ELECTRICAL INSTALLATION ENGINEER

NEWS LETTER

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EDITORIAL

Dear Members, Fellow Professionals and Friends,

Seasons Greetings To One And All!

"Water" is the talking point and concern of everybody nowadays. As we all know, the nature has provided the "Earth" with 75% of the area covered with abundant sea water which helps provide rain for all the areas of the Globe, providing good water for all purposes of all the living beings. Mankind mainly uses it for Agriculture and for drinking and all other uses like washing, cleaning, flushing etc. Technology helps generate Energy using the flow of water. If we look at our country and our problems, we receive about 1.75 Lakhs TMC of rains every year on an average, a major portion of which goes to the sea. The crisis seems to be created by lack adequate storages when the rains pour and lack of adequate arrangements for distribution of surplus waters and floods from those rivers which are mainly in north and Andhra to the other parts, mainly Tamilnadu, which are starved for water. In fact Tamilnadu used to be one of the states till about 50 years ago with lot of tanks and lakes and "Kanmai"s to store water received from rains for use throughout the year for agriculture and other purposes. With rains failing frequently and with the increase of population with increased need for housing etc., no wonder many of these lakes and tanks etc. have disappeared and the ways for flow of waters for these have all disappeared, resulting in flooding of all newly developed residential areas in all cities.

These problems apart, the need of the hour, as propagated by all agencies and organizations, is to conserve water by stringent use, be it bathing or washing or cleaning or flushing, and to look at ways of recycling and using the waste waters at all places. It is very interesting to know that in Chennai, the entire underground sewage and drainage waters are collected in various centers like Perungudi, Nesappakkam, Koyambedu and few more and millions of litres of waters are filtered and purified, a part of which are sold for industrial use. Government has recently announced that arrangements will be made to purify these waters further to make them fit for human consumption and try and distribute them. As Engineers concerned with energy, it will be interesting to know that these sewage treatment stations of Chennai generate about 38 MWH of Energy each day which is entirely used for aeration and water purification purposes. The Electricity is generated through Biogas driven engine generator sets, the Biogas being produced from out of the sludge of the sewage waters. There are huge expansion plans of these systems as the city has grown and the needs have increased. Such systems should be ensured in all other metros and large towns and clusters of towns and villages to ensure healthy surroundings and assured collection and treatment of all waste waters.

World Population Day falls on July the 11th and it is a serious concern of the World and particularly our country. We have to resolve to control the population in all ways and to increase the quality of the population with adequate education and training and to provide facilities and opportunities for each member of the population for growth and useful service to society.

We thank all those members who have helped us by participating in the advertisement appearing for the issue June 2019 – Dehn India Pvt. Ltd., Elecxpo, Galaxy Earthing Electrodes Pvt. Ltd., Indo Swiss, Pentagon, Power Cable, Power Square Engineers (Indotech Transformers Ltd.), Supreme Power Equipment Pvt. Ltd., Visewham Electricals.

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KNOW THY POWER NETWORK – 142

Some more on power quality issues so that we can get a broad view of it. We cannot stop breathing but we can purify the polluted air in our surroundings. Likewise we cannot solve/get ridoff issues related to power quality but we can modify/control some of the responsible factors faced by the electrical equipment so that the severity of the PQ issues may be moderated/limited. Among the correcting measures described, the "setting of PQ regulation" occupies the prime position.

The related regulators should ensure proper monitoring of all PQ standards, ensure its strict compliance and inculcate discipline among the power users and discoms by adopting punitive measures like the levy of penalties on the defaulters/polluters and others who impect its quality.

1. PQ Regulations currently in practice

- Reliability
- Voltage variations-voltage unbalance and voltage monitoring
- Current unbalance
- Harmonics (THDV and THDI limits)

2. PQ Regulations that are expected to be adopted in the near future/already on the anvil

- Frequency deviation
- Harmonics (to follow IEEE 519/12014 and IEC 6100-4-30)
- Voltage variations and flickers (short/long term sensitivity as per IEC-61000)
- Voltage unbalance
- Voltage dips and swells (duration from 10 mins to 1 min)
- Voltage transients (users are required to apply surge suppression devices)
- Supply voltage interruption (voltage drop of 10%)
- Short interruption (20 milliseconds to 1 min)
- Long interruption (above 1 min)
- Power factors that include at fundamental frequency and harmonics frequencies.

3. Important topics that need focus

i) *Power Quality and regulations*

- Quality survey, optimal level of power quality and its impact on electrical equipment and devices measurement protocol.
- Adoption of measurement protocols.
- Measurement equipment and diagnostic tools.
- Over view of key PQ parameter as identified in PQ regulations and its compliance.
- Understanding the PQ regulations that are proposed for the feature use.

ii) *Harmonics*

- Characteristics and non characteristics Harmonics in AC and DC systems
- Harmonics protocols.
- Measurement of Harmonics and simulation.
- Devices are limiting Harmonics

iii) *Voltage Quality*

- Voltage fluctuations and unbalance, voltage dips and lamp flickers, short interruption low frequency switching transients.

- Measurements techniques
- Voltage regulating devices like reactors, static var compenstators, filters (active and passive)
- Modern techniques/stability and security

IV) *Reactive Power Flow* (VAR compensation) in distribution system

- Voltage control and reactive power management.
- Methods to control voltage and reactive power.
- Reactive power control to reduce the cost of utility operation.

4. A more focused approach to the concerns brought by LED lamps, which are widely used at present. It is brought under Technical Trade-off to get more light. You may aware that "Trade-off" is a decision making process where all the reasons, facts and influencing factors are discussed thread bare. That is the positive and negative aspects of the issue on hand are clearly brought out. Such a step is necessary to arrive at a fairly reasonable technical conclusion.

Here is the "technical trade-off" related to LED, CFL and FT lamps. You can arrive at your own decision. The ball is in your court; please act as a jury/judge in this discussion are take proper conclusions. Get ready.

Deciding Factors	
Infavour (Positive Aspects) of	**Against (Negative Aspects)**
A. LED Lamps	
1. Energy efficient. It brings adequate electrical energy savings which is the need of the hour. The investment cost can be got in a reasonable time. This factors forces the government and state owned power utilities to push its wide use advocate is spread.	**1. Higher initial cost**
2. Environment Friendly	**2. Have high flicker rate. This down side assumes greater significance because it affects the health of the end users which is never acceptable. Put it simply, it is akin to the invitation given to an unknown devil to our premises just because it has some good characters. Long exposure to these higher flickers can easily pass serious health implications such as migraines (persistent head aches)**
3. Power factor is around 0.9 (lag)	**3. Its blue light can damage retina of human eyes. So sustained/continued exposure to this kind of lamps is bad for eyes as well as the total health of human beings.**

4. Its disposal finds no problems so far.	
B. Compact Florescent Lamps (FLS)	
1. Moderately Energy Efficient. Its use is widely advocated based on its better energy efficiency when compared with that of ordinary florescent lamps.	**1. Higher Initial cost.**
	2. Its disposal is very difficult, since it contains appreciable quantity of mercury; a toxic material. Actually this aspect works against its use.
	3. Unfriendly to Environment because of its higher mercury content.
	4. Power Factor is around 0.6 (lag)
	5. Quality of light is not good; Colour Rendering Index (CRI) is low or poor.
	6. Its flicker and glare impact human health.
C. Ordinary Florescent Lamps	
1. Initial Investment is affordable	**1. Not Energy Efficient (e.g. 40 W FT lamps consumes SS-60 watts which is not desirable.**
2. Environment friendly i.e. its disposal is not difficult	**2. Power Factor is low (it lies around 0.6 lag)**
3. Does not bring any adverse health effects on humans or impact their eyes.	**3. Poor life span; vulnerable to Power supply. Variations like voltage surges, arc, PF overvoltage; its output is controlled by voltage variations/excursion.**
	4. Requires accessories like starter, choke and holders
	5. Produce electrical noise, radio frequency waves which affect the functioning of radios in the vicinity
	6. compatibility of components with each other is an essential requirement for its smooth functioning

Let us revisit the down side of LED Lamps again. A laboratory study titled "impact of flicker in LED lights on Human Eye and Health in general" indicates,

i.) Exposure to constant flicker and glare emitted by LED lights lead to poor eye high health.

ii.) Its prolonged usage may cause significant problems to human health.

iii.) Its continued exposure leads to head ache (migraine, head ache), eye strain and higher stress which were not attributable to any other physical factor.

In this connection please note that the healthiest light on Earth is "Natural Day light". It has no flickers at all. Higher the flickers rates of light, greater the possibility of head ache and other problems. Children are more vulnerable to the flicker-induced ill effects of LED lamps.

Kindly note how this negative effect, brought by LED lamps impact the end users especially the computer users, vehicle drivers and industrial workers as it is widely applied on domestic areas. Hospitality premises

(Hotels), Hospitals, National & State Highways and other roads and finally commercial establishment, to list a few. Higher flicker rate of LED lamps can cause low productivity and even accidents in Industries. The longer duration of exposure can also result in higher fatique and stress of workers. It may constitute one of the reasons for higher accident rates in high ways and express ways. Have you ever experienced the negative effects on your eyes when you drove a two wheeler and exposed bright light stream from the LED high lights of the opposite vehicles (Both two and four wheelers).

In addition to the adverse impact of flicker of LED lamp, the blue light component of its light can damage retina. Please note that exposure to an intense and powerful LED light is the highest "photo-toxic" and can lead to "irreversible loss of retinal cells" and diminished "sharpness of vision".

The factors that make flickers of LED lamp as our worst enemy are,

- Longer duration of exposure to its light.
- Greater area of retina receiving simulation when it is open to LED light.
- Greater brightness of the LED light flash and
- Its bigger contrast with the surrounding illuminance (light).

Inspite of all these issues LED lights are being manufactured on a larger scale. Why it is so? It is because of the electrical energy savings brought by it. In the electrical energy shortage situation the government finds it easy to catch hold of this straw/latch. So try to boost its usage, notwithstanding its adverse effects. Energy efficiency is now treated as a source of energy generation. Presently the government initiatives are increased at a higher rate to ramp up LED adoption and create awareness of its lower electricity consumption. They also try to make the easy availability of LED lamps at affordable prices coupled with the distribution of these lamps at the subsidies rates.

When this government itself is shepherding the consumer towards LED lamps by laying the red carpet and extending full support for its promotion of LED lamps over FTL and incandescent lamps the manufacturers can be far behind? No they cannot. So they give scant attention to its negative effects albeit they are fully aware of it. LED market is expected to grow around 25% in the coming years. If they try to remedy the negative effects of LED lamps in the production process itself, the cost will go up. Then who will buy these costlier lamps. This is the main obstacle or stumbling block that stands in the way of manufacturing a better LED lamp. Further no standards have so far been set for LED flicker rates in India. Indian make LED bulbs have flickers in the range of 40-80% which is much higher than the related International Standards.

In fine, we have to accept that artificial lighting is an integral part of our lives. It can never be avoided or averted. We spend an average of 10-12 hours beneath these lights. So it is important that the government should come forward to prescribe some standards as in other developed countries for this LED lamps like their flicker rate, the quality of the blue light and their operating frequencies (products below 200 Hz require to have less than 30% flicker rate). The government should also prescribe the photo biological safe standards as done in other countries.

From the above, what inference do you get? I feel that "to get something we have to give something".

Nothing is "free" in our life cycle. It is more or less the reiteration of the well known aphotism viz "what goes around, will come around".

Let me sign up here. Kindly stay tuned. In my next article more focus will be on Harmonics.

(To be continued…)

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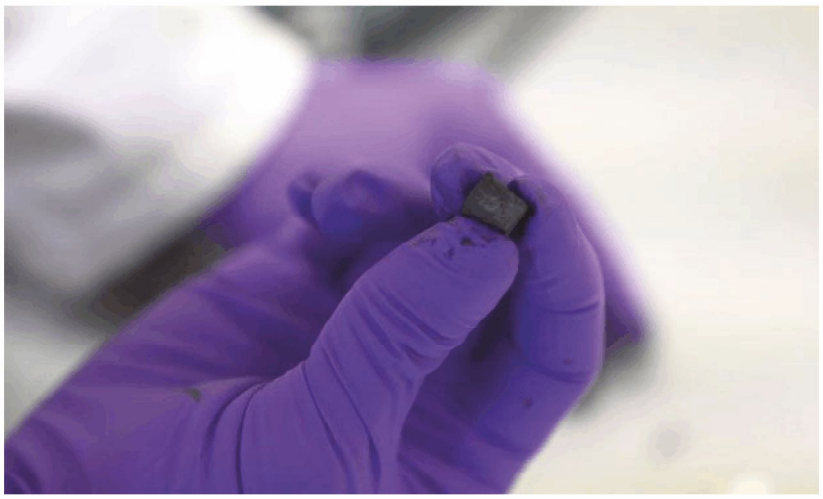
USE SOLAR ENERGY - SAVE COUNTRY

3D-PRINTED SEMICONDUCTOR CUBE COULD CONVERT WASTE HEAT TO ELECTRICITY



From his office at Swansea University in the United Kingdom, associate professor Matthew Carnie has a good view of Tata Steel's furnace stacks. To some, those chimneys rising over Port Talbot are unsightly. To Carnie, they're an opportunity. They emit a good portion of the plant's waste heat, which overall has the same power output as some nuclear plants, says Carnie—around 1,300 megawatts, according to his calculations. With that much potential power waiting to be captured, Carnie and his research team have developed a hybrid, 3D-printed semiconductor material that converts waste heat into electricity. It's 50 percent more efficient than another inexpensive semiconductor material, lead telluride, that's screen-printed, and the new material could be assembled cheaply into a device that converts up to 10 percent of heat wherever it's applied.

"Ideally, they could be deployed in areas where there is high-grade waste heat and be used to generate power to help with energy efficiency," says Carnie. With one-sixth of all energy used by industry in the United Kingdom pouring into the atmosphere as waste heat, the possibilities are big, he says.

Carnie, who has expertise in printed photovoltaics, lately has been exploring the field of thermoelectrics. Here, materials like semiconductors and electrical conductors produce a voltage when hot electrons flow from one kind of heated material to another, relatively cooler kind. To date, the most efficient semiconductor material available is tin selenide, made from tin and selenium. Although it holds the record for efficiency of waste-heat conversion, it hasn't been made into a commercial device.

To work with it, Carnie would need the appropriate rigs—ones that could sinter materials with plasma or press them at high pressures and temperatures in excess of several hundred degrees Kelvin. Those machines were not in his department's budget.

Carnie wondered if he could transfer some of what he knew from printing photovoltaic materials to thermoelectrics. He asked team member and postdoctoral researcher, Matthew Burton, if they could turn tin selenide into an ink. No one had done that before, and Burton was skeptical. But he made it happen by mixing tin and selenium powder with organic binders and water.

Burton then poured the ink into tiny cube-shaped molds about 10 millimeters on each side and dried them in an oven at 120 degrees Celsius. Lastly, he baked the cubeoids at more than 800 degrees K to burn off the organic binders. Efficiency measurements from the first results were promising, says Carnie. In the field of thermoelectric devices, efficiency is measured by a "figure of merit" number, known as ZT. Anything above 1 ZT is considered very promising. Burton's first cubes tested at around .5 ZT. After tweaking the amount of binder and the ratios of tin to selenium, Burton was able to achieve 1.7 ZT. "That is a record for thermoelectric material made in this fashion," says Carnie.

Far more research is needed, says Carnie. For starters, they've made just one of the two different semiconductor materials needed—the type that holds the hot electrons. They still need to make the "cooler" side, where the electrons flow to. But this fall, Tata Steel is sponsoring a PhD student to help develop the second part, and eventually both materials will be sandwiched between slices of ceramic to make a thermoelectric device.

It is not the Government, the members of Parliament to whom the ultimate decision belongs, it is up to you to go forward sure of your sacred right of free opinion, sure of your patriotism.
– JOHN AMERY

AW-ENERGY SUBSTATION FOR NEW SURGE2 OCEAN WAVE ENERGY IN PORTUGAL

AW-Energy (AWE) has now completed the first step by installing a new substation for their SURGE2 project in Peniche, Portugal.

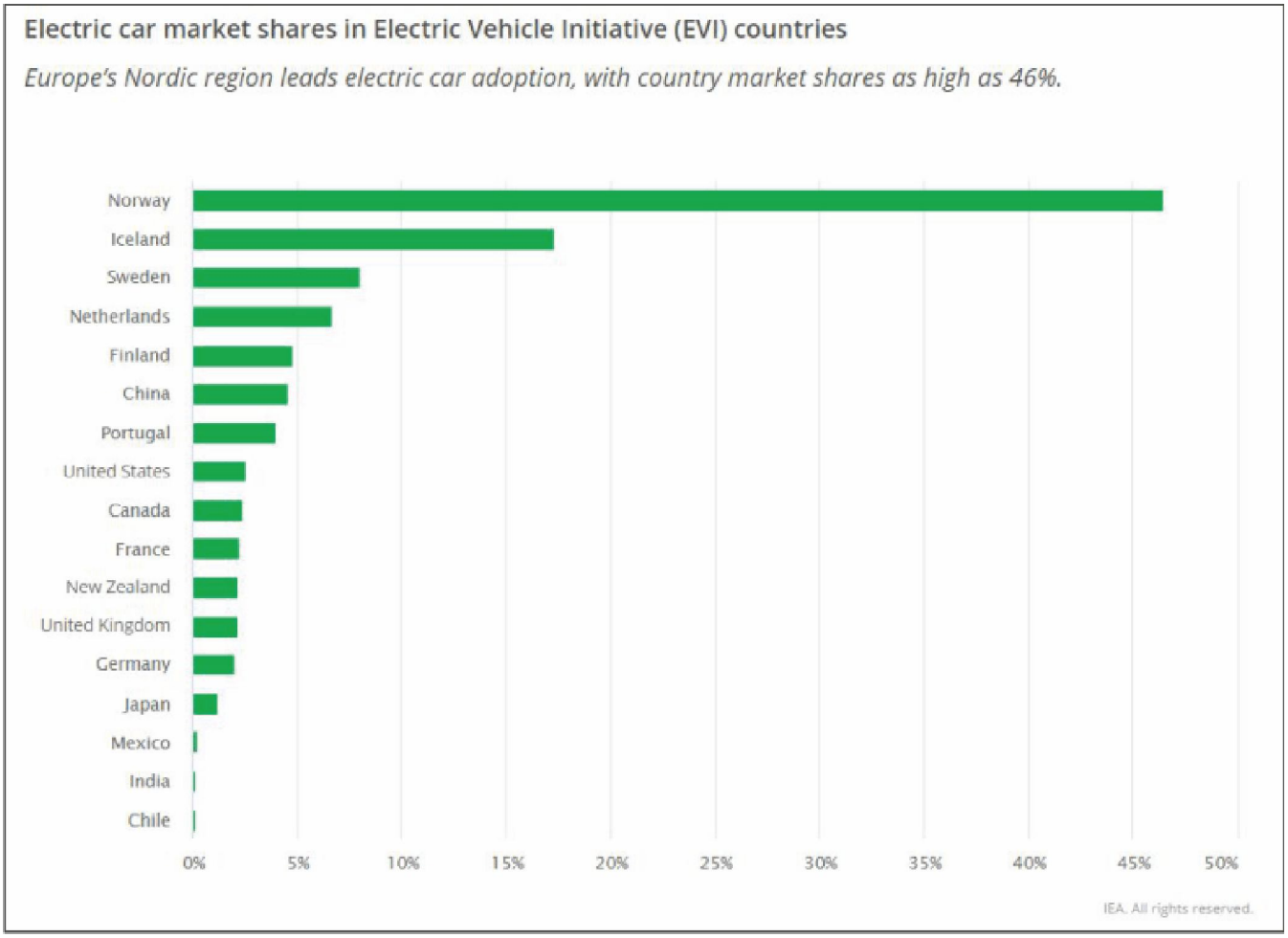
The substation, located on land, connects the WaveRoller device to the grid using transformers, frequency converters and other electrical components. Abeinsa Engineering has been responsible for the project coordination of the new substation's detailed design and manufacturing. The supplier of the substation is PROinSENER Energía. Abeinsa Engineering and PROinSENER Energía are both Spanish companies. AW-Energy sourcing local and global suppliers for serial production AWE has worked with an experienced supply base to build this First-of-a-Kind WaveRoller unit (FOAK). To ensure serial production capacity, AWE is expanding the development of its supply chain by supporting and advancing local production at WaveRoller project sites.

The SURGE2 project follows the successful SURGE project, where AW-Energy demonstrated the technology with a grid connected device producing electricity to the Portuguese grid from a site fully exposed to the ocean storms. This new project, SURGE2, is also designated a FOAK (First of a Kind) project and has been designed to meet ESB's WestWave requirements. Manufacturing of the main components for this new industry (begun in 2016) have been sourced globally - Canada, Finland, Italy, Portugal, Spain, Turkey and the UK. The main subsystems are the foundation, power take off, panel and panel bearings. The project was financed by AW-Energy and a loan from Finland's TEKES (now Business Finland). About the WaveRoller and AW-Energy Oy The WaveRoller is a device that converts ocean wave energy to electricity. The machine operates in near-shore areas (approximately 0.3-2 km from the shore) at depths of between 8 and 20 meters. Depending on tidal conditions it is mostly or fully submerged and fixed to the seabed. A single WaveRoller unit (one panel and PTO combination) is rated at between 350kW and 1000kW, with a capacity factor of 25-50% depending on wave conditions at the project site. The technology can be deployed as single units or in farms. Manufacturing of the main components of the WaveRoller have been sourced in Canada, Finland, Italy, Portugal, Spain, Turkey and UK. The WaveRoller technology provides three unique proven benefits: The WaveRoller is installed and operating in the nearshore area with easy access to the site, protected from extreme conditions with a minimized balance of plant infrastructure cost. It captures power with a bottom fixed panel (oscillating wave surge converter) - this highly efficient power capture can operate in low-, mid- and high-sea states with no cut-off and with only one moving part. It converts movement to electricity using an onboard power storage and hydraulic system - with a smooth and grid-compatible power output, the ability to establish and support the grid and a low maintenance design with an onshore substation.

Read more at: *https://www.offgridenergyindependence.com/articles/17415/aw-energy-substation-for-new-surge2-ocean-wave-energy-in-portugal*

ELECTRIC VEHICLES - TRACKING CLEAN ENERGY PROGRESS

2018 was another record-breaking year for global electric car sales (1.98 million), raising total global stock to 5.12 million. Sales increased 68% in 2018, more than twice the average year-on-year sales growth required to meet the SDS level by 2030. China was the world's largest market (just over 1 million electric cars sold in 2018), followed by Europe (385 000) and the United States (361 000); the three regions made up over 90% of all sales in 2018. Norway continues to have the highest market share for sales (46% in 2018), followed by Iceland (17%) and Sweden (8%). Progress in decarbonising the power sector will accelerate the CO_2 emission reduction benefits of electric vehicles.



Although the global share of electric mobility is still small, the EV fleet is expanding quickly. Ambitious policy announcements have been critical in stimulating the electric mobility transition in major vehicle markets in the past two to three years.

Market developments

2018 was marked by continuous policy and technology announcements in many countries and regions, and global electric car sales accelerated with regards to previous years. The global stock passed the 5 million mark in 2018, with 45% of electric cars on the road located in China, up from just 8% in 2013.

Despite rapid growth in electric car sales over the past decade, the penetration of electric cars is still limited to less than 1% of the global car fleet today. In the Sustainable Development Scenario (SDS), 15% of the global car fleet is electric by 2030, requiring annual average growth of 30% per year between 2018 and 2030. Since PHEV models became widely available on the market around 2012, the share of BEVs in the total electric car stock has remained steady at close to 60%, increasing slightly to 64% in 2018.

BEVs make up 75% of electric cars in China and 57% in the United States, whereas PHEVs clearly dominate the market in several European countries, e.g. the United Kingdom and Sweden.

Electrification continues to expand in other road transport modes as well.

The stock of electric two-wheelers represents more than 25% of all two-wheelers on the road, and they are mostly in China (95%), India and ASEAN member countries. Electric micro-mobility is also becoming more popular in many large cities owing to shared bicycle and foot scooter schemes.

Electric bus sales declined slightly (by 12%) from 2017 to 2018, with 92 000 units sold, and total electric bus stock reached 460 000. The electric bus market is still driven mainly by China, which accounts for 99% of the market, but increasing numbers of electric buses are being procured in Europe, India and Latin America.

Most medium- and heavy-duty electric trucks on the road are in China, where truck sales for 2018 are estimated at 1 000 to 2 000. In Europe, a group of original equipment manufacturers (OEMs) has delivered electric medium-freight trucks to selected fleet operators for commercial testing. Even shipping and aviation are making progress on electrification, as multiple electric ships are in operation in Europe and China (Electrek, 2017; 2018) and several prototype electric planes are at an early development phase (Bloomberg, 2019).

Policy developments

Several key regions are ramping up policy efforts to electrify various transport modes, and policy action is also spreading to smaller markets. The European Union approved a new fuel economy standard for cars and vans for 2021-30 and a CO_2 emissions standard for heavy-duty vehicles (2020-30), with specific requirements or bonuses for EVs. In addition, an agreement for revising the Clean Vehicles Directive will accelerate the adoption of electric buses (and other publicly procured vehicles) in EU countries, setting specific targets for 2025 and 2030.

China is updating its fuel economy standard to 2025 and has announced a voluntary fuel economy standard for EVs. It is also scaling back subsidies for EV purchases and for battery manufacturers, but it maintains its zero-emissions vehicle mandate scheme, which sets a minimum production requirement for the car manufacturing industry. India is ramping up EV support through phase 2 of its Faster Adoption and Manufacturing of Electric Vehicles scheme, focusing on two-wheelers, fleet vehicles and buses. Other countries with increasing policy activity to support EVs are Canada, Costa Rica, Chile and New Zealand. In 2018, more than 90% of global car markets in terms of sales (representing over 50 countries) had EV incentives in place, whereas 80% had support policies for charging infrastructure. However, other policies also impact the EV market, such as building codes for the installation of charging infrastructure and demand-response policies for grid services.

Given the strategic relevance of batteries for industrial development and the clean energy transition, governments are supporting investments in battery manufacturing facilities and innovation in battery technology.

Technology developments

Automotive batteries are a major cost component of EVs. In 2018, the average lithium battery price fell 18% from 2017, to USD 176 per kWh (BNEF, 2018). With battery production expected to grow nearly thirty-fold by 2030 in the SDS, significant battery cost reductions can be expected through the conjunction of battery pack size increase, battery chemistry changes and economies of scale thanks to increasing manufacturing plant size.

The growing size of the Chinese and, more broadly, the global automotive battery market is instrumental to reap the benefits of economies of scale, as it prompts battery manufacturing capacity expansion. While most production is currently still sourced from small plants (capacities of 3 GWh to 8 GWh per year), several recent announcements of production capacity expansions point to an increase in plant size as well as new entrants in the automotive battery market, adding to increases in the capacity utilisation rates of existing plants (Benchmark Minerals, 2018).

Each of the three largest battery factories currently in operation, all recently built, have a capacity of 20 GWh/year and account for roughly 21% of the total installed capacity (EV Volumes, 2019). Original equipment manufacturers (OEMs) have set a wide range of targets to supply the vehicle market with EVs. The number of EV models is expanding rapidly: car makers have announced dozens of models in various size

segments, most of them coming online in the first half of the next decade. Overall, the production and sales targets that car makers have set place them on the SDS trajectory towards 2025.

Policies for the early EV market

EV policy actions depend on the status of the EV market or technology. Setting vehicle and charger standards is a prerequisite for EV adoption.

In the early stages of EV deployment and diffusion, public procurement schemes (for buses and municipal vehicles, for instance) have the double benefit of demonstrating the technology to the public and providing the opportunity for public authorities to lead by example. Importantly, they also allow the industry to produce and deliver bulk orders to initiate economies of scale. Emerging economies can scale up their policy efforts both for new vehicles and second-hand imports.

Tax rates adapted to the tailpipe CO_2 emissions of vehicles are important to ensure that the policy environment is conducive to increased EV uptake. Fiscal incentives at vehicle purchase, as well as complementary measures that enhance the value of driving electric on a daily basis (e.g. preferential parking rates, road toll rebates and low-emission zones) are pivotal to attract consumers and businesses to EVs at an early market stage.

Regulations

More comprehensive policies are critical to lay the foundation for a transition to electrification and to assuage stakeholder uncertainties. Increasingly stringent regulations on tailpipe CO_2 emissions and mandates requiring that automakers sell a minimum share of zero- or low-emission vehicles are well suited to this purpose.

Taxes and incentives

Foregone revenues from fuel taxation calls for alternative tax approaches, to be anticipated early and deployed as larger volumes of alternative powertrains enter circulation. Taxation based on vehicle activity (e.g. distance-based pricing) is well suited to a context in which various powertrain technologies share the road space (vs. fuel-based taxation). This type of taxation can be effective in recovering funds needed for investing in and maintaining transport infrastructure, giving a price to the local pollutant emissions (based on their health and environmental impacts) and reducing traffic congestion.

Infrastructure

Policy makers will also need to set appropriate signals for charging infrastructure and grid service businesses to enable viable business models to emerge and to facilitate smooth EV integration into power grid operations.

Batteries for electric vehicles

Environment, energy and resource ministers should enable the scale-up of battery manufacturing by creating a policy framework that reduces investment risks, e.g. by providing clear signals on the deployment of charging infrastructure, fuel economy standards and low- or zero-emission mandates.

They should also support the establishment of automotive battery production value chains (from raw material extraction, sourcing and processing, battery materials, cell production and battery systems to reuse and recycling) by identifying key industry participants and establishing a dialogue to understand what the main priorities are to enable them to scale up capacity and investments to develop the value chain.

Governments should help create platforms to assess the critical impacts of new-generation lithium-ion (Li-ion) and other battery technologies, which might have unforeseen environmental consequences (e.g. lithium or nanomaterial dispersion). These policy frameworks should give value to the sustainability of battery cell manufacturing to ensure that all stakeholders have an interest in developing the battery value chain with the smallest possible environmental footprint. Multilateral development agencies should strengthen funding for battery manufacturing, coupling it with requirements for sustainable battery cell manufacturing (e.g. with respect to the transparency of supply chains).

Finally, academic institutions and training centres should be well equipped to close skill gaps to enable the timely formation, development and strengthening of the professional profiles needed for the entire battery value chain.

FLEXIBLE GENERATORS TURN MOVEMENT INTO ENERGY

Wearable devices that harvest energy from movement are not a new idea, but a material created at Rice University may make them more practical. For more information see the IDTechEx report on Energy Harvesting Microwatt to Megawatt 2019-2029. The Rice lab of chemist James Tour has adapted laser induced graphene (LIG) into small, metal-free devices that generate electricity. Like rubbing a balloon on hair, putting LIG composites in contact with other surfaces produces static electricity that can be used to power devices. For that, thank the triboelectric effect, by which materials gather a charge through contact. When they are put together and then pulled apart, surface charges build up that can be channeled toward power generation. In experiments, the researchers connected a folded strip of LIG to a string of light-emitting diodes and found that tapping the strip produced enough energy to make them flash. A larger piece of LIG embedded within a flip-flop let a wearer generate energy with every step, as the graphene composite's repeated contact with skin produced a current to charge a small capacitor.

LIG is a graphene foam produced when chemicals are heated on the surface of a polymer or other material with a laser, leaving only interconnected flakes of two-dimensional carbon. The lab first made LIG on common polyimide, but extended the technique to plants, food, treated paper and wood. The lab turned polyimide, cork and other materials into LIG electrodes to see how well they produced energy and stood up to wear and tear. They got the best results from materials on the opposite ends of the triboelectric series, which quantifies their ability to generate static charge by contact electrification. In the folding configuration, LIG from the tribo-negative polyimide was sprayed with a protecting coating of polyurethane, which also served as a tribo-positive material. When the electrodes were brought together, electrons transferred to the polyimide from the polyurethane. Subsequent contact and separation drove charges that could be stored through an external circuit to rebalance the built-up static charge. The folding LIG generated about 1 kilovolt, and remained stable after 5,000 bending cycles. The best configuration, with electrodes of the polyimide-LIG composite and aluminum, produced voltages above 3.5 kilovolts with a peak power of more than 8 milliwatts.

RE TO BE THE PRIMARY SOURCE OF ENERGY BY 2040 BETTERING COAL : BP ENERGY OUTLOOK

Renewable energy is the fastest growing source of energy, accounting for around half of the growth in energy and is set to enter the global energy system more rapidly than any fuel before in history, as per BP Energy Outlook

Energy Outlook deliberates the energy transition from three different viewpoints, each of which helps to illuminate different aspects of the transition: the sectors in which energy is used; the regions in which it is consumed and produced, and the consumption and production of different fuels. The report highlights how the transition to a lower-carbon energy system is opening up a wide range of business possibilities.

According to the report, there is a robust link between human progress and energy consumption. The United Nation's Human Development Index (HDI) suggests that increases in energy consumption up to around 100 Gigajoules (GJ) per head are associated with substantial increases in human development and well-being, after which the relationship flattens out. Around 80% of the world's population today lives in countries where the average energy consumption is less than 100 GJ per head.

Improving energy efficiency in countries which use disproportionate amounts of energy is likely to be the key to solving the dual challenge of providing more energy and less carbon. Almost all of the growth in power demand stems from developing economies, led by China and India. The demand growth in the Organization for Economic Cooperation and Development (OECD) countries is much smaller, reflecting both slower economic growth and weaker responsiveness of power demand to economic growth in more mature, developed economies. The mix of fuels in global power generation shifts materially, with renewables gaining share at the expense of coal, nuclear, and hydro. The share of natural gas is broadly flat at around 20%.

The report points that in an evolving transition scenario, renewables account for around two-thirds of the increase in power generation, with their share in the global power sector increasing to around 30% by 2040. In contrast, the share of coal declines significantly, such that by 2040, it will be surpassed by renewables as the primary source of energy in the global power sector. The growth in renewable energy will be dominated by the developing world, with China, India, and other parts of Asia accounting for almost half of the growth in global renewable power generation.

By the mid-2020s, India is expected to outshine China as the world's largest growth market, accounting for over a quarter of the growth in global energy demand according to the report. However, China is expected to remain the largest market for energy, roughly double the size of India in 2040. In the Indian context, the capacity addition for renewable energy projects fell from 15 GW in 2017 to 14 GW in 2018. Solar PV, which was a substantial contributor to renewable energy capacity addition, is projected to lag this year because of the cancellation of several tenders, complexities about taxation and the general election. Besides the cancellation of tenders, lingering uncertainties around the imposition of safeguard duty and GST have also stalled the development of various projects across the country.

SMART AND SUSTAINABLE, BUT ARE THESE GREEN BUILDINGS SECURE?

Buildings might not be the first thing that comes to mind as potential cyber-crime targets. But where there is an internet connection, there is cyber risk, and today's smart buildings, connected to user devices, control systems, and public infrastructure, in the pursuit of greater efficiency, are not immune.

In the last couple of decades, building systems have become more energy efficient and more sustainable. This transformation has often involved installing building automation systems in a bid to reduce energy wastage, control a building's heating, ventilation and air conditioning, lighting and other system with minimal human control. In turn, powering building automation systems usually requires stuffing buildings to the gills with IoT (Internet of Things) and AI (artificial intelligence) technologies such as sensors and internet-connected data transmitters; almost every facet of building functions in such buildings are connected to each other in some way.

A 2017 report by analyst house ABI Research estimates that by 2020, more than 8 million building management systems globally will incorporate some form of IoT technology; the actual number may turn out even higher. But even as the discussion around smart and sustainable cities and buildings races ahead, the cybersecurity discussion is lagging, say engineers and real estate professionals.

A little-considered risk with big potential

While Singapore has been lucky to suffer only very minor cyberattacks on its buildings to date, incidents in other parts of the world highlight how disastrous a lapse in a building's cybersecurity can be.

In Austria, hackers attacked the electronic key system of a four-star hotel in 2017, locking guests out of their rooms and leaving the hotel unable to create new keys until a ransom was paid. In the US that same year, a casino lost 10GB of data siphoned out through an internet-connected fish tank. In late 2017, the Triton malware sparked global alarm by causing actual physical damage to industrial systems.

Derek Teo, leader, special verticals and key account management at Johnson Controls, notes: "Data theft is one thing. With physical infrastructure, we are also looking at the ability of malicious parties to control a building from the outside." "In the worst case scenario, someone could get into a hospital's controls and turn off the power to the operating theatres. Or they could take over a warehouse and disable the chillers," says Teo. "The attackers might target just one tenant, but everyone in the building will be hit."

Cybersecurity firms have been warning of vulnerabilities in smart buildings for several years, with some firms even predicting that building automation systems will become the next entry point for major ransomware attacks. One chink in a building system's armour is the layering of new technology over older or unsuitable frameworks, say researchers and engineers.

Joe Poon, managing director of Surbana Jurong's smart city solutions division, explains: "The biggest cybersecurity challenge facing buildings becoming smart is the tension between new, IoT-based systems and the old networks, built on a system called SCADA." SCADA—supervisory control and data acquisition—systems are a form of centralised control more commonly associated with industrial automation. "The old SCADA networks were mostly designed without consideration of cybersecurity as the risk of cybersecurity breaches were low back then, says Poon.

"But new smart building systems must still capture data from these old systems and transmit it over the internet, exposing buildings with active old SCADA systems to cybersecurity threats which they were never designed to handle," he adds.

Right alongside technological vulnerabilities is the issue of user complacency. For instance, Teo says that the Johnson Controls teams have encountered clients who, accustomed to using an isolated server that is not at risk because it is not connected to the internet, remain indifferent or even resistant to implementing cybersecurity measures even after the building management system is upgraded and connected to the internet, or even shifted to the cloud entirely.

"Awareness is low and some of them are conservative about change," says Teo. "Cost is the main factor that makes them resistant." Teo adds that while some companies might have a strong IT department or robust cybersecurity policies, all that can be voided by a lack of awareness at the facility management level.

Many building and construction companies in Singapore appear unwilling to speak about cybersecurity—though it is unclear if the reticence is due to security concerns or a lack of focus on the issue. The overwhelming majority of real estate firms approached by Eco-Business declined to comment.

Where do we start?

Ideally, say industry experts, cybersecurity should be built in from day one. For new buildings, it needs to be integrated into the planning and design stages, while in older buildings undergoing retrofit, existing systems must be revisited and given the same rigorous consideration as the new technologies being added.

And although this may represent added costs, building owners need to be forward-thinking about the issue, warn cybersecurity advocates. "There are two ways of looking at cost," says JLL's Clifford. "One: the upfront costs of building cybersecurity in from day one, and designing your building with digital safety measures in mind." "Two: the reputational cost of a breach," Clifford says. "If you are a bank, and someone hacks into your building's functions, even if they do something simple like causing your elevators to stall, what are your clients going to think? Will they still feel safe with you?"

More importantly, people' —building managers, operators and end users' —have to be on board with the idea of keeping buildings secure, says Clifford, pointing out that research shows that the most effective cybersecurity breaches start with human error.

Johnson Controls' Teo says that awareness among facility managers can be improved. His team provides training to customers to keep them informed on the latest cybersecurity trends and threats from an IoT perspective, highlighting gaps, possible consequences, and ways to mitigate risk.

Surbana's Poon recommends starting with comprehensive security policies on data access and usage, and then building cybersecurity plans around those. But, he cautions, security policies are ultimately constrained by the practical need to keep systems useable. "There will be a trade-off between security and convenience for end users," he says.

Converging a building's facility network as well as enterprise and IT systems will inevitably increase security vulnerabilities, remarks Teo, with challenges stemming from different communication protocols and unclear priorities among different stakeholders.

"But these can all be surmounted by working closely with building stakeholders and trusted vendors throughout planning, implementation, testing and even maintenance. A thorough understanding of the different use cases is very important," he says.

Ultimately, cybersecurity for today's sustainable buildings may come down to treating building automation systems with the same abundance of caution shown to any other internet-connected network.

A Parliament is nothing less than a big meeting of more or less idle people.
– WALTER BAGEHOT

THE MINISTER FAVOURS THE REMOVAL OF THE PRIORITY SECTOR LENDING LIMIT ON RE SECTOR

Shri RK Singh reviews the issues pertaining to Renewable Energy sector, calls upon the lenders to fund RE projects .The Minister favours the removal of the priority sector lending limit on RE sector SECI to offer predetermined loans to successful bidders

Shri RK Singh, Union Minister of State (IC) for Power and New & Renewable Energy held a meeting to review various issues pertaining to the Renewable Energy (RE) sector here today. The meeting was attended by various stakeholders including the Secretary, MNRE, senior officials from MNRE, Department of Economic Affairs, Dept. of Expenditure, Dept. of Financial Services, Dept. of Revenue and representatives of Public/Private banks and Financial Institutions.

In the meeting, it was decided that MNRE would follow up with RBI for removal of the priority sector lending limit for RE sector. This will encourage the PSBs to lend more for RE projects and help RE developers access easy finance.

In the meeting Shri RK Singh also asked the Banks/Financial Institutes to categorize RE as separate sector different from power sector so that funds would flow to RE projects. He further said that current tariff rates discovered for various RE projects are viable as the maintenance/running cost of RE projects is very less in long run. He also added that with time, the cost of RE technology is coming down whereas the efficiency of RE equipments is improving day by day. So the low tariffs are not an aberration. The Minister also requested banks to come forward to lend to RE sector.

On the issue of delays in land acquisition for RE projects, the Minister said that SECI will be tying up with State Governments for the land. As the land will be on lease, therefore there won't be any upfront payment for the land. It will also tie up transmission while floating bids. Banks/Financial Institutions were asked to tie up with SECI for offering predetermined loans to successful bidders.

Discussions were held about the GST issues on RE equipments/ components and Dept. of Revenue was requested to place appropriate proposal before the GST council. The issue of inverted duty structure also

came up for discussion during the meeting. The Minister said that every measure need to be taken to promote manufacturing in RE sector in the country, including corrections of duty structure and approval of a scheme to provide capital subsidy.

Discussions were held on starting a pilot project to promote solar cooking in the households.

BRIEF PROFILE:

Shri RK Singh took over as the Union Minister of State (IC) for Power and New & Renewable Energy here, today. He was greeted at the office by Shri Ajay Kumar Bhalla, Secretary, Power and Shri Anand Kumar, Secretary, MNRE along with the senior officials of the Ministries.

Shri RK Singh has served as the Union Minister of State (IC) for Power and New & Renewable Energy since September, 2017. He is currently a Lok Sabha Member of Parliament (MP) from Arrah constituency in Bihar. In 2014, he was elected as Lok Sabha MP from the same seat.

As the Power Minister, Shri Singh is credited with achieving near universal household electrification in India under the Saubhagya scheme.

Prior to joining the Bhartiya Janta Party (BJP) Shri RK Singh has been an IAS officer with an impressive career record spanning nearly four decades. As a civil servant, he has held many important positions including those of Secretary, Department of Defence Production and Secretary, Home Affairs. As Principal Secretary, Road Construction Department of Bihar, he was widely credited with transformation of the road network of the State.

Shri Singh was born on 20 Dec 1952 at Supaul (Bihar). He holds several degrees including B.A. (Hons.) in English Literature, LL.B. and Diploma in Management.

Briefly interacting with the media after taking charge, Shri Singh said that his priorities would be to ensure quality, reliability and affordability of power. He further said that "We will overcome the challenges and would maintain the pace of growth in power sector." The Minister also emphasised on working towards the right energy mix to meet India's international obligations.

MNRE

WORLD FIRST: SIEMENS GAMESA BEGINS OPERATION OF ITS INNOVATIVE ELECTROTHERMAL ENERGY STORAGE SYSTEM

In a world first, Siemens Gamesa Renewable Energy (SGRE) has today begun operation of its electric thermal energy storage system (ETES). During the opening ceremony, Energy State Secretary Andreas Feicht, Hamburg's First Mayor Peter Tschentscher, Siemens Gamesa CEO Markus Tacke and project partners Hamburg Energie GmbH and Hamburg University of Technology (TUHH) welcomed the achievement of this milestone. The innovative storage technology makes it possible to store large quantities of energy cost-effectively and thus decouple electricity generation and use.

The heat storage facility, which was ceremonially opened today in Hamburg-Altenwerder, contains around 1,000 tonnes of volcanic rock as an energy storage medium. It is fed with electrical energy converted into hot air by means of a resistance heater and a blower that heats the rock to 750°C. When demand peaks, ETES uses a steam turbine for the re-electrification of the stored energy. The ETES pilot plant can thus store up to 130 MWh of thermal energy for a week. In addition, the storage capacity of the system remains constant throughout the charging cycles.

The aim of the pilot plant is to deliver system evidence of the storage on the grid and to test the heat storage extensively. In a next step, Siemens Gamesa plans to use its storage technology in commercial projects and

scale up the storage capacity and power. The goal is to store energy in the range of several gigawatt hours (GWh) in the near future. One gigawatt hour is the equivalent to the daily electricity consumption of around 50,000 households.

"Decoupling generation and consumption of fluctuating renewable energy via storage is an essential contribution to implementing the energy system transformation. We therefore need cost-effective, efficient and scalable energy storage systems," demands Andreas Feicht, State Secretary at the Federal Ministry of Economics and Energy.

"With the commissioning of our ETES pilot plant, we have reached an important milestone on the way to introducing high-performance energy storage systems. Our technology makes it possible to store electricity for many thousands of households at low cost. We are thus presenting an elementary building block for the further expansion of renewable energy and the success of the energy transition," says Markus Tacke, CEO of Siemens Gamesa Renewable Energy. The technology reduces costs for larger storage capacities to a fraction of the usual level for battery storage.

The Institute for Engineering Thermodynamics at Hamburg University of Technology and the local utility company Hamburg Energie are partners in the innovative Future Energy Solutions project, which is funded by the German Federal Ministry of Economics and Energy within the "6. Energieforschungsprogramm" research programme. TU Hamburg carries out research into the thermodynamic fundamentals of the solid bulk technology used.

By using standard components, it is possible to convert decommissioned conventional power plants into green storage facilities (second-life option). Hamburg Energie is responsible for marketing the stored energy on the electricity market. The energy provider is developing highly flexible digital control system platforms for virtual power plants. Connected to such an IT platform, ETES can optimally store renewable energy at maximum yield.

VERY HEAVY RAIN BOUTS ARE ON THE WAY

Canadian scientists have examined an exhaustive collection of rain records for the past 50 years to confirm the fears of climate scientists: bouts of very heavy rain are on the increase.

They have measured this increase in parts of Canada, most of Europe, the US Midwest and Northeast, northern Australia, Western Russia and parts of China. Between 2004 and 2013, worldwide, bouts of extreme rainfall rain increased by 7 per cent. In Europe and Asia, the same decade registered a rise of 8.6 per cent in cascades of heavy rain. The scientists report in the journal Water Resources Research that they excluded areas where the records were less than complete, but analysed 8,700 daily rain records from 100,000 stations that monitor rainfall worldwide. They found that from 1964 to 2013, the frequency of catastrophic downpours increased with each decade.

"By introducing a new approach to analysing extremes, using thousands of rain records, we reveal a clear increase in the frequency of extreme rain events over the recent fifty years when global warming accelerated," said Simon Papalexiou, of the University of Saskatchewan's college of engineering.

"This upward trend is highly unlikely to be explained by natural climate variability. The probability of this happening is less than 0.3 per cent under the model assumptions used." As temperatures rise, evaporation increases. A warmer atmosphere can absorb more moisture: capacity increases by 7 per cent with each extra degree Celsius on the thermometer. Moisture absorbed into the atmosphere will inevitably fall again.

Flash flood threat

The world has warmed by at least 1°C in the last century, thanks to ever-increasing use of fossil fuels, and hydrologists, engineers and planners have been warning for years that human settlements and low-lying terrains have a rainfall problem, in the form of flash floods that can overwhelm sewage treatment plants and increase water contamination: rain-induced floods have claimed half a million lives since 1980. Such floods – and other studies have confirmed their increase – trigger landslides, wash away crops, overwhelm buildings and bridges, flood homes and block road transport.

And they could be expected to increase even more because of the phenomenal growth of the world's cities, covering more ground with brick, tile, cement and tarmacadam, to reduce the available marsh, forest and grassland that usually absorbs much of any downpour. Scientists have measured alarming increases in rainfall in urban Australia, linked the catastrophic floods delivered by Hurricane Harvey in 2017 over Houston in Texas to global warming, and warned more and worse is on the way.

Start planning now

"If global warming progresses as climate model projections predict, we had better plan for dealing with frequent heavy rain right now. "Our study of records from around the globe shows that potentially devastating bouts of extreme rain are increasing decade by decade," Dr Papalexiou said.

"We know that rainfall-induced floods can devastate communities, and that there are implications of increasing bouts of heavy rain for public health, agriculture, farmers' livelihoods, the fishing industry and insurance, to name but a few."

There are many members of parliament present here who know as well as I do that, if a man has not already been converted, it will require a great deal more than a letter of appeal to achieve conversion. – FREDRIK BAJER

OUTSTANDING WATER CONSERVATION METHODS

The following methods would prove useful for it:

1. Protection of Water from Pollution;

If the total fresh water available on the earth remains pollution free, it is sufficient to meet the drinking water needs of the existing population of the world, unfortunately a large portion of fresh water does not remain fit for use of the living world due to increasing economic activities, urbanization etc.

Oceanic water in the form of ecological system of seas is an important environmental system, but during the last century pollution has spread in large proportions.

Surface water is mainly found in rivers and lakes and underground water is found under land at different depths, but which have become polluted.

Large cities located on banks of rivers are directly disposing off different wastes without treatment in rivers. Similarly, tourism has spread pollution at war speed on famous lakes and sea coasts. Man is greatly dependent on groundwater for his water related necessities, but some special industrial units have also polluted this amount of water stored in the security cover of the ground.

All the available water store on the earth should be kept pollution-free because pressure of demand for water is increasing on a large part of the earth. Normally, it is presumed that sea water being saline, is not fit to be used by human beings, but indirectly it is useful for maintaining living organisms with whom man is related, e.g., fish provide nutrition to a large portion of the world.

Hence, it is necessary to have a cooperative policy at the international level for control of oily and radioactive pollution of the oceans. On 18th November, 2002, an oil tanker of Bahama met with an accident and drowned in the sea near the 'Coast of Death' sea area 233 km from north-west coast of Spain. 77,000 metric tones of oil poured out from this tanker and spread over the nearby seas and polluted the sea water. During the Gulf War of 2003 also, the water of Red Sea, Gulf Persian and Mediterranean Sea adjacent to the Arabian Sea became polluted.

The origin of water crisis initially started due to its pollution and qualitative deterioration, which became acute due to increasing demand for it. For preventing water pollution, important water sources should not be made places for disposal of wastes. Industrial units should dispose off water only after its treatment. Bathing and other such activities should be prohibited near drinking water sources.

Weeds produced in water should be controlled. Water should become re-usable after physical, chemical, mechanical and organic processing methods. Rivers and lakes should not be used as canals for transport of goods as is being done in Rhine River of Europe, Volga river of Russia, and the Ganges, Yamuna and Kaveri (Cauvery) rivers in India. Thus, the most important aspect of water conservation is control on water pollution.

2. Redistribution of Water:

Water found on the surface of the earth is not equally distributed. Existing form of distribution also becomes a reason for the water crisis. In the African continent, though there is maximum hydro electric production because of excess availability of water in Mediterranean regions, but the Sahara desert situated in the north of Africa and the greatest desert of the world, suffers from water crisis for the whole year.

Droughts faced by the Sahel region in the north of Sahara desert are world famous. Similarly, there is maximum rainfall of the world (1,187 cm. in Mawsynram) in north-east India, whereas there is only 50 cm. rainfall in the west. As a result of it, more than 60 per cent portion of water of Brahmaputra and its companion rivers in the north east flows to the saline seas uselessly, whereas rivers of western Rajasthan remain dry for most of the time in a year.

Hence, by arranging supply of water from areas having lesser demand to the areas having greater demand, water crisis can be minimized. By construction of surface water reservoirs and storage of excess water in them,

supply can be made to scarcity affected areas. This work can be accomplished by development of water reservoirs and canal network.

Excess rainfall water which flows away from rivers without being used, can be stored by construction of water reservoirs, from where it can be supplied for agriculture, industries, urban areas etc. Facilities of fisheries and transport also exist in stored water. These reservoirs are also constructed for protection from floods, and apart from flood protection, such water can also be used for different purposes.

Redistribution of water is also possible through canal system. Canal system transfers water from excess rain water areas to scarce rain water areas and conserves water for different uses. Indira Gandhi Canal is such a type of canal system which has brought water of Himalayas to western Rajasthan and changed the arid ecology. K.L. Rao, the then Irrigation Minister, had drafted this plan by the name of 'Ganga-Kaveri Grid'.

Its length was decided as 2640 km in the beginning, which had to link river Ganges of north India with river Kaveri known as 'Ganges of the South'. It was also proposed to include central rivers Narmada, Tapti, Godavari, Krishna and Pensnar falling in the way. Former President of India A.P.J. Abdul Kalam took a lead in 2003 for its implementation and its work is being started by giving a modern shape to it. It will be able to transfer water from excess rainfall water areas to scarce rainfall areas every year.

Thus, by developing artificial canal system through artificial rivers, excess water can be conserved. For this, canal system should be developed from national level to micro level. Along with big rivers, canal system should also be developed by the side of small rivers to conserve large amounts of water. Though development of canal system will have to face geographical, economic, social, cultural (rehabilitation) and political problems, but its future results would be favourable from the geographical point of view.

3. Rational Use of Groundwater:

Groundwater meets 25 per cent of total supply of water in the world, remaining 75 per cent supply is met by surface water sources of rivers, lakes etc. Demand for groundwater goes on increasing in proportion to its available quantity due to which quantity of groundwater goes on decreasing. After exploitation of groundwater, its re-infiltration takes a very long time to complete.

Hence, groundwater exploitation should be only in proportion to its recharging capacity. In India, the maximum groundwater is utilized for agriculture. Instead of growing crops requiring water according to agricultural climatic conditions, crops of commercial importance requiring more water are grown, due to which overexploitation of groundwater is done.

In Rajasthan, out of 237 blocks, 203 were in the safety zone from the point of view of groundwater in 1984, but due to excessive over exploitation of groundwater during the last two decades, the number of safety blocks reduced to only 49 in the year 2001. Remaining blocks have gone to the 'Dark Zone', where groundwater is not available in the required quantity for different uses in future.

By making only conscientious exploitation of groundwater, it can be proportionately conserved. For that, crops requiring lesser water should be given priority over crops requiring more water. Lesser water should be used by industries. For recharging ground-water, necessary drainage area should also be made available.

4. Population Control:

Water crisis has assumed dangerous proportions due to fast increase in population and deterioration in quantitative and qualitative aspects of water resources. Demand for water is continuously increasing. Along with population increase, demand for fresh water has increased due to expansion of industries and increasing urbanization.

Demand for water increased 35 times from the year 1700 to the decade of 2000. Demand for water has increased more in developing countries. For the year 2001, demand for quantity of water in the whole world was estimated to be 435 cubic kms. 60 per cent of this is required in agriculture, 30 per cent in industries and 10 per cent for cooking, bathing and drinking. Hence, demand for water can also be controlled through population control and at the same time, qualitative deterioration of water can also be prevented by population.

Population of the world would become around 800 crores by the year 2025. In this context, the United Nations Organization has warned that in case population control is not exercised, the whole world will have to face grave water crisis. United Nations Organi-zation declared the year 2003 as the 'Fresh Water Year'.

5. Renovation of Traditional Water Sources:

In India, traditional water storage places have been able to meet the demand of drinking water in many regions but they have been renovated from time to time. Water stored in traditional water sources has been used for both purposes, agriculture as well as for drinking.

Important traditional water conservation methods for irrigation include Kuhul in hilly areas, Jing (Ladakh), Kool, Water Kundis called Khoop in Arunachal Pradesh, Zabo method of Nagaland, Aabi tanks of Haryana, Dong Pokhar of Assam, Bandhare of Maharashtra, Kere of Karnataka, Iree (Tanks) in Tamil Nadu, jackwell of Andaman Nicobar and Nadi, Tanka, Kund, Khadeen, Kui, Bedi, Baori, Jhalra, Toba etc. of Rajasthan.

Beginning of traditional water conservation methods was made in Java (Jordan) in the year 3,000 B.C. by construction of a vast water reservoir. In India, a system of water conservation and drainage was found in Dhauliveera habitations 1000-1500 B.C., which was constructed during the Harappan civilization.

These traditional water conservation methods had been developed in India looking to the nature of rainfall in different regions, but the increasing population necessitated extension of agriculture, leading to deterioration of these traditional sources. Conservation of any traditional water source, instead of being limited to the water reservoir portion, extends to the whole drainage area system where rain water is stored after flowing.

Due to increasing area of agriculture, drainage area of water has been destroyed resulting in reduction of water flow therein. This has caused crisis for the existence of traditional water sources. Water crisis can be prevented by renovating traditional water conservation sources. Unless complete conservation of rain water is done in any region, the dream of water conservation cannot be fulfilled. Hence, supervision has to be done regarding renovation of dying traditional water conservation places.

Now, the whole world has agreed with this fact that water available in its vast form also shall have to be conserved to keep it within our reach. From this point of view, ownership of traditional water sources should be at the village level as has also been agreed by the World Bank.

6. Use of Modern Irrigation Methods:

At the world level, 69 per cent water is used for the agricultural sector. Necessary requirement of water in agriculture is met by surface water sources and groundwater. Surface water used for agriculture is obtained through canals and tanks and underground water from wells and tube wells. Unfortunately, much water is wasted through traditional methods of irrigation. Canal irrigation does not distribute water in a balanced way and it creates problems of water logging.

A large portion of water can be conserved by adoption of modern methods of irrigation. Irrigation consumes double the quantity of water in comparison to all other uses. Sprinkler and drip irrigation methods save 50 percent water.

In drop or drip irrigation method, pipes with holes are spread over the surface of land so that the crop directly receives water. There is no loss due to evaporation in this system and almost 95 percent water is utilized. Thus, maximum water is utilized by this method. Improved modern irrigation methods are thus useful for conservation of water.

7. Increasing Forest Cover:

According to hydrological movements, water is received through rainfall every year in different quantities on the surface of the earth. This water flows on the surface and reaches the seas. Some part of rainwater is stored in stable water reservoirs (lakes and tanks), whereas some quantity of water infiltrates into the land and takes the form of groundwater.

Due to increasing deforestation during the last century, most of the rainwater flowed away to the saline seas without infiltrating into the ground. Water crisis also developed during the last decade in Cherapunji, which gets highest rainfall in the world, because forest cover has been destroyed there due to mining of limestone. As a result of it, rain water flows away very fast to the rivers. A similar thing is happening in the Dehradun area of Uttaranchal.

The old tradition of tree plantation on the banks of rivers and tanks will have to be revived. Forest cover will have to be developed on uncultivable waste lands and hilly slopes on a large scale. Since trees bear drought conditions for a long duration as compared to crops, hence trees are helpful in reducing the demand for water along with recharging water sources.

8. Change in Crop Pattern:

Excess water is not required if crops are grown according to agro-climatic conditions but in the present race of development, changing crop pattern with higher profits has replaced them. These commercial crops require more water than the traditional crops. In north-eastern part of Rajasthan, crops were not grown as per availability of water and intensive cultivation was adopted during the last three decades.

Groundwater was over exploited because of non-availability of surface water and plantation of commercial crops requiring more water. It created serious water crisis. Hence, keeping in mind the experience of Rajasthan, crop rotation should be adopted according to agro-climatic conditions. Agro forestry and horticulture should be given priority in areas having scarcity of water.

9. Flood Management:

A large portion of fresh water in the world becomes devastating due to floods in India, out of a total land area of 32.8 crore hectares, in India, 4 crore hectare land is flood affected, out of which 3.2 crore hectare land can be protected from floods. By construction of embankments and canals a large part of land can be conserved besides minimizing flood losses.

Intensive afforestation can also provide security from floods. If will be helpful in absorption of water in the soil. Drainage areas of Ganges, Yamuna, Mahanadi, Damodar, Kosi and other rivers have been taken up in flood management and security to some limit has been provided to the 1.44 crore hectare land.

10. Use of Geothermal Water:

Water is also received from hot waterfalls regularly at many places on earth. Scarcity of water can be met to a certain extent by using such geothermal water.

11. Conserving Water in Industries:

About 23 per cent of total fresh water available on the earth is used by industries the world over. Some special industries consume water to a large extent, whereas some industries pollute the major portion of water. Dyeing industry and leather industry are such type of industries which pollute the water.

To manufacture one ton of steel, 300 tons of water is required. Consumption of water in industries is done in quantitative as well as qualitative forms. Proportionate consumption of water in industries in developed' countries is more (50%), out of which 75 percent demand is met from surface water sources and 25 percent from groundwater sources.

Water has to be both protected from pollution in industries, and re-used after processing. Recycling of water should be developed because normally industrial units dispose off water on the ground surface after using it only once. Because of not re-using it after processing, it also pollutes other water sources. Demand for water can also be reduced in industries by recycling used water.

An influential member of parliament has not only to pay much money to become such, and to give time and labour, he has also to sacrifice his mind too - at least all the characteristics part of it that which is original and most his own.

– WALTER BAGEHOT

12. Reuse of Urban Waste:

Demand for water has increased in cities due to increasing urbanization. There is no provision for waste water treatment in many big towns and cities of various countries of the world. Instead of being reused, it pollutes other water sources.

Such condition is visible in cities of Delhi, Agra and Mathura on the banks of river Yamuna, whereas in many countries, urban water is used after treatment in nearby fields for growing vegetables and fruits. After use of water in urban areas, disposed waste water can be treated and conserved for use in agriculture in the peripheral areas of cities. Such policies should be incorporated while planning urban development.

13. Water Conservation by Municipal Bodies:

Municipal bodies should manage both individual demand and supply of water as well as conserve water. Municipal laws should provide for collection of rain water from roof tops and implement it. Individual awareness is very important in water conservation.

Every individual should develop the attitude of water conservation and prevent every drop of water from being wasted. As far as possible, one should conserve rain water along with maintaining quality of the water. Depth of traditional water sources should be maintained by controlling its cleanliness.

Since the maximum part of water is exploited in agriculture, hence water should be conserved in agriculture in different forms. Cultivating fields in off season helps in maintaining soil moisture. If cultivation is done upto 30 cm. depth, moisture can go up to 90 cm. depth, and capillary action prevents moisture coming out from the soil.

Besides this, soil moisture can also be maintained by before-time sowing, proper use of fertilizers, pesticides and Weedicides. Green manure and crop rotation should also be adopted.

Environment balancing is the main basis of water conservation. Changes coming in the world environment result in shortage in the quantity of fresh water. Due to rise in temperature of the world, fresh water in the form of snow is melting and drifting towards saline oceans. This change is visible from Antarctica to Gangotri Glacier in the Himalayas.

Change in climate has also caused change in nature and quantity of rainfall, due to which existing unevenness in distribution of water has also increased. Thus, the mentality of World Environment Balancing has to be developed at the individual angle and conservation has to be worked on each stage.

The objective behind the constitution of 'World Water Commission' at the Hague in 1999 was to consider questions related to water conservation and creating an environment so that strategy of water management may be worked out to search out solutions to the impending water crisis. Five groups have been constituted here.

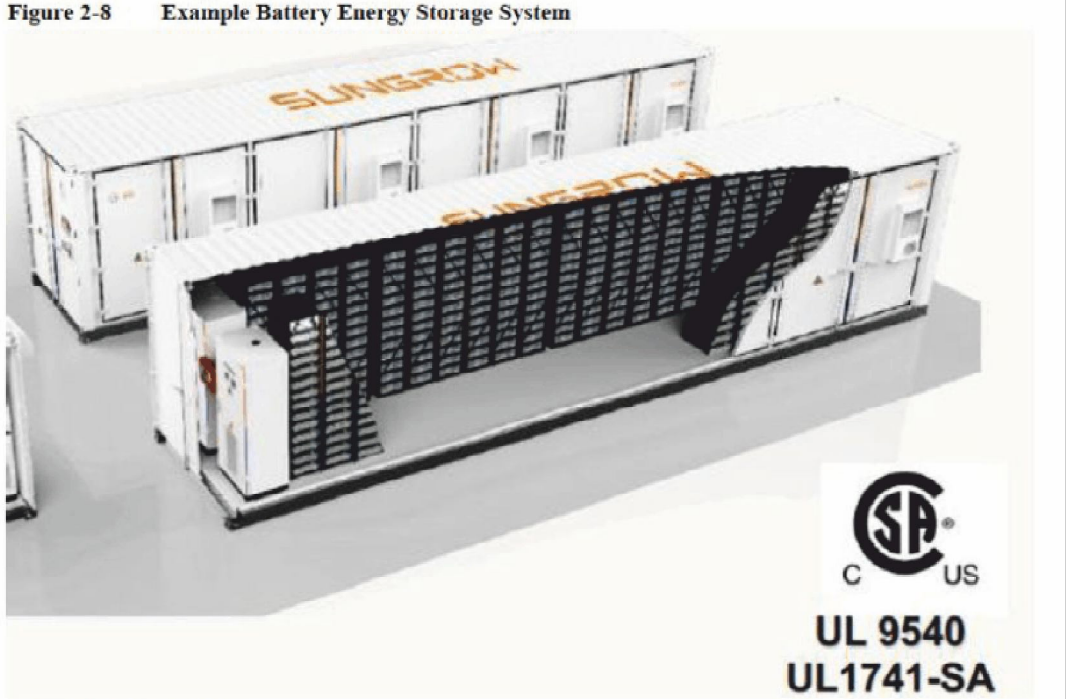
First, for change in information system; second related to energy; third for considering issues related to organic technology; fourth to discuss institutional changes and the fifth panel is for consolidating serially future forecasts based on study of statistics. Apart from them, there is also a panel for traditional areas to consider water for food, water for human consumption and water for environment.

One group also works on dams and national universality in international waters. The years 2025 and 2050 have been targeted by the commission for fulfilling its objective. The reason for such a long duration is that the results of solutions in this context are visible after a long time.

I gather, young man, that you wish to be a Member of Parliament. The first lesson that you must learn is, when I call for statistics about the rate of infant mortality, what I want is proof that fewer babies died when I was Prime Minister than when anyone else was Prime Minister. That is a political statistic. – WINSTON CHURCHILL

WORLD'S LARGEST BATTERY SYSTEM PLANNED FOR NEVADA SOLAR PLANT

Last week, one of the largest solar and battery projects in the world just got one step closer to approval. On Friday the Bureau of Land Management (BLM) released the draft environmental impact statement (EIS) for the colossal Gemini Solar Project, a behemoth planned for 11 square miles of the Nevada desert northeast of Las Vegas off Interstate 15.



The paperwork shows few exact details of the project, and it appears that the developers are not even sure if they will use standard or bifacial solar panels. However, buried in the description is a casual mention that there has been an upgrade to the scale of the battery storage component, with a mammoth 531 MW / 2125 megawatt-hour (MWh) battery planned accompany the 690 MWac of solar that will be deployed. As stated in the draft EIS:

This would make it the largest battery system known, larger even than the 409 MW / 900 MWh battery that Florida Power and Light is planning, or the 495 MW battery that is planned as part of the Juno Solar project in West Texas – neither of which have yet been installed.

Details of the battery system are also sparse. While a graphic to illustrate this system shows a Sungrow battery system, the developer does not appear to have made the final decision as to technology, with the EIS stating that the technology "may be" lithium ion.

One of the few decisions as to procurement which appears to have been made is that the developer plans to utilize a single-axis tracking system. The site of the project was originally chosen by concentrating solar power (CSP) developer BrightSource Energy for the APEX Solar Energy Generating Systems. BrightSource appears to have sold off the project in 2017 along with the Solar Partners XI, LLC, the company that is on the paperwork as building Gemini Solar.

Assuming it can get all the approvals in time, the developer plans to begin construction in October 2019, and could complete the first phase in 2021, with the remainder of the project planned to come online in 2022 or 2023. Construction is expected to employ up to 900 workers at any give time.

ENERGY, ELECTRICAL ENERGY AND RENEWABLE ENERGY – 22

Sustainable Growth, Sustainable Electrical Energy and Renewable Energy

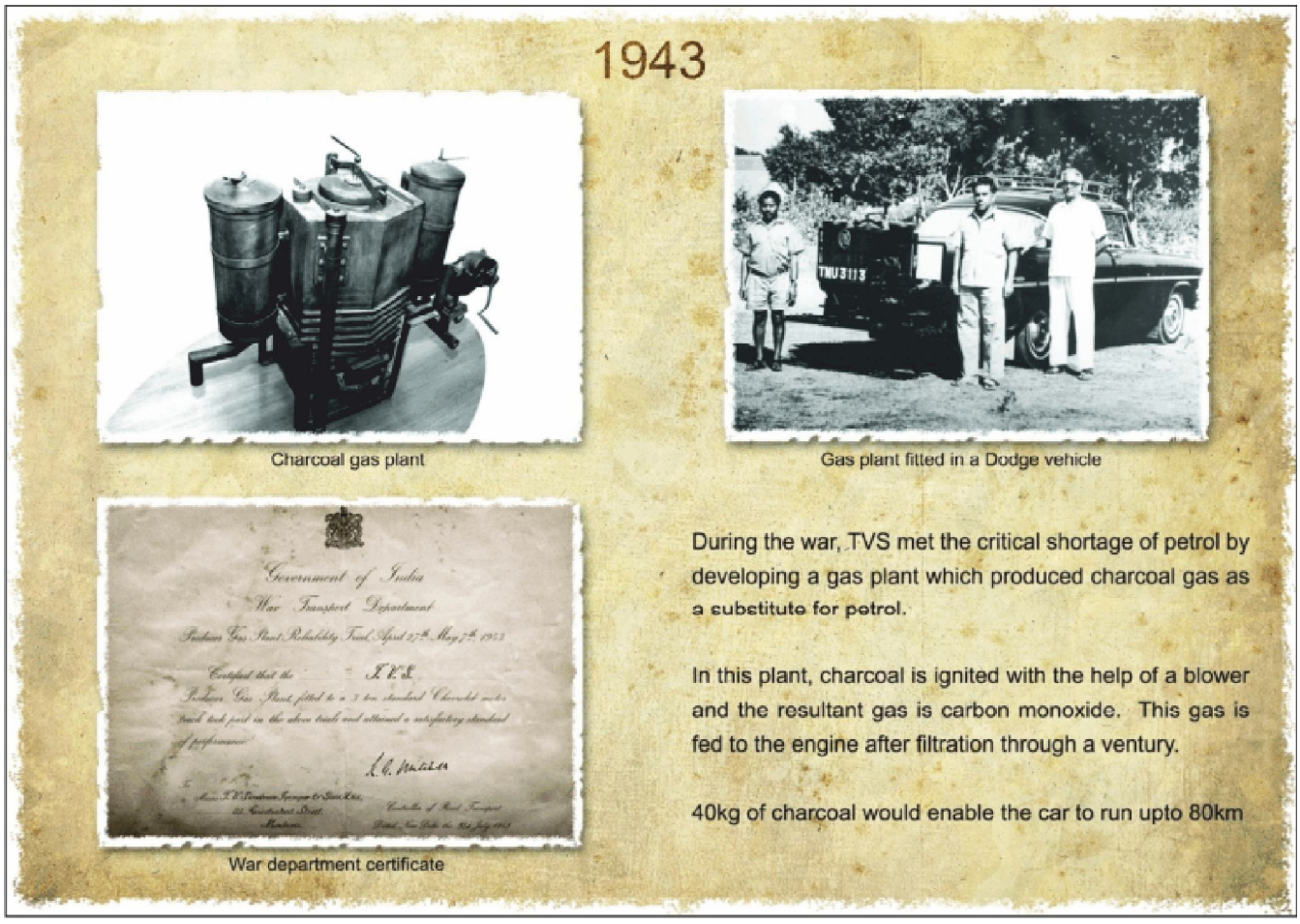
Green Fuel Vehicles for Transportation – Re inventing the use of Charcoal/ Carbon and Producer Gas as Automobile Fuel.

There are lot of efforts and programs these days with a dual purposes of both decreasing the pollution levels and ensuring increased use of renewable energy particularly with regard to the automobiles on the road. There are concentrated efforts to bring in Electrical Vehicles and lot of companies are announcing about their vehicles and models and mileages and so on. Some trials are going on in some of the cities with Electric Buses.

Another effort is to bring in more vehicles using "Bio CNG" and the Government is planning in a big way to encourage production of Bio CNG at various distributed locations all over the country including the rural areas to tap maximum of Biogas potentials in the country. Bio Diesel and Ethanol are other programs that are being looked into.

During the World War and many years after that too lot of automobiles were running on Producer Gas driven Engines, and the Gas being produced using Charcoal or wood chips. In India too vehicles were developed during 1943 itself based on a technology developed by Germans during the war. Lot of Buses were plying all over southern India (should have been the phenomenon all over the country) run by companies like TVS, SRVS and UMS, to name a few.

We will see in this article about the technology and the historical background and the various advantages, particularly in terms of economy, coupled with various other advantages including GHG reduction.



Historically Coal, wood and charcoal gasifiers have been used for operation of internal combustion engines in various applications since the beginning of 20th century. Between the Wars, Germany developed and Sponsored Automobile races using producer gas. It is recorded that 38 no's - 10 ton trucks raced from Rome to Paris using Coal Wood Peat Charcoal. Indian Efforts commenced during World War II. The Applications were improved to plying large number of Buses; continued till the mid '50s. The utilization peak was during the Second World War, when millions of gasifier vehicles were used all over the world. Post World War II Gasifiers lost favour for running vehicles and the Gasifiers were forgotten until 1973 – Presently LOW usage & for Preparedness in case of any crisis. Indian situation is different with the economy strained due to high oil imports. Revival of Gasifier vehicles using Charcoal or Bio Coal with Technology up gradation and refinement will be VERY meaningful.

TVS was one of the important players who did lot of work and picture below is about their work and achievements.

Photos of some of the buses that were plying on the roads till the mid-50s

Gasifiers used to be located at the back of the buses with Gas going to the Engine in the front through pipes with cooler in between.

The Technology and the breakthrough:

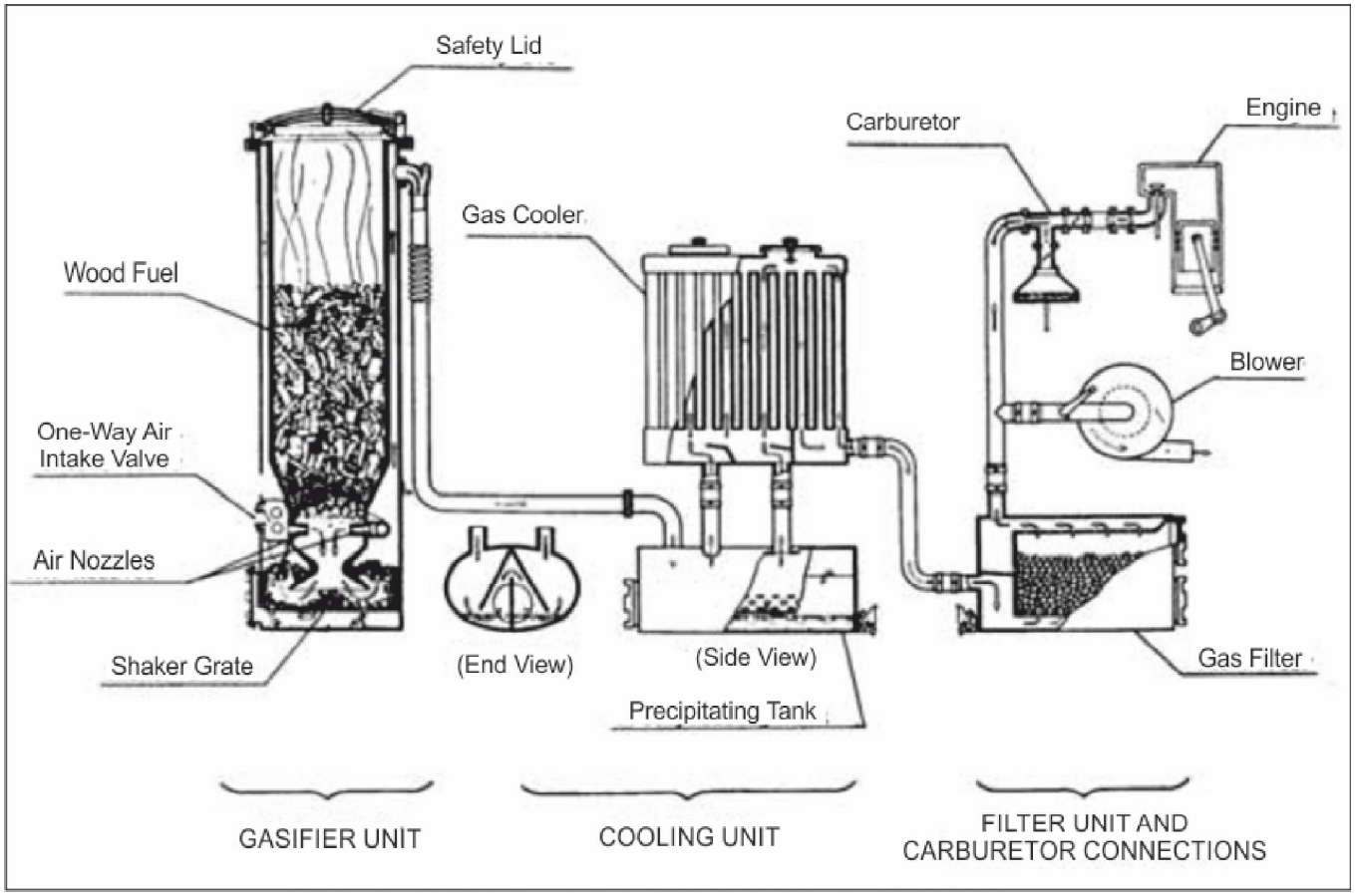
CHARCOAL/ CARBON

Characteristics

Charcoal is an ideal fuel for gasification because, it is easily made from wood/ Biomass and generally runs tar free. It operates in more design types and Designs for Carbon/ Carbon Pellets is feasible.

Charcoal for Gasifiers which can produce Tar Free Gas which is suited for applications like Cars Trucks Buses Tractors Motorcycles and Boats. Charcoal Gasifiers are good for both small & large engines, they are Lightweight and does not require tar destroying. Charcoal Gasifiers are found to be very fuel efficient. It is felt that technology can be adapted to use Carbon Powder/ Carbon Pellets too as there are lot of technologies available to produce charcoal, carbon flakes and powders from all kinds of biomass and even from wastes and sludge's.

Schematic View of a German Gasifier used during World Wars



Technology Details:

- Impart Gasifier Developed is the dominant design for WWII - Europe Used wood chunks as fuel.
- Stratified Downdraft - Simplest gasifier to build; Low/ no tar.
- Blower and Flare Used for starting the generator - Suction Pressure used mostly -Pressure fans can be used - Usually vented to the flare stack - When gas burns blue the engine is ready to start
- The Gasifier Heats the fuel and produces the gas
- The Cooler cools the gas.
- The Filter Cleans the gas
- The Blower Used for starting and idling.
- Gas Mixing Valve Mixes the gas for the engine

Technologies for mass production of Coal/ Bio Coal/ Carbon:

- Traditional and Industrial Charcoal Plants
- Torre faction – Production of Bio Coal from woody or other Biomass.
- Continuous Biomass Carbonization – Production of Carbon and Carbon Briquettes from different Biomass types like Poultry Litter, Rice Husk, Coir Pith, Saw Dust etc.
- Hydro Thermal Carbonization – Production of Bio Carbon, Bio Char, from Biomass with high moisture content – from many types of Biomass including the Waste water and sewage sludge.

Technology improvements and Modernization of Gasifier Vehicles:

- Waste heat recovery in the process of cooling the Producer Gas before sending to the Engine can, probably, be used for Air Conditioning Application.
- Modern Hybrid System being developed for Automobiles with the concept of Engine Generator Charging Batteries and the Batteries running the Automobile as Electric Vehicle could be ideal for Producer Gas driven Engine.
- Can explore the potential to operate a low speed engine and constant power for battery charging over extended periods

Hi Tech and Energy Efficient and Modern Carbon Gasifier Buses on Road can easily become a reality.

(To be continued)

S. Mahadevan, B.E., F.I.E., M.B.A.,
Consultant, Energy and Energy Efficiency,
Mobile: 98401 55209

ELA BHATT | *SEWA* | ENTREPRENEUR

ELA BHATT
SEWA

Ela bhatt, the founder of the Self-Employed Womens Association (Sewa) is widely recognized as one of the Worlds most remarkable pioneer and Entrepreneurial forces in grass roots development.

Known as the "gentle revolutionary" and a follower of the teachings of Mahatma Gandhi, Ela as dedicated her life to improving the lives of India's poorest and most oppressed citizens.

Ela was born in Ahmedabad. Her father had a successful law practice and mother was active in the women's movement. In 1954 she received her degree in law and a Gold Medal for her work in Hindu Law. In 1955 she joined the legal department of the Textile Labour Association (TLA) in Ahmedabad. With marriage and motherhood, there came a break in her career. But she soon picked up the threads and joined the Labour Ministry of Gujarat as an Employment Officer in 1961. In 1968, she went back to TLA as head of its Women's Wing. It was a revelation to her that thousands of self-employed women were not recognized as workers, and that there were no laws to protect their livelihood. That's when, in 1972 she founded SEWA. Today SEWA, operates in over seven states and provides these self-employed women banking, insurance, healthcare, and micro-finance services. SEWA was started with 600 women and today it boasts more than 17 lakh women members. She was one of the founders of Women's World Banking in 1979 and served as it chair from 1980 to 1998. She was granted an honorary Doctorate degree in Humane Letters by Harvard University in June 2001. In 2012, she received a Doctor of Humane Letters, from Georgetown University and an honorary doctorate from Universite Libre De Bruxelles in Brussels, Belgium and Doctorate of Humanities from the Yale University. Ela Bhatt was awarded Padma Shri in 1985 and the Padma Bhushan in 1986. She was awarded the Ramon Magsaysay Award for Community Leadership in 1977. In November 2010, US Secretary of State Hillary Clinton honored her with the Global Fairness Initiative Award for helping poor women in India. She was also selected for the Indira Gandhi Prize for Peace, Disarmament and Development. Ela has played a Pioneering role in empowering women through grassroots entrepreneurship.

HUMOUR - FUNNY QUOTES AND SAYINGS

In the old days, we painstakingly copied our emails onto paper, put a stamp on them and mailed them to arrive 4 to 5 days later. We also churned our own butter and used our phones for talking.
- Peter Sagal, NPR, "Wait Wait...Don't Tell Me!"

Google is really powerful. Type in the question "Is there a God?" and it tells you, "THERE IS NOW."
- Greg Tamblyn

Thanks to the Internet, people we might have only suspected of being idiots can now give us ample evidence. - *Andy Borowitz*

Facebook's new relationship status option: "No longer able to interact with actual people" - *Andy Borowitz*

Getting your news from Twitter is like asking a cat for directions. - *Andy Borowitz*

All I have to do to empty shopping carts online is click a button. It's way easier than the grocery store, where I have to knock them over. - *Bridger Winegar*

Twitter is currently valued at $8 billion, or $1 for every hour it has wasted. - *Andy Borowitz*

I don't even know what "Java" is, but I let it do whatever it wants to my computer. I feel like a slut.
- Dave Barry

11 HEALTH BENEFITS OF ONION AND BANANA JUICE

What is your favorite juice recipes? Is it carrots with orange juice? Or lemon with apple juice? Then, you may be surprised to know that onion and banana juice is the good option to go. Indeed, that may sound not tasty, but you need to see for its nutritional value. Yes, it has the best nutrients for sure. Thus, if you are curious about the things of onion and banana juice, then you can check the health benefits of onion and banana juice below.

1. Source of Fiber

It cannot be denied that onion and banana have the high source of fiber. As a result, fiber is the one that plays a role in promoting digestion. Besides, onion has Inulin as a dietary fiber to promote the presence of healthy bacteria in the intestines. Indeed, it will keep the healthy bowel movement and protect the digestive health for sure. As the consequence, if you want to have the healthy digestion, then having onion and banana juice can help you a lot. You can also check on Health Benefits of Barley and Lentils

2. Source of Antioxidant

It turns out that onion and banana have the good amount of antioxidant level in it. As the consequence, antioxidant will protect the body against disease. Not only for that, the content of phenolics and flavonoids is valuable to prevent cancer and body inflammation. Such the great benefits, right? You can also check on Health Benefits of Kumquats.

3. Helps to Lose Weight

Due to the presence of fiber, then onion and banana juice take part in controlling the body weight. This is due to its ability to makes us feel full longer. Then, it will, control the appetite and help to lose the weight. For the tips, to have a healthy diet, then you need to consume healthy foods such as fruits vegetables together with onion and banana juice for the healthiest results! You can also check on Health Benefits of Eating Raw Bell Pepper

4. Boosts Energy

If you want to have more energy for doing daily activities, then drinking onion and banana juice is something that should be taken into account. At this point, it has good protein content to boost the energy building in the body. Therefore, start your day with a glass of onion and banana juice! You can also check on Health Benefits of Rice

5. Promotes Heart Health

Do you want to have a healthy heart? Then, drinking onion and banana juice may help you a lot. It is due to the presence of high fiber in it. This is also based on a study done by University of Leeds in the UK shown that the consumption of fiber-rich foods can prevent cardiovascular disease and coronary heart disease. For the tips, you can find fiber source in many fruits and vegetables as well. Then, the regular consumption of healthy ingredients like onion and banana juice will help you to reduce the risk of heart diseases such as stroke and heart attack.

6. Controls Blood Pressure

One of the health benefits of onion and banana juice is to control blood pressure level in the body. At this point, banana has low salt content while onion and banana have great potassium level. As a result, potassium plays a role in maintaining blood pressure level. Great, isn't it?

7. Promotes Brain Health

By having onion and banana juice for breakfast, then it can help to promote the brain health. In this case, banana has high potassium level which can promote the memory skill and maintain the brain health. Also, it is known that consuming foods which have potassium can reduce the risk of a blood clot in the brain by 21%. Hence, now the choice is yours, get your onion and banana juice for the healthy life!

8. Prevents Cancer

As described before, onion and banana juice has the great antioxidant level. By this means, it will help to reduce the risks of cancer cells growth such as renal cell cancer, breast cancer, and prostate cancer. For the tips, to prevent cancer, you need to consume healthy foods and apply healthy lifestyle as well.

9. Prevents Anemia

Next, the presence of iron in onion and banana will help to promote the regulation of red blood cells in the body. As a result, it takes part to prevent anemia which is a condition of the low level of red blood cells. Moreover, as you consume onion and banana juice regularly, then it will help to treat chronic fatigue and paleness. Indeed, onion and banana juice is the great beverage as it offers you numerous health benefits! You can also check on Anemia Treatments

10. Treats Respiratory Problems

The next health benefit of onion and banana juice is to treat respiratory problems. This is due to the sulfur content in onion. It will help to relieve chest congestion and treat the common cold. Moreover, it also takes part in relieving sore throat, cough, and even bronchitis. Not only for that, the greater way also comes from onion juice which can treat asthma attacks. Indeed, onion has expectorant properties which are beneficial to fight colds, coughs, bronchitis, and congestion as well.

11. Boosts Immune System

Onion and banana juice create protection for the body as it offers to the strong immune system. This is linked to the presence of antioxidant and anti-inflammatory properties in it. It prevents infection and free radicals damage. Thus, if you want to get rid of certain diseases and infection, then choosing onion and banana juice for your drink is such a good way to go!

To summarize, onion and banana juice has the great nutritional value. The combination of these two superfoods will boost your health for sure. It will become part of your healthy diet to stay healthy. Yet, you need to be aware of the effects due to the consumption of onion juice. It may lead to gastric irritation, nausea, or even vomiting due to the large consumption. Then, drink your onion and banana juice in a right and the proper way to achieve best health results!

Dr Heben (Energy Source)

Parliament is a deliberate assembly of one nation, with one interest, that of the whole; where, not local purpose, not local prejudices ought to guide but the general good, resulting from the general reason of the whole. – EDMUND BURKE

MENTAL HEALTH TIPS FOR WORKING PROFESSIONALS: HANDLING STRESS & DEPRESSION

Dr. K. JANAKIRAMAN, PhD., CCP., CMH., MIAAP., MNAOP

Psychologist & Psychotherapist

Depression is a major public health problem in India, contributing to significant illness, disability as well as impermanence causing significant socio economic losses. Root cause for depression could be several, including biological, social, economic and cultural factors, which are triggered by environmental factors. Unfortunately Depression and suicide are closely interlinked. At its worst, depression can lead to suicide or attempts as well. Recognizing depression at an early stage is critical for reducing suicidal deaths and deliberate self-harm across the spectrum. People with depression often tend to under-perform in workplaces, thereby resulting in loosing of job and event loosing quality of life.

As per NMHS reports higher prevalence of depression is seen among women and working age adults (aged 29,42 20–69 years) has been consistently reported by Indian studies. Depression is also common among the elderly but possibly they fall less in to this trap due to experience and wisdom. Reasons could be many for a Depression resulting from complex mechanisms; there can be no single identifiable cause. However, there is conclusive evidence to reveal that several biological, social, economic, cultural and environmental factors operate in a maladaptive individual, leading to depression. One may develop depression due to the loss of a loved one, or it may unfold in the backdrop of multiple social or financial stresses, or on an account of a family history of depression, or it may begin in the background of a chronic medical condition. Some individuals can experience loneliness and feeling low for no apparent reason at all. It is crucial to note that recognition of these factors is important to provide appropriate intervention for the affected individual and to support the family.

Many a times certain feelings such as sadness, hopelessness, lethargy, lack of involvement were taken lightly or rather omitted among younger generation. When such feeling are left un-attended at the right time or given a lighter approach may possibly lead to a depressed lifestyle. It is also more important to analyze, whether these feelings happen in a combination, its duration or intensity that start to interfere with day-to-day life activity. The real benefit of such identification will help in noticing when people who are in working profession are struggling and hardly find time to get the support they need. The symptoms could be either a depressed mood, or a loss of interest or loss of pleasure in things that were once enjoyable. Many times these will just be a normal part of adolescence and nothing at all to worry about, but this depression will also lead to the indirect results such as:

- *State of Anger with high degree of irritability.*
- *The person will be reluctant and avoid spending time with colleagues in the organization.*
- Can show an *Indifferent behavior leading to collapse of good relationship with colleagues or family.*
- May make excuse to attend meetings, get-to-gethers, or events.
- Depression will make them exhausting and can make people more tired than usual, even after having spent good amount of time in sleeping. Such conditions could lead to **HYPERSOMNIA**.
- The physic may get disturbed and could lead to headaches and migraine etc.,
- There will be an imbalance in the brain chemicals such as **SEROTONIN & NOREPINEPHRINE** which are the primary cause for mood and pain.
- Due to these changes, the person may feel restless, agitated, at times excessive depression can even slow down movement and speech.
- Depression can create an emptiness that feels unbearable. This can make them end up with **Eating Disorder**.

- Various psychological studies have proven that when emotional pain feels too big or when it stops making sense, people hurt themselves by Self-Harming.

Tips to Handle :

If you find the person is supposed to be depressed, the first step is observe his activities and try to show care and love as they expect. Discuss with them on their problems and try to give them comfortable environment in which they can come out of their problems. Remember do not Advise them on how to be and do not compare them with others. In case if the person is not coming out with proper reason or having a difficulty in opening up with you, approach a Counseling Psychologist who can try to fix the problem. Line of treatment comes next, since many people term the affected persons by the terminologies they know and take them for medication. Depression doesn't always need medication, but it might at an aggressive state. Some sessions of counseling can heal, if not then the psychologist should observe and recommend the client to a clinical Psychiatrist. More than working hard, succeeding in work like than studies and career growth more amount of importance is to be given to them for mental relaxation by means of meditation, yoga, take a walk, games could also be a reliever in case of stressful workday. Try to connect them with more friends and colleagues. Create a positive environment around in your workplace, this is because you spend more of your time at office / workplace. In case if the above mentioned proper care is not taken there could also be a possibility of substance addiction developed during a period of time. Keep the mental health fit and free from taking stress for a healthy and longer living. Have a happy living.

This article is published again for the second time in the interest of the members.

TOYOTA TESTING OUT SELF-POWERING SOLAR CARS

Imagine driving an electric car that charges as you drive? Toyota are experimenting with fitting solar cells into the roofs of cars to see if cars can self-charge as they drive along.

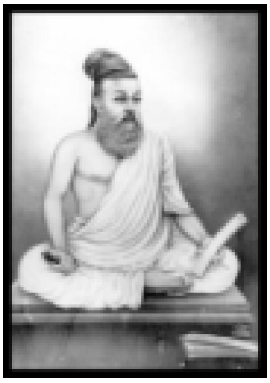
Toyota has previously tested out solar power cells on the Prius PHV (a pilot vehicle that was only available in Japan). Based on some success in an attempt to design a self-powering electric car, Toyota is working with electronics firm Sharp and Japanese national research organization New Energy and Industrial Technology Development (NEDO), to seek further innovations with the technology.

The prototype automotive's solar cells can reportedly convert solar energy at 34 percent. This is considered to be sufficient to charge a car's driving battery while the car is actually being driven. These cells are just 0.03 millimeters thick, but they can deliver around 860 watts of power. If engineers continue to achieve incremental improvements, then a completely self-charging car may not be too far away.

With the latest demonstration model, TechCrunch reports that the technology can provide up to 44.5 kilometers (27.7 miles) of additional range per day while the car is parked in a sunny area. In addition to this, when being driven the solar technology can provide a further 56.3 kilometers (35 miles) of power. This extra power can be diverted to either the driving system or to the auxiliary power battery system (which is located on board to operate air conditioning, navigation and other ancillary features). While this power capture is useful, it remains a long way from powering a car for a substantial journey.

According to The Verge, testing with Toyota's next-gen solar car is due to begin on public roads in Japan later during July 2019 (beginning with Toyota City, Aichi Prefecture, Tokyo); however, there is no indication as to when a commercial vehicle release is expected.

TIRUKKURAL AND FAIR AND ETHICAL MANAGEMENT - 6



Tiruvalluvar stresses on the worth and worthiness of persons to be at the helm of affairs and he clearly brings out various qualities of a worthy person who follows fairness to all and in all dealings. He prescribes that 'Humility' is one of the important qualities of a worthy person and he will be able to see the worth in persons who, in position, could even be far below him. A deep understanding of this concept will be very good for practicing managers for earning the goodwill of all in the organization and outside for ensuring successful conduct of the profession and also to help identify worthy persons wherever they are. The following Kurals illustrate some of the characteristics above.

Atruvar Atral Panithal; Athusandror
Matrarai Matrum Padai. ***Kural 985***

ஆற்றுவார் ஆற்றல் பணிதல் அதுசான்றோர்
மாற்றாரை மாற்றும் படை. *குறள் 985*

"It is 'Humility' that is the strength of the strong: and that is also the armour of the man of worth against his foes"

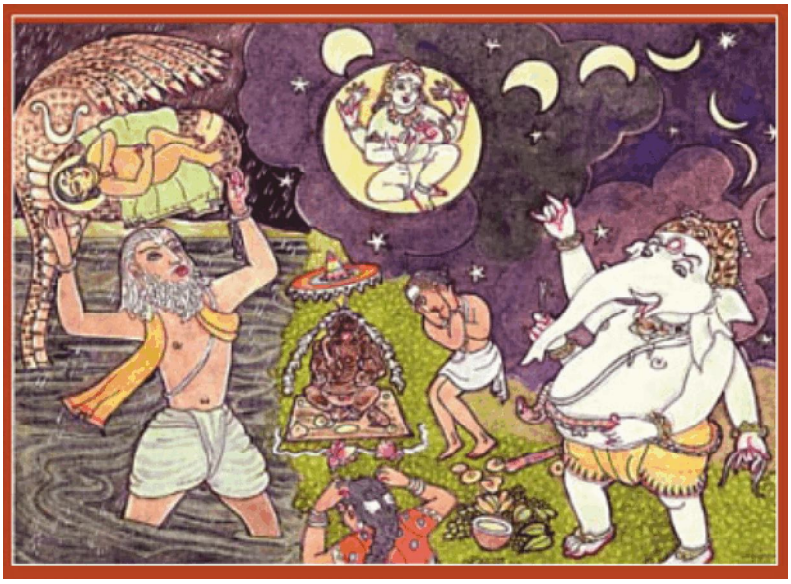
Salbirkkuk Kattalai Yathenin Tholvi
Thulaiyallar Kannum Kolal. ***Kural 986***

சால்பிற்குக் கட்டளை யாதெனின் தோல்வி
துலையல்லார் கண்ணும் கொளல். *குறள் 986*

"What is the touchstone of the worth? It is the acknowledgement of superiority when it is found even in men who are otherwise one's inferiors"

HOME FESTIVALS - 8

ஆவணி - AVANI (August/September)



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

MERCEDES-BENZ - MOTOR SHOW

At the Paris Motor Show, Mercedes-Benz unveiled its new product brand for electric mobility: EQ. The name EQ stands for "Electric Intelligence" and is derived from the Mercedes-Benz brand values of "Emotion and Intelligence". The new brand encompasses all key aspects for customer-focused electric mobility and extends beyond the vehicle itself. EQ offers a comprehensive electric mobility ecosystem of products, services, technologies and innovations. The spectrum ranges from electric vehicles to wallboxes and charging services to home energy storage units.

The new brand is heralded by the close-to-production concept vehicle "Concept EQ", which celebrated its world premiere in Paris. The first series-produced EQ model will be launched in the SUV segment before the end of this decade.

With "Concept EQ", Mercedes-Benz shows how electric cars can soon move into the fast lane: the concept vehicle with the appearance of a sporty SUV coupé gives a preview of a new generation of vehicles with battery-electric drives. The dynamic exterior design with its new electro-look underlines the focus on the powerful electric drive system: two electric motors, with a system output that can be increased to up to 300 kW thanks to scalable battery components, and permanent all-wheel drive deliver the guarantee of dynamic high-level performance.

With a range of up to 500 kilometres and the typical Mercedes-Benz strengths of safety, comfort, functionality and connectivity, "Concept EQ" meets every demand in terms of contemporary, sustainable mobility. Also on the inside, the vehicle offers innovative solutions, including a completely new interior concept. Celebrating its world premiere at the Paris Motor Show, "Concept EQ" is the forerunner of Mercedes-Benz's new product brand for electric mobility, EQ.

Human's best friend in many cases does not have four legs, but four wheels. Networked at any time and from anywhere with your vehicle – this is realised for customers, for example, via Mercedes me: the digital service platform is the central access point to the world of Mercedes-Benz. For Mercedes-Benz, connectivity means much more than Internet in the car. Even those who are not sitting behind the steering wheel can network with their vehicle and much more. The Mercedes me portal and the Mercedes me app bundle all digital offers, services and news. Being online at all times – on board of a Mercedes-Benz, this is a matter of course. Connecting the vehicle to the cloud, multimedia systems make it part of the Internet of Things.

MERCEDES-BENZ - MOTOR SHOW

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