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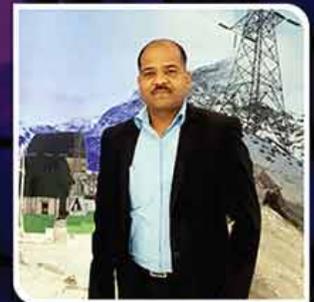
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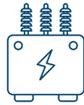
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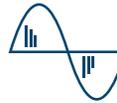
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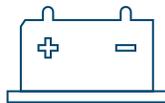
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INCUBATE



Publisher's letter

India envisioned a 100 smart cities to achieve sustainable urbanisation. One of the focus areas in Smart Cities Mission is to provide reliable power supply, minimise distribution loss, and have effective means of managing power distribution in the city. Thus, the power sector will play a huge role in realising this ambitious plan. Here, we present to you an in-depth analysis on why smart cities could be a golden opportunity for the Indian electrical equipment industry.

Smart cities are designed for optimum utilisation of space and resources. Smart electricity plays a critical role in this context. An article by Prof. Sarat Kumar Sahoo from VIT University assesses the necessity of smart electricity for manifestation of a smart city. Also, as smart cities propagate the idea of clean power, Prof. DC Baruah of Tezpur University explains how the rapid advent of ICT integrated control system including micro-grid could make renewable energy as the right candidate for smart city projects.

Coal-fired power plants in India are reported 'unhealthiest' in the world. Experts from the clean energy company Fortum talked about how their technology can counter NOx emission.

Today, luminaires are not merely tools of illumination, thanks to digitisation. Internet of Things (IoT) in lighting is enabling the designers to produce fully-integrated systems that can be connected seamlessly with a wireless network or ethernet. This time, experts from the lighting industry take us through the developments in street lighting. Hope you will enjoy reading this issue as always.

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Electrifying Change

India is witnessing unparalleled transformation from rural to urban living over the last two decades thanks to increasing population and robust economic growth. According to a McKinsey Global Institute report, in India, around 590 million people will be living in cities by 2030. Further, by 2050, it is estimated that half of India's population will be living in cities. Such large-scale urbanisation will certainly impose severe strain on urban infrastructure like housing, electricity, water supply, road and transportation. It will also contribute to rapid environmental degradation. Because of this, the Indian government has decided to put up a number of smart cities that are going to be clean, green and sustainable.

Electric mobility will be a prerequisite for these futuristic cities and electric vehicle (EV) industry is gaining ground due to the push towards smart living. In India, the acceptability of EVs is increasing by the day because of their eco-friendliness, cheaper fuel cost, and lower maintenance expenses.

The government has also taken many initiatives to give a boost to EVs. Being the world's second largest two-wheeler market, fifth largest photovoltaic (PV) market and seventh largest commercial vehicles market, India has set the target of 30 per cent new sales of electric passenger cars, light commercial vans, buses and trucks by 2030.

The announcement of Phase-II of the Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME-India) Scheme, with an outlay of Rs 10,000 crore, also indicates a shift towards EVs. In FY19, total EV sales in India reached a total of 7,59,600 units as compared to 56,000 units in FY18. Once primary hurdles in the way of EV adoption like inadequate charging infrastructure and higher cost of battery are addressed, India will lead the EV movement in the world.



Subrajit Roy

Group Editor

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GE Power wins Rs 142 cr contract for NOx reduction technology

GE Power India bagged a Rs 142 crore order by NTPC for supply and installation of low NOx combustion system for 10 GW of thermal power plant capacity across the country. This is the first project awarded on such a large scale by NTPC to install low NOx combustion technology at its thermal power plant fleet.

The project involves in-combustion system modification of the boiler by staging the combustion air in the furnace to reduce the generation of fuel and thermal NOx during the combustion process. The combustion modification technology can help reduce 30-40 per cent of NOx emissions from these coal-fired boilers upto a level of less than 400 mg/Nm³ at 6 per cent oxygen content in flue gas on dry gas basis at induced draft (ID) fan outlet. The projects that have been selected for installation of low NOx combustion systems includes Stage-I (2X500 MW), Mouda Super Thermal Power Station (STPS); Stage-I (3X660 MW) and Stage-II (2X500 MW) Sipat STPS; Stage-III (2X500 MW); Stage-IV (2X500 MW) and Stage-V (1X500 MW), Vindhyaachal STPS; Stage-II (2X500 MW) Simhadri STPS; (3X500 MW) Vallur TPS; Stage-III (2X500 MW), Talcher STPS. The low NOx combustion system will be delivered in a phased manner over a period of over 30 months. 

HCL Samuday invests Rs 30 cr in UP solar mini-grids

Samuday has invested Rs 30 crore over the last one year to set up 14 solar mini-grids in 15 villages in UP's Hardoi district to supply uninterrupted power to 900 underserved rural households. It has also committed to spending Rs 3 crore every year over the next five years to maintain these grids.

Alok Verma, Associate Project Director, HCL Samuday, shared details about the mini-grids project. He said, "HCL Samuday is working in collaboration with the Government of Uttar Pradesh on a solar electrification program in three blocks of Hardoi district namely Kachhauna, Behendar and Kothawan. We believe our solar power projects in 15 villages have the potential to transform the lives of thousands




of beneficiaries from poor socio-economic background. Our efforts in solar energy are in line with the Government of India's vision that 40 per cent of the country's needs should be supplied through renewable sources."

Varma added, "We at HCL Samuday believe that supplying solar energy to underserved villages will have massive impact on several allied areas too. This includes improving the functioning of healthcare facilities and educational institutions, allowing greater access to potable drinking water by powering underground pipes, supporting agricultural practices by powering mini water pumps, and increasing means of livelihood by powering processing and refrigeration systems for use by fisheries, milk suppliers, etc." 

Tata Projects secure NPCIL order

Tata Projects has received a prestigious order from Nuclear Power Corporation of India (NPCIL). This 2X700 MW power plant order valued around USD 321 million is the company's third contract in the nuclear power sector. It reinforces the leadership position enjoyed by Tata Project in the nuclear power sector's civil construction and engineering segment.

The scope of work involves construction of main plant buildings, structures and other associated works of Gorakhpur Haryana Anu Vidyut Pariyojana - 1 and 2. Nuclear power sector is a highly technology intensive industry wherein execution expertise is an essential criterion. As nuclear

power remains critical to fulfilling India's long-term energy requirements - the need for timely completion of such projects meeting world-class quality criteria is a prerequisite.

Satyanarayana K, COO-Industrial Systems, Tata Projects, said, "We are delighted to secure this prestigious order since it is a reflection of the high-quality work undertaken by Tata Projects over the years. Once completed, this project will provide much needed power supply to the region and ensure developmental initiatives receive an impetus. Tata Projects believes that nuclear projects provide a clean source of power thereby ensuring a more environment friendly future." 

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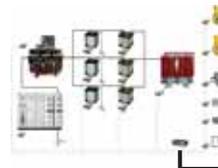
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- Online PD Test System
- Oil BDV Test Set
- AC HV Test Set
- AC / DC HV Test Set
- Online PD Monitoring Systems
- High Voltage PD Filters

ReNew Power commissions 300 MW solar plant in Pavagada

ReNew Power recently commissioned 300 MW solar plant at the Pavagada Solar Park located in Tumkur district in Karnataka. This is ReNew Power's largest solar plant commissioned in terms of capacity till date and will help mitigate 0.6 million tonnes of CO2 emissions per year. ReNew Power currently has a solar portfolio of nearly 3 GW across India, including both commissioned and projects under development.

Sumant Sinha, Chairman and Managing Director of ReNew Power, said, "We take great pride in commissioning our state-of-the-art 300 MW solar power plant at Pavagada as we look to partner with the Government of Karnataka in harnessing the solar potential of the state. At ReNew, we are committed to providing efficient clean energy solutions to drive sustainable economic growth in India and do our bit to arrest climate change."

Parag Sharma, Chief Operating Officer of ReNew Power, said, "This is the first utility scale solar plant in India to use high efficiency solar mono PERC solar modules and is based on seasonal tilt technology with string invertors. With the commissioning of this site, we have now increased our installed capacity in the 2000 MW Pavagada solar park to a total of 350 MW, reinforcing our status as one of the principal developers." 

MYSUN expands its presence in 7 states

MYSUN, a provider of rooftop solar solutions, has expanded its operations and client base across seven Indian states in the last financial year. Adding to its presence in Delhi, Haryana and Uttar Pradesh, the company added industrial and institutional clients

in Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu and Puducherry in the just concluded financial year 2018-19. Over the past year, the company also established a wide installation and service network to provide a seamless 25 years solar journey to its clients.

The company is gearing up for exponential growth in the new

financial year 2019-20 and has already bagged new orders totaling 11MW just over the last few weeks.



These projects are getting executed in Pune, Ratnagiri, Baramati, Washim, Nanded and other cities in Maharashtra and Rajasthan. MYSUN is strengthening

its regional presence across all the key states in India including the Southern states of Andhra Pradesh, Telangana, Karnataka and Tamil Nadu. These projects will result in significant energy bill savings for industries and small and medium enterprises (SMEs) giving them a respite from the high and ever-rising energy bills. 

Crabtree opens India's first futuristic smart experience centre

Crabtree recently announced its strategy to mark the next phase of growth as well as deepen its engagement with customers by



launching India's first futuristic crabtree smart experience centre in Jalandhar, Punjab. This is first-of-its-kind initiative in the industry which will provide holistic experience to the customers i.e. live experience of the smart products under one roof offering instant solutions for specific needs related to modern homes.

This smart experience centre will help customers to explore, purchase and experience Crabtree's most intuitive and advanced range of products such as smart range of

switches, switchgears, security systems and home automation products based on IoT and other futuristic technologies. The center

was inaugurated by Vivek Yadav, Senior Vice President, Havells India. Yadav said, "Today's consumers are aspirational and want to have the best products at their homes. They are ready to uplift their lifestyle and want to make a statement by embracing intuitive products. Internet based smart technologies are adapted by consumers for convenience and in order to cater to this demand in a unique way, we have introduced our first Crabtree smart experience centre." 

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Schneider Electric launches EcoStruxure asset advisor

Schneider Electric recently announced the availability of EcoStruxure asset advisor for electrical distribution as part of the company's EcoStruxure IoT enabled system architecture and platform. EcoStruxure asset advisor brings a proactive approach to electrical distribution, combining IoT and cloud-based technologies with Schneider Electric's experts and services to provide predictive and preventive services for business continuity. EcoStruxure asset advisor services offer the ability to anticipate and address issues before they become critical incidents, mitigating safety risks, avoiding unplanned downtime, operational losses and expensive maintenance interventions.

EcoStruxure asset advisor evaluates live data from customers' environments and applies AI and advanced analytics to identify potential threats. With this data, asset advisor gives customers the power of choice for critical decisions, either to take action themselves or to leverage Schneider Electric's service bureau to do so on their behalf.

The announcement of availability, marks the launch of the EcoStruxure asset advisor service bureau in France, joining bureaus already operating in the United States, United Kingdom and India. Schneider Electric brings over 7,000 professional and field service experts as well. 

ERDA conducts its first Technology Meet

ERDA organised its first ever Technology Meet - 2019 at Vadodara on 21st February to showcase its bouquet of R&D facilities including innovative technologies developed by ERDA and expert services offered by it.

Head of R&D division of ERDA, Dr. SH. Chetwani presented the activities carried out by R&D and Expert Services division of ERDA. He elaborated the Expert Services like failure analysis, material characterization, power quality and power system studies, expert diagnostics, FEM based simulation activities carried out by ERDA. It also covered various R&D programs carried out by ERDA like contract research offered to various customers, sponsored R&D and internal R&D program of ERDA. Many R&D projects like IoT-based intelligent lighting system, smart inverters, improvement of ester oils,

polymer Nano composites, alumina-based Nano composites were discussed. ERDA informed that all R&D facilities available with ERDA are available to its members and customers for any development work or contract research.



Dr. SH. Chetwani also presented the technologies developed by ERDA under internal R&D program. Few technologies which were presented were silver based contact material including Nano silver and Nano CNT based technology, anti-dust coating, corrosion resistance paint, hot spot monitoring for distribution transformers, chargers for E Vehicle, Nano composite for insulating materials etc. 

CleanMax Solar raises funding of Rs 275 cr

CleanMax Solar has raised Rs 275 crore in equity funding from UK Climate Investments LLP (UKCI). This is the third marquee institutional investor to support the company's growth ambitions, having secured equity financing up to Rs 700 crore from affiliate of Warburg Pincus and the International Finance Corporation in 2017.

UKCI's investment will support CleanMax Solar as it expands its renewable energy portfolio – facilitating renewable energy buying for corporates. CleanMax Solar already counts many leading corporates among its clients, including Adobe India, United Breweries, Volvo India, Tata Motors,

TVS Group, ACC.

As per BTI 2018 report, CleanMax is one of the market leaders in both rooftop solar and open access solar for the commercial and industrial segment, with a cumulative India market share of 17 per cent in rooftop and 9 per cent in open access solar, respectively, as of March 2018.

UKCI is a joint venture between the Green Investment Group and the UK Government's department for business, energy and industrial strategy. The fund is managed by Macquarie Infrastructure and Real Assets, and aims to help the world's developing economies tackle climate change and promote cleaner, greener growth. 

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L&T Heavy Engineering dispatches India's heaviest hydrocracker reactor



Achieving another milestone project in the engineering world, the Heavy Engineering business of L&T has completed and flagged off India's heaviest hydrocracker reactor ahead of schedule. The reactor weighing 1,858 MT is manufactured for Hindustan Petroleum Corporation Limited's Visakh Refinery Modernisation Project. The reactor will sail directly to Visakhapatnam from L&T fully integrated state-of-the-art coastal manufacturing facility located at Hazira in Gujarat.

S Raja, Executive Director - Visakh Refinery Modernisation Project, Hindustan Petroleum Corporation, said, "We are proud to have been associated with L&T and would like to congratulate you for establishing a benchmark in manufacturing India's heaviest hydrocracker reactor, weighing 1,858 MT. We are happy to put on record that L&T has successfully achieved early delivery for the FCHCU reactors meeting the quality and safety requirement, with first time right and zero defect, being a marvelous achievement." E1

Altec and Mtrandt Host India's 1st Live Line Symposium

Altec and Mtrandt hosted India's first Live Line Symposium at Pragati Maidan on April 5. The inaugural event, held in conjunction with the GRIDTECH International Exhibition and Conference, hosted experts from across India's electric utility sector to discuss safe live line work practices and the positive effect insulated aerial equipment can have in providing reliable and sustainable power to India.

Attendees at the symposium heard case studies from the USA and a special delegation from China about the long-term benefits of live line work and how insulated equipment has improved productivity, safety, and efficiency in the electric utility industry. Dr. Rajendra Kumar Pandey, Director General of India's National Power Training Institute, was the keynote speaker and focused on trends in safety and training in India.



"The predominant work practice in India is to shut off power during line maintenance with a very small portion of the work being done on live lines," says Chitra Ranganathan, Altec Market Development Director, Asia Pacific. "India is seeing an increased demand for

uninterrupted electric power supply for industrial, commercial, and residential consumers. This demand is driving electric utilities to embrace new technologies and work methodologies."

Altec is one of the leading providers of equipment for live line utility work, providing products and services in more than 100 countries throughout the world. E2

Fortum brings advanced NOx reduction technology in India

Fortum, a Finnish energy company is bringing its proven NOx (Nitrogen Oxide) reduction technology in India under the new business 'Fortum eNext'. As part of this initiative, it organised two seminars in Delhi and Mumbai. The seminar was attended by leading industry experts, regulatory and pollution authorities and power plant companies. The seminar was aimed at showcasing Fortum's innovative global technology and its holistic solutions, with a special focus on offerings for thermal power plants in India.

"Thermal is going to be a mainstay in India's energy mix for the next



30 years. Many countries already have a strict limit on the emission of nitrogen oxides; thus, NOx reduction technologies are being widely deployed. Keeping a clean energy spectrum in mind, India also recently introduced its NOx emission limits, wherein pollution control technologies will be installed on most coal-fired plants," said Sanjay Aggarwal, Managing Director, Fortum India. E3

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- RG precision planetary gearboxes: 10 to 230 Nm.
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Siemens Gamesa installs Arkona offshore wind power plant

Siemens Gamesa Renewable Energy (SGRE) carried out installation of Arkona offshore wind power plant that was officially opened by owners E.ON and Equinor in the German Baltic Sea on 16th April. Siemens Gamesa installed and commissioned 60 SWT-6.0-154 direct drive offshore wind turbines in a record time of only five months between June and October 2018 that was ahead of schedule period. The Arkona power plant has a total capacity of 385 MW and will supply around 400,000 average German households with electricity annually. Siemens Gamesa installed and commissioned the turbines in the wind park area covering 39 sq kms on monopile foundations at water depths between 23 and 37 metres.

All the work at sea were carried out smoothly together with the developer from the port of Sassnitz-Mukran in less than five months. Siemens Gamesa applied its proven 24/ONE concept, in which a turbine is installed within 24 hours. The aim is to reduce installation times through efficient project management and to consequently increase customer benefit. In just over three months, the offshore turbines were installed from an installation ship provided by the operator. Only two days after completion of the installation work, all the wind turbines were fully operational at sea. 

Floating nuclear power unit to begin operations in Russia

After a series of successful and comprehensive tests, including on its twin KLT-40 reactor system, the one of its kind floating nuclear power unit (FPU) 'Akademik Lomonosov' is ready for commercial operations in Russia. FPU units 1 and 2 were successfully brought up to 100 per cent capacity on March 31st. These tests confirmed the operational stability of the main and auxiliary equipment of the FPU, as well as the automatic process control systems.

Director General of Rosenergoatom, Energy Division of Rosatom State Atomic Energy Corporation, Andrei Petrov explained that based on the results of these tests acceptance certificate for the FPU would be issued by authorities and operating license will follow suit in July. At the same time, onshore



and hydraulic structures for the floating nuclear power plant (FNPP) as well as infrastructure ensuring the transmission of electricity to the local grid and heating for the city's network, are scheduled to be completed by the end of this year Russia. Current engineering work is going as per schedule.

The FPU is scheduled to be towed to the Port of Pevek during the 2019 summer where it will operate as part of a floating nuclear power plant, replacing the capacities of the outgoing Bilibino Nuclear Power Plant and Chaunskaya CHPP. 

GE, Uniper unveil 'GT26 HE' solution



Continuing its commitment to invest in its mature gas turbine fleets to keep them competitive in today's dynamic energy marketplace, GE recently announced the launch order for its new GT26 HE (high efficiency) gas turbine upgrade with Uniper for the utility's Enfield power station in greater London.

"We're proud to launch our new GT26 HE upgrades with Uniper—it's the most advanced solution we have ever introduced on a GT26 gas turbine, and one of our most

efficient upgrades within the F-class portfolio," said Scott Strazik, President and CEO of GE's new gas power business. "Not only will this upgrade revitalise Uniper's Enfield power plant, it will also improve its competitive position in the Great Britain generation market, supporting its long-term profitability and viability."

Key performance benefits include higher efficiency for combined-cycle power plants, more than 2 per cent base load increased efficiency, translating to as much as USD 4 million in fuel savings annually per unit. Upto 1 per cent increased efficiency in part load, yielding up to \$1 million in fuel savings a year per unit. 



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BuildTrack automates Jaquar's orientation centres with IoT

BuildTrack has deployed its wireless lighting automation system based on the latest IoT technologies and multiple customer orientation centres of the Jaquar Group. Customers visiting the Jaquar orientation centres in Mumbai, Pune, Nagpur, Gurgaon, Ahmedabad, Chandigarh, Indore, Raipur, Lucknow, Bhopal, Hyderabad, Bangalore and Jammu are able to experience the exceptional variety and splendour of the lighting solutions on display all from a smart app.

Through enabling the transformation of these traditional stores into smart stores, BuildTrack aims to enhance the customer experience within the store as they go about exploring the myriads of exceptional solutions by turning them on or off and dimming them individually or collectively. The digital catalogue of over 300 lights in the entire showroom can be controlled via smart app. The system was deployed after the store was completed and in operation, hence, the deployment had to be wireless. The app is a built-in catalogue and digital control unit at the same time.

"We are excited to be part of Jaquar's exquisite store and to have a hand in creating a memorable shopping experience for the customer. A touch of technology can bring vast difference to retail stores," said Dr Narendra Bhat, Founder and President at BuildTrack. 

LANXESS' e-Powertrain team to focus on e-mobility

LANXESS sees great application potential for its technical plastics under the brands Durethan (polyamide) and Pocan (polybutylene terephthalate) in the new mobility growth market. This is why the high-performance materials business unit founded the 'e-Powertrain team', which is geared up to the needs of the global automotive industry and supports external partners throughout the entire development chain for components of electric vehicles and the associated infrastructure. This support includes materials that are tailor-made for specific customers and applications as well as processing development and engineering services for component design such as CAE simulations, mold flow calculations and finished product inspections.



The new group is the central point of contact for electromobility development projects and inquiries from all regions. "We coordinate knowledge exchange among our applications and processing development centers, which we operate in all of the world's major economic regions. The aim is to provide our international partners with the best possible products and service locally. We are also responsible for close-to-production and advance development projects," explained Julian Haspel, who heads the team. 

Finn-Russian company tests AI solution to boost oil well production

ZYFRA Group, Finnish-Russian AI and IIoT solutions developer for industries has successfully tested the electrical submersible pump (ESP) software unit, designed to enhance the efficiency of oil extraction by boosting oil well production rates by 1.5 per cent with no additional capital investment.

The ESP software unit is operational now for more than three months on 500 oil wells in Western Siberia, Russia, which claim an additional profit of \$2 million and growth in production of 1.5 per cent. It is equipped with AI to provide recommendations based on historical big data analysis. The unit recommends a mode of

well operation that will ensure the maximum oil flow rate for a certain period of time and provides for stable operation during that period by analysing current frequency, gauged oil flow rate, periods of intermittent pump operation and other operating parameters.

"Scientists regularly claim that the era of oil will end soon and that readily available hydrocarbons are almost exhausted. The digitalisation of the oil and gas industry will help simplify extraction of hard-to-recover oil while at the same time extending the lifespan of the oilfield by more than one decade", said Dmitry Krikunov, ZYFRA's AI team leader in the oil and gas sector. 



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Reduction of
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Frost and Sullivan appoints Sarwant Singh as regional leader



Sarwant Singh

Frost and Sullivan has appointed Sarwant Singh as the Regional Leader for Middle East, Africa and South Asia (MEASA). Singh will assume this responsibility in addition to his current role as the company's Global Head of the Mobility, Aerospace, Defence and Security Practice.

Sarwant brings with him over two decades of experience in strategic consulting and advisory to fortune 1000 companies, public sector enterprises and multi-lateral organisations in the mobility and advanced technologies sectors. His counsel has been sought by the Prime Minister's Office in the UK; international organisations like UNIDO, leading global automotive manufacturers; private equity firms, and investment banks. A former member of the World Economic Group's Automotive and Transport Council, he is now on the Advisory Board of Nissan, Aerospace Technology Institute (ATI) and Leeds University Business School.

Aroop Zutshi, Global President and Managing Partner, Frost and Sullivan said, "His appointment reflects our commitment to continue driving profitable growth across all our business units, augmenting our research and consulting expertise, and strengthening our value proposition across the region." ❶

Kamalesh Das appointed as Director (Engineering R&D) BHEL



Kamalesh Das

Kamalesh Das has assumed charge as Director (Engineering R&D) of BHEL. Prior to this appointment, Das was heading as Executive Director of various business verticals at BHEL's industry sector that is responsible for carrying out the company's diversification and growth initiatives. Major verticals in his portfolio included renewable energy, industrial systems, electrical and transmission products.

Earlier, he was also the head of various manufacturing units of BHEL like insulator plant, Jagdishpur, Electro-Porcelains Division, Bengaluru, and Component Fabrication Plant, Rudrapur. Das is an engineering graduate from Calcutta University and also has a post-graduate diploma in management. He joined BHEL as an engineer trainee at the company's insulator plant in 1982. Das has over 36 years of holistic and hands-on experience in energy, transmission and industrial systems. During his career in BHEL, he has developed and demonstrated a comprehensive set of competencies in various value chain activities like marketing, engineering, production, commercial, project management, human resource and industrial relations, legal management, project finance and strategic management. ❷

Cairn Oil and Gas Selects Ajay Kumar as CEO



Ajay Kumar Dixit

Cairn Oil and Gas recently announced the appointment of Ajay Kumar Dixit as CEO. Ajay succeeds Sudhir Mathur, who after seven successful years with the company, moves on to pursue personal endeavours.

Ajay brings 39 years of rich experience in the energy sector and joined Vedanta in 2015 from Siemens where he was CEO - Energy for South Asia. An alumnus of Delhi College of Engineering, he served as the acting CEO of Vedanta's aluminium and power business before being elevated to this new role. He brings deep experience in strategy, operations, technology, finance and regulatory affairs. His leadership will support Cairn's vision to realise the full potential of Barmer block, grow the offshore business, appraisal of new blocks under OALP I and DSF II, and in continuing to steer a strong and high growth organisation.

Srinivasan Venkatakrishnan, CEO, Vedanta, said, "Ajay has a deep understanding of our business and the markets we operate in. He is a dynamic and values-driven leader with an impressive track record of delivering consistent high-quality performance in a safe and sustainable way."

Ajay said, "We will continue to invest systematically and bring in world-class technology to further strengthen our India exploration footprint. Our focus will remain on exploration and production in innovative and sustainable ways to support India's vision of energy security and self-sufficiency." ❸



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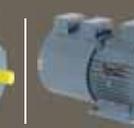
Flange Motor



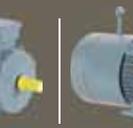
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Fulham Bluetooth SmartBridge 0-10V Controller Gets Product of the Year Award

The new Bluetooth to 0-10V SmartBridge from Fulham Co, a supplier of lighting components and electronics for commercial and specialty applications, has been recognised as the 2019 Product of the Year in Lighting Control Equipment by Electrical Construction & Maintenance magazine. By installing the new Bluetooth SmartBridge controller, wireless Bluetooth access and control can be added to remotely manage and monitor any 0-10V dimmable LED luminaire.

The Bluetooth to 0-10V SmartBridge offers a simple and easy-to-install means of adding Bluetooth mesh support to installed 0-10V LED drivers. By adding Bluetooth mesh support, multiple LED controllers can be incorporated into a wireless network to manage the building's lighting infrastructure.

Since the Bluetooth SmartBridge is compliant with the specifications for SIG Qualified Bluetooth mesh it can support two-way data communications, so the SmartBridge can be used to remotely commission

LED drivers and update firmware, as well as monitor and control luminaires from any Bluetooth-enabled device. Fulham has just released its own iOS- and Android-compatible mobile apps to provide Bluetooth lighting controls from a smartphone or tablet.

"We are delighted that EC&M selected our Bluetooth SmartBridge



as lighting control product of the year," said Russ Sharer, Vice President of Global Marketing and Business Development for Fulham. "Bluetooth mesh is rapidly gaining acceptance for building automation, and LED drivers offer the ideal skeleton to create a Bluetooth mesh ecosystem. While many commercial buildings are being retrofitted with Bluetooth-ready LED drivers, we

also recognised the market need for a transitional product like our Bluetooth SmartBridge to extend the value of installed drivers. At Fulham, we understand that innovation is not only developing next-generation technology, but providing customer with interim solutions to help them prepare for the future."

The Bluetooth SmartBridge is being offered in two configurations. Fulham's Model CTBRCB02JM02 Bluetooth SmartBridge provides wireless on or off and 0-10V dimming controls for a transmission range upto 50 meters or 160 feet at 2.4GHz.

The Bluetooth SmartBridge has 120 to 277VAC input, as well as a sensor input for motion controls and daylight harvesting. Fulham's Model CTBRCB03JM03-PC offers additional functionality, including power metering and color tuning. Both units are designed for indoor or outdoor use at operating temperatures from -40 degrees to 140 degrees (Fahrenheit) and come with Fulham's five-year warranty. 

Orient Electric Gets 'Superbrand 2019' Status for Fans & Air Coolers

Orient Electric has been conferred with the prestigious 'Superbrand 2019' status for fans and air coolers by leading independent brand arbiter Superbrands India. Orient Electric emerged as a powerful entity in both the categories after a thorough evaluation process by eminent professionals in marketing and advertising.

Also, it ranked amongst the top 5 per cent and 10 per cent of all

brands across categories in India for fans and air coolers respectively. This year's effort was endorsed by 18,031 people who scored across 1488 brands and 237 categories.

Rakesh Khanna, MD & CEO, Orient Electric said, "We are delighted to receive the consumer validated Superbrand status for two of our businesses – fans and air coolers. Our focus has always been on using technology led innovation to create the differentiation

that the new age consumers expect. At a time when air coolers are still considered as a commodity, we have created differentiators by introducing IoT-enabled air coolers and modular metal-bodied outdoor air coolers. In fans category, the phenomenal success of Aero Series range has helped us capture No. 1 position in the premium segment and our recently launched IoT and voice enabled Aeroslim fan is getting extremely positive response." 

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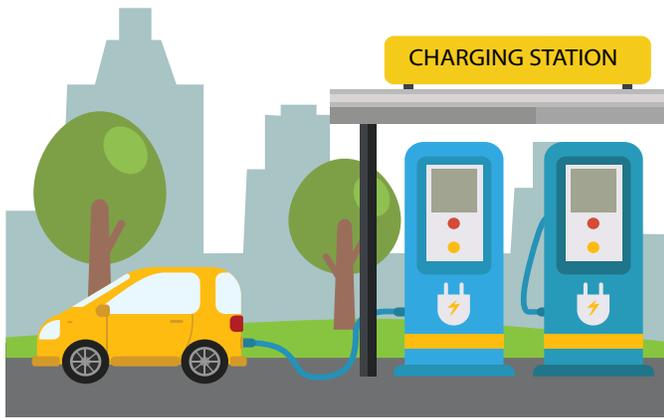
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EV Market worth 10.79 mn units by 2025

The major factors behind the growth of electric vehicle sales are government support in the form of grants, subsidies, and tax rebates, increasing environmental consumer awareness, improving charging infrastructure and increasing vehicle range.



According to Marketsandmarkets report, global electric vehicle sales are projected to grow at a CAGR of 32.57 per cent from 1.50 million units in 2018 to 2025, to reach 10.79 million units by 2025.

The major factors behind the growth of electric vehicle sales are government support in the form of grants, subsidies, and tax rebates, increasing environmental consumer awareness, improving charging infrastructure and increasing vehicle range.

Electric passenger car segment: Expected to dominate the EV market

Technological advancements and increasing focus on research and development activities by leading OEMs to launch affordable and premium quality electric passenger cars. The models in the electric passenger car segment such as the Tesla model S, Nissan Leaf, BYD Tang, and Mitsubishi Outlander are some of the top selling electric passenger cars in 2016. Availability of subsidies and tax rebates, features such as increasing vehicle range and improved charging infrastructure, reduction in charging time, and the decreasing price of EVs are the major factors driving the global EV market.

BEVs: Expected to dominate the EV market

In 2018, the sales of electric vehicles comprise of BEV

and PHEV cross 2 million units mark. Refillable batteries can fuel the market for electric vehicles market. It can be refuelled in minutes at a huge network of converted gas stations. Governments prefer BEVs as these are zero emission vehicles. Various governments around the world support the sales of BEVs with subsidies and tax rebates. BEVs are also the most preferred vehicles in China in 2017. It is expected that the continuously improving charging infrastructure, reducing charging time and existing government support would help the BEV segment to dominate the other EV propulsion systems such as PHEVs and FCEVs.

Asia Pacific: Largest market for EVs

The Asia Pacific region is the largest market for EVs due to government support in the form of grants, subsidies and tax rebates and continuously improving charging infrastructure in countries such as Japan and China. The governments in both the major markets i.e. Japan and China provide subsidies and other non-financial benefits such as access to number plate, car pool lane access, and road tax exemptions for EV users. Continuously improving charging infrastructure and increasing vehicle range are the major factors which have contributed to the Asia-Pacific to be the fastest growing market. Additionally, the alarming pollution level in economies such as Japan and China have fuelled the demand for zero emission vehicles in such countries thus, creating huge demand for EVs in such countries. Additionally, in 2018, the sales of electric vehicles comprise of BEV and PHEV in China cross 2 million units mark. Further, the Volkswagen Group sells about 4,000,000 vehicles in China and requires 400,000 NEV credits in 2019.

The major market players in the global electric vehicle market are Tesla (US), Nissan Motor Corporation (Japan), BYD (China), and BMW (Germany), and Volkswagen (Germany). ®

Keep your electricity flowing & business growing



Uninterrupted power supply is the goal of every power transmission and distribution company, but many problems lie in the path of achieving it. These problems can lead to unnecessary shutdowns, and can cause huge monetary and man-hour losses. To help power companies achieve highest efficiency, FLIR brings a wide range of thermal imaging cameras and T&M products.



Transformer Thermal Image



Substation Thermal Image

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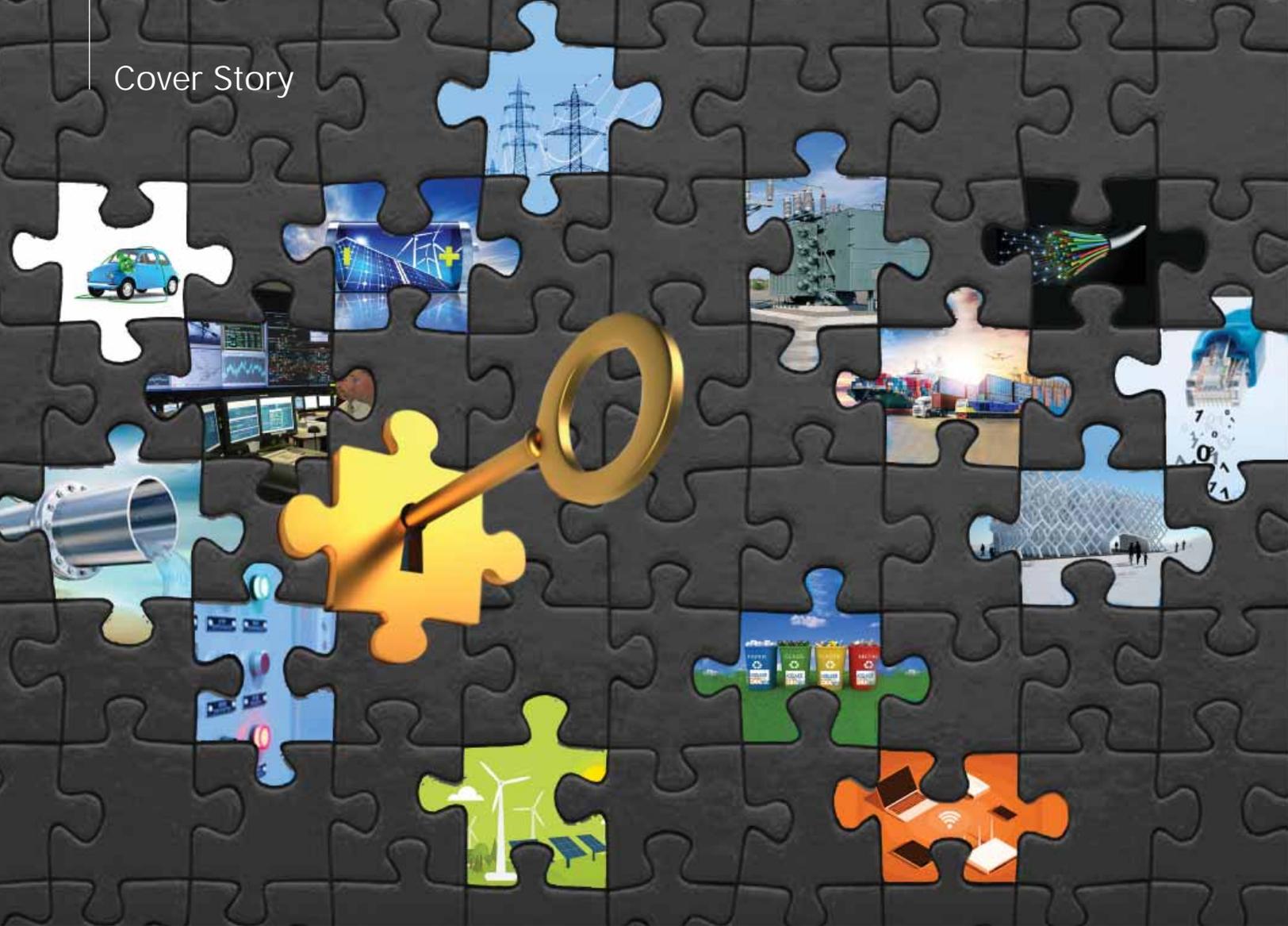
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SMART OPPORTUNITIES

An in-depth analysis on why smart cities could be a golden opportunity for electrical equipment industry.

**Subhajt Roy,
Group Editor**

The Government of India launched the 100 Smart City Mission in June 2016 focusing on sustainable development of infrastructure and services benefiting the citizens. One of the focus areas in Smart Cities Mission is to provide reliable power supply, minimise distribution loss, and have effective means of managing

power distribution in the city. Recognising that sustainable electrical solutions lie at the core of a smart city's infrastructure - for power, water, transportation, and industrial needs, the industry has witnessed a remarkable development through economical and industrial changes, with a seven-year high growth of 12.8 per cent in 2017-18.

High demand for sustainable and smart offerings

Commenting on why smart cities are a golden opportunity for Indian electrical equipment industry, C P Vyas, President - Electrification business, ABB India said, “Smart cities will call for a complete transformation of the industrial landscape, with intelligent factories and sustainable solutions increasing the efficiency and productivity of businesses across the country. In this regard, the electrical equipment industry will witness a high demand for its sustainable and smart offerings. This will therefore contribute greatly to India’s growth as it embraces a transformed lifestyle, built on smart electrical technologies and sustainability.”

ABB products and solutions are a crucial part of a city’s critical infrastructure, which is relied upon for everything from the supply of power, water and heat, to the automation of the factories and buildings. “With companies like ours constantly innovating and providing intelligent and efficient technologies, we can expect great things for India’s smart cities,” adds Vyas.

Cable manufacturing firms are reaping the benefits

“The union government’s focus on smart cities and leveraging digital solutions for transforming urban living has come as a breath of fresh air for the Indian electrical equipment industry. Cable manufacturing firms are reaping the benefits of increased demand in optical fibre – which acts as a backbone of any smart solution,”



With companies like ours constantly innovating and providing intelligent and efficient technologies, we can expect great things for India’s smart cities.

C P Vyas,
PRESIDENT -
ELECTRIFICATION
BUSINESS, ABB INDIA

said Jayant Kohale, Business Head - Smart Infra, KEC International Ltd. The government’s focus on connecting gram panchayats with high-speed Internet through the BharatNet initiative has added to this demand. Traditional transformers are now being upgraded with added capability of IoT sensors that capture multiple external and internal data points and provide real time update to the end-user.

Push for e-mobility

A niche industry that is gaining ground due to the push towards smart living is the EV charging industry. EV chargers need to be as accessible as petrol pumps to ensure that the transition from fossil fuel-based vehicles to electric or

hybrid vehicles is effective, opines Kohale of KEC. He adds, “Renewable energy is another priority area for the government. From large-scale rooftop solar projects in urban areas to Battery Energy Storage Systems (BESS) in urban slums or villages, the market has opened for all players.”

Quality electrical equipment in demand

According to Sameer Saxena, Director Marketing, Legrand (Group) India, “Smart cities were undertaken as a sustainable housing solution to meet the rising demand in urbanisation in the country. It aims to digitalise the communication and technology used therein to optimise the usage of resources such as energy, water, and roads and infrastructure and improve governance, transportation, and waste management.”

As per the Smart Cities Council, all the data that is collected from sensors – electricity, gas, water, traffic and other government analytics – is carefully compiled and integrated into a smart grid and then fed into computers that can focus on making the city as efficient as possible. To this effect, smart cities have been a golden opportunity for companies in the Indian electrical equipment sector.

“The smart cities programme is expected to push the demand for quality electrical equipment and lead to massive growth opportunities for electrical equipment manufacturers,” informs Saxena. “It has also led to demand creation of in the electrical components likes switches, smart switchgears, ACBs, MCBs and demand creation in power supply.”



It is safe to say that by investing in R&D, both traditionally large players as well as small niche players of the electrical industry stand to gain in this rising tide of digitisation and smart living.

Jayant Kohale,
BUSINESS HEAD - SMART
INFRA, KEC INTERNATIONAL
LTD

Efficient power management is a building block

“From a power sector perspective, smart city is a city with smart systems that can make power usage efficient, reliable and sustainable,” observes Anil Kadam, General Manager - Business Development, Solution Architect - Smart Grid / Smart Cities, Schneider Electric India. “Efficient power management is foundational and a building block of any city. As smart cities are redefining the benchmark for energy efficiency with better transmission and distribution system, special emphasis is being laid on developing an efficient distribution network for optimal utilisation with zero possibility of any outage. Also, integration of

the smart grid technology in the smart cities project will provide a unique opportunity to deliver quality and reliable 24X7 electricity to consumers.”

Focus on productivity

Smart city has a mission to build infrastructure which fits the environment, opines Milind Thakkar, Marketing Head, Megger India. It has infrastructure that includes provision for 24X7 water and power supply, underground ducting of electrical or data cables with electrical smart metering, modernisation of existing traffic management and mobility to name few. According to Milind, to cater to these requirements and to maintain them, utility companies will require advanced quality electrical equipment to increase the productivity. This is going to be the requirement of most smart city projects and that makes it a golden opportunity for electrical industry, he said.

Smart Solutions for Smart Cities

Smart Infrastructure

In the core domain of smart cities, KEC has been awarded two projects - Bidkin Smart City and Aurangabad Smart City. Bidkin Smart City, part of the Delhi Mumbai Industrial Development Corridor, is a greenfield project where KEC is implementing the complete Information Communication and Technology (ICT) stack including setting up the fibre backbone, core networking, data center, command and control centre, surveillance, Wi-Fi and other IoT sensors.

The Aurangabad Smart City project is a brownfield project

including the pan city components like surveillance, core networking, data centre, integrated command and control centre and operation command centre, Wi-Fi, solid waste management and IoT sensors. The IT systems being set up will be used both by the Aurangabad Police and the municipal corporation of Aurangabad. In the domain of communication, KEC is L1 in the project for setting up the fibre infrastructure for one package of Himachal Pradesh.

“In our segment of smart utilities, we are implementing a first-of-a-kind R&D project of energy storage at Puducherry involving grid integrated energy storage,” informs Kohale.

KEC has executed a pilot with the Ludhiana Smart City and set



The smart cities programme is expected to push the demand for quality electrical equipment and lead to massive growth opportunities for electrical equipment manufacturers.

Sameer Saxena,
DIRECTOR MARKETING,
LEGRAND (GROUP) INDIA

Continued on Page 34



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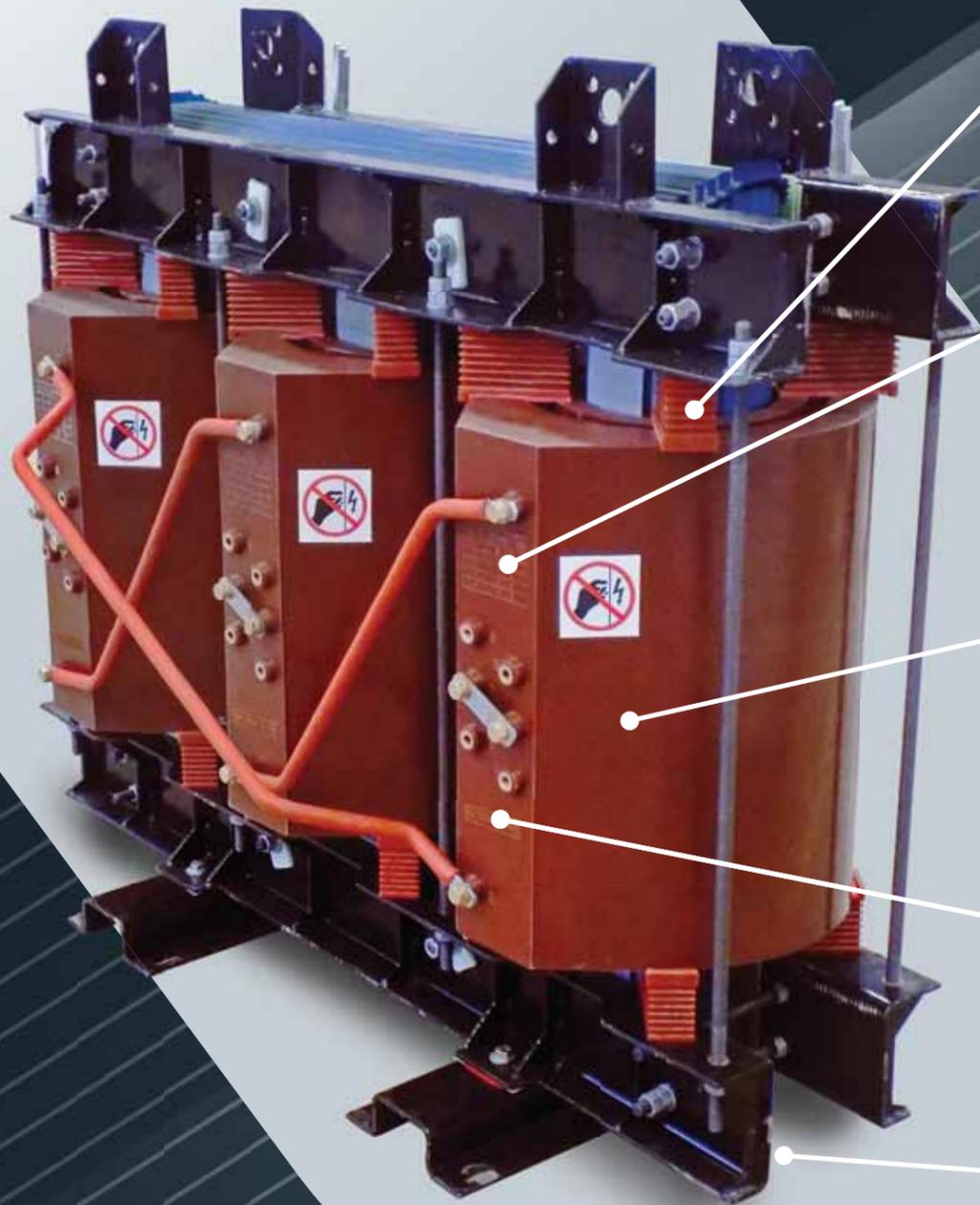
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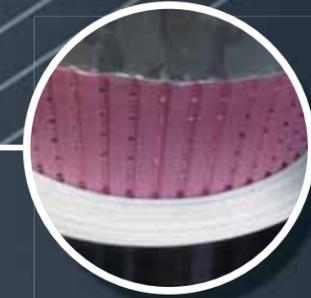


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Cover Story

Continued from Page 30

up a Smart Pole under the 'Make in India' initiative. The indigenously developed smart pole is a one-stop solar-powered solution that encompasses all benefits of smart lighting, variable message display, public address system, environmental sensors and EV charging. "It is safe to say that by investing in R&D, both traditionally large players as well as small niche players of the electrical industry stand to gain in this rising tide of digitisation and smart living," asserts Kohale.

Intelligent Solutions

ABB's products are relied upon for the enhanced experience of how we work, live, and move, offering intelligent solutions for communication, power, water, transport, buildings, and heating and



From a power sector perspective, smart city is a city with smart systems that can make power usage efficient, reliable and sustainable.

Anil Kadam,

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cooling. Therefore, ABB's portfolio is multi-dimensional, serving all the needs of a smart city, claims C P Vyas.

ABB has recently collaborated with IIT Roorkee to construct an operational Smart Electricity Distribution Network and Management System (SDNMS) in its campus. The company has also partnered with the Surat Municipal Corporation to deploy a more scalable and sustainable model, by upgrading the existing manual flowmeters to digitally-enabled devices for managing the city's water more efficiently.

Control & Command Center

Legrand is already working with all smart city development authorities at various locations like New Raipur, Amravati, Bhopal to name a few. They have completed projects in New Raipur (cable management solutions, UPS, energy distribution and digital infrastructure).

The areas of expertise where Legrand is participating are residential, offices, transport, and EV charging infrastructure. The heart of all smart cities will be at the control and command center. Legrand has the capabilities to provide end-to-end solution to this command center with - energy distributions, environmental sensors, surveillance, city administration etc.

Fault location instruments

The cable fault location process has multiple steps and it's vital that it's completed as quickly and safely as possible to minimise the time that customers are without supply. Megger manufactures a wide range of fault location instruments that



Smart city has a mission to build infrastructure which fits the environment.

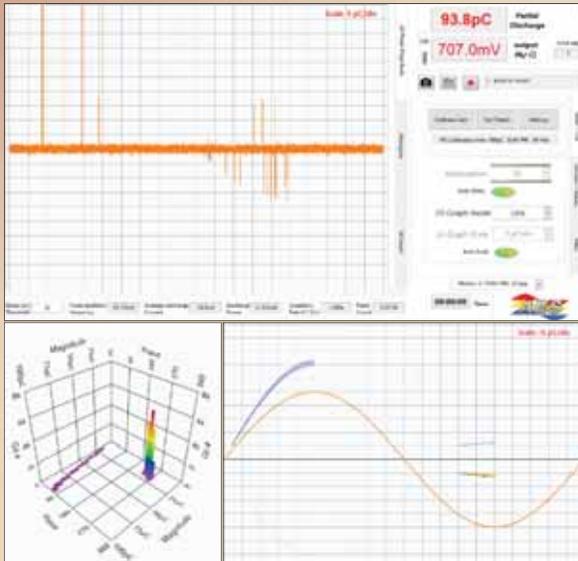
Milind Thakkar,
MARKETING HEAD, MEGGER
INDIA

have been developed to be easy to use.

IoT enabled operating solution

Schneider Electric offers EcoStruxure for smart cities which is an innovative IoT enabled operating solution that helps cities to become more efficient, resilient and sustainable. The EcoStruxure for smart cities further comprises of EcoStruxure Grid, Building and Water and Wastewater. The EcoStruxure Grid helps to increase grid efficiency for sustainable networks bridging the gap between energy demand and supply. EcoStruxure Building brings engineering efficiency combined with asset and energy performance services. It enables lifetime efficiency of buildings ensuring productivity and comfort for occupants. And finally, EcoStruxure for water and wastewater helps smart cities to enhance key processes and application across the water cycle. ☺

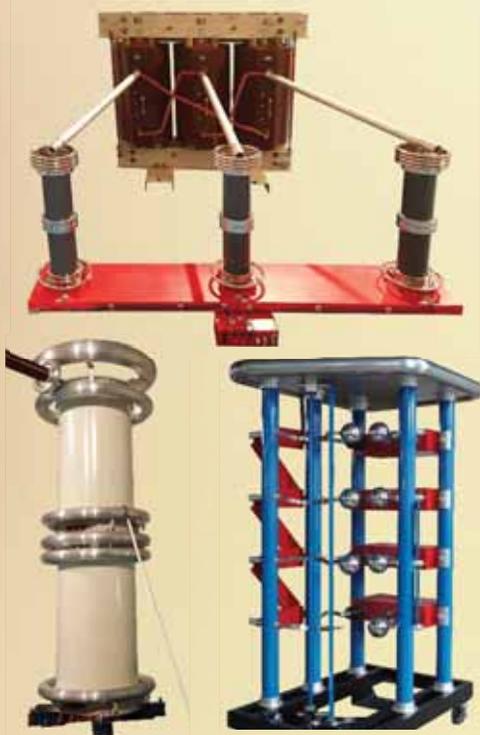
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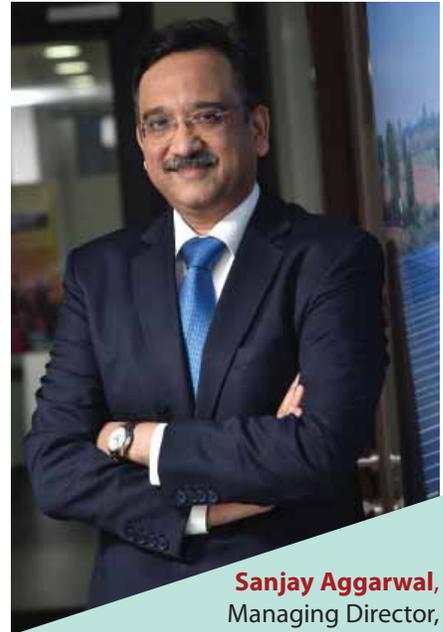
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Juha Suomi,
Area Director, Asia,
Fortum eNext



Sanjay Aggarwal,
Managing Director,
Fortum India

Fortum: Gearing up for EV opportunity

Fortum, a Finnish energy company is bringing its proven NOx (Nitrogen Oxide) reduction technology in India under the new business 'Fortum eNext'. As part of this initiative, the company recently organised a seminar in Mumbai to showcase its innovative global technology and its holistic solutions, with a special focus on offerings for thermal power plants in India. On the sidelines of this event, **Juha Suomi, Area Director, Asia, Fortum eNext** and **Sanjay Aggarwal, Managing Director, Fortum India** speak to **Subhajt Roy** and explain about the company's roadmap for Indian market. Excerpts:

India's coal power plants are reported unhealthiest in the world and you have solutions which can be used for making those plants clean. In this context, how do you see the business potential in India?

Juha Suomi: Over the last 30 years, the European Union has periodically tightened the air emission regulations and particularly the NOx emissions for coal fired power plants. Fortum, being a leading clean-energy company, is offering, among other energy efficiency programmes, its own NOx reduction technology since 1990s. Now that the Indian government is bringing stringent laws to restrict NOx emission

levels for thermal power plants similar levels to Europe, we see tremendous potential here for our offering. We have already done a couple of Low-NOx pilot projects with NTPC at their Ramagundam plant and one other with a private power producer. Our forte is not to sell only the equipment, our goal is to provide solution for our customers.

In India, not much of capacity addition is happening in the thermal power segment. Still, why do you consider it as a potential market?

Juha: Energy consumption per capita is increasing in India and it is envisaged that the thermal will remain the mainstay in

the country's energy mix for the next 30 years. Moreover, the existing coal-fired plants will need to go through technological upgradation to meet the stringent emission norms. Even the 15-20 years old power plants have potential to improve their energy efficiency and reduce their air emissions significantly, like in case of NOx emissions, by adopting the best available technologies. Through our global experience and product portfolio, we are in good position to offer such solutions also in India. **What are the advantages of your NOx reduction technology?**

Juha: Fortum eNext's advanced NOx technology reduces emissions effectively by staging and optimising the combustion process, thus elimination of NOx formation at its source. Compared to alternative and expensive solutions, there is a minimum need for new equipment, no auxiliary power consumption, no water consumption, and no ammonia or urea consumption thus no by-products for disposal. We are also committed to make the necessary physical modifications within the scheduled shutdown of the power plant.

How do you see the acceptance from the Indian market as there is a CAPEX involve?

Juha: The CAPEX we offer for the NOx abatement is 50 per cent less than what was anticipated in Indian markets two years ago, so it is really welcomed. Our solution provides one-off CAPEX investment for the customers without additional OPEX required and therefore is really cost-effective. We have estimated that for a 500MWe coal-fired power plant the life-cycle cost for the first five years of our Low-NOx implementation would be around 3 MEUR compared to a selective non-catalytic reduction (SNCR) being approximately 25 MEUR. Then comes the other options like the catalyst, which is an extremely expensive costing around 40-45 MEUR.

Sanjay, what will be your focus areas?

Sanjay Aggarwal: We would start off with private sector first as there are lots of captive plants. We will keep looking at PSUs also.

You have a significant presence in the Nordic

►►► We believe, by 2023 there would be a tipping point and when there would be a rush for EVs, we want to be prepared for that.

Sanjay Aggarwal, Managing Director, Fortum India

region especially in the renewable energy segment. How would you like to strengthen your Indian market presence?

Sanjay: We are a leading clean-energy company having significant presence across in the Nordic and Baltic countries, Russia and Poland. We are one of the major players in Nordic region for heating business. In India, we started operations in 2012 and today we have a portfolio of 685 MW.

How challenging is the solar power sector in India?

Sanjay: Tariffs have gone down over a period of time. The return levels have also gone down. Probably the return expectations have also gone down. But we are still in the market which obviously means that the thresholds that we have, we still meet those. So, it all depends on how effective engineering you do and how effective sort of purchases that you do. If you actually see the tariffs have come down, it is not only that the developers have reduced their return expectations. The module prices have come down by more than a half. So, everybody is passing the benefit of reduction in the cost of inputs of the tariff. Nobody is taking it with them.

What's your comment on the bid cancellations?

Sanjay: Bid cancellations are really disappointing. But I would say that everybody has played a part in that – one cannot point fingers on why they are

►►► Fortum's mission is to engage customers and society to drive the change towards a cleaner world and make the ongoing energy transformation sustainable.

Juha Suomi, Area Director, Asia, Fortum eNext

cancelling the bids because we have made tariff as the centre of everything whereas it should not be like that. Reason being, tariff would depend from state to state because irradiation differs, and it would depend on what is the timeline which is required for commissioning the plant and so on and so forth. But when you break down everything to the lowest common denominator obviously these things would happen. You would have the tendering authority who expects a certain amount of tariff to be achieved and if you do not get to that tariff, they always have the right to cancel it. Yes, it is disappointing and according to us it should stop. The fact is, a lot of resources, both money as well as manpower, goes in preparing the bids as well. People prepare the bids, bank guarantees to submit, and everything has a cost to it. It is not that anybody can create a 250 MW bid at free of cost. So, as we move forward, people would start realising and if they feel there is the possibility of a bid getting cancelled, people would not bid.

In future, will you continue with bidding?

Sanjay: We would not randomly bid. As long as we feel that the counter party is someone that we can rely upon it and passes through our credit checks. We would only bid where we feel that there is a decent probability of acquiring land, the transmission line is fine and the counter party is ready, we will participate there.

You have presence in thermal power, renewable, heating and cooling. Where do you see the business is coming from in India in next 5 years or so?

Sanjay: From our perspective, renewable would remain the central piece and in renewable it will be essentially solar. Alongside, we see electric mobility coming up. With respect to e-mobility whether it is battery swapping or electric EV charging infrastructure, we would be there. We are putting up a bamboo-based bio-ethanol refinery in Assam in a joint venture with Numaligarh Refinery Limited along with Chempolis. In the next 5 years, we would build on whatever we have done in solar and in e-mobility. We would complete bio-ethanol projects and look for more opportunities.

You are expected to build around 700 EV charging stations in India by 2020...

Sanjay: I would not get into those numbers. I think, there is no fun in putting up charging stations without electrical vehicles being made. All we are saying is that we are willing to match the adoption of EV in India and depending upon that we would scale back or skill up.

We believe, by 2023 there would be a tipping point and when there would be a rush for EVs, we want to be prepared for that. In the meantime, we would like to see how our charging infrastructure operates with different types of cars, with different type of batteries, at different locations, and how our back-end Cloud system is performing so that we are ready for the EV adoption. As of now, in India, we have 40 charging points and one battery swapping station.

What is your vision for Indian market for next 5 years?

Sanjay: I think renewables will continue to grow. Alongside renewables, we will have battery storage coming in next couple of years which will make more sense to renewable, electric mobility would also come in. I would say at some point of time, biomass connected projects would also gain profits.

What is your commitment to the group in terms of business and growth?

Sanjay: With respect to solar, we will continue to look at 250 to 300 MW every year at least in near foreseeable future. In 'Charge and Drive', we want to be a meaningful player and similarly in bio-ethanol. So, I think the group expects that in some areas we would continue the growth path, in some, where we may not be the market leaders, we would like to be the thought leaders and bring in the new concept.

Juha: Fortum's mission is to engage customers and society to drive the change towards a cleaner world and make the ongoing energy transformation sustainable. At Fortum eNext, we will continue to support Indian energy producers to adapt to changing operational and environmental requirements. We are fully committed to build smart and sustainable solutions optimal for Indian markets and regions.

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Clean Electricity for Smart Cities

The rapid advent of ICT integrated control system including micro-grid could make RE as right candidate for smart cities project. Intelligent micro grid based solar power and electrical mode of vehicular mobility are anticipated to provide added advantages for smart cities projects in India.



million by 2050. India's plan of developing 100 smart cities and 500 Atal Mission for Rejuvenation and Urban Transformation (AMRUT) cities within five years appears appropriate as sustainable and inclusive urbanisation are becoming essential for this rapidly urbanising nation (rate of urbanisation exceeding world average).

A smart city is expected to integrate the capabilities of ICTs (information and communication technologies inclusive of Artificial Intelligence and automation) to improve the quality of life and services, efficiency of operations, meeting rational needs of economic and social aspirations to keep the earth sustainably habitable forever. Practically, it is expected to bring positive changes in all aspects including comfortable living (equipped with basic amenities, healthcare, waste disposal and sanitation), governance (efficient and transparent functioning of local administrations to serve its people keeping environment intact), education (opportunity to acquire completeness and intellectual nurturing as residents of a city), economy (enabling to avail economic opportunities that the city offers), mobility (safer and easier movement for all) and environment (no additional pollution loading and ensures required air and water quality). Thus, smart cities

is a modern and holistic concept for economic and sustainable development where resource management would play critical role.

Electricity is key for success of smart cities projects

Financial resources, innovative tools and technologies coupled with competent human resources are fundamental requirements for a sustainable and successful smart cities project. However, among all, reliable supply of electricity is essential for success of each and every aspects of smart cities project as mentioned in the previous section. The intensity of electricity demand vis-à-vis consumption vary among the regions due to spatially varying attributes. For example, HVAC is a major component of domestic electrical loads which is climate dependent. Similarly, prevailing modes and pattern of transport services would also govern the amount of electricity demand. The per capita annual electricity consumption (kWh/person/year) data of six developed nations, which may be considered as the reflection of the level of electricity consumptions of six smart cities located in these nations, are presented in Table 1. The level of electricity consumption is substantially higher than average consumption in India. Human

Overall, half of the total global population live in urban areas with variations of percentage share among regions. In India, about 460 million (around 34 per cent) people are living in urban areas, which is expected to be increased up to 600 million by 2030 and probably stabilised at 814

Table 1: Global status of Smartness related with electricity consumption

Smart City	Country's annual per capita electricity consumption, kWh	HDI	SCI (in a scale of 10)
Copenhagen, Denmark	5720	0.925	8.24
Singapore, Singapore	8160	0.925	7.83
Stockholm, Sweden	12853	0.913	7.82
Zurich, Switzerland	7091	0.939	7.75
Boston, USA	12071	0.920	7.70
Tokyo, Japan	7371	0.903	7.59

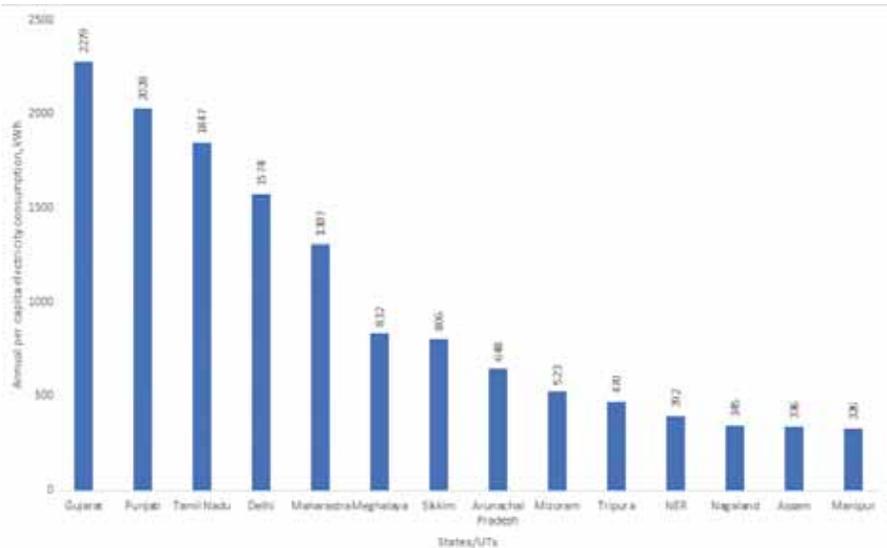


Figure 1: Per capita electricity consumption among some states of India

Development Index (HDI), which encompasses several attributes concerning the nature of living and facilities, is a universally accepted index to measure the quality of life. Similarly, SCI (Smart City Index) parameter is also used to indicate the fulfillment of objectives of smart cities project. Thus, higher level electricity is pre-requisite for better quality of living and it is better to plan additional generation from renewable sources for country like India.

Clean and smart electricity

Higher rates of GHG emissions through the conventional resources (coal based thermal power plant) strongly justify the needs of switching over to clean resources such as solar, wind, biomass etc for power generation. Besides reducing carbon emission, other benefits of renewable resources include the capability of decentralised generation. The rapid advent of ICT integrated control system including micro-grid could make RE as right candidate for smart cities project. Intelligent

micro grid based solar power and electrical mode of vehicular mobility are anticipated to provide added advantages for smart cities projects in India. Ambitious concept of upgrading conventional electricity grids to ICT enabled National Electricity-Internet comprising of prosumers (producer cum consumer) integrated electricity-intranet (micro-grid) are started incubating. The residents of smart cities could play roles of consumer (domestic consumption), manager (storing at EV battery and supplying to micro grid as per need) and producer (rooftop generation) and thus, participate in the innovative electricity intranet.

Looking at the various renewable energy options, India can take advantage of its huge biomass, solar and wind resources potential. Being situated in the tropics, India receives annual solar insolation of 5000 TWh or 4-7 kWh per square meter per day. The country has potential to harness about 750 gigawatts of solar power through grid-connected and off-grid installation of solar panels. Against the Government of India's target of 175 GW renewable power by 2022, country has installed 17 GW of solar power so far and several solar plants of hundreds of megawatts size are under construction. To achieve the ambitious targets of additional RE based generation, the regional level assessment and planning are essential. The electricity planning for proposed smart cities in different parts of India should also examine the regional renewable energy based inventories.

Smart cities project and existing electricity consumption status among northeastern region

The obvious disparity of electricity consumption (Figure 1) among the Indian regions has been a serious concern for the planner as positive correlation between electricity consumption and HDI has been

Table 2: NE cities identified for smart cities projects

S. No.	Cities	State	Rank /Round
1	Guwahati	Assam	17 /1st Round
2	Agartala	Tripura	10/2nd Round
3	Imphal	Manipur	11/2nd Round
4	Namchi	Sikkim	18/3rd Round
5	Kohima	Nagaland	24/3rd Round
6	Pasighat	Arunachal Pradesh	20/4th Round
7	Aizawl	Mizoram	27/4th Round
8	Gangtok	Sikkim	30/4th Round
9	Itanagar	Arunachal Pradesh	5/ 5th Round

Continued on page 40

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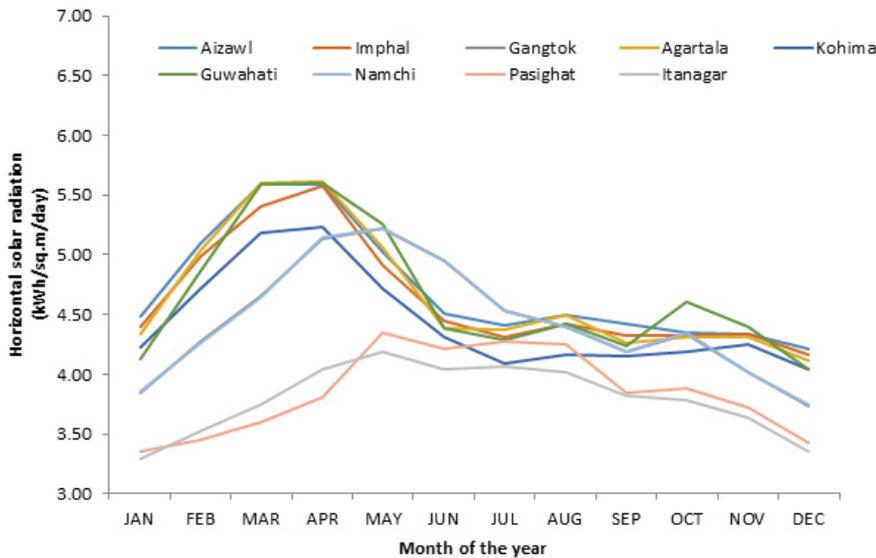


Figure 2: Horizontal solar radiation (kWh/m²) of the NE smart cities

conclusively evidenced. Consuming only about 392 unit per annum, the people of northeastern states are living well below the development (less than 800 kWh unit per capita per annum is considered lower HDI). Moreover, experts suggest the requirements of a minimum of 1,850 unit of electricity for each citizen to ensure a reasonable standard of living. Inadequate local generation capability has been considered as one of the major reasons of deficient consumption in NE India.

Thus, not only for the proposed smart cities project as listed in Table 2, but also for the welfare of the entire population, northeastern

India should target increase in electricity generation capacities through sustainable means such as solar and biomass. The large hydro power, though marked as potential, could not be capitalised due to several socio-political reasons.

Renewable energy resource Potential of NE India

Favourable solar insolation almost in all parts (Figure 2) over major period of the year make solar PV generation an advantageous option for the northeastern region. Both rooftop and medium scale centralised generation, integrated with smart micro-grid could be useful to support smart cities project in NE.

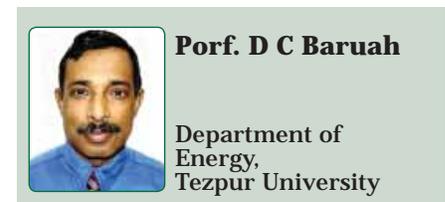
Table 3: Renewable energy potential among NE states

State	Solar, BU	Biomass, BU	Small hydro, BU	Wind, BU	Total, BU
Arunachal Pradesh	23.1	0.7	7.2	1.5	32.5
Assam	26.6	5.2	0.7	0.6	33.1
Manipur	7.7	0.4	0.4	0.2	8.7
Meghalaya	5.7	1.4	0.8	0.4	8.8
Mizoram	7.4	0.4	0.6	-	8.4
Nagaland	4.1	0.9	0.6	0.06	5.7
Sikkim	2.6	0.1	0.9	-	3.6
Tripura	3.4	0.2	0.2	-	6
Total	80.6	9.3	11.4	2.8	106.8

Fours feasible renewable energy resources viz, solar, biomass, small hydro and wind are considered to estimate the renewable electricity generation potentials among the nine northeastern states and presented in Table 3 using standard procedure.

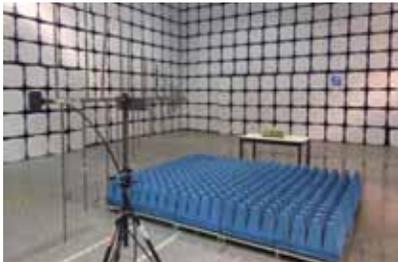
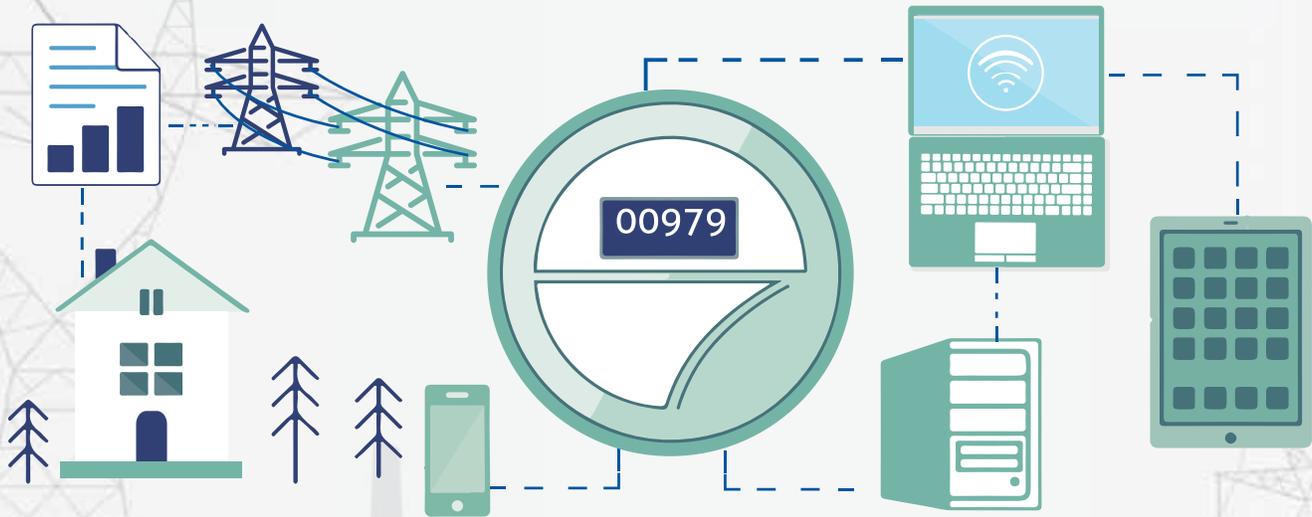
A total of 106.8 BU of annual electricity generation from RE sources is possible in NE India dominating by solar energy based electricity generation (75 per cent). State of Assam is capable of generating more than 33 BU of renewable electricity (26.6 BU from solar) annually.

In general, electricity demand ranging from 82 BU (in the year 2019) to 101 BU (in the year 2050) is estimated to meet 2,000 kWh/capita (aiming HDI of 0.8) for the entire population of for NE India. Doubling the expected level of energy consumption up to 4,000 kWh, the demand would further increase up to 184 BU (2019) and 226 BU (2050). Thus, the potentials of combined renewable energy resources from solar, biomass, small hydro and wind are found capable to contribute substantially for electricity demand of NE states. However, considering the global status of energy consumed by smart cities (Table 1), the regional renewable energy resource potential might not be adequate to support fully the electricity demand for its smart cities. ¹⁵

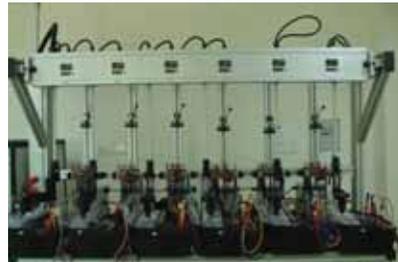


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SMART INDIA NEEDS SMART ELECTRICITY

The article aims to assess the necessity of smart electricity for manifestation of smart city.

Electric power is a fundamental element of any city and smart electricity plays a substantial role in manifestation of a smart city. A smart city is equipped with smart grids which ease collection of data of every individual and transferring those data to the utility without any manual intervention. The government of India named 20 states that will be aided Rs 50,802 crore in next five years, smart cities aim to maintain basic infrastructure with the best quality and 100 per cent efficiency. These states will be benefitted by information and communication (ICT) based initiative such as zero loss monitored by smart meters, LED street lighting and city beautification.

The idea of smart city was initiated aiming optimised use of available resources such as roads, building and infrastructure, energy and healthcare. Smart electricity deals with uninterrupted supply of quality power, monitoring power loss and record the real time data of the energy provided to various building, industries and commercial spaces. Smart electricity is the modern vision of integrating the conventional T&D system with internet of things which would focus towards sustainable and comprehensive development. Installation of smart grid has shown an exponential growth since 2012. Also 23 per cent of total share of budget of smart city is diverted towards energy which reveals the future of smart electricity in all smart cities.

Installations of smart meters grew 22 per cent annually from 2012 to 570 million units in 2016. It is expected to cross 15 billion by end of 2020.

Proper utilisation of renewable energy to produce power will make zero polluting and self-sustaining cities. A city can be called smart only if quality of living for its citizen enhances. For smart electricity, we need more distributed, more interconnected

and more intelligent infrastructure. Using distributed generation will personalise the energy usage and consumption, and because of bidirectional nature of distributed generation the electricity would now be a form of trade. The concept of smart homes defines of a well-designed connector for power transfer between the home and the utility. The smart home which is enabled with a smart meter continuously keep track of energy production and energy usage.

It is beyond imagination how much the life will be easier after implementation of smart cities, but certainly the complexity of the resources used would increase.

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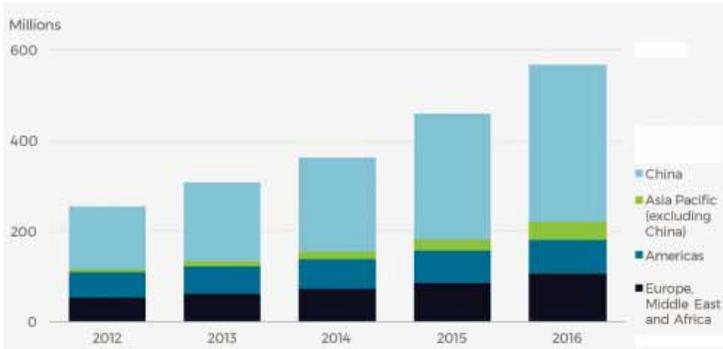
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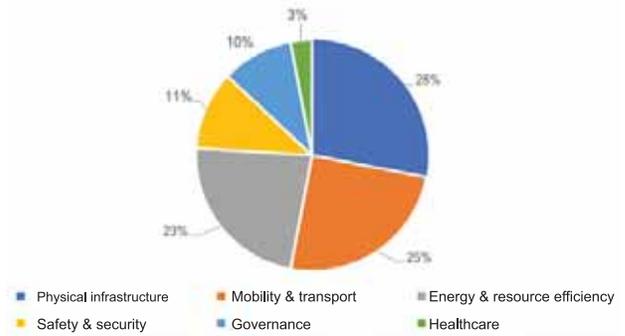
Dr. Vaddadi Koteswara Rao
Technical Director
Ph: +91 9908393337

Smart meters installations are quickly accelerating



(Source: IEA 2017)

Share of Smart City by Project Group



(Source: 2018 IHS MARKIT)

The problem with a large number of modern-day consumers, that they expect energy at cheaper price. We can see a different scenario in next five years, as the amount of distributed generation might exceed the centralised generation. The

information and data needed by the system will be easier to access and will be more relevant. For this to happen, the connectivity between the conventional system and distributed system will be critical.

Another component which will be

into limelight in smart electricity will be use of batteries in storing electricity which is produced in surplus during distributed generation. The excess energy produced can be stored using battery banks without trading back to the utility. Batteries are used to provide a backup power supply for the real time clock present in smart meter.

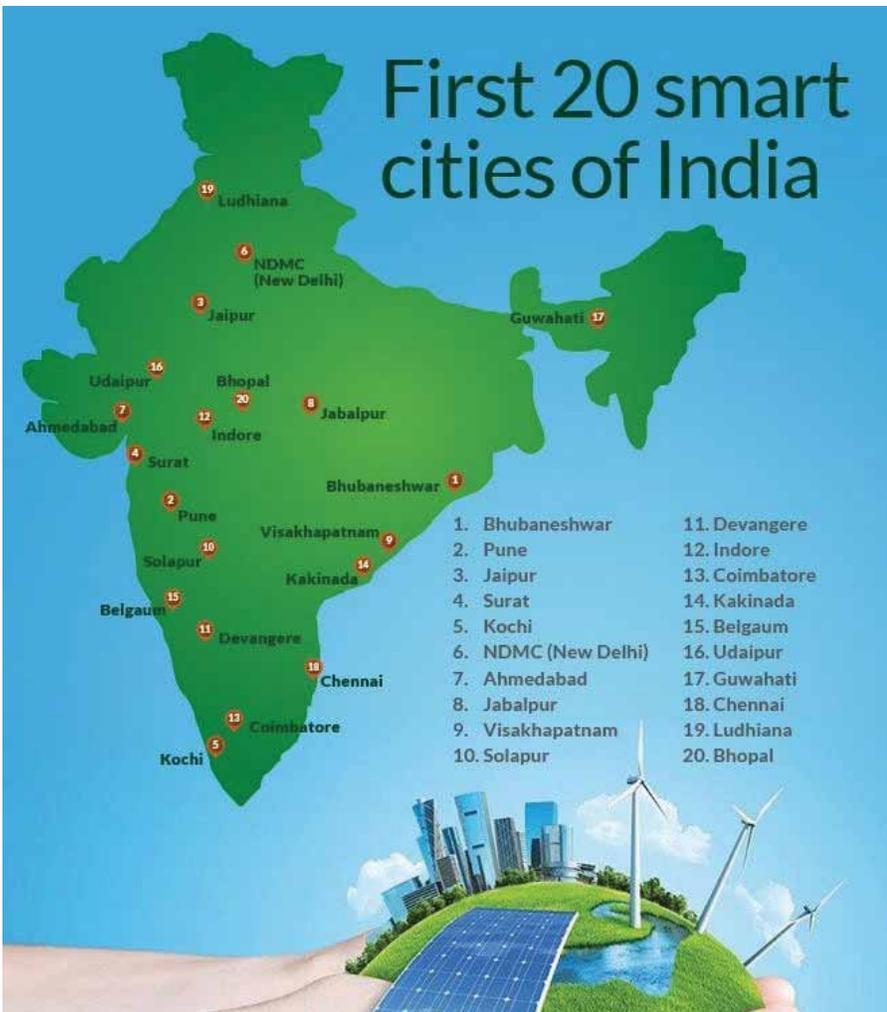
Smart city development boards of different countries are aiming setting up of Smart integrated infrastructure which will be a convergence of physical infrastructure, communication, data and analytics. These arrangements will look for greater efficiency and greater steadiness, and to give best performance when connected with distributed generation units.

India has shown tremendous growth in field of implementation of solar energy, this will limit our dependence on use of fossil & fuels and also will reduce demand on the utility. India has climbed up to twenty- sixth position in world electricity accessibility ranking in the current year from 99th spot in 2014.

Case Study

Power Grid Corporation of India Limited (PGCIL) has taken a world-shattering initiative to

Continued on page 52





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— Supporting —



Renewables-based generation (TWh)	Growth rate (%)	
	2018	2017-18
United states	744	4.1%
China	1854	10.9%
India	291	10.6%
Europe	1462	8.5%
Rest of world	2449	4.0%
world	6800	7.1%

(Source: IEA)

developing smart grid pilot project at Puducherry. Real time monitoring of energy consumption pattern, various alarms associated with it, etc. have been made possible with AMI system installed at Puducherry. Under this project various smart grid attributes have already been implemented and are being scaled up in a progressive manner. Presently, more than 1,600 smart meters at consumer's premises along with Data Concentrator Units (DCU) and Meter Data Management system (MDMS) have been integrated at one common platform at smart grid control centre at Puducherry.

A demonstration model of demand response has also been set up at Puducherry. It would facilitate customer to receive utility signal and to respond for demand management. In addition, efficient street light automation system has been implemented for 126 nos. of street light which has resulted into reduction of energy consumption for street lightening by about 57 per cent.

Challenges in Smart Electricity

- Data traffic occurs because the size and amount of data collected is very large, traffic here means congestion which causes misleading of data and produce error in the system.

- Ever-increasing volume of sensors and their data, increases the complexity of the system, which further leads to maloperation of system and difficult at time of recovery.
- Digital security is another threat smart electricity faces when they try to implement smart city projects. As personal data gets uploaded into the cloud, it is often shared with digital devices, which, in turn, share the information among multiple users.

Merits of Smart Electricity

- The need for smart grids can be due to environmental, rising energy demands and rising fuel cost.
- Energy wastage can be minimised and billing can be more efficient.
- Electricity theft can be curtailed and customer end can be remotely controlled.
- Power quality will be enhanced and per unit cost will be lessened.

Initiatives by Government for Smart Electricity

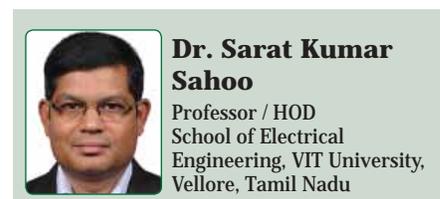
- A joint venture of the Delhi government and Tata power is set to install smart meters and also launch a mobile app for android. At first, 2.5 lakh smart meters would be installed in

North and North-west Delhi.

- 280 million LED bulbs were sold under the UJALA scheme resulting in a saving of Rs 14,618 crore.
- USTDA has given grant to explore and develop opportunities in the areas of rooftop solar energy, energy storage systems and smart vehicles.
- Five projects have been sanctioned under National Smart Grid Mission
 - CED, Chandigarh (Sub Division 5)
 - CED, Chandigarh (complete city excluding sub Div 5)
 - KSEB, Thiruvanthapuram (Kochi)
 - JBVNL, Jharkhand (Ranchi)
 - OPTCL, Odisha (Rourkela).

Conclusion

Concerning the emerging end-use technologies, it seems to be clear that smart electricity will play an important role in the future. Its penetration in different countries will increase in the next 10-20 years. Main obstacle is still the price of the components involved which still seems to remain in quite at high level although there is potential for decrease during the next five years. Cost benefit analyses shows that smart metering is in most case economically feasible if the benefits to all stakeholders and to society is taken into account. 



Dr. Sarat Kumar Sahoo

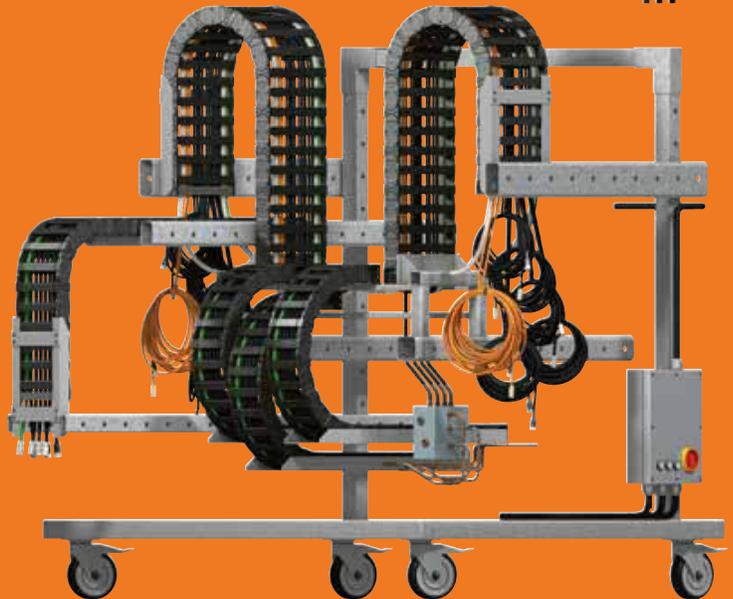
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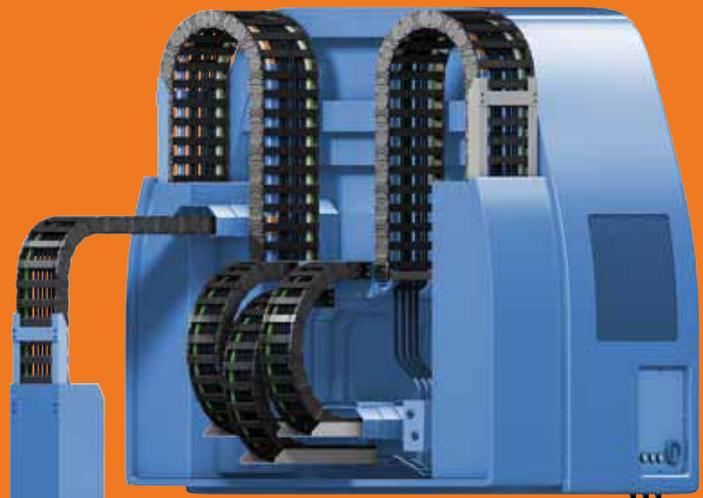


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AI can help fight climate change, improve oil & gas sector efficiency



Artificial Intelligence is emerging as a money saving answer to climate change and to improve efficiency of the oil and gas sector.

Global economic losses caused by climate change could cost US\$ 23 trillion if no steps are taken to mitigate the climate change, this has been predicted by a global group of 415 investors managing US\$ 32 trillion in assets. These investors in their combined statement have said that the gap between real-world emissions and levels required to keep global

warming below 2 degrees must be closed by 2030.

Artificial Intelligence Business Director of Zyfra Dmitry Lukovkin makes a case for AI and say that it can help in reducing the polluted emissions by about 20 per cent. "AI-driven solutions implementation for heavy industries have proven effect of 5-30 per cent reduction depending on the industry. The

United States with Saudi Arabia and Russia together occupy over 40 per cent of global hydrocarbon production and carbon emission. Annual industry losses due to wellbore instability are estimated to be more than US\$ 14 billion," Lukovkin added.

According to Lukovkin, application of the AI-based drilling optimisation solution alone allows to

increase oil production up to 20 per cent and decrease non-productive time by 5-7 per cent, while cutting the losses up to 35 per cent. "Some estimates show that more than 94 per cent of the wells globally will require artificial lifts at some point of time in their asset life cycle. The raw estimation of how much AI solutions could save to global economy could reach US\$ 5 trillion by 2030 due to a reduced carbon emission," the Zyfra's AI Business Director added.

According to a research study conducted by Infosys, in India 48 per cent of the respondents from energy, oil, gas and utility industries consider AI to be a fundamental driving force behind their organisation's success, whereas 46 per cent state that their organisations are incorporating AI

into the "company ethos". AI can coordinate and optimise the use of energy resources as well as IoT. The Infosys research study further stresses that data leveraged by AI will be a primary "driver of a future sustainable energy ecosystem that includes an appropriate mix of fossil fuels and renewables."

In fact, India has risen in the Global Innovation Index rankings for the second year in 2017 and the reason behind it are companies working in the sector of AI and Machine Learning. Both these sectors are being touted as one of the biggest enablers of human civilisations that will help in its transition to a 100 per cent renewables powered grid.

Indian firm Tech Mahindra has also committed itself to create a

sustainable future and mitigate the impact of climate change by harnessing next AI.

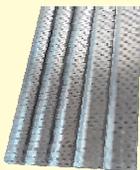
Also, AI can help oil sector from volatile prices. The world oil sector has been in a turmoil. International Brent crude oil futures fell below US\$ 60 per barrel in early trade, but firmed to US\$ 60.17 a barrel by 1041 GMT, up 11 cents from the close. Oil and gas giants have declared trillions in losses just a day after the OPEC+ meeting. Russia agreed to cut its supply by 200,000 barrels a day in order to keep prices stable. But that is a temporary measure. In the long-term, the market should face further decline in prices.

United States Geological Survey (USGS) assessed the amount of oil and gas in Texas and New



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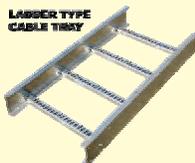
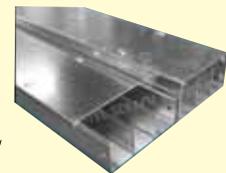
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Mexico's Delaware Basin, the largest assessment it has ever conducted. It is estimated to have 46.3 billion barrels of oil and 281 trillion cubic feet of natural gas.

“What could really save oil companies from crisis is the technological advancement. Companies should cut the supply and enhance efficiency at the same time. Here is where new digital optimisation solution, which uses a wide set of geological and drilling data, comes into play,” Lukokvin opined.

So far China has been unable to overtake leading oil exporters like the US, Russia and Saudi Arabia. Now with the help of AI, China is getting ready to storm the global energy market and undermine the positions of major exporters to become the number 1 oil exporter in the world.

Being a major world energy consumer, Chinese approach towards digitalisation of the Oil and gas industry could dramatically increase the efficiency of its energy sector and help it surge ahead of the current leaders. The studies show that the present leaders in the energy sector will fail to catch-up with China's use of digital technologies in the coming 5 years.

Digitalisation is inevitable for oil and gas companies to remain competitive in the market structure. The leaders in the market of digitalisation are obvious. As an earlier research by Zyfra showed that China held second place behind the US in terms of AI development, while taking the first in capitals and monetisation. Some 48 per cent of global AI venture funding went to China. Businesses and the Chinese

Government have collaborated under a sweeping plan to make the country the world's primary AI innovation centre by 2030.

When AI technologies will go for actual application, China will benefit from its engineers, entrepreneurs as well as foreign and vast domestic market. The US has shared almost all of its top AI research with Canada and the UK, but China has the advantages that can enable it to eventually leapfrog them.

In petroleum industry as well, China is taking giant strides. Asia Pacific (APAC) is by far the largest region in terms of global refining capacity, with China accounting for approximately 12 per cent of total global capacity in 2018. In the next five years growth will be driven by projects in China and India, as they strive to meet rising demand for oil from the growing economies.

The US capacity has remained constant last year, with no major new refineries. Ageing facilities in Western Europe and Russia have faced tougher competition from newer and complex facilities in APAC and the Middle East that can process lower quality and thus cheaper feedstocks. Now the primary motivation for investment in digitalisation in oil and gas sector is to improve efficiency. According to Gartner, the “smart oil deposit” concept development could help oil companies to cut cost by 5 per cent and to enhance production volume by 2 per cent. The Chartered Enterprise Risk Actuary (CERA) estimates “smart oil and gas deposit” to cut production cost by 1–6 per cent, while shrinking oil-well downtime by 1–4 per cent and to lower labour intensity up to 25 per cent.



www.electricalindia.in

Chinese petroleum -giants have already announced a number of projects under the “smart” concept. China National Offshore Oil Corporation (CNOOC) has signed a production sharing contract (PSC) with Roc Oil and Smart Oil for Weizhou 10-3W oilfield and Block 22/04 (contract area) in the South China Sea. In a bid to align with smart shipping and innovation, Dalian Shipbuilding Industry Co (DSIC) is currently developing China’s first smart crude oil carrier that will be designed to incorporate technology to assist the Captain in operation.

Last year Huawei also announced

that it will manufacture the Mobile Edge Computing (MEC) network system for the Ningbo Zhenhai smart refinery. The smart industrial facility venture is a noteworthy development as it undertakes data improvement.

Moreover, China welcomed numerous world-leading digital companies to create for its petroleum -industry and among them are Wison Engineering Ltd, Honeywell and Zyfra Group.

According to Price Waterhouse Cooper (PwC), global GDP is set to increase by 14 per cent because of AI. The technology’s deployment in the decade ahead will add US\$ 15.7

trillion to global GDP, with China predicted to take US\$ 7 trillion and North America US\$ 3.7 trillion, according to the PwC estimates.

In comparison, the AI technologies in India are data oriented. According to an independent research convened by Infosys Utilities companies are implementing AI technologies around big data automation (71 per cent), predictive or prescriptive analytics (57 per cent) and machine learning (52 per cent). Currently, the IT department is the leading user of AI technologies (60 per cent), followed by operations (39 per cent) and business development (33 per cent). E1

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Engineering Plastics in Electrical Industry



Varun Gupta, Director, Calco Poly Technik explains why engineered plastics are gaining acceptance in electrical industry.

Engineering Plastics (EP) globally is a \$67 billion industry, growing at 14 per cent growth rate, and is expected to touch \$130 billion in 2025. With a wide range of applications in

various industries, EP businesses are gradually witnessing a streaking growth in the market. Due to their excellent performance in high heat stability, chemical resistance, mechanical strength, EPs have gained acceptance in the market and is emerging as a promising business venture for young entrepreneurs.

EP industry is a vast industry in its own, due to its diverse applications. It is because of its diverse applications that the industry provides solutions to many end-user industries as well. This gives the EP industry another way to expand them in the market.

Keeping the environmental aspect of EP products into consideration, these products work in tune with environmental conservation as well. They demand not just light but smart solutions with optimal

transmission and reflectance for different application areas. These days there are different types of lighting available to pep up your home.

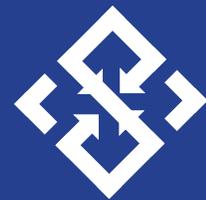
EP has been recently introduced to Indian market and has now been developed intensively because of the great potential benefits and have better mechanical and thermal properties. This plastic component is stronger and lighter than the regular plastic. Besides equalling or surpassing them in weight/strength and other properties, EPs are much easier to manufacture, especially in complicated shapes. It is light in weight and can reduce the weight of appliances by almost 50 per cent. The plastic industry is increasingly looking at such cost effective alternative and innovative

measures. This will result in an organisation profit but also gives a huge contribution to the renewable energy market.

The plastic industry is growing at an exponential rate and it is becoming the material for choice because of its distinctive properties. The competition in this Industry is gaining the race. The penetration level of plastic products is low in the Indian markets, due to which the per capita consumption in India is low. This low consumption scale, signifies the fact that there is a scope for an industry boost. Technological improvements and cost competitiveness in the electronics are resulting in great demand abroad, which has been growing at an estimated rate of 16 per cent in the last five years.



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The flourishing customer base and the increasing penetration of electronic products in consumer durables segment have also provided enough scope for the growth of plastics in the Indian electrical industry.

However, introduction to EP has proved to be a good contributor to the economic development in the electrical industry. Moreover, EPs are chiefly a group of plastic materials that have better mechanical and thermal properties than widely used plastics. In addition, electricity too covers every aspect of our lives whether it is at home, work place, or while driving to name a few. Thus, plastics revolve around us every second and minute! Consequently, EPs have become a vital factor to run electrical industry.

Engineered products also demonstrate aesthetic appeal with respect to colour, gloss and ability to form any shape. This is a by-product of performance that plastic offers which acts as a protection shield during any fire. It gives strength with reinforcement materials for durability in heat sensitive applications like lighting materials, giving an excellent thermal conductivity.

It has been witnessed that electrical energy demand in India is around 1,500 million tonnes, which is equivalent of oil by 2030 putting economic pressure on import bills. One way to solve this problem is by reducing dependency on energy requirement by making energy efficient equipment. This is possible by minimising loss of energy transmission and increasing conductivity, both thermal (heat) and electrical. Plastics being

poor conductor of thermal and electricity and are found less in electrical equipment due to their unwanted behaviour. But with innovations in plastics, there are significant improvements in energy-efficient use of LED with low energy consumption. Similarly, modern panel displays and solar cells are devised by use of high conductive plastic. These components are integral part in efficient electronic circuit for better ratings of electrical equipment. EP thus plays a very pivotal role in defining a sustainable roadmap for efficient equipment.

Wide range of environment friendly flame-retardant polymers are used to replace the conventional heavy metal materials, offering low smoke to prevent from choking in case of fire. Affordable LED product range are also made for down lighters, bulbs and tubes which assist to replace existing incandescent light bulbs/CFL. This innovation in Engineered Plastics can be utilised to make entire housing assembly out of plastic, replacing metal giving benefits of higher productivity and lower total cost of production.

As we all know that the plastic industry is stamped by negative remarks, on the contrary it still has the support of the government. To exemplify: Initiatives like 'Make in India' and Pradhan Mantri Sahaj Bijli Har Ghar Yojana are proving to be an asset to the plastic industry.

Such schemes are bringing strong interest in manufacturing of electrical sectors, thus providing corridors to foreign investments in electricity at each and every house. In a nutshell, in next 2-3 years, the EPs will see a lot of new ideas and innovations!

Future Scope

The World Bank in its report titled 'Utility scale DSM opportunities and business models in India' has pegged India's energy efficiency market at Rs 1.6 lakh crore by considering the end use of energy efficiency opportunities, which is four times the Rs 44,000 crore in 2010. The UJALA Scheme to distribute LED Bulbs (Bachhat Lamp Yojana) also contributes to the success. Till now, over 28 crore LEDs have been sold across the country, which has resulted in energy savings to the tune of 36,545 MUs and avoided peak demand of 7,317 MW. In monetary terms, savings of around Rs. 14,618 crore have been achieved. This will also provide a very good market for companies manufacturing energy efficient lighting and appliances as well as companies providing DSM solutions.

The government is pushing for safety and successful implementation of EE norms. In 2017, the government found innovative solutions to address the electricity access challenges. They have set parameters for builders, designers and architects to integrate renewable energy sources and energy efficient appliances in the building design. The government has recommended that all new buildings and offices in the future be Super ECBC (Energy Conservation Building Code) and Net Zero Energy Buildings. A stable government framework with initiatives like 'Make in India', Smart Cities, have increased the purchasing power, large domestic market, and an ever-increasing development in infrastructure will made India a favourable destination for investment, creating path for

investments and subsequent demand for boost in electrical products.

The year 2022 has been earmarked for achieving '24x7 Power for All'. To achieve this target, it means to electrify more than 7 lakhs households every month. The government is planning to provide electricity to every household, apparently which will boost the electrical product market too. Even as villages are getting new power infrastructure, there are issues of last-mile connectivity and supply, making the 'Power for All' goal a challenge.

The flagship program of the Power Ministry is to facilitate 24X7 Power Supply in Villages was launched in 2015 in Patna. It focuses on feeder

separation (rural households and agricultural) and strengthening of sub-transmission and distribution infrastructure. This initiative under the government has achieved a new milestone of more than 13,123 villages of 18,441 electrified in 2017.

Currently, it has helped in bringing 'Electricity to All' of India's 597,464 census villages in April, 2018 and setting up the stage for universal household electrification.

As the government races to meet the 2022 target, it must also focus on designing robust and innovative tools to measure and monitor the progress on a multi-dimensional level, rather than just counting the number of connections. Here the private

sector is helping the government to achieve their target of 'Power for All'. Reducing the demand for electricity and making energy-efficient equipment, can also help in dispersal of electricity to the areas, where the light at night is still a dream. This is possible by minimising loss of energy transmission and increasing conductivity, both thermal (heat) and electrical. Here EPs act as a game changer and results in improvement in terms of efficient use of energy. [Ⓜ]



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Director,
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SWITCH TO Smart STreet Lighting

The article takes a review of the replacement of traditional street lights with LEDs, barriers in its replacement, solutions and outlook for the street lighting.

– *Supriya A Oundhakar, Associate Editor*



The United Nations report estimates that India will have added 416 million urban dwellers by 2050. The burgeoning urbanisation and migration to cities have generated the need for upgradation of the aging infrastructure while simultaneously reducing carbon emissions by the use of energy efficient resources. Further, rising global warming has also accelerated the need for sustainable living. Energy efficiency, sustainable resources, advancement in digital technology have led to the rise of the smart cities concept. The Indian government has committed to develop 100 smart cities and 99 cities have already been declared as part of the US\$ 14 billion mission. The lighting industry will play a major role in ensuring sustainability and energy saving.

The street lighting in India has been undergoing transformations with advent of the government's initiatives like UJALA, the smart cities mission and Street Lighting National Program (SLNP). Energy Efficiency Services Ltd (EESL) under the of Ministry of Power has launched the SLNP program for the replacement of conventional street lights with LEDs with the objective of mitigating climate change, reducing energy consumption in lighting that helps DISCOMs to manage peak demand. EESL has set the target of 1.32 crore for replacement of traditional street lights. As of April 2019, EESL has replaced 89.15 lakh street lights in 1,400 Indian cities with LEDs.

Venkatesh Dwivedi, Director (Projects), EESL is optimistic about the development of smart cities and

future of lighting industry in the country. He feels, this ambitious goal will make a huge difference, enabling peak demand reduction of 1,500 MW, annual energy savings of 900 crore kWh, reduction in 62 lakh tonnes of CO₂ and development of smart cities. "EESL has a bright and promising future as India is observing a revolution in the areas of light management with the rise of smart cities. Lighting will play a significant role in the development of smart cities of the future," avers Dwivedi.

The LED lighting manufacturers have geared up themselves to cater to the rising demand of LEDs across the country. Sumit Joshi, Vice Chairman and Managing Director, Signify India Innovations Ltd foresees a growing demand for smart street lighting in India over the next few years. Signify



India, formerly known as Philips Lighting India, has installed Philips Amplight connected street lighting system in the municipalities of NDMC (New Delhi Municipal Corporation), Varanasi, Hyderabad and Pune (together with Tata Projects).

In order to tap the growth potential in the power sector in India, Havells India has already enhanced its manufacturing capabilities from 5 lakh lamps to 25 lakh lamps per month so that it assists the government's plans for increased efficiencies in the power sector. "We are now only focusing on the manufacturing of LED lights which have huge growth potential and currently contribute 75 per cent to our lighting division's turnover," informs Anil Bhasin, President Luminaries, Havells India Ltd.

IoT in Street Lighting

Today, digitisation has scaled up the functioning of lighting beyond illumination. Internet of Things (IoT) in lighting has enabled the designer to produce fully integrated systems that can be connected seamlessly with a wireless network or ethernet. The user can remotely monitor and control lighting systems with this connected system with advanced controls and sensors. This has led to the emergence of smart street lighting, playing a significant role in the development of smart cities of the future. Upgradation of regular street light to connected smart street lights, which can be remotely accessed, controlled and managed, thus optimising operations offers benefits like reduction in energy consumption by 50 per cent, minimising maintenance costs, lowering CO2 emissions and curbing light pollution.



Lighting will play a significant role in the development of smart cities of the future.

Venkatesh Dwivedi,
DIRECTOR (PROJECTS),
ENERGY EFFICIENCY
SERVICES LIMITED (EESL)

Recognising the key role of IoT in the development of smart cities, Dwivedi says, "Under the National Street Lighting Programme, EESL is instrumental behind Central Control and Monitoring System (CCMS), which ensures that urban local bodies, municipalities and public-sector utilities have ease of maintenance in taking care of the LED street lights installed."

He adds, "IoT in street lights ensures that street lights are automatically switched on once the sun sets and switched off after dawn. The system also sends alerts for each light that needs attention, to reduce failure and the need for sudden repair. Therefore, the avoided generational capacity can be ascertained from the reduced consumption of electricity. The system also helps note the exact consumption of energy, which is used to define the cost to be paid."

Bhasin from Havells India informs, "By using a smartphone or a hand-held device, the users can adjust the lighting systems according to occupancy, ambient light, and daylight availability, rather than just flicking a conventional switch. Smart lights help in energy conservation and save on electricity bill since with motion sensors, the lights can automatically adjust or turn themselves on or off when needed."

The LED manufacturers have developed IoT enabled LED lighting system. Signify India recently introduced its Interact City connected LED lighting system and management software that provides a robust infrastructure to improve city services, citizen safety, beautify public spaces, engage with citizens and encourage civic pride. Interact City is a secure, scalable IoT platform that collects insights from connected LED street lighting, embedded sensors and IoT devices over an IoT-ready connected lighting system. It can help reduce energy costs and increase efficiency so city administrators can reinvest savings in new smart city projects.

Here, Sumit Joshi explains some of the unique features of Interact City which will aid in improving street lighting performance:

- **Lighting asset management and energy optimisation:** Interact City saves time and money by enabling managers to centrally commission and manage smart city lighting for the city, block, or even a single lighting point.
- **Scene management:** City administrators can remotely adapt city lighting to the time of night, season or event, for

example they can increase lighting in the area where there is an accident or crime or dim to 30 per cent in the middle of the night when nobody is around. They can also use smart dynamic lighting to turn parks and plazas into memorable, liveable spaces.

- **Environmental monitoring:** Environmental monitoring uses sensors in the connected street lighting system to gain insights into problems in the city and support decisions on zoning, traffic flows and improving liveability in the city.
- **Incident detection:** Incident detection uses sensors on light poles to continually monitor and alert emergency services when unexpected traffic, sounds or



We foresee significant potential for growth in the street lighting industry, with more and more cities defining their smart city blueprints that include smart street lighting.

Sumit Joshi,
VICE CHAIRMAN AND
MANAGING DIRECTOR,
SIGNIFY INDIA INNOVATIONS
LIMITED

crowd noise is detected. Data is shared over the connected lighting system, so city administrators can respond more quickly and accurately.

Signify India has already installed 29 million connected light points worldwide and plans for its every new LED product to be connectable by 2020.

Chintan Shah, the founder and CEO of TVILIGHT, an intelligent lighting solution provider based in the Netherlands, believes that a street light pole is an ideal spot for mounting all sorts of IoT systems as public lighting represents one of the finest grids spread across the globe. It is a nervous system of a city that connects millions of street lights worldwide with access to 24x7x365 power. TVILIGHT offers solutions based on Open API that allows seamless interconnection and interoperability between smart street lighting and smart city IoT applications.

Stumbling Blocks

Though a number of cities have genuinely recognised the importance of upgraded public lighting infrastructure, they face multiple challenges like growing population, rapid urban expansion, increasing power tariffs, and a bewildering array of multiple technologies available in the market.

Outdated and inefficient public lighting infrastructure imposes hefty burden on municipal budgets. Moreover, old power supply distribution lines for street lights lead to rise in technical losses and require frequent maintenance.

The current procurement practices are primarily governed by the initial cost of equipment and do not consider the equipment's operating costs and energy performance over time. A significant challenge in street lighting energy efficiency projects is the absence of a comprehensive Measurement and Verification (M&V) strategy. This leads to challenges for ESCOs trying to implement energy efficiency projects for municipalities. Other challenges concern policy and institutional support, as well as financial and technical challenges, informs Venkatesh Dwivedi from EESL.

Concerns about expected performance, reliability, and the rapidly changing nature of the technology also play a role in the decision-making process around LED conversion.

“Cost of LED lights is low because of which local manufacturers get low margins and the business faces intense competition from Chinese manufacturers as



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Smart lights help in energy conservation and save on electricity bill since with motion sensors, the lights can automatically adjust or turn itself on or off when needed.

Anil Bhasin,
PRESIDENT LUMINARIES,
HAVELLS INDIA LIMITED

they are flooding the market with low quality and inferior products. SYSKA being a home grown brand we have the cutting edge and we give consumers LED lighting solutions at a more affordable price than other players in the market,” claims Rajesh Uttamchandani, Director, Syska Group.

The lighting industry stalwarts offer solutions to overcome the bottlenecks in the adoption of smart street lighting in India. EESL has set an example for the replacement of conventional street lights with LEDs by making joint ventures with Local Urban Bodies (LUBs) and municipal bodies in order to bring transition in the street lighting segment. EESL pays for the cost of LEDs replacement, thus requiring no upfront investment from municipal

bodies and LUBs. So, EESL's strategy proves to be helpful for overcoming the challenges.

For instance, the use of CCMS for remote operation and supervising has mitigated the lack of monitoring mechanism and warranties against technical defects.

“When compared to conventional lighting systems, LED street lights emulate daylight better due to better colour rendering index, making roads safer for drivers and pedestrians. The use of LED luminaires for the devices also adds an aesthetic touch. LEDs can be automated by using sensors since they have the capability of being controlled dynamically. In addition to offering many benefits, LED enhance the surroundings significantly,” informs Dwivedi of EESL.

Havells India's Anil Bhasin suggests, innovative lighting solutions such as Power over Ethernet (POE) and smart street lighting LED solutions and indoor light automation are to bring new era of efficiencies and savings in lighting usage and consumption.

The next-generation technology smart street lighting LED solutions of Havells offer a CCMS, which enables remote-controlled and scheduled operations of the lights, energy analysis, fault monitoring etc.

In order to bring efficiency in the adoption of smart street lighting, Signify India works closely with municipal corporations in several cities to define various financing models for the LED upgradation of street lighting in the city. In addition to municipal funds, one unique financing model can be a public private partnership, wherein the LED lighting is self-financed through

the energy savings generated by switching to LED lighting. These innovative models can enable municipal corporations to upgrade to LED lighting, without huge upfront capital expenditures.

Signify's wireless street lighting management software Interact City provides complete visibility of the lighting assets of a city, enabling city administrators to remotely manage faults, optimise performance and monitor energy usage across the city. This real-time data can help administrators overcome any concerns about performance and reliability of their lighting assets, informs Sumit Joshi.

Outlook

In order to reduce the carbon footprint, many countries across



Cost of LED lights is low because of which local manufacturers get low margins and the business faces intense competition from Chinese manufacturers as they are flooding the market with low quality and inferior products.

Rajesh Uttamchandani,
DIRECTOR, SYSKA GROUP

Continued on page 68

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The Smarter E India to be held in Bengaluru in November

After the successful conclusion of Intersolar India West, held in Mumbai between 4th and 5th April, the next edition will return to Bengaluru and deliver an even deeper view into the renewable energy future. It will be part of “The Smarter E India” – India’s innovation hub for the new energy world – addressing the needs of a changing energy world in India.

The event will present cross-sector energy solutions and technologies and reflects the interaction of the solar, energy storage and electric mobility industry. The smarter E India will bring together the renowned Intersolar India, ees India and Power2Drive India. The exhibition trio will take place at the Bengaluru International Exhibition Centre in the capital state of Karnataka on November 27-29.

Impressive footfalls received at Intersolar India West in Mumbai

The Mumbai edition gathered over 5,600 trade visitors from various end user industries in the span of 2 days. The visitors attended in huge numbers on both the days putting a strong networking platform for more than 75 exhibitors from across the globe offering solutions on photovoltaics, PV production and solar thermal technologies. The variety of solar and renewable solution providers enabled a good sourcing platform for the industry stakeholders including; installers and integrators, project developers/EPC contractors, manufacturers and suppliers, energy consultants, investors and analysts, architects/energy planner and government officials; etc.



Electrical India at Intersolar India West

The exhibition included important conference sessions enabling more insights on India’s PV market development along with topics like; financing and business models, enhancing profitability and safety through O&M and improving rural economy - mini and micro-Grids.

Sessions like “Bridging the Sustainability Gap - Skills, Entrepreneurship and Technology” conducted by Skill Council for Green Jobs; welcomed around 50 speakers throughout the 2 days giving over 100 delegates numerous opportunities to get insights on the latest trends and key drivers of the solar and renewable industry. The day 2 of the exhibition concluded with few of the key exhibitors presenting their technologies to the registered delegates. 

For more information on The smarter E India, visit www.thesmartere.in

Continued from page 66

the globe are treading the path of energy efficient resources through upgradation of public lighting with smart street lighting. As a result, adoption of smart LEDs for street lighting is witnessing rapid growth. It is expected to reach 338.9 million by 2025. According to a new research report by Global Market Insights, the smart lighting market will exceed USD 24 billion by 2024.

The smart street lighting market is expected to grow at an estimated CAGR of 40.3 per cent during the forecast period 2016-2022. Europe

is the biggest market for the smart street lighting followed by America. The countries which are leading in the smart street lighting market are Germany, the UK, and the US. The upcoming markets for the smart street lighting are India, China, and Poland due to the growing number of smart cities projects in these countries, says Venkatesh Dwivedi of EESL.

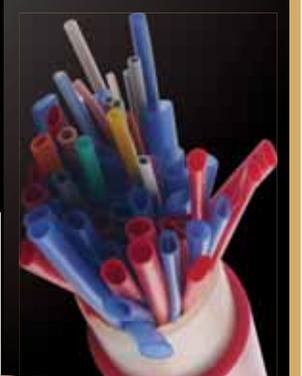
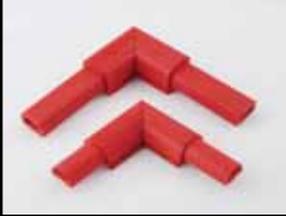
Sumit Joshi of Signify India foresees significant potential for growth in the street lighting industry, with more and more cities defining their smart city blueprints that

include smart street lighting.

Anil Bhasin of Havells India expects to witness exponential growth in coming years due to the augmentation in infrastructure development such as roads, offices, real estate, and commercialisation, government’s flagship programs such as rural electrification, ‘Power for All’ and smart cities program. All these initiatives will create demand for a smart, connected and energy efficient lighting solutions thereby leading to the robust growth of street lighting industry. 



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The private PPA market could flourish with the help of a few government policies such as increasing AD benefits from 40 per cent to 80 per cent as well as ensuring the segment stays free of policy changes.



FUNDING RENEWABLE ENERGY IN INDIA

Renewable energy as the upcoming investment class

It is a known fact that the Indian economy has grown phenomenally well over the last two decades. This growth has been complemented by a strong financial system which led to the rise of 4 major asset classes: Equity, debt, gold and real estate.

Up until now, Indian household wealth of over \$5 trillion had been majorly invested across these asset classes. Infrastructure while promising had been out of the reach of a majority of India's 3.4 lakh dollar-denominated millionaires due to the requirement of high Initial Investment. With the advent of renewable energy as the 5th asset class, an increasingly large number of HNIs are now participating in the infrastructure story. Renewable energy projects offer investor superior returns, regular cashflows while also contributing to the betterment of the environment.

Asset Class	15 Years CAGR (%)
Equity	16.65
Debt	8.75
Gold	11.71
Real Estate	15
Renewable Energy	15.5

Source: Government Data

It is evident that over the long term, renewable energy generates the 2nd highest returns of any asset class in India. Moreover, renewable energy offers the advantage of monthly cash-inflows vis-à-vis other asset classes that entail a one-time cash inflow, which is mostly dependent on the sale of the asset. Equity, gold and real estate assets returns are subject to market cycles wherein, the asset value depreciates during a down-cycle and appreciates during an up-cycle. Hence, entry and exit timing is of utmost importance whereas debt offers quasi-immunity from market cycles in exchange for guaranteed but lower returns.

Asset Class	Cash Inflows	Ease of exit	Speed of Exit
Equity	One-time. Very Small inflows through dividend	Easy	Fast
Debt	Monthly and/or quarterly	Medium	Medium
Gold	One-time	Easy	Fast
Residential Real Estate	One-time. Small inflows through rent	Hard	Slow
Renewable Energy	Monthly	Medium	Medium

Despite its inherent attractiveness, the renewable energy sector of India has been experiencing mixed funding growth. On one hand, large funds with access to low-cost financing are funding utility-scale project auctions by center and state governments. This has led to large projects being built at ultra-low tariffs. While on the other hand, smaller existing investors are shying away due to the large quantum of funds required for such projects. It has also been difficult to attract new investors towards retail financing of renewable energy due to low awareness, inconsistent central and state government policies, high GST burden, low tariff rates, absence of new government PPAs for smaller capacities, and an inefficient energy transmission infrastructure. All of this has led to an installed capacity of only 77 GW of renewable energy in the country – a figure that is far off from the target of 175 GW by 2022 by the government.

Majority of the current renewable energy growth in the country is a result of the large-scale auctions that are being funded by developers who have access to low-cost capital. And most of these developers seem to face no issue in repeatedly raising funds (mostly because of their reputation) and then bidding out other players at auctions as well as at subsequent bids whereas for smaller developers, access to capital is a major issue. They get little support from banks as there is a demand for additional collateral (such as real estate). The money invested in renewable energy asset is not considered to be worthy of being a collateral, which makes it even difficult to get funding in this sector. Additionally, 83 per cent of Indian state discoms have a credit rating below "Junk" status with only 7 state discoms commanding a credit rating of A or higher. The poor financial health of the discoms spills over to the entire power sector causing a burden on generators and consumers alike. Certain large discoms are known to have an average payable of over 500 days to power generation companies. Hence, generators face large working capital requirements to service debt and other obligations inherently reducing their own financial viability. Given the poor credit rating of these discoms and the increased working capital requirement banks are reluctant to fund these projects for smaller developers. Thereby, offering no alternative to the smaller developers to raise funds for future projects, whereas the large developers continue to raise low-cost financing with ease.

Given the investment scenario, smaller developers

are increasingly looking at the private PPA market. The simple reason for this is that the investment per project is much smaller in comparison to the utility-scale projects. Hence, an investor can distribute the risk over multiple projects. RESCO provides a stable monthly cash flow for investors which is more prompt in comparison to the government payback time. Moreover, the tax incentive in the form of accelerated depreciation gives investors a small tax benefit. The policy risk is extremely low simply because we are not using the grid since the power is produced and consumed at the same location instantaneously. However, the purely commercial nature of these transactions carries a high counterparty risk i.e. one to one. With India being a high network and relations driven society it becomes easier for us to get a sense of the promoter's credibility in the market. But, in case of disputes the only option to resolve it would be via court which can be a lengthy process. The private PPA market could flourish with the help of a few government policies such as increasing AD benefits from 40 per cent to 80 per cent as well as ensuring the segment stays free of policy changes.

Another promising avenue for renewable energy funding in India was Open Access. Open Access allows large users of power —

typically having a connected load of 1 MW and above — to buy cheaper power from the open market. The idea is that the customers should be able to choose from many competing power generation companies—instead of being forced to buy electricity from their existing electric utility monopoly. It helps large consumers particularly the sick textile, cement, and steel industrial units by ensuring regular supply of electricity at competitive rates. However, such projects have faced stiff opposition from the existing utility monopolies. The monopolies have ensured that there are arbitrary charges and regulations governing open access projects. This has reduced the price advantage that power companies were able to offer through open access affecting their efficiencies. Open Access projects have a high policy risk wherein the policy horizon is usually provided for three years which makes the modeling of a 25-year project difficult. Moreover, within those three years, there have been amendments in the policies which make it a risky proposition for investment.

Therefore, the most important thing that the renewable sector needs right now is a centralised model that has uniform policies and strict guidelines across all states. The government should permit net metering for RESCO projects (of

all sizes) and these projects should not be subject to cross-subsidies or surcharges.

For Open Access, the government should have a clear policy for 25 years that is not subject to retrospective amendments. Also, the abolishment of the state monopoly of discoms will go a long way in solving the issues with power distribution and transmission. This will help in building a stronger ecosystem and open the market for investors. Furthermore, if the government completely privatises power generation and consumption, the market will be set to boom.

Artha's roadmap

Artha is looking forward to developing around 15 MW in RESCO greenfield projects. To advance investments in the sector, the company is launching its first SPV of Rs 25 crore to support the initial set of projects over the next 12 months.

For the second phase of projects, Artha plans to establish an Alternate Investment Fund of Rs 150 crore that will last up to 2-3 years. Going ahead, the company aims to establish an InvITCo fund with an excess of Rs 500 crore to fund future projects. 



Animesh Damani

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Top Trends Influencing Global Solar Charge Controllers Market

Study finds that in 2018, East Asia and Europe were attractive regions in the solar charge controller market, accounting for more than 49% of the global market share.

Global warming, environmental conservation, and carbon footprint are dominating discussions around energy policies of both developed and developing nations alike. There is no denying that there is an urgent need to reduce our dependence on non-renewable sources of energy, and build effective mechanisms for harnessing renewable sources. Low energy efficiency continues to be a longstanding challenge for stakeholders.

The solar energy landscape is approaching the next level of energy efficiency with R&D of solar panels, batteries, and charge controllers. Besides high-efficiency product development, competitive pricing and technology integration mark the most influential trends in solar energy space. Global sales of solar charge controllers are set to

surpass \$2 billion by 2022, signalling heightened activity in this marketplace. Although developed countries, including the US, Japan, Germany, and the UK currently account for higher sales of solar charge controllers, gains have been impressive in developing countries in recent years.

South Asia & East Asia likely to emerge as high-growth markets

While North America represents over 20 per cent of the global installed base of solar charge controller, South and East Asia collectively account for more than one-third of the global solar charge controller market value. In lucrative developing regions such as South Asia, East Asia, and Latin America, increasing preference for implementation of the smart solar system has been trending in recent years. In addition, high-efficiency solar charge controllers enabled with smart sensor technology and auto-night detection capabilities is currently a thriving trend in the solar charge controller landscape.

Demand for off-grid installations is surging in developing regional markets, creating room for adoption of solar charge controllers in the near future. Off-grid solar installations have been crucial in pushing the potential of small-scale solar applications, particularly in developing economies from across the globe. Strongly backed by favourable government initiatives such as subsidies and incentives, the traditional energy transmission and distribution method has now completely shifted to a complex model that involves multi-point electricity grids that significantly supports growth of the solar charge controllers market. Moreover, the International Solar Alliance (ISA) has announced to initiate joint efforts in curtailing technology costs to broaden the solar energy application platform for solar-rich regions.

However, the lack of strong regional players in the manufacturing space still persists, which is creating massive investment opportunities for global leaders who look forward to establish bases in developing countries. Manufacturers based in China and India are however driving Asian markets currently, with a considerable number of contacts in the pipeline.

Quest for high efficiency driving preference for MPPT solar charge controllers

Although sold at an expensive price point, MPPT (maximum power point tracking) solar charge controllers



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are capable of pairing non-matching voltages from batteries and panels, thereby reducing the power flow as soon as it nears the capacity. MPPT type solar charge controllers have been witnessing impressive demand, as they can adjust their input to deliver the maximum possible power possible from the solar array. Moreover, these controllers are capable of delivering varying power output, based on the attached battery.

Currently, PWM type accounts for almost 60 per cent of overall sales of solar charge controllers. However, perceived as more efficient than PWM (pulse width modulation) variants of the solar charge controllers, it is highly likely that MPPT controller variants will continue to receive growing attention in forthcoming years. Developed regional markets are already demonstrating a rapid shift from PWM to MPPT, driven by the high expenditure of superior energy efficiency and growing support from governments for solar panel installations.

Integration of smart communication technologies is adding value to solar charge controllers

Smart technology, invading myriad industrial realms, also marks an important trend in the solar landscape. Integration of solar charge controllers with Bluetooth 4.0 and BLE (Bluetooth Smart) technologies is significantly influencing the functional capacities of solar charge controllers and thereby, the output.

MPPT solar charge controllers that are enabled with Bluetooth technology are already in use for wireless monitoring, setting the parameters, and real-time data checking. The real-time data communication includes the solar history, voltage of the battery, and overall load output.

While such avant-garde innovations are likely to complement efforts of end-use verticals with swift, hassle-free communication, the

industry behemoths are also investing heavily in discovering the long-term benefits of flexible battery charge algorithms, light dimming options, and day/night timing adjustability for partial shading conditions.

With an elevating number of remote operations in industries such as marine and oil and gas, it is highly likely that the demand for solar installations will speed up, for a wide range of production, drilling, and exploration activities. As remote locations often have to face operational challenges as a result of limited electricity access, leading site operators in these industries tend to selectively sign contracts with package providers of solar panels, batteries, and solar charge controllers. 



Nikhil Kaitwade

Research Manager,
Future Market
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Anchor becomes 'Panasonic Life Solutions India'



(From L-R) Tetsuyasu Kawamoto, Joint MD; Vivek Sharma, MD; and Dinesh Aggarwal, Joint MD at the unveiling of the new corporate identity of Panasonic Life Solutions India

Anchor Electricals Pvt Ltd, a wholly-owned subsidiary of Panasonic, recently announced the change in its legal entity to Panasonic Life Solutions India Pvt Ltd with effect from 1st April. With this, the brand has also changed its corporate identity from 'Anchor by Panasonic' to 'Panasonic'.

Panasonic Life Solutions India, formerly known as Anchor Electricals, has been selling a wide range of electrical products for over five decades through its strong dealer and distributor network spread across the country.

Vivek Sharma, Managing Director, Panasonic Life Solutions India said, "We are delighted to unveil our new corporate identity which will help us in strengthening our position in our segment. With this change, we would position the brand as one that would take care of the expectation of modern India consumers." Panasonic is also strengthening its focus in B2B and B2G segments to penetrate the untapped markets, he said.

Tetsuyasu Kawamoto, Joint Managing Director, Panasonic Life Solutions India, said, "We aim to offer outstanding products and services across all categories to our consumers. With the new name, our goal will be to transform the vision of 'Making a better, comfortable life with human-oriented solutions' to reality."

Dinesh Aggarwal, Joint Managing Director, Panasonic Life Solutions India stated, "Through Panasonic Life Solutions India Pvt Ltd, our objective is to augment the brand recall amongst our existing consumers and enhance our consumer reach. At the core, brand Anchor will cater to value for money consumers whereas, Panasonic will focus on providing a comprehensive solution for energy saving, comfortable and safe living."

Brand positioning

Anchor has been one of the industry leaders in wiring devices and also has a significant presence in switchgears, wires, cables and tapes, conduit pipes, lighting, solar, housing, power tools and indoor air quality (IAQ).

Talking about the positioning

of both the brands, Sharma said, "Anchor will be positioned in the value-for-money segment whereas Panasonic will be seen in the money-for-value segment."

Setting up new facility in AP

Panasonic targets to be a billion-dollar company by the financial year 2021-22. To meet this target, the company plans to set up a new facility in India. Explaining the same, Sharma said, "As of now most of our factories are in North and West whereas the market for expansion is in East and South India. So, it became imperative for us to expand our footprint for production. After doing a nationwide survey across 49 sites, we seem to be in sync to set up a new facility in Andhra Pradesh. Our internal study suggested that by 2020 our current production capability would be fully utilised. So, our new facility should start production by 2020."

Increasing export

Sharma further adds, "Panasonic considers India as a critical market in the ISAMEA (India, South Asia, Middle East and Africa) region. We target to increase our export by 10 per cent in next 5 years." 



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The 4-20mA Current Loop

Industries have been growing from heavy steam engines to completely automated systems with least human interventions. One can say it's a revolutionary change since the commencement of the first industrial revolution.

Industry 4.0 is about automation and exchange of data in manufacturing processes. Technologies like logic controllers for process controls, computer-based algorithms and Internet of Things are predominant in Industry 4.0.

In order to achieve production efficiency, consistency and economic advantages, process control systems are widely adapted in industries.

Process controls was a collaborative approach emerged from the fields of both control engineering and chemical engineering.

In the very first industrial revolution processes were controlled by hydraulics; mostly by water. But there were several disadvantages of this system and hence new techniques of process control came into existence. Due to increase in availability and reduction in costs of electronic circuits the era shifted towards use of electrical signals.

Analog signals for process monitoring & control

Using varying electrical signals like voltage and current is the most basic means of information transfer. Out of all the analog signals, 4-20mA current loop is far more superior. It comes with advantages of simplicity, reliability, cost effectiveness and most importantly linear behaviour of output.

How do we communicate or transfer information using analog signals?

The answer to this question can be explained with the help of a block diagram as shown in figure 1; it consists of the following main components:

Sensor:

A sensor is required to sense any physical quantity or to measure a process variable. Type of sensor depends on the application.

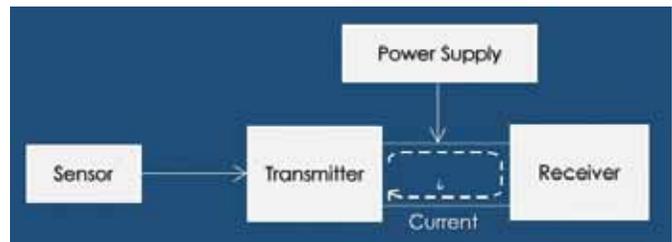


Figure 1

Transmitter:

The value obtained from sensors are to be converted to appropriate electrical signals generally of the range 4-20mA i.e. 4mA for 0-degree and 20mA for 60-degree C.

Receiver:

It is a device at the receiving end which will convert the signals back to original form either it may use these signals to display original values or actuate a device to control processes.

Power source:

A power source is essential to generate signals. In order to obtain unidirectional signal a DC source is generally used.

Loop:

Let us understand what a current loop means and its importance. A current loop is a closed path in which the current flowing through each element is same.

The law governing a current loop is simply Ohm's Law given as;

$$V = I * R \text{ Volt} \dots\dots\dots [1]$$

Considering a simple closed circuit (loop) with a DC source and resistors in series, a voltage drop takes place at every resistor and this can be obtained using Kirchhoff's Voltage Law, Refer fig.2;

$$V = IR_1 + IR_2 + IR_3 \dots\dots\dots [2]$$

Hence, if instead of current signals voltage is used then there would be drop in voltage and the signal received at the receiving end would be weak. Leading to inefficient

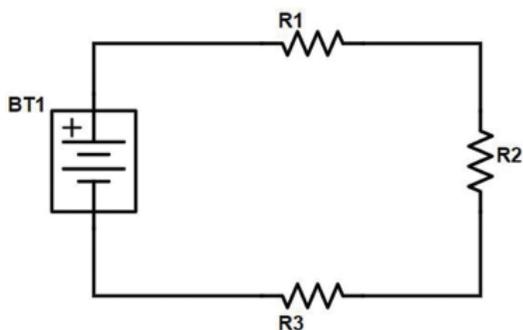


Figure 2

signal transfer.

Whereas, for the same case, current will be same throughout the loop. And hence there are least chances of failure of transferred signals. Thus, signals can be transferred at long distances efficiently.

Why use current loop?

As inferred from its operating principle, a current loop is more convenient to use for remote or communication over long distances. It reduces chances of signal failure and information transfer becomes efficient and effective.

When using 4-20mA current signal advantage of live-zero can be taken to detect sensor failure. Added benefits are of low electromagnetic susceptibility and better immunity to noise.

How to relate actual signal (quantity under measurement) with 4-20mA signal?

Let us consider an example in which temperature of a zone is to be controlled and monitored using PLC.

Following are the conditions:

- An RTD is used to sense the temperature of heating chamber which varies from 32-degree C to 180-degree C.
- Input to PLC is via a temperature transducer which will convert and provide output of 4-20mA.
- Hence (32 to 180)-degree C is to be mapped with 4-20mA signal.

For this case;

Input start value (x_1) = 32-degree C

Output start value (y_1) = 4mA

Input end value (x_2) = 180-degree C

Output end value (y_2) = 20mA

Now let's say the present temperature of chamber is 106-degree C (z_1), what will be the transducer output equal to?

Let the unknown parameter be ' z_2 '; Therefore,

$$z_2 = ((y_2 - y_1) * (z_1 - x_1) / (x_2 - x_1)) + y_1 \dots \dots \dots (1)$$

$$z_2 = ((20 - 4) * (106 - 32) / (180 - 32)) + 4$$

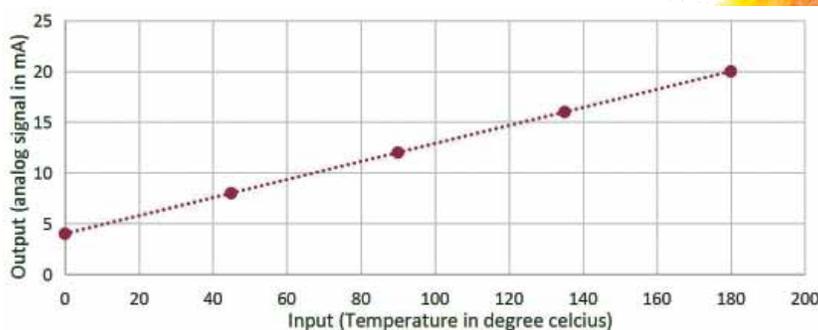


Figure 3

$$z_2 = ((16) * (74) / (148)) + 4$$

$$z_2 = ((16) * (74) / (148)) + 4$$

$$z_2 = ((16) * (0.5)) + 4$$

$$z_2 = 8 + 4$$

$$z_2 = 12 \text{ mA}$$

Hence the output of the temperature transducer will be 12mA corresponding to present chamber temperature 106-degree C.

Proper understanding and implementation of this technology makes complex task of communication simpler. Due to the world wide acceptance and large user-supplier base many technological advancements have been put forth. Such are - loop powered devices and HART communication system.

HART Communication:

The standard 4-20mA analog signal used in industry can transmit only a single parameter that too in a single direction, it wouldn't act as a receiver of a 4-20mA signal.

To mitigate this drawback and to make this technology advanced a bi-directional communication protocol was been developed with which one can transmit and receive information by superimposition of an alternating current signal over the 4-20mA signal. This technology is called Highway Addressable Remote Transducer (HART).

Conclusion

Hence, it has been a standard industrial practise to use 4-20mA current signals instead of 0-20mA with the benefits of detecting open circuit faults as well as it is easier to convert it to low voltage (1-5V DC) signal, easily processed by majority of controller input cards, catering the needs of most of the control processes. E



Neha Mistri

Application Engineer,
Rishabh Instruments Pvt. Ltd.



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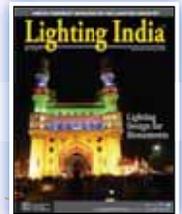
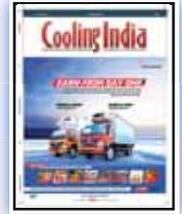


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KEI Celebrating

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Glorious Years

With the aim to cater the customer of electrical wires and cables, KEI recently came up with the range of co-axial and communication cables.

Anil Gupta,
Chairman-cum-Managing Director,
KEI Industries



KEI Industries is one of the leading manufacturers of cables and wires in India. In an interaction with Subhajt Roy, KEI's CMD discusses about the company's performance, industry outlook, competitive scenario, and his future plans.

KEI has completed 50 years. What are the major milestones that you look back on with satisfaction and pride?

We have recently celebrated 50 glorious years of KEI in India. Going regionally to meet our dealers, customers and rejoicing with them on this occasion has been my most memorable assignment. This celebration stands synonymous to all the hard work put in the last 50 years and all this work has resulted us in reaching at this level today. This milestone is what I look back with utmost pride and satisfaction.

What are the business mantras you have embraced as you sought to establish your success story?

I have 37 years of experience and have been working at KEI Industries Ltd. in the capacity of Chairman-cum-Managing Director since 1992. I have always believed in having a transparent and friendly environment. Building a cordial environment is key to running a successful business.

How has the business evolved post collaboration with Pro Cable?

In 2005, we stepped into the production of medium voltage cables like 11KV, 22KV and 33KV cables, which remains our mainstream product till date. Later in 2010, we decided to increase the voltage range in our cables and we added voltage ranges of 66KV, 132KV and 220KV in our product

segment. For this purpose, we entered into a technical collaboration with a Swiss company Pro Cable and used their technical and marketing assistance to open our project in Chopanki, Rajasthan. This is the mainstream product of our company, today. In fact, we have used their technical assistance to enter into the voltage range of 400KV. ROW issues have led to the replacement of overhead transmission in many cities and areas with underground cables, at present.

What's your outlook on the recent status of electric wire and cable market in India?

The growth in the current market of electric wire and cable market in India is quite good which can be attributed to several reasons. Firstly, there is substantial growth in the solar and wind power. Secondly, a lot of infrastructure projects such as highways etc. are underway. Overhead to underground cabling is also happening at substantial number of places. Thirdly, industrial sector is also witnessing growth especially in steel and refinery sector.

How does KEI stand apart from its peers?

At KEI, we have meticulously and strategically built a 'power'ful connect that helps us touch millions of hearts, and light millions of homes every day, in many small and big ways. Several factors such as presence across major sectors, transparency in all dealings, world-class manufacturing facilities, Robust R&D capabilities and being end-to-end service providers set us apart from our peers.

At KEI, we have received the

KEI performance - in numbers

- Net Sales, Q1-Q3 FY'19 Rs 2,968.17 cr, Growth by 23%, compared to Q1-Q3 of FY'18.
- Net Profit After Tax (PAT), Q1-Q3 FY'19 Rs 121.94 cr, Growth by 28% compared to Q1-Q3 of FY'18.
- Export Sales, Q1-Q3 FY'19 Rs 390 cr, Growth by 10% compared Q1-Q3 of FY'18.

certification and approval for Quality Management System, Environment Management System, and Occupational Health and Safety Management system. Further to that, we have also received Certificate of Accreditation for its facilities at manufacturing unit Bhiwadi, Alwar (Rajasthan) in discipline of Electrical Testing from National Accreditation Board for Testing and Calibration Laboratories (NABL).

Tell us a bit more on your product launches, expansion plans etc.

With the aim to cater the customer of electrical wires and cables, KEI recently came up with the range of co-axial and communication cables. It includes jelly-filled co-axial cables, LAN (computer) and CCTV (4+ 1) cables and telephone cables. We are working towards continuously expanding our business. In sync with that, the company is aggressive on expansion with over 1,400 dealers PAN India by this fiscal end, almost a jump of 9 per cent from our 1,284 dealers as on March 31, 2018. 

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The new Fluke Pocket Thermal Imager small enough to carry every day without worry, the PTi120 stands up to dirt and water, and can survive a 1-metre drop. Now enhanced infrared inspections are right in your pocket for quick temperature scans of electrical equipment, machinery and other assets.



After successfully scanning the QR code or barcode on your equipment, you can send your images complete with data and time stamped information to predefined folders. Send via Wi-Fi or automatically upload once you connect to the network or computer via USB. Now you can more efficiently safe, find and report on issues before

they become problems.

The PTi120 comes complete with Imager, USB cable (charging/data transfer), soft transport bag, and adjustable lanyard. 

For more information, visit www.fluke.com

KS5 – Advance Synchronising Unit

Synchronising units are generally meant for automatic switching of three-phase generators for parallel operation with the grid or with additional generators. In order to achieve the desired operation, few points need to be addressed like:

- The voltage of the incoming alternator must be same as the bus-bar voltage
- The frequency of the incoming alternator must be same as the frequency of bus-bar voltage
- The phase of incoming alternator voltage must be identical to the phase angle of bus-bar voltage
- The phase sequence must be identical, in case of a three-phase alternator.



Lumel SA, Poland, a Rishabh Group Company, has designed a product, which would help in monitoring the key points for synchronising system mentioned above. The product created is very much user friendly and with TFT colour graphic screen. The devices are equipped with RS485 Modbus communication port and Ethernet with in-built www server to help user interface with centralised system.

Few of the key characteristics are:

- Clear data visualisation using colour graphic display 3.5-inch TFT (separately for the Synchroscope, differential voltmeter, frequency meter).
- Range of input signals: 50...150 V or 150...400 V.
- Direct or indirect measurement through voltage transformers.
- Additional control input:
 - BLK - lock synchronisation
 - START - start synchronisation.
- Programmable hysteresis of voltage difference, frequency, and phase shift angle.
- Relay output for
 - Sync enable (available with 300V/1A)
 - Alarm output.
- Ethernet interface 10/100 BASE-T for connecting the synchronization meter to the local area network (LAN) or the global one (WAN):
 - Network services: web server, Modbus TCP / IP, DHCP client;
 - RS485 with MODBUS RTU protocol.
- Password protection for two accounts of Web Server user.
- Measurement of the minimum and maximum values of voltage and frequency
- External dimensions: 96 x 96 x 77mm. 

For more details, visit www.rishabh.co.in

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In use at (-) 40 C: How 25 e-chains help prepare planes before they fly

Friction-free operation of a fully automatic maintenance system for aircraft enabled by e-chains and igubal pillow block bearings



The e-chains of the E4.1 series are resistant to chemicals and moisture, as well as operate reliably even at low temperatures. (Source: MSG Production AS)

De-icing and washing aircraft is still a very manual process. To reduce time, delays and therefore costs, MSG Production AS developed a fully automated all-in-one concept that can de-ice and wash aircraft. The Norwegian company relies entirely on the advantages of motion plastics from igus: energy chains of the E2 and E4 series ensure reliable cable guidance and igubal pillow block bearings for mounting of cleaning nozzles.

The de-icing of aircraft is expensive and time-consuming, since multiple steps here still require manual intervention. As many aircraft have to be freed of ice simultaneously, the de-icing becomes the bottleneck at the airport. The same situation applies to cleaning. The washing of a Boeing 737 takes place manually – and that can take up to ten hours. MSG Production AS took on these challenges and for the first time developed a stationary, fully automatic system, which fulfils two purposes: de-icing and washing. It reduces the de-icing time to seven minutes and the washing time to twenty minutes. The system consists of three beams, attached to each of which are two telescopic arms and bars. There is a nozzle system in the bars and on the floor. When an aircraft enters the hangar, it is

pulled by an electric carriage and cleaned or de-iced by the system similar to that in a car wash. Since this must work reliably despite humidity, chemicals and cold, the manufacturer makes special demands on the system components. The developers therefore rely on energy chains from igus for safe guidance of hoses and cables.

Cable routing made easy with igus energy chains

In total, there are 25 energy chains in the system. In addition to 19 e-chains of the E4.1 series, MSG Production AS also installed six 2400 series energy supply systems. The material igumid G ensures that the chains are insensitive to moisture and chemicals. Even temperatures down to (-) 40 degree C is no problem. Both energy chains are dirt-resistant and do not require lubrication, which makes them ideal to use in de-icing or cleaning equipment.

Lubrication-free nozzle movement due to igubal pillow block bearings

In addition to cable guidance, MSG Production AS also relied on igus products for mounting the nozzles. The igubal pillow block bearings reliably ensure the mobility of the individual nozzles. Their position on the floor and the bars, also permanently expose them to chemicals and moisture. Like all products of the motion plastics specialist igus, the bearings are lubrication- and corrosion-free, wear-resistant and have low-friction. Another advantage is that the service life of the bearings and the e-chains can be calculated quickly and easily using online tools. The forecasts are based on more than 12,000 tribological tests and 10 billion test cycles a year in the company's own 2,750 square-metre test lab. This gives the customer a reliable statement about the service life of his used bearings as well as e-chains and cables. This helps to avoid unplanned machine downtime. 

For more details, visit www.igus.in

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