who are against renewables have always argued that the lights are going to go out, the grid is going to be unstable, and it will cost too much to keep a clean, *renewable-energy* grid stable and reliable,” Jacobson said. “Skeptics have never studied a system of 100 percent clean, renewable energy for all purposes, and particularly one that combines low-cost storage with demand response and some hydrogen, as in this new paradigm.” Jacobson, who is also a senior fellow at the Stanford Woods Institute for the Environment and the Precourt Institute for Energy, briefed a congressional panel on his research on Nov. 19.

Restructuring the grid

In his new study, Jacobson and his coauthors, including Bethany Frew, now at the National Renewable Energy Laboratory, and graduate student Mary Cameron, suggest that combining existing low-cost ways of storing green energy and using that stored energy to smooth out the uneven demand for electricity, heat and cold simultaneously

over the course of a minute, day, week or year could solve that problem. All raw energy for this system would come from wind, water and sunshine – no natural gas, biofuels, coal or nuclear power. The resulting drop in **air pollution** would save tens of thousands of lives each year, the researchers say. Sixty thousand to 65,000 people die prematurely in America annually as a result of air pollution.

As a demonstration of some of these technologies, Jacobson points to the Drake Landing Solar Community in Canada, near Calgary. The 52 homes there are heated in winter with solar energy captured and stored underground during the summer. Water warmed to 175 degrees Fahrenheit by the sun is kept in insulated tubing buried under 120 feet of rocks, earth and insulation. The stored warmth is enough to heat the homes in the community through winter, Jacobson said. An all-electric nation could reap a number of benefits. While the cost of electricity per kilowatt hour in Jacobson's system might be about the same as electricity generated from fossil fuels, users would actually spend about 30 percent less due to the fact that fewer kilowatt hours are needed in the new system because the efficiencies of electric engines exceed those of combustion engines, Jacobson said.

And underground storage of energy is cheaper than batteries, he added. Some wind turbines now shut down when there is no immediate demand for their electricity, because the cost of storing it is too high. Using excess electricity to produce heat simultaneously with using solar collectors to produce heat increases the availability of stored energy. Widespread use of underground energy storage and the other types of storage he proposes would cost much less than batteries, Jacobson says. Storing electricity in batteries currently costs \$350/kilowatt hour, compared with a cost two orders of magnitude lower for storing heat in soil, he said. Similarly, storage in concentrated solar power, pumped hydroelectric power and existing hydroelectric reservoirs costs one-tenth of storage in batteries.

"You eliminate air pollution and global warming emissions, stabilize fuel costs, create over two million more jobs than are lost in the U.S., you reduce reliance on international trade of fuels, and you reduce the risk of power disruption, such as from terrorism or massive failure, because more energy is distributed over larger areas," Jacobson said. "Most energy would be local. You can eliminate a lot of fuel emissions, just because you won't have to transport oil in tankers across the ocean, you won't have to use trains of coal cars to ship the coal."

This methodology for keeping the grid stable, he said, should work in many places worldwide.

Read more at: <http://phys.org/news/2015-11-solar-energy-underground-cloudy-day.html#jCp>

NUCLEAR WASTE DEEP STORAGE PLANS APPROVED

Finland's government issued a construction license to nuclear disposal consortium **Posiva** last week, Reuters **reported**. The license gives the group approval to build a storage facility on Olkiluoto Island, Finland, designed to last 100,000 years.

The facility would be the first of its kind in the world. Since the beginning of the nuclear power age, energy firms have paid to store nuclear waste in temporary holding ponds unlikely to last more than a couple of centuries. The Posiva facility, decades in the planning, may pioneer a more sustainable era of disposal. (See "**Finland's Nuclear Waste Solution**," *IEEE Spectrum*, December 2009).

Nuclear waste consists of metal rods composed mostly of uranium with a molecular weight of 238. Over time, the depleted uranium atoms release radioactive particles—a process called decay—that converts the uranium into lighter elements. Over billions of years, those atoms decay, too. By the end, all that is left is lead.

In the (long) meantime, however, the radioactive material can contaminate its surroundings, and therefore requires costly management. The United States and other nuclear-powered countries have thus far proven unable to agree on where to store their half-century's worth of accumulated nuclear waste. An earthquake, volcanic activity, or even a slow leak of water could disrupt the temporary facilities in which the waste now sits.

To provide safer and more permanent storage, Posiva proposes to bury electrically-welded iron-and-copper capsules 400 meters underground. The capsules would be surrounded by clay barriers and capped with rubble and cement. The facility, which would have a 6,500 metric ton capacity, could likely hold Finland and Sweden's projected future nuclear waste. But that capacity doesn't come close to the volume required by larger nations such as the United States, which has over **70,000 metric tons of waste piled up, and produces an additional 2,200 tons a year**.

Though tunneling has been going on for over a decade, Posiva had to wait for the Finnish government to approve its 2012 construction permit application before it could begin the trickier task of loading radioactive waste into its metal coffins. That task may begin as soon as 2023, continue for up to a century, and end when operators fill in the access tunnels with rubble and cap them off with cement. Posiva estimates that installation and operating costs for the first century will be around €3 billion (US \$3.21 billion).

INDIA & COAL

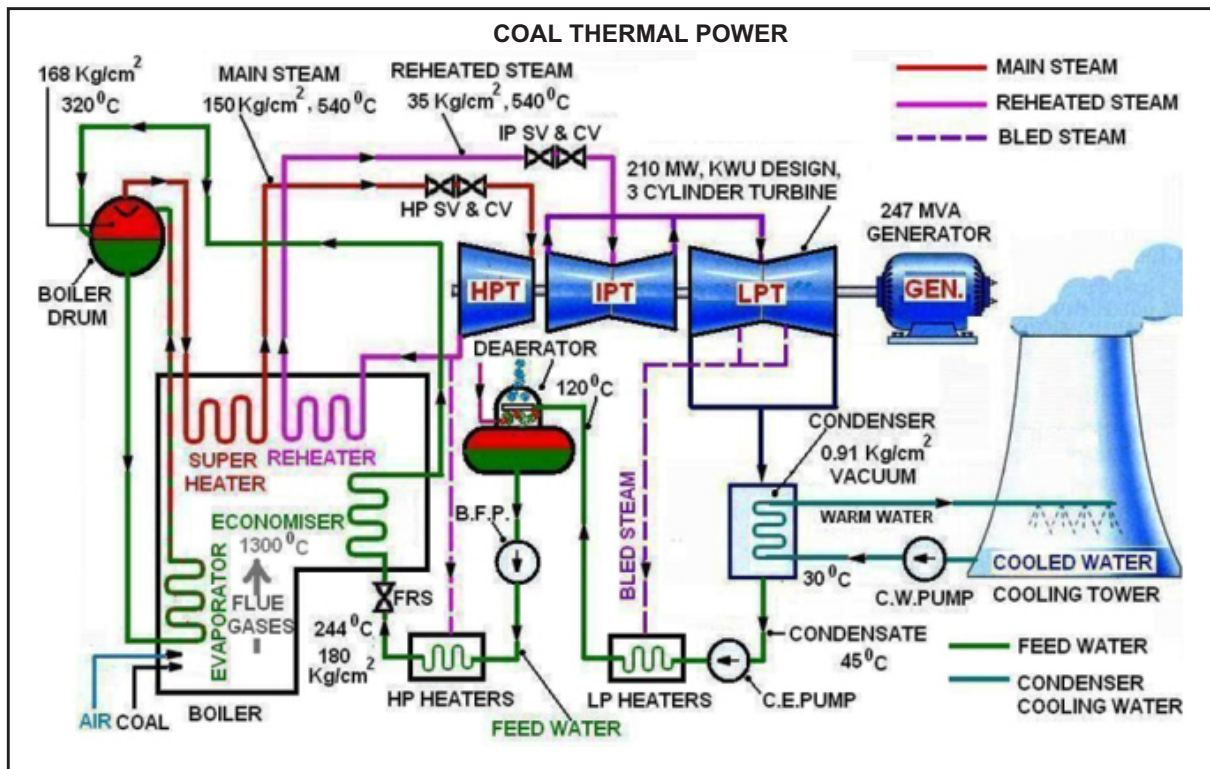
India's coal dependence has led to rising emissions. Now, even the Chief Economic Advisor has acknowledged that India needs to cut down on them. A new global report has revealed that India has become the world's fastest-growing major polluter. Bucking a worldwide trend of slowing carbon emissions, India's emissions grew quicker in 2014 than they had ever done before. This holds serious implications for climate change. The first sign that the Indian establishment has taken note of this emerged on Wednesday with a report in the *Business Standard* stating that Chief Economic Advisor Arvind Subramanian has written to the Prime Minister, recommending that India radically change its strategy on climate change. "He has advised that India stop focusing on adaptation to meet the inevitable threats of climate change on the poor and, instead, do more to reduce its own emissions," the newspaper said.

The projected risks of extreme climate change as a consequence of rising carbon emissions spells nothing less than catastrophe for India: extreme heat waves, changes in rainfall patterns and persistent droughts affecting food security, a rise in sea levels that will impact cities and the large coastal population, a freshwater scarcity owing to melting glaciers, a rise in vector-borne diseases and overall distress migration and conflict. This not a futuristic scenario: some of these impacts are already being felt in the form of unprecedented heat waves that killed hundreds of people in the Deccan earlier this year, extreme weather events like the 2013 Uttarakhand flash floods and increasingly erratic rainfall.

India's increased carbon emissions are the result of its high growth rate. Economic growth is fuelled by energy consumption – and since fossil fuels meet 85% of India's energy needs, this means greater carbon emissions. India's high emissions are unlikely to fall soon. Projections by several international agencies including the World Bank show that the Indian economy is expected to grow faster than any other major economy, including China. However, a high GDP growth rate alone does not explain India's disproportionately high emissions. The Chinese economy, almost five times as big, grew at the same rate (7.4%) as India in 2014, but China's carbon emissions growth was only half of India's. This brings us to the second layer of the problem: coal.

Coal-dependent growth

Coal is India's biggest source of energy, supplying 54.5% of the country's total energy needs. It is at the heart of our government's growth strategy, the primary energy source fuelling that massive, Chinese-style industrialisation drive envisaged by the Make In India initiative. Data from the World Resources Institute show that of 1,200 new coal-based thermal power plants being planned worldwide, the lion's share – 455 plants – are set to come up in India. The cheapest of all fossil fuels, coal also has the highest carbon content, making it the dirtiest energy source in terms of pollution and impact on climate.



There's another layer to the problem. India's coal-based power plants are among the most inefficient in the world. Earlier this year, the first-ever environmental study of coal-based power plants in India, conducted by the Centre for Science and Environment, showed that Indian coal plants fail to meet global benchmarks on nearly every count. While India's high emissions are a consequence of these factors, carbon emissions in other parts of the world have been steadily declining. This is because the economic slowdown in most major economies means that they are using less coal. Besides, the European Union and Japan have made globally-significant emission cuts, while China has made a major push in renewable energy.

More than a trend

It is true that our government is also pursuing a renewable-energy programme, considered to be among the world's most ambitious, apart from a clutch of energy-conservation schemes. However, this does not indicate a turn away from highly polluting fossil fuels, as is evident from the government's massive investment in coal power to meet its ambitious growth targets. The recent crack down against the Greenpeace India, which has consistently opposed coal-mining in forest areas and highly polluting coal powered plants, attests to the determination behind the government's energy policy. Considering that India is still in the early days of the government's aggressive industrial push, Indian emissions will keep rising in the coming years even as emissions by other major polluters continue to decline. In short, India has, almost overnight, emerged as one of the most critical players when it comes to climate change.

The case of the missing pledge

This December, government delegations from almost every country will converge on Paris for the 2015 Conference of Parties of the United Nations Climate Change Conference, which has been described as the most important climate negotiation in history.

Ahead of the meet, each member nation is expected to submit a voluntary emissions pledge or Intended Nationally Determined Contribution, which usually includes a commitment to a future "peak emissions" date. The INDCs signify the extent of each nation's willingness (or lack of it) to tackle climate change, and are largely what will determine the outcome of the negotiations. Among major polluters, India alone is yet to submit its INDC.

India's Minister for Environment and Climate Change Prakash Javadekar has stated that India will submit its pledge ahead of the Paris talks, but added that it will not set a date for peak emissions. Mysteriously, he also added that India's INDCs would be "much more ambitious" than the world expects.

Minister's statement points to the age-old division that has plagued international climate talks over the decades: Developing nations emphasise historical emissions to insist that rich nations should make bigger cuts, while the latter point to future emissions and want developing nations to apply the brakes first. The result is a climate gridlock, which is why most talks have failed. While India and other developing countries accuse rich nations of double standards on climate change, they are right. This may be a genuine grievance, but it almost amounts to a technicality when seen against the enormity of the existential threat that is climate change.

Climate change: a planetary crisis

The impact of carbon emissions, scientists say, is cumulative: every ton of CO₂ added to the atmosphere adds to the rise in global temperatures, which in turn pushes the world that much closer towards irreversible climate change. The scientific consensus today pegs the absolute maximum temperature increase that the planet can afford at 2 degrees Celsius, beyond which there is a risk of dangerous and irreversible warming that could endanger human survival itself. The cumulative impact of CO₂ emissions means that the question of who is responsible for how much emission in the past matters less; what really counts is that every additional ton of CO₂ increases the risk for everyone. In fact, the risks are not the same for every country. Studies have repeatedly shown that for largely tropical countries like India, with its large coastal populations, largely rainfall-dependent agriculture and glacier-dependent fresh water supply, climate change poses a disproportionately graver threat.

Business as usual won't do

Analyses of the data presented by the Intergovernmental Panel on Climate Change's authoritative Fifth Assessment Report show that anywhere from 80%-90% of remaining fossil fuel reserves should

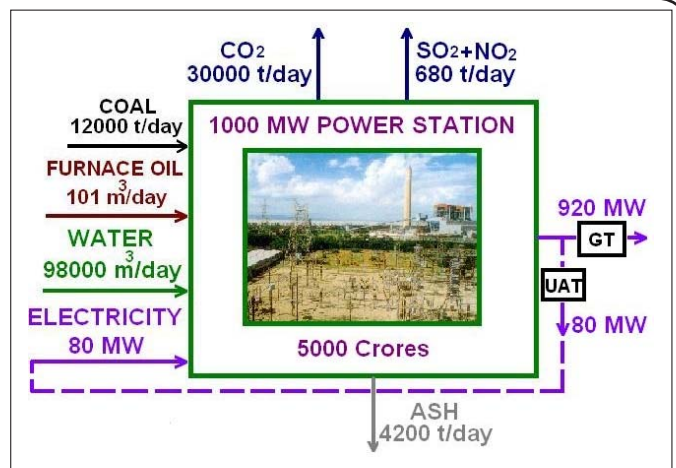


be left in the ground for the world to even have a chance of limiting global warming to below 2 degrees Celsius. Recent research shows that if carbon emissions continue at present rates, the 2 degrees Celsius barrier may be breached as early as 2036.

India simply cannot afford to mimic China's "grow now, pay later" approach. The choice is clear: given its own vulnerability to climate change, India must rethink its growth-obsessed economic model and act immediately to effect a voluntarily transition to clean energy, while simultaneously putting pressure on other big polluters to follow suit. Else, it can continue playing a lethal game of brinkmanship from which everyone loses, most of all India itself.

As the 3rd largest economy in the world with more than a billion people, the supply of power in India can scarcely keep up with demand. Across the country, households and industry suffer from regular power cuts, while more than 400 million lack access to even this unreliable supply. Given the energy scenario, the need to expand power generation capacity and deliver more electricity for India is immediate. To meet the growing electricity demand, the expansion of the coal-fired thermal power plants (TPPs) is the most likely scenario, which consequently also leads to an array of environmental and health impacts.

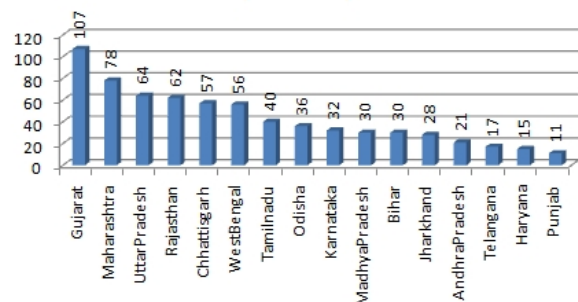
The National Ambient Monitoring Program (NAMP) collects 24-hour averages of particulate matter with diameter less than $10\mu\text{m}$ (PM_{10}), sulphur dioxide (SO_2), and nitrogen dioxide (NO_2), 2-3 times per week, at 400+ manual stations in 150 cities. This network is operated and managed by the Central Pollution Control Board (CPCB, New Delhi, India). Of the three pollutants, one pollutant is routinely shown under compliance – SO_2 . Interventions such as introduction of Bharat-4 diesel (equivalent of Euro-4, with 50 ppm sulfur) for cities and relocation or refurbishing of industries with better efficiency norms have led to this compliance. For most cities, the smaller power plants within 30-50 km of the city limits are also converted to operate on natural gas, which further drops the sulfur emission levels in cities and the ambient SO_2 levels below the national annual ambient standard ($50\mu\text{g}/\text{m}^3$). This does not mean that the sulfur emissions in India are dropping. Since all these monitors are in the cities and often the contribution of the TPPs to the air pollution problems is underestimated. Using the OMI satellite data, Lu et al. (2013) reported that the annual average SO_2 concentrations in coal-fired power plant regions of India increased by more than 60% between 2005 and 2012. The Indo-Gangetic plain, with states of Bihar, West Bengal, Jharkhand, Odisha and Chhattisgarh harbour the largest coal mines in the country and a cluster of TPPs. Several of the large TPPs also exist in the states of Punjab, Haryana, Delhi and Uttar Pradesh, making the north and north-eastern belt the most polluted.



Anticipated health impacts due to ambient $\text{PM}_{2.5}$ pollution from the proposed coal-fired TPPs in India

	Premature Mortality	Asthma attacks
Year 2017-18	112,500 – 126,000	23.4 million
Year 2020-21	132,500 – 153,500	28.4 million
Year 2025	164,000 – 197,500	36.7 million
Year 2030	186,500 – 229,500	42.7 million

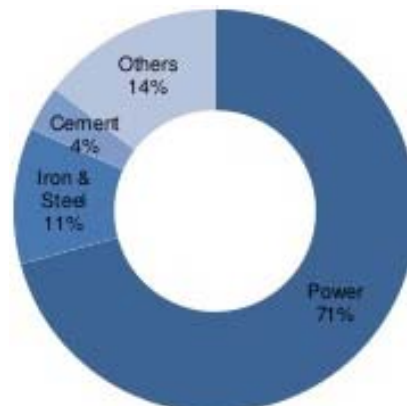
Coal-fired power plants emitting deadly $\text{PM}_{2.5}$ in 2014 (in kilotons)



Coal Consumption in India

Power generation is the largest consumer of coal in India, followed by iron & steel and cement.

Sector-wise Coal Consumption

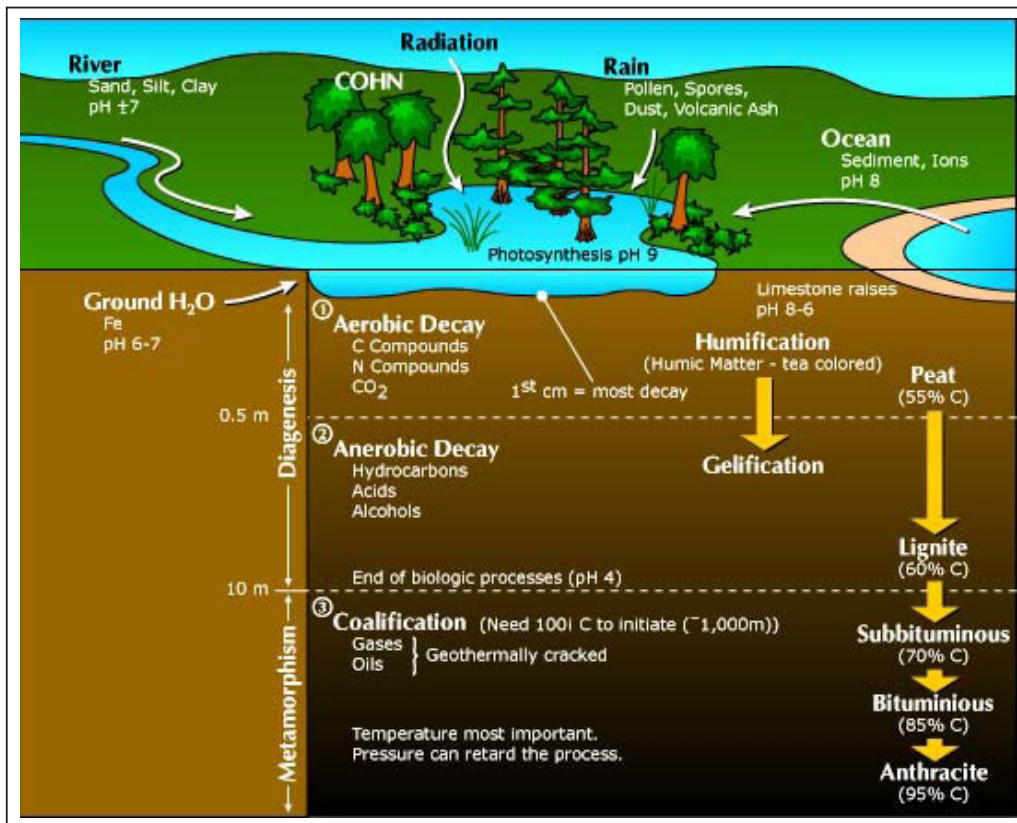




Coal generation capacity grows 300% - The total installed capacity is expected to increase three times from 159 GW in 2014 to 450 GW in 2030; under the proposed list of power plant projects. Largest (three fold) expansions are expected in the states of Andhra Pradesh, Odisha, Chhattisgarh, Bihar and Jharkhand, all of which have coal reserves. A two fold expansion is expected in the states of Karnataka, Madhya Pradesh, Maharashtra, Punjab, Tamilnadu and Uttar Pradesh.

Coal consumption increases 200-300% - The total coal consumption is estimated to increase 2-3 times from 660 million tons/year to 1800 million tons/year; accordingly the CO₂ emissions from 1,590 million tons/year to 4,320 million tons/year.

Air emissions at least double through 2030 - The PM, SO₂, and NO_x emissions will at least double in the same period. Most of the planned plants are supercritical- and ultra- TPPs, which tend to utilise less coal per MWh of electricity generated. With no emission regulations in place for SO₂ and NO_x, these are assumed uncontrolled and allowed to release through the elevated stacks for dispersion.



100% increase in health impacts - The total premature mortality due to the emissions from coal-fired TPPs is expected to grow 2-3 times reaching 186,500 to 229,500 annually in 2030. Asthma cases associated with coal-fired TPP emissions will grow to 42.7 million by 2030

Limited emission standards for power plants - India currently has no standards for either SO₂ or NO_x both of which drive a large portion of the estimated these health impacts – in the form of secondary sulphates and secondary nitrates.

Impacts on Humans - Coal pollutants affect all major body organ systems and contribute to four of the five leading causes of mortality in the U.S.: heart disease, cancer, stroke and chronic lower respiratory diseases.

Respiratory Effects: Air pollutants produced by coal combustion act on the respiratory system, contributing to serious health effects including asthma, lung disease and lung cancer and adversely affect normal lung development in children.

Cardiovascular Effects: Pollutants produced by coal combustion lead to cardiovascular disease, such as arterial occlusion (artery blockages, leading to heart attacks) and infarct formation (tissue death due to oxygen deprivation, leading to permanent heart damage), as well as cardiac arrhythmias and congestive heart failure. Exposure to chronic air pollution over many years increases cardiovascular mortality.

Nervous System Effects: Studies show a correlation between coal-related air pollutants and stroke. Coal pollutants also act on the nervous system to cause loss of intellectual capacity, primarily through mercury. Researchers estimate that between 317,000 and 631,000 children are born in the U.S. each year with blood mercury levels high enough to reduce IQ scores and cause lifelong loss of intelligence.

Impacts of water use in coal power:

Coal plants, like most other steam-producing electricity-generating plants, typically withdraw and consume water from nearby water bodies, such as lakes, rivers or oceans, to create steam for turning their turbines.

A typical coal plant with a once-through cooling system withdraws between 70 and 180 billion gallons of water per year and consumes 0.36 to 1.1 billion gallons of that water. A typical coal plant with a wet-recirculating cooling system withdraws only a fraction as much as a once-through-cooled plant, but consumes 1.7 to 4.0 billion gallons per year, while a typical coal plant with a dry-cooled system consumes much less.

When water is drawn into a coal power plant, millions of fish eggs, fish larvae and juvenile fish may also come along with it. In addition, millions of adult fish may become trapped against the intake structures. Many of these fish are injured or die in the process.

History of Coal

Coal formation

All living plants store solar energy through a process known as photosynthesis. When plants die, this energy is usually released as the plants decay. Under conditions favourable to coal formation, the decaying process is interrupted, preventing the release of the stored solar energy. The energy is locked into the coal.

Coal formation began during the Carboniferous Period - known as the first coal age - which spanned 360 million to 290 million years ago. The build-up of silt and other sediments, together with movements in the earth's crust - known as tectonic movements - buried swamps and peat bogs, often to great depths. With burial, the plant material was subjected to high temperatures and pressures. This caused physical and chemical changes in the vegetation, transforming it into peat and then into coal.

Coalification

The degree of change undergone by a coal as it matures from peat to anthracite is known as coalification. Coalification has an important bearing on coal's physical and chemical properties and is referred to as the 'rank' of the coal. Ranking is determined by the degree of transformation of the original plant material to carbon. The ranks of coals, from those with the least carbon to those with the most carbon, are lignite, sub-bituminous, bituminous and anthracite.

The quality of each coal deposit is determined by:

Types of vegetation from which the coal originated

Depths of burial

Temperatures and pressures at those depths

Length of time the coal has been forming in the deposit

- Coal was formed about 300 million years ago.
- Coal mining uses two methods: surface or underground mining where surface mining is more dominant method because it is less expensive than the underground mining.
- Coal is mainly used for generating electricity (more than 90% of US coal).
- World coal consumption is more than 5.3 billion tons annually of which three quarters are used for generating electricity.
- Coal was already used in the Bronze age (Britain).
- Coal's share in the total world electricity production is about 40%.
- Coal can be converted like to gasoline or diesel by couple of different processes like for instance the Fischer-Tropsch process, Bergius process and Karrick process.
- Coal total reserves are approximately about 998 billion tons.
- Coal is mined in more than 100 countries.
- Coal has been used as an energy source for hundreds of years and was part of international trade in as long ago as the Roman Empire.
- 37% of the electricity generated worldwide is produced from coal.
- The world's iron and steel industry depends on the use of coal.
- Coal reserves are spread over almost 100 countries. Proven coal reserves are estimated to last over 200 years with current production rates. In contrast, proven oil and gas reserves are equivalent to around 40 and 60 years.
- Coal ash is used as filler for tennis rackets, golf balls and linoleum.
- Coal provides over 23% of global primary energy needs. It generates around 39% of the world's electricity. Almost 70% of total global steel production is dependent on coal.

Many large countries contain significant proven reserves of coal.

While data quality varies widely, the countries with the greatest estimated recoverable reserves of coal are —

United States 273 billion tons

Russia 173 billion tons

China 126 billion tons

India 93 billion tons

Australia 90 billion tons

TORONTO HYDRO PILOTS WORLD'S FIRST OFFSHORE COMPRESSED-AIR ENERGY STORAGE PROJECT

Canadian startup Hydrostor says it can slash the cost of compressed air storage.

A set of pipes running nearly two miles out into Lake Ontario are part of a novel project to help Toronto Hydro extend the life of its distribution equipment.

The two-year pilot is not another tidal energy project — it's the first test of an underwater compressed-air energy storage system by Ontario-based startup *Hydrostor*. The company uses off-the-shelf technology to pump air into underwater balloons. When energy is needed, the air can be released from balloons and expanded to create electricity.

The pilot project will help Toronto Hydro defer distribution investment by providing peak electricity. But the near-term market opportunity for Hydrostor is in displacing backup and peak generation sources like diesel or coal. Depending on the success of the Toronto pilot in the next few months, Aruba also has a pending contract for Hydrostor's technology.

"We are able to work more like a developer," said Curtis VanWalleghem, CEO and co-founder of Hydrostor. "We can make a brisk business doing a few projects a year."

By not manufacturing anything, VanWalleghem said Hydrostor's costs are far lower than other compressed-air energy storage startups, such as *LightSail*.

The company uses drilling techniques that reduce the demand for boats and cranes at the surface to deploy the pipes and balloons. VanWalleghem said the installation of the underwater balloons, which are slight modifications of the ones used for marine salvage, requires only one tugboat. Although Hydrostor has streamlined the installation and reduced costs, it requires some serious permitting. The pilot in Toronto, for example, required 17 permits.

Back on land, electricity runs a compressor to produce the compressed air. During that process, waste heat is captured and could be used to increase the round-trip efficiency from about 60 percent to as high as 80 percent.

The compressed air is pressurized to match the pressure at the ocean floor where the balloons are located. The air is then pumped down to fill those balloons. When electricity is needed, the system goes into reverse mode and the weight of the water pushes the air back to land, where it is converted back into energy.

The balloons will come with at least a 10-year warranty, and that could be expanded to up to 20 years after the pilot.

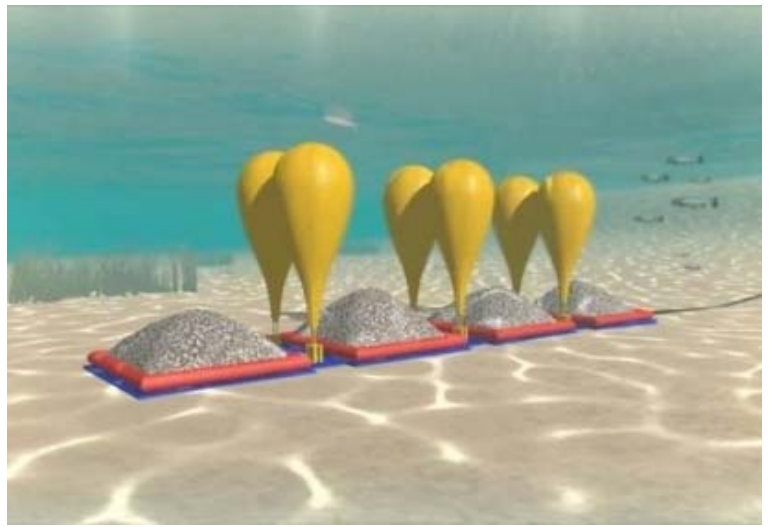
If Hydrostor can prove itself, it sees opportunities not only on islands, but also in fast-growing coastal cities, especially in Asia. The pilot will also assuage potential clients and investors asking about marine environment impact and potential threats to boaters. VanWalleghem said the technology is not a threat to marine animals or boating traffic, and has a track record from years of use by maritime and oil and gas industries.

The Toronto pilot is a 1-megawatt project, but Hydrostor will offer larger storage, including a 5-, 10-, 50- and 100-megawatt option if fully commercialized. At 10 megawatts, the cost would be about \$250 per kilowatt-hour, said VanWalleghem. That would make it far cheaper than the full cost of compressed-air energy storage on land.

The cost is dependent on how deep the water is close to shore. In Toronto, the balloons sit about 180 feet deep and about 1.8 miles offshore. The price of the base design is based on a depth of about 650 feet at 1.8 miles offshore.

Because the energy storage solution is dependent on specific water depths, Hydrostor is currently mapping offshore water depths, local power prices and transmission constraints to identify ideal markets. "We have a list of target islands," he said.

The company has raised about \$5 million to date through a seed round and a Series A round funded by ArcTern Ventures. The Canadian startup is also in talks with global engineering, procurement and construction firms with the goal of a strategic partnership.

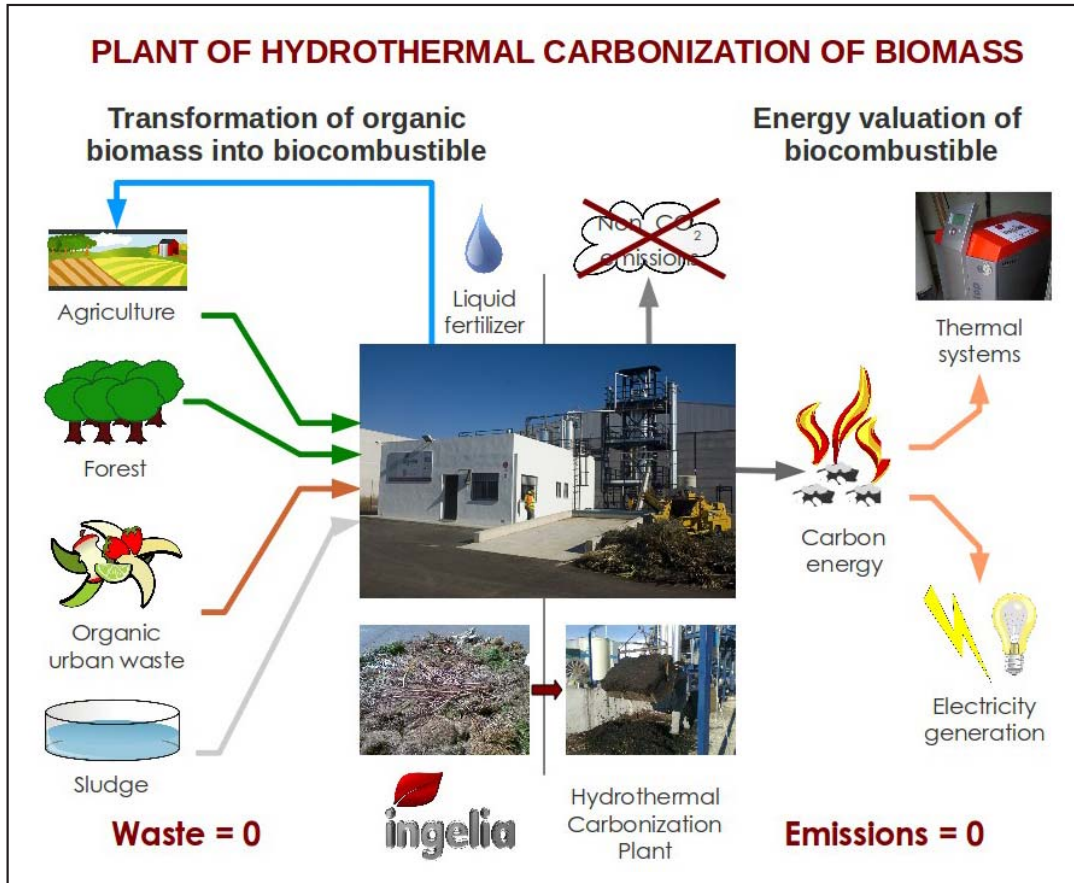


SOME THERMO CHEMICAL PROCESSES OF BIO ENERGY FOR ENERGY AND ALTERNATE FUEL SOLUTIONS

“Science is Universal; Technology should be localized for GROWTH”

Prime Minister 5/11/15

The News and the technology materials that appeared in the November '15 Issue, is of great relevance with respect to the future of “Renewable Energy” in our country with its huge potential in the area of Bio Energy.



Conversion of Biomass to Carbon and use it for generation of different forms of Secondary Energy is one of the important developments at the present times which can be very useful for our country’s Renewable Energy and Decentralized Distributed Energy Programs.

Some details about various technologies developed and employed for conversion of Biomass to Carbon are presented for information and further work.

Bio Energy:

Bio Energy, which is largely ‘Waste to Energy’, has tremendous scope and potential in our country and the exploitation level is very low so far, mostly because of lack of appropriate, tested and “Localized Technologies”. There are a number of areas of Bio Energy in which lot of R & D and Proto Typing work seem to have been carried out in our Country as well as in many other Countries of the World. This brief write up presents about some of the important areas and Technologies which have lot of relevance to the potentials available in our Country. Some immediate initiative in some or all the areas can go a long way to help our Country achieve premier position in Renewable Energy. There is lot of focus in India at present for Solar and Wind Energies with increasing exploitation year after year and Bio Energy can also contribute substantially with the availability of “Localized Technologies”.

a) BIOMASS to CARBON Technologies:

Other than ‘Woody’ and dry Biomass, which is mostly used in the Biomass Power Plants in the country at present, there is lot of generation of Biomass in the form of residues or wastes from Agriculture, Plantations, Cattles and Poultry, Agro and other Industrial wastes etc. Conversion of Biomass to ‘Carbon’ can make it a

convenient fuel for Combustion or Gasification Processes for generation of Heat and Electricity. It can also make it usable as an alternate Fuel for Automobiles.

- 1) **“TORREFACTION”** - This is a Process to convert solid Biomass to “BIOCOAL” making it very similar in properties to Coal. A sample analysis of comparison is given below

	Woodchips	Wood pellets	Torrefied wood	Coal
Moisture content (%)	30 – 55	7 – 10	<1	10 – 15
Calorific value (LHV: MJ/kg)	7 – 12	15 – 17	20 – 24*	23 – 28
Volumetric energy density (Mj/m ³)	1,400 – 3,600	8,250 – 11,050	13,000 – 19,200	18,400 – 20,400
Hygroscopic properties	Hygrophilic	Hygrophilic	Inert to water	Inert to water
Biological degradation	Fast	Medium	None	None
Grinding requirements	Special	Special	Standard	Standard
Product consistency	Limited	High	High	High
Transport costs	High	Medium	Low	Low

The Power Plants of both ‘Combustion’ and Gasification, using Woody Biomass frequently have problems of ‘Tar’ which affects the Efficient and sustained operations. Bio Coal can help eliminate this problem completely.

- 2) **HTC – Hydro Thermal Carbonization** – This is an Aqueous Carbonization process to produce Homogeneous Bio Coal from all kinds of Wet Biomass or Wet Biogenic residues based on Cellulose, Hemi cellulose, or Protein with Energy like Straw, Corn Stalks, Spent Tea Leaves, Coconut, Palm and Areca nut peels, fronds and other wastes, Fruit peels, Sewage sludge, Agricultural and Industrial process sludge

The Process - 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, carbonization 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 carbonization (HTC) has received increased attention. HTC can make a valuable contribution to resource conservation and sustainable energy. This can be looked at as an alternative to Bio Methanation with much higher overall Efficiency in terms of ‘Energy’ extraction.

- 3) **Biomass Carbonization** – This is yet another process of converting Biomass to Carbon, somewhat similar to Torre faction, but focusing more on Biomass which are in Lumps and Granular form with medium and low moisture contents. One typical example is Poultry litter which is generated in Millions of Tons due to large and ever increasing production of Eggs and Chicken.

The Process with example Poultry Litter - The poultry litter is burned in a controlled environment. The litter is carbonized and the flue gas, free of minerals and the ash residue is captured along with the mineral components. Residue ash is converted to a concentrated fertilizer, high in phosphorous, potassium, calcium, magnesium and other valuable micronutrients.

- 4) **Carbon as an alternative Fuel for Automobiles** (This is more a revival of a ‘Viable Technology’ that was in use was use in India as well as many countries of the World almost 65 years ago. This can certainly be refined and improved with the help of latest technological developments).

Charcoal or Bio Coal or Carbon can be a fuel for running Automobiles through Production of ‘Tar Free’ Producer Gas and the Engines running on the Producer Gas. Buses, as well as Smaller Automobiles, for Medium and short distances could be run with this Technology and Fuel. This Technology and Application is not new and was very much in use all over Tamilnadu (could have been in many parts of India also) during the mid 1950s, when there was shortage of Diesel all over, caused by lack of imports of crude and insufficient local production. These Gasifier Buses were based on a Technology developed during the II World War. They were later given up when the situation of supply of diesel eased.

With the thrust on Renewable Energy, Green Fuel etc, it is time that the Gasifier Vehicles are revived. It sounds more apt and relevant as the latest technologies of Bio Energy address conversion of Biomass to Bio Coal, Bio Carbon and Bio Oil.

“...An average of seventy-four species become extinct every day, which was one good reason but not the only one to hold someone’s hand...” – NICOLE KRAUSS, The History of Love

CAN WE PRODUCE ENERGY FROM FOSSIL FUELS WITHOUT CARBON DIOXIDE?

Researchers in Germany believe they can extract hydrogen from fossil fuels without producing harmful greenhouse gases. While this would certainly be an improvement, the production of fossil fuels poses considerably more problems for the environment than just the production of carbon dioxide when burning it. So while this research is very interesting, it does not address the environmental issues associated with the extraction of natural gas from the ground.



In a joint project initiated by Nobel Laureate and former IASS Scientific Director Professor Carlo Rubbia, the Institute for Advanced Sustainability Studies (IASS) in Potsdam and the Karlsruhe Institute of Technology have been researching an innovative technique to extract hydrogen from methane in a clean and efficient way. After two years of intensive experiments the proof-of-principle has now been provided. With the experimental reactor running reliably and continuously, the future potential of this technology has become apparent.

The combustion of fossil fuels to produce electricity, power car engines or generate heat is a major source of harmful carbon dioxide emissions. In particular methane — the main component of natural gas — is a widely used fossil fuel whose worldwide production is forecasted to rise dramatically in the coming decades. Left unchecked, this continued reliance on conventional fossil fuel technologies will greatly hamper our efforts at mitigating climate change. This is why researchers at the IASS and KIT have decided to investigate an alternative and more sustainable approach: what if we could extract the energy content of methane, in the form of hydrogen, without generating any carbon dioxide in the process.

Instead of burning methane (CH_4), its molecular components, hydrogen (H_2) and carbon (C), can be separated in a process called ‘methane cracking’. This reaction occurs at high temperatures (750°C and above) and does not release any harmful emissions.

The first product, hydrogen, is an energy vector best known for its clean combustion and high energy density per unit mass. In fact, many view it as an important component of a future, sustainable energy system. Envisaged applications include fuel cells, electricity generation and hydrogen-powered vehicles. But hydrogen is already today an important industrial commodity, used in large quantities for the production of ammonia — a key precursor for the fertiliser industry. Yet most of the world’s hydrogen production is currently based on conventional technologies like steam methane forming (SMR), which also uses natural gas as feedstock but releases significant amounts of carbon dioxide in the process. Indeed, carbon dioxide emissions from the ammonia industry alone amount to approximately 200 million tons per year — by comparison, Germany generates around 800 million tons of carbon dioxide per year.

While hydrogen is the main output of methane cracking, its by-product, solid black carbon, is also an increasingly important industrial commodity. It is already widely employed in the production of steel, carbon fibres and many carbon-based structural materials. The black carbon derived from the novel cracking process is of high quality and particularly pure powder. Its value as a marketable product therefore enhances the economic viability of methane cracking. Alternatively, black carbon can be stored away, using procedures that are much simpler, safer and cheaper than the storing of carbon dioxide.

Methane cracking itself is not an entirely new idea: in the last two decades, many experiments in different institutions have been carried out that have proven its technical feasibility. But these past attempts were limited by issues such as carbon clogging and low conversion rates.

The IASS and KIT have decided to build on this knowledge base and go one step further, setting up an experimental reactor that could demonstrate the potential of methane cracking and overcome previous obstacles. The starting point is a novel reactor design, as proposed by Carlo Rubbia and based on liquid metal technology. Fine methane bubbles are injected at the bottom of a column filled with molten tin. The cracking reaction happens when these bubbles rise to the surface of the liquid metal. Carbon separates on the surface of the bubbles and is deposited as a powder at the top end of the reactor when they disintegrate. This idea was put to the test during a series of experimental campaigns that ran from late 2012 to the spring of 2015 in KIT’s KALLA (KARlsruhe Liquid Metal LAboratory). Researchers were able to evaluate different parameters and options, such as temperature,

construction materials and residence time. The final design is a 1.2-metre-high device made of a combination of quartz and stainless steel, which uses both pure tin and a packed bed structure consisting of pieces of quartz.

“In the most recent experiments in April 2015, our reactor operated without interruptions for two weeks, producing hydrogen with a 78% conversion rate at temperatures of 1200°C. In particular the continuous operation is a decisive component of the kind of reliability that would be needed for an industrial-scale reactor” said Professor Thomas Wetzel, head of the KALLA laboratory at KIT. The innovative reactor is resistant to corrosion, and clogging is avoided because the microgranular carbon powder produced can be easily separated. The reactor thus guarantees the technical preconditions that would be needed for the continuous operation of an industrial-scale reactor.

While these remain laboratory-scale experiments, researchers can extrapolate from them to gain insights into how methane cracking could be integrated into the energy system and, more specifically, what its contribution to sustainability could be. To this end, the IASS is collaborating with RWTH Aachen University to conduct a life cycle assessment (LCA) of a hypothetical commercial methane cracking device based on a scaling-up of our prototype. Notably, we assume that some of the produced hydrogen is used to generate the required process heat. The compared hydrogen production technologies were steam methane reforming (SMR) and water electrolysis coupled with renewable electricity. With respect to emissions of carbon dioxide equivalent per unit of hydrogen, the LCA showed that methane cracking is comparable to water electrolysis and more than 50% cleaner than SMR.

Furthermore, IASS researchers have also analysed the economic aspects of methane cracking. At this stage, cost estimates are uncertain, since methane cracking is not yet a fully mature technology. However, preliminary calculations show that it could achieve costs of 1.9 to 3.3 euro per kilogram of hydrogen at German natural gas prices, and without taking the market value of carbon into consideration.

“Our experimental results as well as the environmental and economic assessments all point to methane cracking as a clear candidate option in our portfolio of measures to transform the energy system,” said Professor Carlo Rubbia. “This could be a gap-bridging technology, making it possible to tap into the energy potential of natural gas while safeguarding the climate and facilitating the integration of a clean energy carrier like hydrogen.”

In the next phase of the process, the IASS and KIT will focus on optimising some aspects of the reactor design, such as the carbon removal process, and progressively scaling it up to accommodate higher flow rates.

AP PLANS TO REPLACE OLD TUBE LIGHTS WITH LED LIGHTS

Inspired with the national recognition by getting all the five prestigious National Energy Conservation Awards 2015 and achieving excellent results in energy savings through ongoing energy conservation programs, the Andhra Pradesh government today decided to take up one more gigantic program of replacing existing old conventional tube lights with LED street lights in rural areas which will brighten the villages with less energy cost.

Accordingly, Chief Minister N. Chandrababu Naidu, who instructed the State Energy Conservation Mission, Energy and Panchayat Raj departments to devise a perfect mechanism for implementation of the same, has emphasized the need to focus on this



Herculean task to be taken up in some 12,900 Gram Panchayats in a phased manner in the State which will be expected to save about 200 MU per annum apart from reducing the burden of power bills on Gram Panchayats. The AP Chief Minister has also advocated the usage of LED bulbs and usage of star rated electrical appliances, which would directly help the consumers in the form of reduced electricity bills and paves way for environmental protection and reduction of the Green House Gas emissions for the benefit of future generations.

ENERGY CONSERVATION THROUGH ENERGY EFFICIENCY – 9

We have analyzed in an earlier Part (7) of this series about the importance of Power Factor for basically controlling the I^2R losses – higher Power Factor results in reduced “I” and thus the reduction of I^2R losses.

The Article below compiled from one of the technical presentations, dealing with Power Factor Case Studies will help illustrate the potential of Energy Conservation through reduction of losses.

Power Factor – MVAR (Reactive Power) case studies

Legally power factor is to be maintained at 0.8 to 0.9 lag, vary from state to state. But TECHNICALLY , MORALLY and CONSCIOUSLY (Refer “Guiding Souls” written by Dr. A.P.J. Abdul Kalam , former President of India.),the power factor has to be maintained at 0.995 lag to unity, for the fast development of our nation, like China.

Power factor is defined by the ratio of KWH to KVAH generally vary from 0.8 lag to unity. It is also known as load current generally lagging behind to voltage supplied, in degrees (Cos.0 for unity power factor and cos 60 for 0.5 and so on).

To improve the lagging power factor, for quality of Electric supply and less electric bill, adequate capacitors are to be connected to the load.

For 1MW connected load, of 11KV system for unity power factor, it takes 52.5Amps. If the Power factor is at 0.8 lag for the same 1MW Load at 11KV system, it takes 65.5 Amps, if adequate capacitors are not connected to the load. Thus 13.21Amps raise and this causes more high I^2R losses in the system. All industries and consumers having 500KW and above should have a daily check on power factor maintenance and thus for a better electrical Grid system, and at large for Nation development.

States like Maharashtra, Tamil Nadu , etc have been providing incentives for their electrical consumers for better power factor. **Union Ministry of Power, Planning commission GOI have to examine seriously to extend this benefit for the other top 10 States drawing 20000MU/yearly.** These ten states along with Maharashtra and Tamil Nadu have been consuming 84% of our Country usage with 85% consumers and 90% distribution transformers etc.

Western Railways, Mumbai received Rs 7.24 Crore incentive on Rs.107 Crore electricity bill for 2007-2008 by maintaining excellent power factor ranging from 0.99lag to unity. Singarani Collieries Company Ltd increased coal production from 30 million tons to 38MT from 1999-2000 to 2006-07. Energy consumption declined from 23 units / ton of coal to 16.8 units / ton of coal. The electrical bill paid to APTRANCO was Rs.247 Crores in 1999-2000 reduced by Rs.59.25 cr. Monthly residential consumption for SCCL has come down from 500 units to 182 units. IIT Bombay has been maintaining 0.98 power factor. These are some examples in the Govt. Sector as role models for others to follow. IIT Kanpur has a daily check on power factor for their institutions.

In private sector also most of them follow for better Power factor. Batra Hospital, Tuglakhabad, New Delhi; In orbit Malls Malad (west), Mumbai; ITC Maurya, New Delhi are some examples taking advantage on maintaining good power factor.

The other side of the coin as follows.

President Secretariat, Rastrapathi Bhavan (96 Lakhs Units annual Consumption), PMO & South Block (65 lakhs annual consumption) have programmed automatic power factor regulator system by 31/03/2009 by CPWD. Yojana Bhavan, Planning commission GOI (25 Lakhs Annual Consumption) has yet to be provided with capacitor bank. Shram sakthi Bhavan (23 Lakhs Consumption) has 200 KVAR, 10 year old capacitor bank presently not in operation and programmed to erect 250 KVAR Capacitor Bank shortly.

APTRANSCO Paid surcharge for their main building VIDYUT SOUDHA Rs.38 Lakhs for 47 months and latter erected to 240KVAR. BITS Pilani used to pay 4-5 Lakhs for 5-6 months in the last three years and programmed to erect capacitor bank by 31/03/2009. NIT Warangal erected and commissioned Capacitor banks after paying Rs.60000 surcharge for 9/2008. For 2007-2008, 15 numbers of state/central Govt. Buildings in Hyderabad/ Secundrabad had paid more than Rs 1 lakh surcharge for poor power factor. This may also be the case in other parts of our country which required immediate attention by the concerned officials.

MVAR (Reactive power)

As per CEA Website (WWW.CEA.NIC.IN , Grid Operation – Grid Management – Capacitors installed State wise) 6600MVAR is short fault in northern zone. Presently it has 22000 MVAR as per CEA web site. All the state governments under Northern Zone have to erect capacitors banks for this short fall MVAR so that another 6600 MW can be taken without much investment of Rs.800 Cr on capacitor bank, avoiding Rs33000 Cr for actual

generation for 6600 MW. Union Ministry of Power, Planning Commission, GOI and respective state Governments of Northern zone have to take initiative for improvement of short fall of MVar component.

According to Mr. L.P. Srivastava Addl. Director General, CPWD – New Delhi, and energy audit was carried out for Udyog Bhavan in Delhi. The consumption was 47.12 lks units in 2007 has come down to 44.36 lks units that is 19% less. The Building was also provided power factor controllers for its reactive power requirements and thus the same Rs. 8 lakhs per annum. CPWD has to arrange this type of power factor controllers for it reactive power for the remaining 700 building at the earliest for the benefit of the nation.

AIIMS, New Delhi having a connected load of 7566 kw paid Rs 221.55 lakhs for July 2008 for electricity bill maintaining power factor at 0.8 to 0.9 is not a healthy sign. The power factor is to be improved to 0.995 to unity like Westren Railways, Mumbai which got Rs 7.24 cr incentive on Rs 107 cr electric bill for 2007-08. By investing Rs10-20 lakhs for additional capacitors p.f can be improved to 0.995 and electricity bill will come down by 15%, a saving of Rs 2 cr on Rs 25 cr yearly payment. The Project on Energy Efficient improvement is to be speeded up for early fruitful results.

(To be continued)



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ELEVATOR USES SOLAR AND STORAGE FOR NET-ZERO OPERATION

The cover of our last issue (SOLAR TODAY, March/April 2014) featured the Bullitt Center, a net-zero five-story office building in Seattle. Bullitt Foundation President Denis Hayes noted that the building has no elevator to draw electric power. If they were building it today, Bullitt might go for a solar-powered, net-zero elevator.

The Swiss elevator manufacturer Schindler, with U.S. operations based in Morristown, N.J., now sells a net-zero solar elevator, using a solar array and battery bank to take the lift entirely out of the building's energy equation. According to Product Manager Mario Heggli, Schindler's model 3300 runs on a 220-volt, 6.2-kilowatt single-phase gearless electric motor, claimed to be up to 60 percent more efficient than a hydraulic drive — and it's capable of regenerative braking. The compact motor eliminates the need for a mechanical bay above or below the elevator shaft.



A key feature is the bank of AGM batteries with about 7 kilowatt-hours capacity. The cab can hoist nine people (up to about 980 kilograms, or 2,156 pounds) on a 30-meter hoist. Over 24 hours, any passenger elevator carries as much weight down as up, so the only long-term energy loads are lighting, controls, mechanical friction and electrical efficiency losses. The regeneration charge stored going down provides most of the energy for the next trip up. The difference is made up by the photovoltaic (PV) array, and the system is capable of up to 12 hours of sunless operation.

In "solar-dedicated mode" — Schindler's term for a stand-alone off-grid elevator — the batteries are recharged with a PV array with a peak capacity of about 2.2 kilowatts. The elevator can also be tied into a larger, grid-connected solar array powering the whole building.

The first Schindler 3300 solar elevator went into service a year ago, in a five-story building in Barcelona. Schindler won't disclose the brands of solar equipment used.

Courtesy: SOLAR TODAY



SHIV NADAR
Founder, HCL Group

For Shiv Nadar, Who As A Professional Moved From DCM To His Own HCL Enterprise And Started From A Barsati, Life Revolves Around Philanthropy

Acknowledged as a visionary in the field of IT sector, Shiv Nadar, Chairman and Chief Strategy Officer of HCL Technologies founded HCL in 1976 with an initial investment of Rs 187,000. Born in 1946 in Tamil Nadu, he completed his graduation in Electrical and Electronics Engineering from PSG College of Technology, Coimbatore.

Nadar transformed HCL, at a time when India had a total of 250 computers, into one of the top most firms creating computers and office equipment. He also transformed the IT hardware company into an IT Enterprise over the next three decades by constantly reinventing his company's focus.

In 2009, Forbes Magazine featured Nadar in its list of **'48 Heroes of Philanthropy'** in the Asia Pacific region with personal wealth of USD 5.6 billion. In 2005 he received the **'CNBC Business Excellence'** award from the Prime Minister of India. He was conferred the Padma Bhushan for his contribution to Trade & Industry and for his deep commitment to public life. A hardcore philanthropist, Nadar continues to support many critical social causes through the **Shiv Nadar Foundation that focuses on elevating the educational system of India.** It has established the not-for-profit SSN College of Engineering in Chennai, which is today among the top ten private engineering colleges in India. Recently, it has opened Shiv Nadar University in Greater Noida and is also building **"Vidya Gyan"** public schools in Uttar Pradesh for rural students.

Nadar whose HCL makes about Rs 35,000 crore annually, plans to pump in the Rs 2,500 crore over the next five years in the education sector, ramping up the engineering college, four schools and private university that he has already launched. **On India Today's, 50 Power List 2013, High and Mighty, Nadar has been ranked No. 15.**

20 MOST PEACEFUL COUNTRIES IN THE WORLD - 13

NEW ZEALAND



Each year since 2007, the Institute for Economics and Peace has ranked **New Zealand** as one of the most peaceful countries in the world. With a

small percentage of its population in prison, limited military capability, strong relations with Australia and down-to-earth hospitality, New Zealand is a wonderful country to live in. This is a country of natural beauty, diverse scenery and quirky natives. Visitors from all over the world come to New Zealand to experience rugged landscape, breathtaking alpine glaciers, awesome beaches and fantastic geothermal and volcanic activity. The country is also renowned for its fine wines and there are a great number of grape varieties planted throughout New Zealand. So if you are a great wine lover, you should definitely visit New Zealand at least once in life.

(To be continued)
Courtesy: Amerikanki



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மழை நோய்களுக்கு செலவில்லா மருத்துவம்



தமிழகத்தின் பல பகுதிகளும், குறிப்பாகச் சென்னையிலும் மழை, வெள்ளம் மோசமாகப் பாதிக்கப்பட்டுள்ள காலம் இது. மழைக்காலத்தில் அதிகமாகத் தேங்கியுள்ள மழைநீர் கழிவுநீராலும், குடிதண்ணீர் மாசுபட்டிருந்தாலும் பாக்கிரியா, வைரஸ் போன்ற தொற்றுக்கிருமிகள் பெருகுவது வழக்கம். இப்படிப் பரவலாகும் நோய்களை எளிய சித்த மருந்துகள் மூலம் சுலபமாகக் குணப்படுத்த முடியும்.

சீரகத் தண்ணீர்

மழைக் காலத்தில் வைரஸ், பாக்கிரியா போன்ற கிருமிகள் தண்ணீரில் கலந்திருக்க அதிக வாய்ப்பு உண்டு. இதனால் மஞ்சள் காமாலை, வாந்திபேதி, டைபாய்டு போன்ற நோய்கள் பரவலாம். சாதாரணமாகவே தண்ணீரைக் கொதிக்க வைத்து, வடிகட்டிதான் பயன்படுத்த வேண்டும். அப்படிச் செய்யும்போது உலோக உப்புக்கள் ஆவியாகி விடுவதால், இந்தத் தண்ணீர் சுவையற்று இருக்கும். இதற்கு நல்ல மாற்றாக சீரகத் தண்ணீர் அமையும். சித்த மருத்துவத் திலும், தமிழக மக்களிடம் பன்னெடுங்காலமாகவும் பழக்கத்தில் உள்ள தண்ணீர் இது.

ஒரு லிட்டர் தண்ணீருக்கு 10 சீரகம் போதும். எண்ணி போட முடியாவிட்டாலும் தேக்கரண்டியில் சிறிதளவு எடுத்துப்போட்டு, அரை மணி நேரம் அல்லது 100 டிகிரி செல்சியஸ் வெப்பநிலையில் தளதளவென்று வரும்வரை கொதிக்கவிட வேண்டும். பிறகு வடிகட்டிப் பயன்படுத்தலாம். இதனால் தண்ணீரில் உள்ள கிருமிகள் நீக்கப்படுகின்றன. இதற்குச் சீரகத்தில் உள்ள கியூமினால்டிசைடு என்ற வேதிப்பொருளே காரணம். அது மட்டுமில்லாமல் சீரகத்தில் உள்ள வேதிப்பொருட்கள் கலந்து தண்ணீரின் சுவையைக் கூட்டுகின்றன. இந்தக் தண்ணீர் செரிமானத் திறனை அதிகரிக்கும். இது ஒரு நல்ல ஆன்ட்டி ஆக்சிடண்ட்டும் கூட. பெயருக்கேற்ப சீரகம், உடலை (அகத்தை) சீராக வைக்கும்.

கட்டிடச் சீரழிவு நோய்

அதிக மழையால் வீட்டின் உட்புறச் சுவர்வரை நனைந்திருக்கும் நிலைமையுடன், வீட்டுக்குள் நீர் புகுந்ததாலும் பூஞ்சைகள் வளர்வதைக் காணலாம். இதற்குக் காரணம் Gloeocapsa Magma என்ற பாக்கிரியா. இதனால் வீட்டின் உட்புறக் காற்று மாசுபடுவதால் கட்டிடச் சீரழிவு நோய் உருவாகி (Sick building syndrome) மூக்கு, கண், தொண்டை பகுதியில் எரிச்சல், தலைவலி, உடல்வலி, ஆஸ்துமா போன்றவை ஏற்படலாம். உலகச்

சுகாதார நிறுவனம் கட்டிடச் சீரழிவை நோய் என்று வரையறுத்துள்ளது. இந்த நோயை எதிர்கொள்வதற்கான வழிகள்:

1. வீட்டுக்குள் சுத்தமான காற்று சென்று வர, மழை நின்றிருக்கும்போது கதவு, ஜன்னல்களைத் திறந்து வைப்பது.
2. ஃபார்மால்டிஹைடு, ஸைலீன், நைட்ரஜன் ஆக்சைடு போன்றவற்றால் ஏற்பட்ட நச்சுக் காற்றை நீக்க மருள் (Sansevieria) எனும் தாவரத்தை வீட்டுக்குள் தொட்டியில் வளர்க்கலாம். 'இருள் நீக்கும்' என்று சித்தர்களால் பெருமைப்படுத்தப்பட்ட இந்தத் தாவரம் பற்றி, அமெரிக்க விண்வெளி நிறுவனமான நாசாவும் சுட்டிக்காட்டியுள்ளது.
3. வீட்டுக்குள்ளும், மொட்டை மாடிகள், சுவர்களில் கருப்பு நிறம் படிந்திருப்பதற்கு gloeocapsa magma என்ற பாக்கிரியாவே காரணம். இதை குளோரின் தூள் அல்லது பிளீச்சிங் தூள் கொண்டு கழுவி நீக்கலாம்.
4. நொச்சி இலை அல்லது வேப்ப இலை மூலம் வீட்டுக்குள் புகைபோட்டால் நச்சுக்காற்று நீங்கி, ஆரோக்கியம் பெருகும்.

கட்டிடச் சீரழிவு நோய்க்கு மருந்து

நொச்சி இலை, பூண்டு, கிராம்பு, மிளகு ஆகியவற்றைச் சரிசமமாக எடுத்து, அரைத்து ஐந்து கிராம் வீதம் வெந்நீரில் கலந்து காலை, மாலை உட்கொண்டு வந்தால் இந்த நோய் கட்டுப்படும்.

நொச்சி இலையைச் சுடுதண்ணீரில் இட்டால் வரும் ஆவியைக் குறைந்தபட்சம் 20 முறை காலை, மாலை சுவாசித்துவந்தால், ஆஸ்துமா நோயின் தீவிரத்தைக் குறைக்கலாம்.

பூஞ்சைத் தொற்று

ஈரமான ஆடைகளை அணிவதாலும், நன்றாக ஈரம் உலராத உள்ளடைகள் அணிவதாலும் படை உருவாவதற்கு வாய்ப்பு உள்ளது. இதைத் தடுக்கக் கஸ்தூரி மஞ்சள், பாசிப்பயறு சம அளவு எடுத்துக் கலந்து, சோப்புக்குப் பதிலாகத் தேய்த்துக் குளிக்கலாம். குளித்த பின் மூன்று நிமிடங்களில் (நீரிலிருந்து அகன்ற பின், தோலின் புற அடுக்கில் 3 நிமிடம் வரைதான் தண்ணீர் தங்கும்) செக்கில் ஆட்டப்பட்ட தேங்காய் எண்ணெயை உடலில் லேசாகத் தேய்த்துவிட்டால் காளான் தொற்று ஏற்படுவதைத் தவிர்க்கலாம். அது மட்டுமில்லாமல் சூரியப் பாதுகாப்பு காரணியையும் (SPF - Sun Protecting Factor) இது கொண்டிருப்பதால், புறஊதாக் கதிர்கள் தோலில் ஏற்படுத்தும் சுருக்கமும் தடுக்கப்படும். தேங்காய் எண்ணெய், தோல் உதிர்வைத் தடுப்பதில் சிறந்ததும் கூட.

இதை மீறிப் படை வந்துவிட்டால், சீமை அகத்தி களிம்பைப் பூசலாம். நாகமல்லி (Rhina Canthus Masutus) 10 இலைகள், ஒரு மிளகு ஆகியவற்றைத் தேங்காய் எண்ணெயில் இட்டுக் காய்ச்சித் தடவி வரலாம்.

தலையணை உறை

மழைக் காலத்தில் வீட்டுக்குள் நிலவும் குளிர்ந்த காற்றோட்டத்தால் மெத்தை விரிப்புகள், பாய்கள், தலையணை உறையைப் பூஞ்சை தொற்றுகளுக்கும்,

படுக்கை உண்ணி (Bed mite) என்ற சிறுபூச்சிகளும் பல்கிப் பெருகி இருக்கும். வெளியே செல்ல அணியும் ஆடைகளை தினமும் கசக்கிக் கட்டுகிறோம். அதே அளவுக்கு இரவில் நம் உடலுடன் ஒட்டியிருக்கும் தலையணை உறை மற்றும் மெத்தை விரிப்புகளை மாதக்கணக்கில் துவைக்காமல் இருப்பது எப்படிச் சரியாகும்? இதனால் சைனஸ், ஆஸ்துமா போன்ற நோய்களுக்கு இரயாகிறோம். தலையணை உறை, மெத்தை விரிப்புகளை வாரம் ஒருமுறை சுடுதண்ணீரில் இட்டுத் துவைத்துப் படுக்கை உண்ணியை விரட்டுவோம்.

குழந்தைகளுக்கு

அதிக மழையில் குழந்தைகள் சளியால் அவதிப்படுவார்கள். வழக்கமாகத் தலைவலிக்கான களிம்புகளைக் குழந்தையின் மூக்கு, முதுகு, நெஞ்சில் தடவுவது வழக்கமாக இருக்கிறது. இது தவறு. குறிப்பாக இரண்டு வயதுக்கு உட்பட்ட குழந்தைகளுக்கு, இப்படிச் செய்யக் கூடாது என்று சர்வதேச அளவில் வலியுறுத்தப்படுகிறது. ஏனென்றால், இந்தக் களிம்புகள் குழந்தையின் மூக்குக்குள் அதிகச் சுரப்பை ஏற்படுத்தும். அது மட்டுமல்லாமல் குழந்தைகளின் சுவாசப் பாதையில் சளியை வெளியேற்றும் முடிகளை உடைய செல்கள் இல்லாததால், சளி வெளியேறாமல் போய் நோய் நிலைமை மோசமாகக் கூடும்.

கற்பூரவல்லி இலை அல்லது நவரை பச்சிலை என்ற இலையின் சாற்றை 2.5 மி.லி. வெந்நீரில் கலந்து இரண்டு வேளை புகட்டுவது நல்லது.

நோய் எதிர்ப்பு சக்தியை அதிகரிக்கச் சித்த மருத்துவர் ஆலோசனைப்படி உரை மாத்திரையை வழங்கலாம்.

பிரளி

தண்ணீர் அசுத்தத்தாலும், கைகளையும் காய்கறிகளையும் நன்றாகக் கழுவிப் பயன்படுத்தாததாலும், குழந்தைகளுக்கு ஏற்படும் பச்சை நிறக் கழிச்சலுக்குப் பிரளி (Giardiasis) என்று பெயர். இதற்கு மருந்து கன்னியாகுமரி மாவட்டத்தில் பயன்படுத்தும் பிரளிக்காய் என்ற வலம்புரிக்காய். இதைச் சட்டியில் பொன் வறுவலாக வறுத்து ஐந்து கிராம் அளவு எடுத்து. 100 மி.லி. தண்ணீர் சேர்த்து, அது 25 மி.லி.யாக வற்ற வைத்துக் காலை, மாலை கொடுத்துவந்தால் உடல் சீரடையும். அதேபோல, வாந்தி பேதிக்கு இணை உணவாக நெற்பொரியைக் கஞ்சியாக வழங்கி வரலாம்.

இப்படியாக மழைக் காலத்தில் நோய் தாக்காமலும், நோய் தாக்கினாலும் எளிய சித்த மருத்துவ வழிமுறைகள், சித்த மருந்துகளால் ஆரோக்கியமாக வாழ முடியும். **மருத்துவர் - ஜெ. ஸ்ரீராம், அரசு சித்த மருத்துவர் தொடர்புகு: sriramsiddha@gmail.com**

Courtesy: தி இந்தி, 21.11.2015

தொற்றுநோய்களை விரட்டும் மகா சுதர்சன மாத்திரை

தொடர் மழையால் சிறு குழந்தைகள், முதியவர்கள், நாள் பட்ட நோயாளர்கள், கொடிய நோயால் பாதிக்கப்பட்டவர்கள், சத்து குறைவாக உள்ளவர்கள், உடலில் எதிர்ப்பு சக்தி குறைவாக உள்ளவர்கள் ஏதோ ஒரு வகையில் பாதிக்கப்படுவார்கள்.

சிறு தலைவலிக்காக மருத்துவமனை சென்றால் கூட, குறைந்தது இருநூறு ரூபாய் ஒரு நாளைக்குத் தேவைப்படுகிறது. காய்ச்சலாக இருந்தால் ஒரு வாரத்துக்கு ஆயிரத்து ஐநூறு ரூபாய் செலவாகிறது.

மலிவு விலை மருந்து

தினசரி கூலித் தொழிலாளர்கள் என்ன செய்ய முடியும்? அதுவும் தொடர் மழை, வெள்ளத்தால் பாதிக்கப்பட்டு அனைத்து உடைமைகளையும் இழந்து தவிக்கும் மக்களுக்குத் தொற்றுநோய் ஏற்பட்டாலோ, விஷக் காய்ச்சல் வந்தாலோ என்ன செய்வார்கள்? எப்படி நோயிலிருந்து பாதுகாத்துக் கொள்வார்கள்?

பயப்படத் தேவையில்லை. இதற்கு மிக மலிவான சித்த மருந்து உள்ளது. தொற்று நோய்கள் தாக்காமலும், விஷக் காய்ச்சல், மர்மக் காய்ச்சல் வராமலும், டெங்கு, சிக்குன் குன்யாவை விரட்டவும், சளி, இருமல், தும்மலைத் தடுக்க இருக்கவே இருக்கிறது மகா சுதர்சன சித்த மாத்திரை. இந்த மாத்திரையில் 45 வகை மூலிகைகள் மற்றும் படிக்காரம் கலந்துள்ளது.

தீரும் நோய்கள்

அனைத்து வகை காய்ச்சல் (விஷக் காய்ச்சல், மர்மக் காய்ச்சல், டெங்கு, சிக்குன் குன்யா, டைபாய்டு, மலேரியா, குளிர் காய்ச்சல்), சளி, இருமல், தும்மல், மூச்சடைப்பு, உடல்வலி, தலைவலி, தலை பாரம், மூட்டு வலிகள், தொற்று நோய்களுக்குத் தடுப்பு மருந்தாக, ஆஸ்துமா, நாள்பட்ட சர்க்கரை நோய், தோல் நோய்கள், எய்ட்ஸ்.

புற்று நோய் ஆகிய அனைத்துக்கும் தீர்வு தரும் ஒரே மருந்து. இந்த மகா சுதர்சன மாத்திரை.

மாத்திரை அளவு

ஒரு வயதிலிருந்து ஐந்து வயதுவரை 1/2 மாத்திரை மூன்று வேளை. தேன், பால். வெந்நீரில் கலந்து கொடுக்கலாம். ஐந்து வயதிலிருந்து 15 வயதுவரை ஒரு மாத்திரை மூன்று வேளை. தேன், பால், வெந்நீரில் கலந்து கொடுக்கலாம். 15 வயதிலிருந்து எந்த வயதினருக்கும் இரண்டு மாத்திரை மூன்று வேளை. ஆகாரத்துக்குப் பிறகு வெந்நீரில் சேர்த்துச் சாப்பிடவும். நோயின் தீவிரத்துக்கேற்ப ஆறு மணி நேரத்துக்கு ஒருமுறை தரலாம். இதனுடன் மருத்துவரின் ஆலோசனை பெற்று நிலவேம்புக் குடிநீர் எடுத்துக்கொள்ளவும்.

உணவு

எளிதில் செரிமானம் ஆக்கக்கூடிய இட்லி, இடியாப்பம். அரிசிக் கஞ்சி, பருப்பு கலந்த சாதம் போன்றவை. தேவைப்பட்டால் ஆங்கில மருந்தைச் சேர்த்து எடுத்துக்கொள்ளலாம். பலன் அதிகம், பக்க விளைவு தடுக்கப்படும். அனைத்துச் சித்த, ஆயுர்வேத மருந்துக் கடைகளில் இந்த மாத்திரை கிடைக்கிறது. விலை மிக மிகக் குறைவு.

உடலின் எதிர்ப்பு சக்தி அதிகரிக்க, வேறு பல நோய்கள் உள்ளவர்கள் தொடர்ந்து மகா சுதர்சன மாத்திரையை எடுத்துக்கொள்ளலாம். மருத்துவர் ஆலோசனை பெற்று அனைவரும் காலை இரண்டு மாத்திரை, இரவு இரண்டு மாத்திரை உணவுக்குப் பிறகு சாப்பிட்டுவர, உடலின் நோய் எதிர்ப்பு சக்தி குறையாமல், சகல நோய்களையும் கட்டுப்படுத்திச் சங்கடங்களை நீக்கும்.

டாக்டர். எஸ். காமராஜ், கட்டுரையாளர், திருச்சி இ.எஸ்.ஐ. சிறப்பு நிலை சித்த மருத்துவர் தொடர்புகு: drkaamaraj@gmail.com

Courtesy: தி இந்தி, 12.12.2015

அறிவுக்கும் உணவுக்கும் ஊட்டமளிக்கும் நெய்

ஆயுர்வேத மருத்துவத்தில் நெய் முக்கியத்துவம் வாய்ந்தது. அது மட்டுமல்லாமல் உணவில் சேர்க்க வேண்டிய முக்கியமான 10 உணவு வகைகளில் நெய்யும் ஒன்று.



மருத்துவரீதியாக நெய் மிதமான குளிர்ச்சியை அளிக்கக்கூடிய பொருள். இளமையோடு இருக்க உதவும் பொருளை உள்ளடக்கியிருப்பதால், நெய் ஆயுளை நீட்டிக்கச் செய்கிறது. இதனால்தான் பெரும்பாலான ஆயுர்வேத மருந்துப் பொருட்கள் தயாரிப்பில் நெய் முக்கிய அம்சமாக விளங்குகிறது.

செரிமானத்துக்கு உதவி

ஒருவருடைய உடல்நலம், உட்கொள்ளும் உணவைப் பொருத்ததல்ல. செரிமானமடைவதையே சார்ந்துள்ளது. சத்து நிறைந்த உணவுப் பொருட்கள் சாப்பிடும்போது, அது சரியாகச் செரிக்காவிட்டால் உரிய பலன் கிடைக்காது. உணவுப் பொருள் முழுமையாகச் செரித்தால்தான், சத்துகள் உடலுக்குக் கிடைக்கும்.

இந்த வகையில் உணவு முழுமையாகச் செரிமானமடைய நெய் உதவுகிறது. இதன் மூலம் உடலில் உள்ள ஒவ்வொரு செல்லுக்கும் அதிகபட்ச சத்து கிடைக்கிறது. அதனால் ஆரோக்கியமான மனிதனின் உடலுக்கு, நீரைப் போல் நெய்யும் இன்றியமையாதது.

வறுப்பதற்காக நெய்யைப் பயன்படுத்தும்போது, உணவிலுள்ள ஈரப்பதத்தை நீக்கப் பயன்படுவதுடன், உடலுக்கு நன்மையும் தருகிறது. உணவைத் தயாரித்த பின்பும் நெய்யைச் சேர்த்துப் பயன்படுத்தலாம். நாள்பட்ட செரிமானப் பிரச்சினை மற்றும் வாய்வுத் தொல்லைகளுக்கு நெய் நிரந்தரப் பலன் கொடுக்கிறது. இதில் பசு நெய் சிறப்பானதாகக் கூறப்படுகிறது.

பலன்கள்

நெய் அறிவாற்றலை அதிகரிக்கச் செய்கிறது, நினைவாற்றல் பெருகும், ஸ்திரமான மூளைச் செயல்பாட்டுக்கு வழிவகுக்கும், பார்வைத் திறன் அதிகரிக்கும். இவ்வாழ்க்கை சிறக்கும். குழந்தைகளுக்கும் நெய் ஏற்றது. முதியவர்கள் உடலைச் சுறுசுறுப்பாகவும் வலுவாகவும் அழகாகவும் வைத்துக்கொள்ள உதவுகிறது. தினசரி நெய் சேர்த்துக்கொள்வதன் மூலம், தோலின் ஈரப்பதம் சீராக இருக்கும். நோய்த்தொற்றைத் தடுக்கவும், சரும ஒவ்வாமை, நிறம் மாறுவது, வயதாகும்போது ஏற்படும் தோல் சுருக்கம் போன்றவற்றையும் நெய் தடுக்கும்.

ரத்தத்தின் தன்மையையும் அளவையும் பாதுகாக்க நெய் உதவுகிறது. உடலின் மேம்பட்ட ஆரோக்கியம். தோலின் பளபளப்பிலிருந்து இதை அறிந்துகொள்ளலாம். குரல் வளம் நீடிக்கவும் நெய் உதவும்.

சிறப்புத்தன்மை

நெய்யில் கரையும் உணவுப் பொருட்கள், நேரிடையாக மூளைக்கும், கருவில் உள்ள குழந்தைக்கும், உடலின் மற்றப் பாகங்களுக்கும் கொண்டு செல்லும் விசேஷத் தன்மை நெய்க்கு உண்டு. நெய்யைக் கொண்டு தயாரிக்கப்படும் மருந்துகளும் இதேபோலத்தான். நெய் மூலம் இப்பொருட்கள் உடல் முழுவதும் சமமாகப் பகிர்ந்தளிக்கப்படுகின்றன.

இதனால்தான் பல வகை மருந்துப் பொருட்கள் நெய்யை அடிப்படையாகக் கொண்டு தயாரிக்கப்படுகின்றன. உயிர் காக்கும் ஆயுர்வேத மருந்துகள், புத்துணர்வுட்டும் மருந்துகள், செல்களுக்குப் புத்துயிர் அளிக்கும் மருந்துகளில் நெய் முக்கியமாகச் சேர்க்கப்படுகிறது.

மருந்துகளில்...

நரம்பு மண்டலச் செயல்பாடுகளைப் பாதிக்கும் நோய்களைக் குணப்படுத்த, நெய்யை மூலப்பொருளாகக் கொண்ட மருந்துகளே பெரும் பாலும் பரிந்துரைக்கப்படுகின்றன.

மூளைத் திசுக்களைச் சிறப்பாகச் செயல்பட வைப்பதில் நெய் முக்கிய பங்கு வகிக்கிறது. நெய் குறைவாகப் பயன்படுத்தும்போது, மறதி நோய், பார்க்கின்சன்ஸ், அல்செய்மர் நோய் போன்றவற்றைக் குறைக்க உதவுகிறது. மூளை செல் பாதிப்பு, மனஅழுத்தம், மனச்சிதைவு போன்ற நோய்களால் பாதிக்கப்பட்டோரின் எண்ணிக்கை அதிகரித்துவருவதன் பின்னணியில் இதைப் புரிந்துகொள்ள வேண்டும்.

மயக்கம், வலிப்பு நோய், தலை, கண், காதில் ஏற்படும் நோய்கள், பிறப்புறுப்பில் ஏற்படும் நோய்களைத் தீர்ப்பதில் நெய் முக்கிய பங்கு வகிக்கிறது. புண்கள், கொப்புளங்களைக் குணப்படுத்தவும் உதவுகிறது. நெய் சேர்க்கப்பட்ட மருந்துகள் காயம், தீ மற்றும் விஷப் பாதிப்புகளைக் குணப்படுத்தவும் பயன்படுத்தப்படுகின்றன. எனவே, உணவாகப் பலனளிப்பது மட்டுமல்லாமல், மருந்துகளிலும் நெய் முக்கிய பங்கு வகிப்பதிலிருந்து அதன் முக்கியத்துவத்தைப் புரிந்துகொள்ளலாம்.

தண்ணீரைக் கூட சல்லடையில் அள்ளலாம், அது பனிக்கட்டி ஆகும் வரை பொருத்தால்

எவ்வளவு சாப்பிடலாம்?

- உள்ளூக்குச் சாப்பிடும் மருந்துகளில் நெய் முக்கியமானது. வெளிப்புண்ணுக்கு தடவவும் பயன்படுகிறது. தீக்காயம், அரிப்பு, உலர்தன்மை ஆகியவற்றுக்கு நெய் சிறந்த தீர்வு. சில நேரம் மருத்துவ மலமிளக்கியாகவும் தரப்படுவது உண்டு. அதேநேரம் ஆயுர்வேத மருத்துவரின் பரிந்துரைப்படி நெய்யில் தயாரிக்கப்பட்ட மருந்துகளை உட்கொள்ள வேண்டும். சரியான செரிமான மடைந்தால், நெய் எவ்விதத் தீய விளைவுகளையும் ஏற்படுத்துவதில்லை. உணவில் நெய்யைச் சீராகப் பயன்படுத்துவதால் நன்மை கிடைக்கும், கொழுப்பு உடலில் சேரும்.
- சுவாசம் தொடர்பான பிரச்சினை உள்ளவர்களுக்கு நெய் பரிந்துரைக்கப்படுவதில்லை. சளி அதிக அளவில் இருந்தாலும் நெய் பரிந்துரைக்கப்படாது.
- ஓர் ஆரோக்கியமான மனிதர் தினசரி 5 மி.கிராம் அளவுக்கு உணவில் நெய்யைச் சேர்த்துக்கொள்ளலாம்.

நெய் மருந்துகள்

நெய் சேர்க்கப்பட்ட சில ஆயுர்வேத மருந்துகள்:

இந்துகாந்த கிருதம் - உடலில் நோய் எதிர்ப்புத் திறனை அதிகரிக்க உதவும்.

கல்யாணக கிருதம் - குழந்தைகள், முதியவர்கள், கர்ப்பிணிகள் ஆகியோருக்கு மூளையைச் சுறுகறுப்பாக வைத்திருக்க அளிக்கப்படுகிறது.

டாடிமதி கிருதம் - ரத்தத்தில் உள்ள அனைத்துச் சத்துகளும் மேம்பட, சருமம் பளபளப்பாக இருக்க உதவும்.

மாதுளம் பழம் கொண்டு தயாரிக்கப்பட்ட இந்தக் கிருதம், ரத்த நலனைப் பராமரிப்பதன் மூலம் தோலை மிருதுவாகவும் பொலிவாகவும் வைத்திருக்க உதவுகிறது.

திரிபால கிருதம் - உடலில் உணர் உறுப்புகளையும், அவற்றின் செயல்பாடுகளையும் மேம்படுத்த உதவுகிறது.

டாக்டர் K. நீத்து சென், கட்டுரையாளர்,
சஞ்ஜீவனம் ஆயுர்வேத சிகிச்சை
மையத்தின் ஆயுர்வேத மருத்துவர்
Courtesy: The Hindu, 26.09.2015

HUMOUR

Marriage Counseling...

A couple attended marriage counseling to resolve communication problems. The fighting and bickering during the session was so bad the counselor called for a timeout and told them he was ending the session early but had an assignment for the husband.

“John,” the marriage counselor said, “you’re an athletic guy... here’s what I want you to do. I want you to jog 10 miles everyday for the next 30 days. At the end of the 30 days call me and let me know how things are going.”

John agreed.

At the end of the 30 days, John called the marriage counselor very excited. “I did just as you said and I have never felt better in my life!” he exclaimed over the phone.

“Great!” replied the counselor, “And how’s your wife?”

John paused and then replied with agitated dismay, “How should I know, I’m 300 miles from home!”

A joke from an Asian American from the US

Now that I’m on a fixed income, I’ve disconnected my home alarm system.

I also decided to turn off my external lights and resigned from Neighborhood Watch.

To save money I’ve raised 2 Pakistani flags in my front garden, one at each corner, and have the black flag of ISIS in the centre.

It’s so good now, my neighbours, Local Police, the Federal Police and the Armed Forces are all keeping watch on the house.

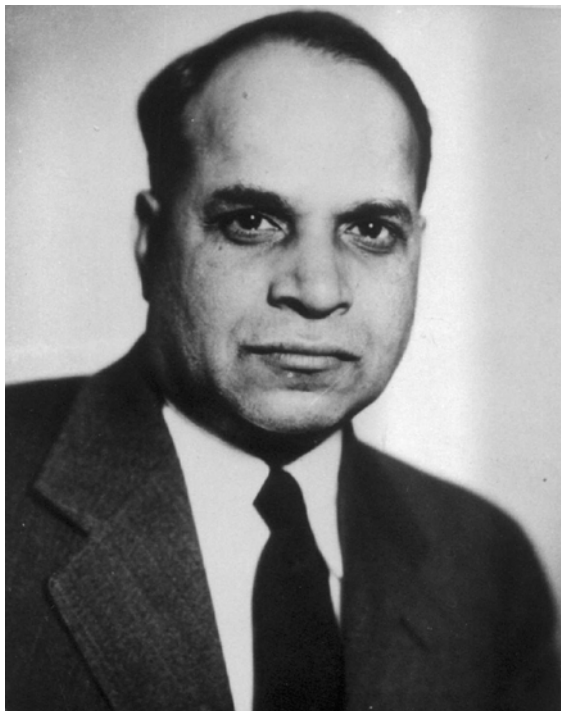
In addition, I am followed & watched everywhere I go. I’ve never felt safer, and I’m saving \$149.50 a month.

Questions actually asked of witnesses by attorneys during trials and the responses given by insightful witnesses

- Q: “Doctor, before you performed the autopsy, did you check for a pulse?”
A: “No.”
Q: “Did you check for blood pressure?”
A: “No.”
Q: “Did you check for breathing?”
A: “No.”
Q: “So, then it is possible that the patient was alive when you began the autopsy?”
A: “No.”
Q: “How can you be so sure, Doctor?”
A: “Because his brain was sitting on my desk in a jar.”
Q: “But could the patient have still been alive nevertheless?”
A: “It is possible that he could have been alive and practising law somewhere.”
- Q: “Do you recall the time that you examined the body?”
A: “The autopsy started around 8:30 p.m..”
Q: “And Mr. Dennington was dead at the time?”
A: “No, he was sitting on the table wondering why I was doing an autopsy.”
- Q: “Doctor, how many autopsies have you performed on dead people?”
A: “All my autopsies are performed on dead people.”
- Q: “Can you describe the individual?”
A: “He was about medium height and had a beard.”
Q: “Was this a male, or a female?”

YELLAPRAGADA SUBBAROW

Yellapragada Subbarow (12 January 1895 – 9 August 1948) was an Indian biochemist who discovered the function of adenosine triphosphate as an energy source in the cell, and developed methotrexate for the treatment of cancer. Most of his career was spent in the United States. Despite his isolation of ATP, Subbarow was denied tenure at Harvard and remained without a green card throughout his life, though he would lead some of America's most important medical research during World War II. Subbarow is also credited with the first synthesis of the chemical compounds folic acid and methotrexate.



Early life and education

He was born in Bhimavaram, Madras Presidency, now in West Godavari District, Andhra Pradesh in India. He passed through a traumatic period in his schooling at Rajahmundry (due to the premature death of close relatives by disease) and eventually matriculated in his third attempt from the Hindu High School, Madras. He passed the Intermediate Examination from the Presidency College and entered the Madras Medical College where his education was supported by friends and Kasturi Suryanarayana Murthy, whose daughter he later married.

Following Gandhi's call to boycott British goods he started wearing khadi surgical dress; this incurred the displeasure of M. C. Bradfield, his surgery professor. Consequently, though he did well in his written papers, he was awarded the lesser LMS certificate and not a full MBBS degree. Subbarow tried to enter the Madras

Medical Service without success. He then took up a job as Lecturer in Anatomy at Dr. Lakshmipathi's Ayurvedic College at Madras. He was fascinated by the healing powers of Ayurvedic medicines and began to engage in research to put Ayurveda on a modern footing. The promise of support from Malladi Satyalingam Naicker Charities in Kakinada, and financial assistance raised by his father-in-law, enabled Subbarow to proceed to the U.S. He arrived in Boston on 26 October 1922.

Career in United States

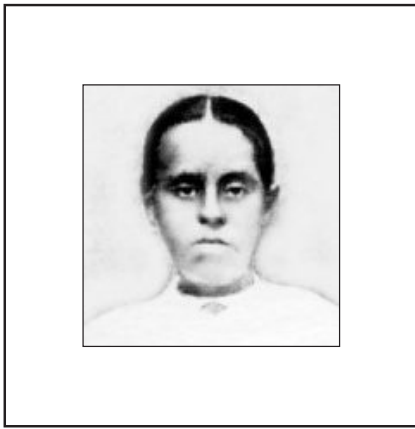
After earning a diploma from the Harvard Medical School he joined Harvard as a junior faculty member. With Cyrus Fiske, he developed a method for the estimation of phosphorus in body fluids and tissues. He discovered the role of phosphocreatine and adenosine triphosphate (ATP) in muscular activity, which earned him an entry into biochemistry textbooks in the 1930s. He obtained his Ph.D. degree the same year. He joined Lederle Laboratories, a division of American Cyanamid (now a division of Wyeth which is owned by Pfizer), after he was denied a regular faculty position at Harvard. At Lederle, he developed a method to synthesize folic acid, Vitamin B₉, based on work by Lucy Wills to isolate folic acid as a protective agent against anemia. After his work on folic acid and with considerable input from Dr. Sidney Farber, he developed the important anti-cancer drug methotrexate - one of the very first cancer chemotherapy agents and still in widespread clinical use. Subbarow also discovered the basis for hetrazan which was used by the World Health Organization against filariasis. Under Subbarow, Benjamin Duggar made his discovery of the world's first tetracycline antibiotic, aureomycin, in 1945. This discovery was made as a result of the largest distributed scientific experiment ever performed to that date, when American soldiers who had fought all over the world were instructed at the end of WWII to collect soil samples from wherever they were, and bring the samples back for screening at Lederle Laboratories for possible anti-bacterial agents produced by natural soil fungi.

Honours

Subbarow's colleague, George Hitchings, who shared the 1988 Nobel Prize in Physiology or Medicine with Gertrude Elion, said, "Some of the nucleotides isolated by Subbarow had to be rediscovered years later by other workers because Fiske, apparently, did not let Subbarow's contributions see the light of the day." A fungus was named *Subbaromyces splendens* in his honour by American Cyanamid. Writing in the April 1950 issue of *Argosy*, Doron K. Antrim observed, "You've probably never heard of Dr. Yellapragada Subbarow. Yet because he lived you may be alive and are well today. Because he lived you may live longer."

THILLAIYADI VALLIAMMAI

Thillaiyadi Valliammai (22 February 1898 - 22 February 1914) was a South African Tamil woman who worked with Mahatma Gandhi in her early years when she developed her nonviolent methods in South Africa fighting its apartheid regime.



Biography

She was born to R. Munuswamy Mudaliar and Mangalam, a young immigrant couple from a small village called Thillaiyadi in Nagappatinam near Mayiladuthurai in India to Johannesburg – the gold-city of South Africa to work for their way out of difficulty. Her father was a trader and owner of a confectionery shop. Since her mother Janaki is from Thillaiyadi in Tamil Nadu, her daughter Valliammai came to be popularly called Thillaiyadi Valliammai. Valliammai had never been to India. She grew in an environment that was rather hostile to Indians. But the young child did not even know that it was not right to be segregated so, until she was in her early teens.

A law was passed that any marriage that is not according to the Church or according to the marriage law of South Africa would be held null and void, which disproportionately affected the Indian community in that country. Doubts regarding inheritance arose. Mohandas Karamchand Gandhi began his opposition. Young Valliammai joined her mother in the march by women from Transvaal to Natal – which was not legally permitted without passes.

Valliamma, and her mother Mangalam, joined the second batch of Transvaal women who went to Natal in October 1913 to explain the inequity of the three pound tax to the workers and persuade them to strike. (Valliamma's father, R. Munuswamy Mudaliar, owner of a fruit and vegetable shop in Johannesburg and a satyagrahi in the Transvaal, was recovering from an operation). They visited different centres and addressed meetings. They were sentenced in December to three months with hard labour, and sent to the Maritzburg prison. Valliamma

fell ill soon after her conviction, but refused an offer of early release by the prison authorities. She died shortly after release, on 22 February 1914.

Gandhi wrote in Satyagraha in South Africa:

“Valliamma R. Munuswami Mudaliar was a young girl of Johannesburg only sixteen years of age. She was confined to bed when I saw her. As she was a tall girl, her emaciated body was a terrible thing to behold.

‘Valliamma, you do not repent of your having gone to jail?’ I asked.

‘Repent? I am even now ready to go to jail again if I am arrested,’ said Valliamma.

“But what if it results in your death?’ I pursued.

‘I do not mind it. *Who would not love to die for one's motherland?*’ was the reply.

“Within a few days after this conversation Valliamma was no more with us in the flesh, but she left us the heritage of an immortal name.... And the name of Valliamma will live in the history of South African Satyagraha as long as India lives.”

On 15 July 1914, three days before he left South Africa, Gandhi attended the unveiling of the gravestones of Nagappan and Valliamma in the Braamfontein cemetery in Johannesburg.

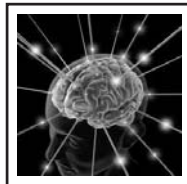
Honors

- Thillaiyadi Valliammai Memorial Hall, including a public library, was instituted in 1971 on 2452 square meters of land by the Indian Government in the village of Thillaiyadi, now in Tharangambadi Taulk, Nagapattinam, India. The Library is functioning regularly in this memorial. Other buildings in her name include Thillaiyadi Valliammai Nagar and the Thillaiyadi Valliammai High School in Vennanthur.
- Co-op-tex a government owned cooperative industry, have given her name as 600th sale.
- As Thillaiyadi Valliammai remembrance the government taken her face in stamp.
- As her sake Gandhi has written a book *southafrican* that he written her history.
- A commemorative stamp on her was released on 31-December-2008.



POWER YOUR MIND – FREEDOM - THE GOAL

Longing for sex is Lust
 Obstacle to desire is Anger
 Passion to possess more is Greed
 Urge to dominate is Ego
 Attachment to the unreal is Delusion
 Feeling of inferiority is Jealousy



Tendency to hate is Violence
 Tendency to hide is Lie
 These are the worst enemies
 Hence absence of these is Freedom.

Courtesy: Swami Srikantananda

TIRUKKURAL AND MANAGEMENT IN A 'NUTSHELL' – 31



The function of Marketing is an important element in the Management of Business, apart from Manufacturing, Finance, Human Resources Management etc. The importance of Marketing function will be seen by the fact that all other functions are tuned to match with the Marketing efforts, size of Markets and volumes of Business generated

and so on. Competition is a common thing in the Market place and strategies are formulated understanding the Market and the Competition. Marketing is considered as war in the Market Place which we can see very clearly at the current times. Marketing Books are written on Marketing Warfare with competitors as enemies and with concepts and lessons from history of wars as applicable to Business and Marketing Management.

Tirukkural has a number of Chapters dealing with the wisdom of warfare and enemies etc, which can help sharpen Marketing Management skills.

1. The Kural chosen below deals with the wisdom of judging the power of the enemy and designing the strategy. In the situation of Marketing also, the

competitor could be strong or weak. The weak should be faced directly without wasting even a moment and the strong should not be faced with direct confrontation but with suitable circuitous methods.

Valiarkku Maruetral Ombuga; Ombaa

Meliaarmel Mega Pagai

Kural 861

வலியார்க்கு மாறுஏற்றல் ஓம்புக; ஓம்பா

மெலியார்மேல் மேக பகை குறள் 861

“Strive not with the powerful: but against those that are weaker than thyself carry on the wars without relaxing even for one moment”

2. The Kural chosen below stresses the importance of strategy formulation intelligently as the lack of it can make things easy for the competition to destroy you.

Vazhinokkan Vaayppana Cheyyan; Pazhinokkan

Panbilan Patrarkku Inithu

Kural 865

வழிநோக்கான் வாய்ப்பன செய்யான் பழிநோக்கான்

பண்புஇலன் பற்றார்க்கு இனிது குறள் 865

“Tactlessness, no care for honor of success and neglect of science of strategies and the things that it enjoyeth can make you an easy and sweet prey for the enemy”

HOME FESTIVALS – 1

தை – Thai (Mid-January/Mid-February)



At left the Sun god, Surya, is being worshiped with the outdoor cooking of a large pot of rice from the recent harvest. The overflowing of the dish is called “pongalo-pongali”, and thus this festival is known as Thai Pongal. Other crops, like sugarcane, bananas and turmeric, are also offered. *Kolams* (hand-made rice flour patterns) are drawn in the form of the chariot, with the Sun and Moon in the center. On this day cows and other animals are decorated and fed special foods, and their owners prostrate to them. Crows and other birds are offered food on leaves of turmeric. Sisters pray for the welfare of brothers, and elders bless the children. Thai Pongal is celebrated by the poorest farmers and the wealthiest householders.

(To be continued)

Fifty years ago, physicists held the view that matter was made of a number of distinct elements and they held the theory of absolute difference among things. Now, however, denying the distinctiveness of individual elements of matter and mutual difference between what is with form and what is without form, they proclaim that they are all evolutes of one Energy. Thus, modern scientists are giving up the theory of difference and are gradually getting oriented to the philosophy of non-difference. Especially great savants like Einstein, Sir James Jeans and Eddington have come very near the doctrine of Advaita taught by Sri Sankara Bhagavatpada. Declaring that the phenomenal world of perception is not ultimately true but only relatively real, they have come in effect to reject difference itself. – **H.H. Shri Paramacharya**

THE MILWAUKEE ART MUSEUM

The Milwaukee Art Museum collects and preserves art, presenting it to the community as a vital source of inspiration and education.

30,000 works of art. 400,000+ visitors a year. 125 years of collecting art. From its roots in Milwaukee's first art gallery in 1888, the Museum has grown today to be an icon for Milwaukee and a resource for the entire state.

The 341,000-square-foot Museum includes the War Memorial Center (1957) designed by Finnish-American architect Eero Saarinen, the Kahler Building (1975) by David Kahler, and the Quadracci Pavilion (2001) created by Spanish architect Santiago Calatrava.

Central to the Museum's mission is its role as a premier educational resource, with educational programs that are among the largest in the nation, involving classes, tours, and a full calendar of events for all ages.

The graceful Quadracci Pavilion is a sculptural, postmodern addition to the Milwaukee Art Museum completed in 2001, designed by Spanish architect Santiago Calatrava. A 1975 addition had increased space five-fold, but the Museum remained hidden from public view on the lower floors of the War Memorial Center. A \$10 million then-anonymous gift from Betty and Harry Quadracci kicked off a capital campaign.

The 142,050-square-foot Quadracci Pavilion was planned to primarily contain public spaces—a reception hall, auditorium, café, store, and parking, plus 10,000 square feet of flexible space for temporary exhibitions.

The structure incorporates both cutting-edge technology and old-world craftsmanship. The hand-built structure was made largely by pouring concrete into one-of-a-kind wooden forms. It is a building that could have only been done in a city with Milwaukee's strong craft tradition.

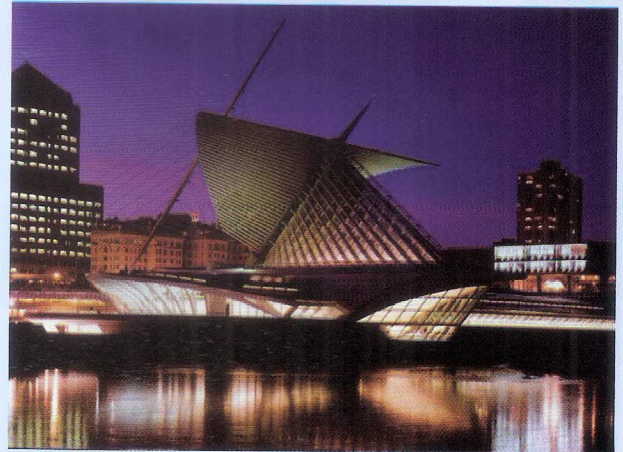
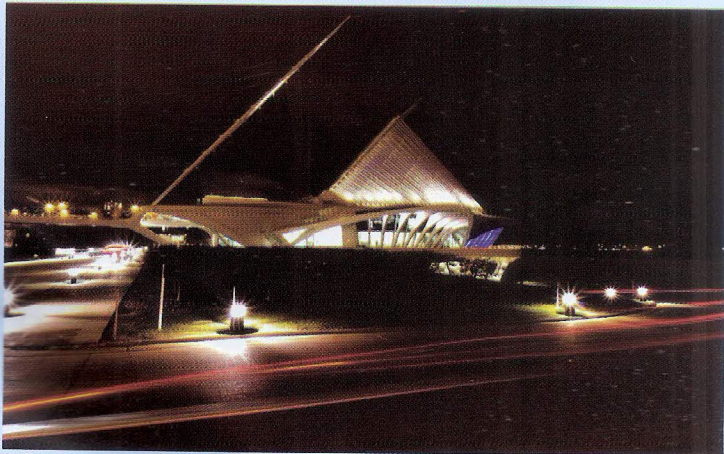
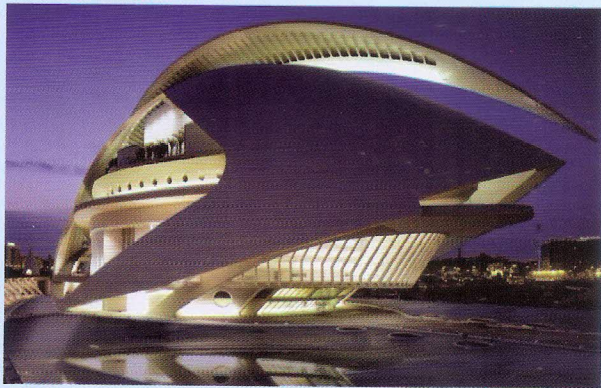
Windhover Hall is the grand entrance hall for the Quadracci Pavilion. It is Santiago Calatrava's postmodern interpretation of a Gothic Cathedral, complete with flying buttresses, pointed arches, ribbed vaults, and a central nave topped by a 90-foot-high glass roof. An average-sized, two-story family home would fit comfortably inside the reception hall.

The hall's chancel is shaped like the prow of a ship, with floor-to-ceiling windows looking over Lake Michigan. Adjoining the central hall are two tow-arched promenades, the Baumgartner Galleria and Schroeder Foundation Galleria, with expansive views of the lake and downtown.

The Museum's signature wings, the Burke Brise Soleil, form a moveable sunscreen with a 217-foot wingspan. The brisesoleil is made up of 72 steel fins, ranging in length from 26 to 105 feet. The entire structure weighs 90 tons. It takes 3.5 minutes for the wings to open or close. Sensors on the fins continually monitor wind speed and direction; whenever winds exceed 23 mph for more than 3 seconds, the wings close automatically.

The "wings" open at 10 a.m. in accordance with regular days of operation, close/reopen at noon, and close at 5 p.m. (8 p.m. on Thursdays). *Schedule is subject to change without advance notice due to weather/maintenance.*

THE MILWAUKEE ART MUSEUM





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