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From the Publisher's Desk

MoP is Stressing on Low-cost Finance

After a long slow-down, in the reopening phase of the economy, the need for power is increasing. Smooth financing being one of the most essential pillars for the growth of the sector, special focus is now being paid on this area. On October 4 and 5 respectively, R.K. Singh, Union Minister of Power and New & Renewable Energy has reviewed the performance of REC Ltd. (a Navratna company under the Ministry of Power) and PFC Ltd. (a Schedule-A Maharatna CPSE). He was also accompanied by the Minister of State for Power Krishan Pal, Secretary Power and Senior Officers of Ministry of Power, and Senior Officers of these CPSEs.

In these meetings, the Union Minister has made it clear that the Union Government is intending to ensure availability of affordable power for all 24x7. Although the oppositions in our country are ever-ready to criticise the present Union Government for its basic intention to privatise the loss-making and/or low potential government entities, it is praiseworthy that the Union Government is not at all drifting from its strategies that have been built upon rigorous evaluation of analyses of the historical evidences, present market scenario and the future potentials.

Singh has advised both PFC and REC to look for ways to reduce their cost of funds – to explore better and cheaper options for raising funds, including from offshore sources, with an overall objective of ensuring that the power sector value chain gets access to cheaper funds. So, I feel the intention of the Union Government is quite admirable, let us watch how the companies translate those into actions.

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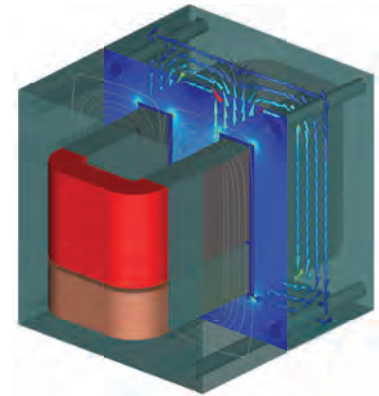
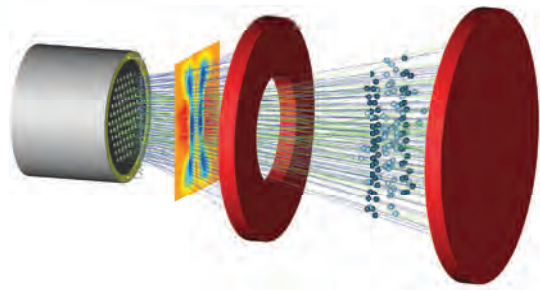
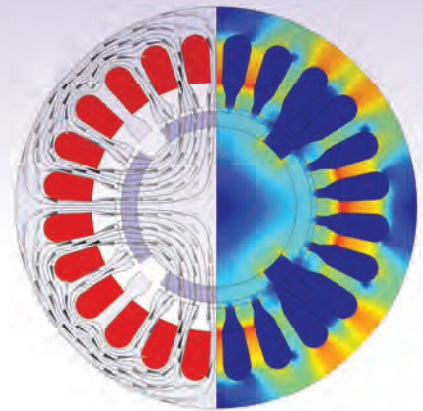
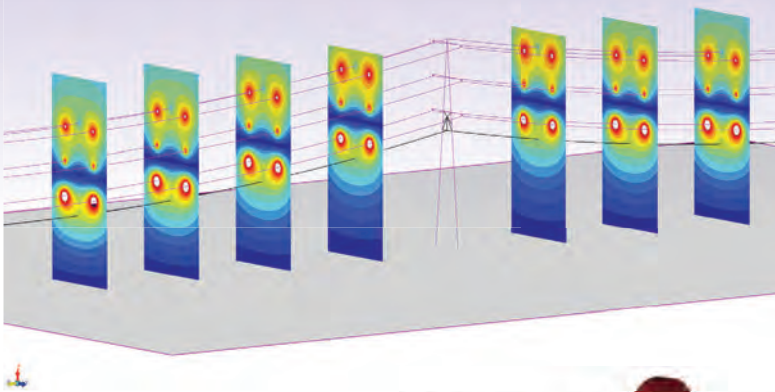
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REC LIMITED CLOSES US\$ 75 MILLION SOFR LINKED TERM LOAN

In a first for any NBFC in India, REC Limited has successfully raised a USD 75 million, 5-year Secured Overnight Financing Rate SOFR linked Syndicated Term Loan on October 7, 2021, with Sumitomo Mitsui Banking Corporation (SMBC), Singapore Branch appointed as the sole Mandated Lead Arranger and Bookrunner. Along with the loan, REC has also entered into interest rate swap referencing SOFR to hedge the interest rate risk on this facility, which is the first such deal by any Corporate in India.

The proceeds from this facility shall be utilized to fund infrastructure power sector projects as permitted under the ECB guidelines of the Reserve Bank of India.

Commenting on the successful closure of the USD Term Loan, Sanjay Malhotra, Chairman and Managing



Sanjay Malhotra, CMD, REC Ltd.

Director of REC, said, “With the imminent cessation of LIBOR and following the notification from the Reserve Bank of India on roadmap for LIBOR Transition, we are very happy to raise this SOFR linked Term Loan Facility, which is also the first one by any NBFC in India. The experience gained from the process will enable REC in USD LIBOR transition to SOFR for our existing term loans in a better manner.”

REC Limited is a Navratna NBFC focusing on Power Sector Financing and Development across India. Established in 1969, REC Limited has completed over fifty years in the area of its operations. It provides financial assistance to state electricity boards, state governments, central/state power utilities, independent power producers, rural electric cooperatives and private sector utilities. **ET**

PKTSL COMMISSIONS THE TRANSMISSION SYSTEM FOR RAJASTHAN SOLAR ENERGY ZONE

POWERGRID presently has 263 sub-stations and more than 172,000 ckm and 447,000 MVA of transformation capacity...

POWERGRID Khetri Transmission System Ltd. (PKTSL), a fully owned subsidiary of Power Grid Corporation of India Limited (POWERGRID), has commissioned the Transmission System associated with Rajasthan Solar Energy Zone (SEZ) Part-C on October 04, 2021. This is one of the largest Inter State Tariff Based Competitive Bidding (TBCB) projects established in the state of Rajasthan.

The Transmission Project involves a new 765 kV Sub-station at Khetri (Rajasthan) and connects the capital of India at Jhatikara (Delhi) through a 765 kV Double Circuit Transmission line and also connects Sikar (Rajasthan) through a 400 kV Double Circuit Transmission line.

The commissioning of PKTSL system will facilitate transfer of Renewable Power from Rajasthan to various

parts of the country. It will benefit industries, households and businesses, boosting the economic development of Rajasthan and the country in totality. It will augment the transmission infrastructure to evacuate renewable energy, thereby reducing dependency on fossil fuels, in line with Government of India's vision of achieving 450 GW renewable energy target by 2030.

Charging of this important transmission project will enhance ease of living as well as provide GatiShakti to infrastructure development activities, through supply of quality & reliable green power across the country.

With the adoption of the latest technological tools and techniques, enhanced use of automation and digital solutions, POWERGRID has been able to maintain average transmission system availability in the country greater than 99%. **ET**



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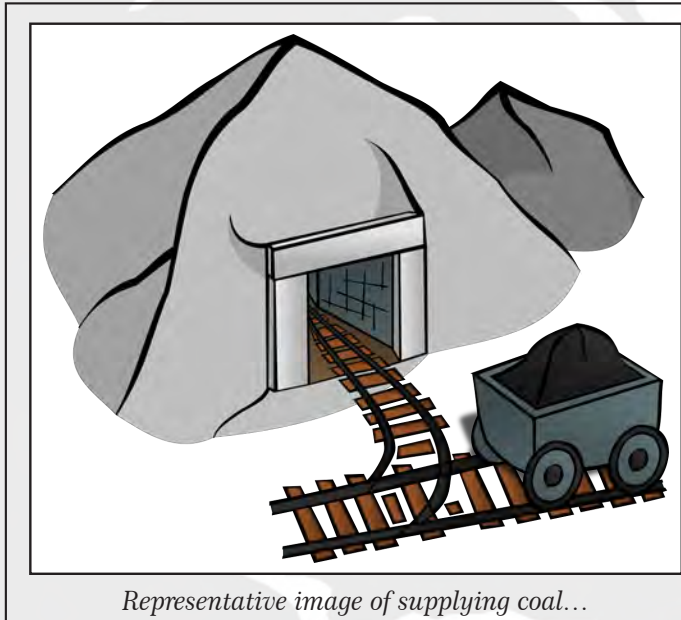
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GOVERNMENT IS VIGILANT ON COAL STOCKS IN THERMAL POWER PLANTS

In order to manage the coal stock and ensure equitable distribution of coal, Ministry of Power constituted a Core Management Team (CMT) on August 27, 2021 comprising representatives from MoP, CEA, POSOCO, Railways and Coal India Ltd (CIL) – to ensure daily monitoring of the coal stocks and despatches. The CMT is closely monitoring and managing the coal stocks on daily basis and ensuring follow up actions with Coal India and Railways to improve the coal supply to power plants.

The demand for power has been increasing from August, 2021 onwards. In August, 2021, the power consumption was 124 Billion Unit (BU) whereas the consumption in August, 2019 (before the COVID period)



Representative image of supplying coal...

was 106 BU. This was an increase of almost 18-20%. The increasing trend is persisting – the demand on August 4, 2021 was 1,74,000 MW - 15,000 MW more than on the corresponding day in the previous year.

There was continuous rain in the coal bearing areas in the months of August and September, 2021 leading to lower dispatch from coal mines in this period. However, the despatches have picked-up again. On 04 October, 2021, the total number of

rakes dispatched was 263, which is 15 rakes more than the rakes dispatched on August 03, 2021. It is expected that the despatches from coal lines will increase further. Now, the coal is being dispatched through rakes every day from the coal mines to thermal power plants. **BI**

POWER MINISTER REVIEWS PERFORMANCE, GIVES INSTRUCTIONS TO THDCIL AND NEEPCO

The minister has directed both the CPSUs to bid for Solar and/or Wind Projects...

Recently, Union Minister of Power and New & Renewable Energy, R K Singh took review meetings of the Tehri Hydro Development Corporation Limited (THDCIL) and North Eastern Electric Power Corporation Limited (NEEPCO). A direction given to both the CPSUs was to bid for Solar and/or Wind projects. The minister also directed both the CPSUs to increase their Capital Expenditure (CAPEX) and to spend 90% of their CAPEX by the end of Q3.

Singh appreciated the progress made by THDCIL for the initiatives taken by them in installation of Carbon Capture Technology for the Khurja Super Thermal Power Project (2 X 660 MW). He also commended the initiative of THDCIL for diversification in the field of 'Green Hydrogen' under the 'National Green Hydrogen Mission' and to develop 800 MW capacity

Green Hydrogen production and storage project on commercial scale in Chitrakoot District of Uttar Pradesh. THDCIL was also asked to create two new divisions in the company, one each for construction of Thermal Power Plants and another for development of Mines.

The minister expressed concern on NEEPCO's high manpower per megawatt strength and advised the CPSU to bring it within norms fixed by CEA (Central Electricity Authority). He directed NEEPCO to diversify the operations of NEEPCO in Renewable Energy and also expand its area of operations to PAN India.

THDCIL is a leading power sector and profit making public sector enterprise and registered as a public limited company. NEEPCO is conferred with the Schedule A- Miniratna Category-I CPSE status. **BI**



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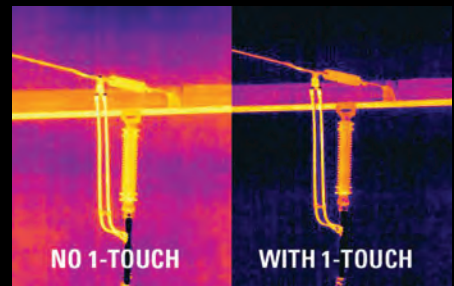
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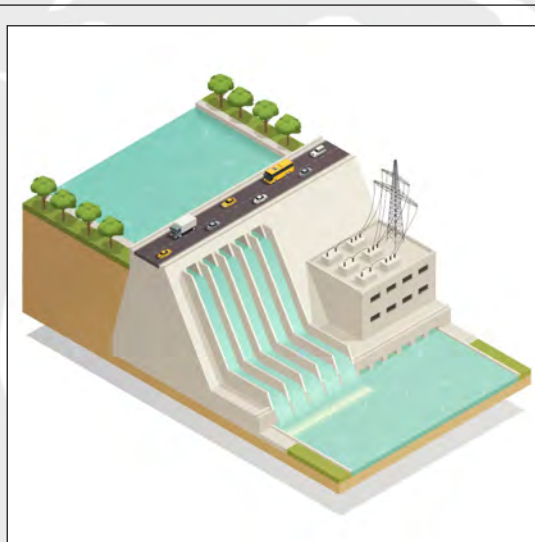
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BHEL COMPLETES COMMISSIONING OF THIRD RENOVATED HYDRO UNIT AT BAIRA SIUL HEP

Bharat Heavy Electricals Limited (BHEL), established as a leader in India's Hydro Segment, has completed R&M (Renovation & Modernization) and commissioned the third and final unit of the 3x60 MW Baira Siul Hydro Power Station located in Chamba district of Himachal Pradesh. The first and second units of the station have already been renovated and commissioned in Dec., 2019 and Oct., 2020 respectively.

Set up in 1981, Baira Siul is the first hydro station of NHPC Limited and also the first to be taken up for comprehensive Renovation & Modernisation (R&M). The R&M of the project will result in restoration of output capacity and improvement in efficiency, besides leading to better plant availability and life extension of equipment. Significantly, the capacity of



Representative Image of a hydropower plant...

each unit has been maintained at the rated output of 60 MW, even at the reduced head of 238.1 metres, as compared to the originally designed rated head of 260 metres.

Notably, BHEL is also the Original Equipment Manufacturer (OEM) of the hydro units that have been successfully operating for over 35 years, before being taken up for comprehensive R&M. BHEL's scope in the project comprised design, manufacture, supply, replacement and commissioning of critical parts

of Turbines & auxiliaries, Governors, Generators and Control & Monitoring. The equipment has been supplied from BHEL's manufacturing units at Bhopal, Bengaluru and Jhansi, while the on-site installation activities were carried out by the company's Power Sector - Northern Region division, Noida. **EI**

TATA POWER ACHIEVES MILESTONE OF MORE THAN 1000 EV CHARGING STATIONS

The company is committed to play a key role along with other stakeholders in achieving the national goal of transition to green mobility...

Tata Power has set up a network of more than 1000 Electric Vehicle (EV) charging stations across the country. This network of public EV charging stations provides innovative and seamless EV charging experiences for Tata Power's customers across Offices, Malls, Hotels, Retail Outlets, and places of public access, enabling clean mobility and freedom from range-anxiety.

In addition, there are close to 10,000 home EV charging points, which make EV charging super-convenient for the vehicle owners. Tata Power EZ Chargers ecosystem covers the entire value chain of Public chargers, Captive chargers, Bus/ Fleet chargers and Home chargers.

Starting with the first chargers being installed

in Mumbai, Tata Power EV charging points are now present in nearly 180 cities and in multiple State and National highways under various business models and market segments. The company is now planning to have a base of 10,000 Charging Stations the entire stretches of highways across the country.

Detailing on their plan, Dr. Praveer Sinha, CEO & MD, Tata Power, said, "We have started the first of our many milestones towards enabling the EV revolution in the country through successful deployment of over 1000 EV charging points in public domain. This makes Tata Power the country's largest EV charging solutions provider. Our innovative and collaborative approach has made a significant impact in developing this ecosystem and encouraging EV adoption in the country." **EI**

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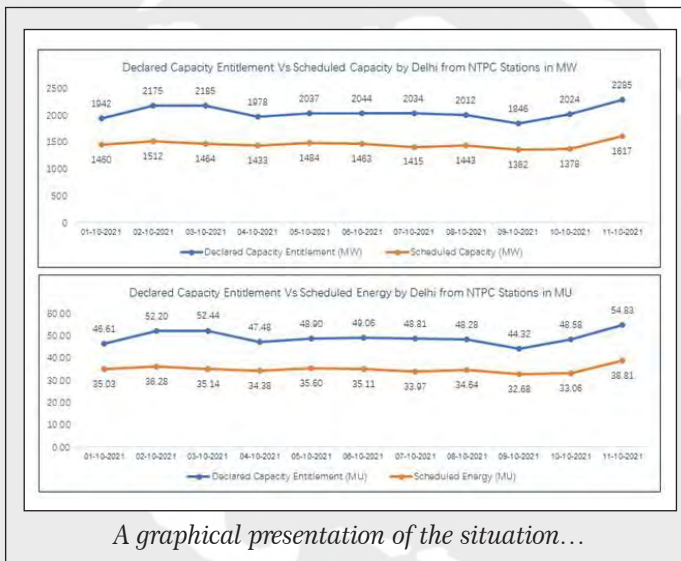
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DELHI DISCOMS SCHEDULING LESS POWER THAN THAT ALLOCATED BY NTPC

NTPC Ltd., India's largest integrated power producer, has been providing required power to capital city, Delhi. As per October 1, 2021 to October 11, 2021 data, Delhi DISCOMs have been scheduling only 70% of power that has been made available by NTPC. The same is indicated by the graph that lays down the power scheduled by NTPC plants for Delhi versus what has been drawn by the city's DISCOMs.

It is also pertinent to mention that Delhi DISCOMs have allocation of 756 MW from Dadri-I (840 MW) thermal power station of NTPC. Dadri-1 thermal power station was setup for strategically important state of



Delhi and has consistently served the consumers of Delhi. However, since November-2020, Delhi DISCOMs have not been scheduling power from this station even when the fixed charge of Dadri-I station is 0.97 Rs/kWh at normative present Energy Charge Rate (ECR) is 3.20 Rs/kWh. Ironically, Uttar Pradesh, which has allocation of only 10% from Dadri I units, is scheduling power from Dadri-I station meet the

power requirement of the state consumers.

NTPC is making all efforts for ensuring availability of coal at all of its power stations for meeting the power requirement of the country. In the first half of financial year 2021-22, NTPC's generation growth has been over 21% compared to same period last year. EI

IEX TO COMMENCE TRADE IN ENERGY SAVING CERTIFICATES UNDER PAT CYCLE- II

IEX pioneered trade in ESCerts in 2018 under PAT cycle I, which covered 478 DCs from 8 energy intensive sectors...

The Indian Energy Exchange has commenced trade in Energy Saving Certificates (ESCerts) under Perform, Achieve & Trade Cycle-II (PAT-II) scheme apropos the notification dated March 31, 2016 as issued by the Bureau of Energy Efficiency (BEE), Ministry of Power (MoP). The trading on the Exchange will happen once a week on every Tuesday.

PAT-II aims at achieving an overall energy savings of 8.87 MTOE and covers 621 Designated Consumers spanning across 11 energy intensive industry sectors. Petroleum refinery, railways and power distribution utilities have been added under PAT-II besides the eight industries including cement, thermal power plant, iron and steel, textile, aluminium, fertilizer, chlor-alkali, paper and pulp

that continue to be included from PAT-I.

The National Load Despatch Center (NLDC), which is the nodal agency for ESCerts trade in accordance with the CERC ESCerts Regulations 2016 has already commenced the process of registration. A total of 349 DCs can sell and 193 DCs are expected to participate on the buy side as per the BEE notification dated August 18, 2021. The MoP has already issued 57 lakh ESCerts to 349 DCs and about 193 DCs are entitled to purchase 36.68 lakh ESCerts as per the BEE.

Speaking on the occasion, S N Goel, Chairman and MD, Indian Energy Exchange Limited, informed, "We have maximum liquidity on our platform to enable the market participants to trade in the most competitive and efficient manner." EI

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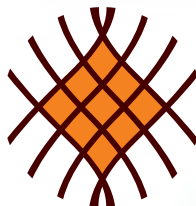
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AIR PRODUCTS' LARGEST-EVER INVESTMENT IN THE US TO TAKE SHAPE

Recently, Louisiana Governor John Bel Edwards; and Air Products Chairman, President and Chief Executive Officer Seifi Ghasemi have announced that a \$4.5 billion clean energy complex to be built in Louisiana that will make the state a leader in the United States' (U.S.) clean energy transition. Air Products is a world-leading industrial gas company that produces and transports hydrogen and other essential industrial gases to many customer facilities in Louisiana, across the U.S. Gulf Coast and around the world.

Air Products will build, own and operate the megaproject, which will produce over 750 million standard cubic feet per day (MMSCFD) of blue hydrogen in Ascension Parish, Louisiana. "Blue" products are produced utilizing hydrocarbons as a



Louisiana Governor John Bel Edwards looks on as Air Products' CEO Seifi Ghasemi delivers remarks about the company's newly announced plan...

feedstock, with the carbon dioxide (CO₂) in the production process captured for permanent sequestration. The project will create 170 permanent jobs with a total annual payroll of \$15.9 million and more than 2,000 construction jobs over three years. It represents Air Products' largest-ever investment in the U.S.

A portion of the blue hydrogen will be compressed and supplied to customers

by Air Products' extensive U.S. Gulf Coast hydrogen pipeline network. The network is the largest hydrogen pipeline system in the world, stretching more than 700-miles from Galveston Bay in Texas to New Orleans, Louisiana. At present, this vast U.S. Gulf Coast pipeline network can supply customers with more than 1.6 billion cubic feet of hydrogen per day from approximately 25 production facilities. **ET**

LEONI AG SIGNS AGREEMENT WITH BIZLINK HOLDING INC.

LEONI offers standard and special cables as well as custom-developed wiring systems and related components for the automotive industry...

Leoni AG has signed a binding agreement with BizLink, an international provider of solutions for cables and connectivity services, on the sale of the Business Group Leoni Industrial Solutions. LEONI is a global provider of products, solutions and services for energy and data management in the automotive sector and other industries. The value chain encompasses wires, optical fibers, standardised cables, special cables and assembled systems as well as intelligent products and smart services. As an innovation partner and solutions provider, LEONI supports its customers with pronounced development and systems expertise.

The sold activities generated sales of approximately € 430 million in fiscal year 2020 and are valued with

an enterprise value of around € 450 million. The expected cash inflow of more than € 300 million after deduction of, among other things, financial liabilities and pension charges is to be used to improve liquidity. The transaction will thus contribute to significantly improving Leoni's financial position. Upon completion of the sale, a profit of around € 200 million is expected, to be accounted for in the Group's reported EBIT.

The closing of the transaction is still subject to approval of Leoni AG's financing banks and customary closing conditions, including merger control and investment review, and is expected in early 2022. The Executive Board and the Supervisory Board of Leoni AG as well as the Board of the buyer have already approved the planned sale. **ET**

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SECOND UNIT OF M701JAC GAS TURBINE BEGINS COMMERCIAL OPERATION

Mitsubishi Power, a power solutions brand of Mitsubishi Heavy Industries, Ltd. (MHI), has commenced operation of a second M701JAC gas turbine unit for natural gas-fired power plants in Thailand. Inaugurated on October 1, this is the second of eight units ordered on a full-turnkey basis as part of a joint venture between Gulf Energy Development Public Company Limited, one of Thailand's largest Independent Power Producers (IPP), and Mitsui & Co., Ltd. The first unit, which was also a first M701JAC in Southeast Asia, started commercial operation at the end of March this year. The two ultra-large-scale power plants are under construction in Chonburi and Rayong Provinces, approximately 130 kilometers southeast of Bangkok.

This M701JAC joins the global fleet of J-Series and



The GTCC Power Plant in Chonburi...

JAC-Series gas turbines that have amassed more than 1.4 million operating hours; with 83 units ordered across the globe. When completed, the eight units in the project will form a Gas Turbine Combined Cycle (GTCC) power system with a total output of 5,300 megawatts (MW). A 25-year Long-Term Service Agreement (LTSA) for these units is also in effect and Mitsubishi Power is fully supporting the customer's reliable operation and maintenance of the first

and the second units through remote monitoring of plant operation with TOMONI, which is Mitsubishi Power's digital solution service including an analytical platform developed for the optimization of power plant operation. The construction of the remaining six units have commenced and are expected to be completely operational by 2024.

HITACHI ENERGY SIGNS ECONIQ FRAME AGREEMENT WITH BKK NETT

This frame agreement with BKK Nett marks an important milestone as the very first for the new EconiQ breaker technology...

Hitachi Energy has signed a frame agreement with Norway's major distribution grid company, BKK Nett to install EconiQ Live Tank Breakers (LTA) 145 kV in more than 10 substations in the western region. For Hitachi Energy, this is the very first frame agreement globally for its EconiQ eco-efficient breaker technology.

Norway plans to cut at least 50% of its greenhouse gases by 2030 with the target to achieve carbon-neutrality by 2050. To achieve this goal, the country is taking action to adopt eco-efficient technologies and accelerate the path towards carbon-neutrality.

The first project in the frame agreement is the Askøy substation, located on an island west of the city of Bergen, Norway. BKK Nett will rebuild the substation

to meet the growing electricity demand from businesses and households.

"We are committed to work with our customers to reduce carbon footprint and accelerate the energy transition. We are pleased to be partnering with BKK Nett in the quest towards achieving carbon neutrality," said Markus Heimbach, Managing Director of the High Voltage Products business at Hitachi Energy.

"We are excited to join forces with Hitachi Energy to bring new and innovative EconiQ technology that reinforces our strategy for sustainable operations. With such an eco-efficient technology, we are able to build future-proof substations with lower environmental impact," said Atle Isaksen, Head of Grid Development at BKK Nett.

D. SANYAL TO BECOME CEO OF VARO ENERGY



He is highly experienced in finance, business development and renewable energy...

Recently, VARO Energy, a leading energy company active in Europe, has announced that Dev Sanyal has been appointed as its new Chief Executive Officer (CEO), effective from January 1, 2022. Sanyal will oversee the company's next chapter of growth, as VARO evolves its business in the context of the energy transition, leveraging its asset base to capitalise on opportunities in renewable energy, from its existing biofuel business to hydrogen and decarbonisation

initiatives, among other energy solutions VARO is actively driving.

With over 30 years' experience in the energy sector, Sanyal is well placed to lead this new phase. Since 2016, he has been Chief Executive, Alternative Energy at BP and has also led BP's Gas and Low Carbon business globally. During this period, he has led BP's pivot in low carbon energy with the creation of Europe's largest solar company, Lightsourcebp. 

F. NEY IS NOW A PART OF DALI ALLIANCE



He is quite experienced in developing DALI-supported devices...

Fränz Ney has joined the DALI Alliance (Digital Illumination Interface Alliance, or DiiA) staff as a Technical Software Developer. His initial focus will be to develop DALI Alliance test sequences including the tests for DALI+ and DALI gateways. His other tasks will include analysing test results and writing or maintaining technical guides.

At his former company, DALI Alliance member Loytec GmbH (part of Delta Electronics), Fränz worked for the past five

years in the field of building automation and DALI. He contributed to the DALI Alliance subgroups including macro-code development for test sequences.

Commenting on Ney's appointment, Paul Drosihn, General Manager of the DALI Alliance, said, "We are delighted to welcome Fränz to the DALI Alliance. His expertise and experience will help us to accelerate our efforts to introduce certification for DALI+ devices and wireless to DALI gateways." 

A. MOSKWA HAS BEEN THE NEW POLISH MINISTER OF CLIMATE AND ENVIRONMENT



During 2020-2021, she acted as the President of the Management Board in Baltic Power...

The President of the Republic of Poland has recently appointed Anna Moskwa as the Minister of Climate and Environment. Anna Moskwa comes from Zamość. She graduated from the Catholic University of Lublin in Sociology, from the Maria Skłodowska-Curie University in International Relations and completed postgraduate studies at the University of Warsaw in Enterprise Management. She is also a graduate of the Łazarski University, where she completed her MBA studies.

Moskwa acted as the Vice-President and President of the European Meeting Centre – Nowy Staw Foundation – where she started her work as a volunteer. In 2010, she directed the Polish branch of the Habitat for Humanity organisation. After 2012, she was involved in advisory activities with regard to HR, labour market and EU funds. Since 2021, she has been the Director of offshore wind farms office at the Orlen company. 



PREPARING FOR THE NEXT STAGE OF POWER REFORM

Here is a snapshot of the recent changes brought in by the Ministry of Power (MoP) for easing the overall operation of the Indian power sector and of course improving profitability at all stages. All items of information are based on the inputs available from the MoP...

- P. K. Chatterjee (PK)

For the Ministry of Power (MoP), October 2021 was the month for preparing for several future actions. Most interestingly, the Supreme Court of India has resolved the 10-year-long pending jurisdictional issue related to power market between CERC (Central Electricity Regulatory Commission) and SEBI (Securities and Exchange Board of India). MoP has taken review of several CPSUs (Central Public Sector Undertakings).

A step towards Power market reforms

On October 06, the long pending matter between SEBI and CERC regarding regulatory jurisdiction of Electricity Derivatives has finally got resolved with the Supreme Court favourably disposing of the matter in terms of the agreement reached upon by SEBI and CERC.

MoP took the initiative of resolving the jurisdictional issue between SEBI and CERC with regard to various forms of contracts in electricity for Efficient Regulation of Electricity Derivatives by constituting a committee on 26th October, 2018, under the Chairmanship of the Additional Secretary, MoP with representatives from Department of Economic Affairs (Ministry of Finance), Central Electricity Authority, Central Electricity Regulatory Commission (CERC), Power System Operation Corporation Limited (POSOCO), Securities and Exchange Board of India (SEBI), Indian Energy Exchange, Power Exchange of India Limited and Multi Commodity Exchange to examine the technical, operational and legal framework for electricity derivatives and to give recommendation in this regard. Committee submitted its report on 30.10.2019 with the following recommendations:

- Henceforth, all Ready Delivery Contracts and Non-Transferable Specific Delivery (NTSD) Contracts



Photo by Matthew Henry on Unsplash

as defined in the Securities Contracts (Regulation) Act, 1956 (SCRA) in electricity, entered into by members of the power exchanges, registered under CERC (Power Market) Regulations, 2010, shall be regulated by CERC subject to the following conditions, namely:

- i. the contracts are settled only by physical delivery without netting;
 - ii. the rights and liabilities of parties to the contracts are not transferable;
 - iii. no such contract is performed either wholly or in part by any means whatsoever, as a result of which the actual delivery of electricity covered by the contract or payment of the full price therefore is dispensed with;
 - iv. no circular trading shall be allowed and the rights and liabilities of parties to the specific delivery contracts shall not be transferred or rolled over by any other means whatsoever;
 - v. the trading shall be done only by authorised grid connected entities or trading licensees on behalf of grid connected entities, as participants;
 - vi. the contracts can be annulled or curtailed, without any transfer of positions, due to constraints in the transmission system or any other technical reasons, as per the principles laid down by CERC in this regard. However, once annulled, same contract cannot be reopened or renewed in any manner to carry forward the same transaction.
 - vii. all information or returns relating to the trade, as and when asked for, shall be provided to CERC, who shall monitor the performance of the contracts entered into on the power exchanges.
- Commodity Derivatives in electricity other than Non Transferable Specific Delivery (NTSD) Contracts as defined in SCRA shall fall under the regulatory purview of SEBI.
 - The Central Government reserves the right to impose additional conditions from time to time as it may deem necessary.
 - A Joint Working Group between SEBI and CERC shall be constituted with Terms of Reference as agreed in the Report of the Committee.

Based on the recommendations of the Committee both SEBI and CERC have come to an agreement that CERC will regulate all the physical delivery based

forward contracts – whereas the financial derivatives will be regulated by SEBI. MoP issued suitable order on 10.07.2020.

Benefits

This has opened the gate for introduction of longer duration delivery-based contracts in the power exchanges, which has been currently restricted to only 11 days due to the pendency of the case.

This will enable the DISCOMS and other large consumers to plan their short term power procurement more efficiently. Similarly, the commodity exchanges viz. MCX etc., can now introduce financial products viz. Electricity futures etc., which will enable the DISCOMS and other large consumers to effectively hedge their risks of power procurement.

This is a significant development and has the potential to change the landscape of the power market in the country. This will bring newer products in the power/commodity exchanges and attract increased participation from GENCOs, DISCOMs, large consumers etc., which will eventually deepen the power market.

This will further deepen the power market from the present level of approx. 5.5% of the volume to the targeted volume of 25% by 2024-25.

New rules for easier access to electricity transmission network

MoP has announced the change in the Electricity (Transmission System Planning, Development and Recovery of Inter-State Transmission Charges) Rules 2021. This paves the way for overhauling of transmission system planning, towards giving power sector utilities easier access to the electricity transmission network across the country.

At present, generating companies apply for Long Term Access (LTA) based on their supply tie-ups, while medium-term and short-term transmission access is acquired within the available margins. Based on LTA application, incremental transmission capacity is added. A number of sector developments, such as the increasing focus on renewable energy, and the development of the market mechanism, necessitated a review of the existing transmission planning framework based on LTA.

The rules underpin a system of transmission access, which is termed as a General Network Access (GNA)

in the inter-state transmission system. This provides flexibility to the states as well as the generating stations to acquire, hold and transfer transmission capacity as per their requirements. Thus, the rules will bring in rationality, responsibility and fairness in the process of transmission planning as well as its costs. In a major change from the present system of taking transmission access, power plants will not have to specify their target beneficiaries. The rules will also empower state power distribution and transmission companies to determine their transmission requirements and build them. Also, states will be able to purchase electricity from short term and medium term contracts and optimize their power purchase costs.

Apart from introducing GNA, the rules also specify clear roles of various agencies involved in the transmission planning process. CEA shall prepare a short-term plan every year on rolling basis for next 5 years and perspective plan every alternate year on rolling basis for next 10 years. The Central Transmission Utility shall prepare an implementation plan for inter-state transmission system every year on rolling basis for up to next 5 years that will take into account aspects such as right-of-way and progress of the generation and demand in various parts of the country. The rules specify how the existing LTA would be transitioned into General Network Access. They also outline the recovery of GNA charges from the users of transmission network and assign the responsibility of billing, collection and disbursement of inter-state transmission charges to the Central Transmission Utility.

Benefits

For the first time, the rules have ensured that the transmission capacity can be sold, shared or purchased by the states and generators. The rules prescribe that excess drawal or injection over the GNA capacity sanctioned shall be charged at rates that are at least 25% higher and this will ensure that the entities do not under-declare their GNA capacity. CERC has been empowered to bring out detailed regulations on GNA in interstate transmission system.

The Central Government has notified these rules with a view to streamline the process of planning, development and recovery of investment in the transmission system. The rules are aimed at encouraging investments in the generation and transmission sectors. These rules will enable the country to develop deeper markets. 



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CONSTRUCTING 400kV TOWERS AT BRAHMAPUTRA RIVER CROSSING

This article strives to describe in detail various types of challenges faced during the construction of the 400kV towers on River Brahmaputra and operational challenges faced during the operational stage...

North East Transmission Company Limited (NETCL) has constructed & is operating the 662.8 Km, 400 kV Double Circuit inter-state transmission corridor through difficult hilly & dense forest terrain of the States of Tripura, Meghalaya and Assam in the North Eastern Region (NER) of India. The transmission line crosses two major rivers namely Brahmaputra & Barak. The mighty Brahmaputra River with its source in Tibet, flows down through the steep Southern Himalayas with great speed and flows with huge discharge & speed during monsoon season from its numerous tributaries causing erosion, flash floods and siltation leading to frequent changes of its course.

Background

North East Transmission Company Limited (NETCL) is a Joint Venture Company of POWERGRID, OTPC and Six states of

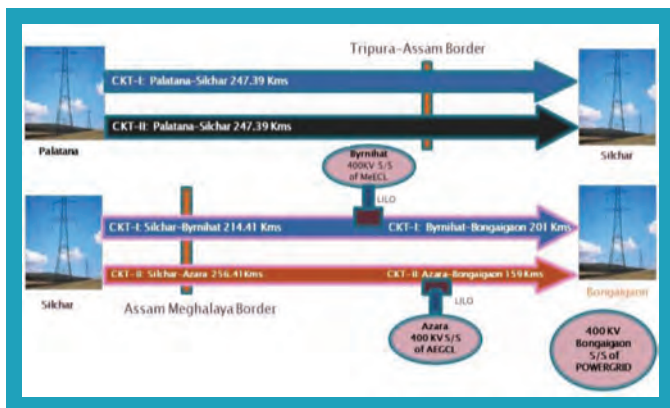
North Eastern region. The main objective of the company is to evacuate 726.6 MW power from Gas Based Combined Cycle Power Project (GBCCPP) of OTPC at Palatana in Tripura. NETC is operating 400kV D/C Palatana-Silchar-Bongaigaon transmission line of 662.8km traversing through the states of Tripura, Meghalaya and Assam. One circuit of 400kV Silchar-Bongaigaon double circuit Interstate line is looped-in looped-out at Byrnihat substation in Meghalaya and another circuit is looped-in looped-out at Azara substation in Assam. The task for construction transmission line corridor was very challenging due to heavy rainfall. In addition to the above mentioned environmental & climatic challenges, there are many local & social challenges related to insurgency, theft, right of way, various approvals from government, cyclones etc. faced during the construction of river crossing towers and so on.



River Crossing Tower Constructional Challenge

Construction of River Crossing Towers: River crossing involved in NETC Transmission line, is most important link of the line. The NETC line has undergone 4 river crossings namely: Brahmaputra (son of Brahma), Champamati, Barak, Lukha river that is selected judiciously and carefully by NETC.

Construction of 2 well foundations (1023 & 1024) in Brahmaputra River: The construction of 2 Deep Circular well foundation (Caissons) on the



mighty Brahmaputra river is one of the historical milestones achieved by NETC in Indian Tower Engineering. The mighty Brahmaputra river flows down from Himalaya to Bay of Bengal, with its source in Tibet. The Brahmaputra river is one of the largest rivers of India. The river crossing span is 2.56 km. The weight of the tower is 272MT and its height is 138 metre. The myriad challenges that were faced during the construction & erection of the tower have been discussed hereafter.

For well foundations, soil & geotechnical survey was carried out in a very challenging condition. NETC has

adopted all the standard practices, which are required for the river crossing tower design as well as Erection & Commissioning (E&C) of tower with special T&P. River crossing tower requires solar-based Obstruction Lights as per GRID Code. The pipe type earthing is installed in the river for well foundations. The special conductor AACSR size (Al54/3.53, Steel 7/3.53) & AACSR Earth wire (16/2.86mm + 19/2.48mm) were used in river crossing towers. River crossing span stringing, testing and commissioning were done successfully.

Construction of well foundations underwent the following stages:

- Laying the Well Curb & Cutting Edge.
- Alignment Control.
- Construction of Well Curb.
- Well Steining.
- Well Sinking, Bottom plug Well Cap, Fender, Wall formation, Island of 22 metre, Chauffer dam.

Foundation Type	Circular Type Wells (Deep well, Caisson)
Diameter of the Well	14 metre.
Depth of the Well	65 m.(Average)
Loc No of Well foundation	AP41/1 & AP41/2
Size of well Cap	14x6m
No of Well	2
Size of well Cap	14 X6m
Total Qty of Concreate	25000Cum
Total Qty of Reinforcement	2600 MT
Flood Discharge	90,400cum /sec.
L.W.L.	29.55 M
H.F.L.	36.87M
L.B.L.	21.22 M
Maximum Bed scour	RL (-) 6 m
Size of pile Cap	4.5x4.51.2
Cost of Well & pile foundation work.	Approx. 70 Crore.
Average Rainfall	2160mm
Grade of the Concreate	M-35 grade concreate.
Practice adopted	IS 456-2000 & IRC21/6-2000
Construction Starting year for Well Foundation.	January 2012
Line Commissioning year	2015
Starting Time	2012

Case Study

- Technical details of well foundation
- Pile foundations on Brahmaputra river

One pile foundation constructed on the bank of Brahmaputra with the 1500mm diameter R.C.C. vertical bored pile with approximate depth of



Photo 1: GPS view of well foundation on river Brahmaputra during construction phase...



Photo 2: GPS view of well foundation on river Brahmaputra during construction phase...



Photo 3: GPS view of well foundation on river Brahmaputra during construction phase...

50 meter with Pile cap, Erection of tower and stringing and commissioning.

1500 mm dia.pile	36 Nos
Size of pile Cap	4.5x4.51.2
Process	DMC

Pile foundation in Champabati River Crossing with the 1200 mm diameter R.C.C. vertical bored pile with 50 metre depth pile cap.

1200 mm dia pile	16 Nos
Size of pile Cap	4.5x4.51.2

- NETC Tower in Barak River Crossing in Assam, which also has a large catchment area prone to flood and erosion with crossing span of 712 metre. The height of the tower is 122 metre & weight is 210 MT.
- NETC Tower in Lukha River crossing: Lukha River is located in the southern part of East Jaintia Hills, Meghalaya. Its main tributaries originate from the catchments of Saipung Reserve Forest. Along its route, it also receives water from Lunar River (Wah



The piling work at the time of construction...



The steel structure at the time of construction...

Lunar) and small streams draining from the Narpuh Reserve Forest and the undulating hills.

All the river crossing towers are constructed with all the safety precautions. All the towers are being monitored by NETC periodically from construction time and NETCL average availability is 99.95 %.

Operational challenges faced due to change of river course by Brahmaputra

Adoption of pile foundations for towers under threat due to Brahmaputra River changing its course in O&M phase: In operation stage, due to heavy rainfall & flood in Assam, one of the anchor tower location (1026) on the right bank of the river was 137 metres away from the river bank edge during construction in 2010.

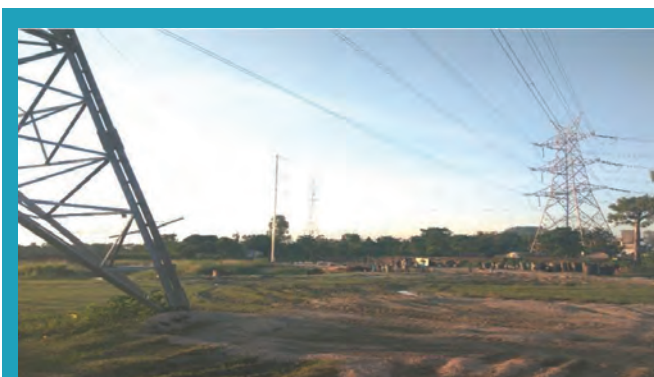


Shifting of the tower location to a safer point...

Subsequently, because of continuous erosion of the bank, the distance reduced to 10 metres in the year 2016, which was 137 metres during 2010. During the year 2016, this Anchor Tower location also got submerged by Brahmaputra river water. Considering the fact that any

further shifting of bank line or formation of any whirlpool in this area may cause a problem to the stability of the Anchor Tower foundation, this location was shifted to a safer location with pile foundation as per details indicated in the previous Table. Prior to shifting, to protect this location from the continuous river bank erosion, Bamboo Palisading work, Bank protection had to be provided at the river bank face as a temporary protection measure.

For smooth and accident-free work of pile foundation, one of the circuits, which was directly above the new pile foundation under construction had to be shifted by using an Emergency Restoration System (ERS) tower. Subsequently, on completion of the pile foundation the entire work of tower erection and final stringing was carried out by keeping one of the circuits continuously charged as per requirement – so as to keep the power flow through this line intact. All tower foundations have been designed with adequate factor of safety.



Stringing was carried out by keeping one of the circuits continuously charged...

In addition to regular on-line update on weather condition, rain, physical patrolling of the river crossing tower continued. The patrolling through water boat and regular defect rectification were carried out by the O&M team.

Asset monitoring of River Crossing Towers

In addition to regular patrolling & defect rectification of river crossing towers, NETC has been monitoring the line through advanced Condition-based Maintenance Technique. In future NETC is exploring the idea of Installation of TLA in river crossing spans or vulnerable locations. It is one of the best options to avoid the tripping due to lightning in river crossing span. NETC is also exploring the idea for use of drones for patrolling, Artificial Intelligence (AI) & Machine Learning (ML), advance sensors technology in near future.

Type of Pile	R.C. Bored
Method of Piling	Hydraulic Rig
Concrete Grade	M25
Total Nos. of Pile	24 nos.
Nos. of Pile on Each Leg	6 nos.
Liner Depths of a Pile from test level (m)	10.00 m
Pile Diameter	1200 mm
Pile depths from test level	49.90 m
Pile Cap	7.5 m x 4.5 m x 1.2 m
Chimney	Dia. = 1 m, Vertical Height = 2.52 m

Case Study



Patrolling through water boat...



View showing –Sinking is in progress



View showing Shuttering work for Cantilever beam portion...



View showing – Reinforcement work of well cap 2nd stage is in progress...

Conclusion

Power transmission lines constitute essential infrastructures of the the society and these are very vital elements of the power system. The transmission lines pass through varying environment. It is concluded that NETC has successfully constructed the 2 Well & 2 pile



foundations (towers) on Brahmaputra River Crossing spans ,after facing myriads of the challenges. The Brahmaputra River is the largest river in the Indian sub-continent with very high velocity and 10th largest in the world in terms of discharge and known for its character of shifting its course. Various operational challenges are also faced by NETC due to change of river course. Mitigation measures are taken thereon, for example: shifting of raft foundation to pile foundation on tower Loc.1026 on Brahmaputra river. EI



Harshal Radheshaym Malewar is a graduate in Electrical Engineering from the Govt. College of Engineering Chandrapur, Maharashtra. He also possesses an MBA degree in Power & Operation Management. He has diversified experience of more than 14 years in the Power Transmission & Distribution with various power sectors' companies – such as RECTPCL, MSETCL, Sunflag Steel & Power, Jyoti Structures Ltd. and North East Transmission Company Ltd.

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Photographs (in clockwise order from top right)



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THE "WAR OF THE BATTERY" FOR FUTURE EVs

Part - 2

In the "War of The Batteries", many technology would fall and many underdogs would rise in coming times before few winners take their righteous place. Here is a description of the development of the batteries and the present day status with the future potential...

Battery Options for EVs

Despite the fact, the EVs had early comers advantage over ICEVs & ruled the mobility world before the rise of ICEVs, yet the rechargeable batteries back then were not efficient, difficult to handle, and were not economical. The rise of Henry Ford's mass-produced affordable & reliable ICEVs pulled the plugs for the EVs, which by the 1950s slowly died their natural death. With EVs gone, went the associated battery development for EVs. Fortunately, the quest for stored portable energy never died and with the rise of the semiconductor & electronics industry in 1970, the need for long-serving, low cost safe & high performance batteries was more seriously

Energy Storage

operate well after 100,000 miles (160,000 km) and over a decade of service as well GM using them in its second generation EV-1, NiMH did not become a popular choice of EV makers due to poor efficiency, high self-discharge, very tricky charge cycles, and poor performance in cold weather. As per news Toyota is also now planning to shelve this technology.

Advantages

- Has Higher Energy Densities
- Profitable For Recycling
- Simple Storage And Transportation
- Environmental Friendly-Contains Only Mild Toxins

Disadvantages

- Limited Service Life
- Limited Discharge Current & High Self-Discharge
- Generates Heat During Charge
- Requires Regular Full Discharge To Prevent Crystalline Formation.
- Prone To Memory Loss
- Performance Degrades At Higher Temperatures
- Trickle Charge Is Critical & Needed Careful Control

Sodium (Na) Nickel Chloride Battery (ZEBRA Battery)

IN 1985, this battery was developed by Zeolite Battery Research Africa, hence the name ZEBRA which was later expanded differently as Zero Emission Battery Research Activities. It contained electrolyte of molten Sodium tetrachloro-aluminate (NaAlCl_4) salt and has with a specific energy between 90-120 Wh/kg. Pre heating of Sodium salt is must. These cells are proved to be highly reliable with cell failures virtually to be non-existent. Though they have been used in few EVs produced by now closed MODEC Inc. (Mitsui Ocean Development & Engineering Company Inc.) from UK yet due to many

inherent factors they could not become a favoured choice of EV makers & the development refocused almost exclusively on the higher voltage variants.

Advantages

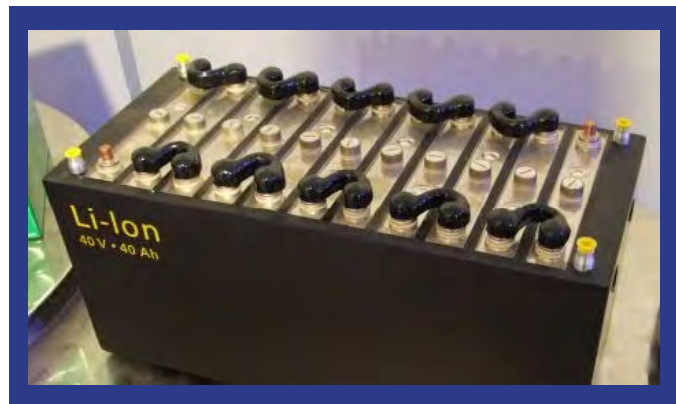
- High Energy Density $>110\text{Wh/Kg}$
- Capacity & Performance Are Independent Of Discharge Rate & Temperature
- No Self Discharge
- Cells Do Not Short Circuit
- High Energy Density (>5 Times Than LAB)
- Single Cell Failure Does Not Cause Complete Battery Failure
- Maintenance Free, Fully Sealed, No Gassing
- Long Storage & Operational Life
- >2000 Cycle Life At 100% Capacity

Disadvantages

- High Cost
- Preheating To 270°C Needed To Get Battery Functional
- Large Capacity Batteries Only ($>20\text{KWh}$)
- High Internal Resistance
- High Operating Temperature
- Uses 14% Of Its Own Capacity To Maintain Temperature Even When Not In Use
- Needs Thermal Management System
- Only One Manufacturer In The World

Lithium-Ion Battery (LIB)

Lithium is the lightest of all metals and has the greatest electrochemical potential to provide the largest energy density for weight but Lithium metal also has inherent instability during charging when used in the battery. In early 1970, M. Stanley Whittingham discovered the process to control this charging instability. However, he could not make this rechargeable lithium battery a practical one. During 1974~76, a process of reversible intercalation in graphite and intercalation into cathodic





oxides was discovered by J. O. Besenhard who proposed its application in lithium cells. The research work continued on these cells and in 1991 when a Japanese team at Sony, led by Yoshio Nishi who successfully released the first commercialized lithium-ion battery. The development of LIB technology was considered to be so revolutionary that in 2019, the Nobel Prize in Chemistry was awarded to John Goodenough, Stanley Whittingham, and Akira Yoshino “for the same. Though these batteries are called LIBs, in real terms they do not have any Lithium as metal but as intercalated lithium compound. These LIBs are extensively used in modern EVs, however battery technology analyst Mark Ellis of Munro & Associates sees three distinct LIB form factors & their combination that would be used in future EVs: a) cylindrical cells (e.g., Tesla), b) prismatic pouch (e.g., from LG), and c) prismatic can cells (e.g., from LG, Samsung, Panasonic, and others).

Advantages

- High Energy Density
- Does Not Need Prolonged Priming When New
- Relatively Low Self-Discharge
- Low Maintenance
- Can Provide Very High Current To Needed During Quick Acceleration
- No Memory
- Higher Cell Voltage (3.6V)

Disadvantages

- Subject To Aging, Even If Not In Use
- Requires Protection To Maintain Voltage And Current
- Expensive To Manufacture
- Transportation Restrictions
- Not Fully Mature - Metals And Chemicals Are Continually Changing
- Need Storage In A Cool Place

Lithium Polymer Battery (LPB)

The lithium-polymer battery the electrolyte is made of a polymer resembling a plastic-like film that does not conduct electricity but allows ions to flow freely. The polymer resembling film offers simple fabrication



with ruggedness & safety as well as a thin-profile geometry. With a cell thickness measuring as little as one millimeter (0.04 inches), equipment designers are left with their imagination in terms of form, shape, and size. Unfortunately, the dry lithium-polymer suffers from poor conductivity & the internal resistance is too high which cannot deliver the current bursts needed to power modern EVs. Lithium-ion-polymer has not caught on as quickly as some analysts had expected. Its superiority to other systems and low manufacturing costs has not been realized. No improvements in capacity gains are achieved the capacity is slightly less than that of the

Energy Storage

standard lithium-ion battery. Lithium-ion-polymer finds its application only in a niche market requiring waferthin geometries, such as batteries for credit cards and other such applications. Some car manufacturers e.g. Hyundai Motor Company & Kia Motors also used this type of battery in their BEVs & HEVs.

Advantages

- Very Thin Profile Possible
- Flexible Form Factor
- Lightweight
- Excellent Storage Stability
- High Energy Densities
- Hermetically Sealed-No Gassing Or Leakage
- Wide Operating Temperature Range
- Shock And Vibration-Resistant

Disadvantages

- Lower Energy Density
- Expensive To Manufacture
- Higher Cost-To-Energy Ratio
- The Capacity Decreases Gradually On Cycling
- Low Current Drains
- Power Output Reduced At Low Temperatures
- Care Must Be Exercised To Prevent Short

Solid State Battery (SSB)

A SSB is a rechargeable battery that uses solid electrodes (made of materials like ceramics e.g. oxides, sulfides, phosphates) and solid electrolytes (made of solid polymers) instead of using liquid or polymer gel electrolytes that are found in LIB or LPB. Despite that the solid electrolytes were first discovered by Michael Faraday between 1831 and 1834, it had several shortcomings e.g. low energy densities, low cell voltages, and high internal resistance, which allowed their use for limited application like pacemakers, RFID, and wearable devices. Improvement of the technology in the late 20th and early 21st century brought back interest in SSB battery technologies, especially when EVs are becoming the new normal.



With more than 1,000 patents, Toyota stands at the top of the global chart when it comes to SSB technology development and is already working to introduce an EV driven by these SSB by this year end to cover 500 km range on a single charge with fast charging capability of zero to full in 10 minutes, all with minimal safety concerns. Ford and BMW have also announced to invest \$130 million in SSB driven EVs. While Nissan too has plans to develop its own SSB by 2028.

Advantages

- Much Safer
- Much Faster Charging Speed
- High Charging Cycles
- Much Higher Energy Density
- No Dangerous Or Toxic Substance

Disadvantages

- High Cost
- Need To Be Proven In Real World Conditions
- Mass Production Processes Are Not Yet Established
- Durability Need To Be Established
- Requirement Of Higher Rating Charging Infrastructure
- Temperature And Pressure Sensitivity
- Decay Due To Growth Of Dendrites

...To be continued 📺



Prabhat Khare possesses a BE (Electrical) degree from IIT Roorkee (Gold Medalist). Now, he is the Director of KK Consultants. He is also a BEE Certified Energy Manager and a Lead Assessor for ISO 9K, 14K, 45K & 50K.

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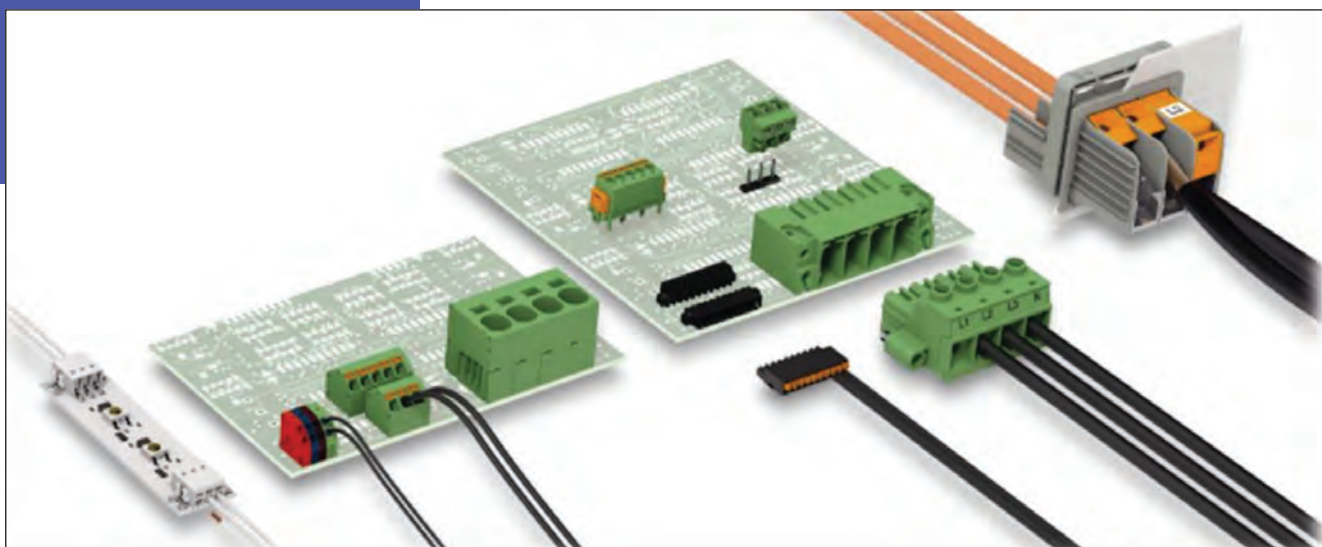
*Social Media keeps Changing, but
Networking is Constant*



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contact us: pravita@charypublications.in

Innovative Ways to Improve Connectivity

Phoenix Contact provides safe and reliable solutions for the efficient automation of all processes surrounding the production site. Pipelines and storage systems are the backbone of the oil and gas industry. For this reason, they require integrated communication systems with a large number of connection options. Phoenix Contact offers a wide range of connectors and enclosures for secure & reliable device connectivity...



Phoenix Contact brings you a complete comprehensive range of innovative PCB connectors to cope up with each and every application related to data, signal and power connection solution within and outside the device. One can find various connection solutions such as panel feed-through, PCB Terminals, Pluggable Terminals, ranges from 2.5 mm to 20 mm pitch with ratings up-to 232A, 1000V with a variety of connection technologies like screw, spring-cage, crimp, insulation displacement, piercecon. There is also a choice in mounting technologies like SMD, THR, wave-soldering, Press-in and SKEDD direct connection technology.

COMBICON Control

This range provides connection methods for areas of Measuring, Controlling and regulation technology. 2.5mm to 7.62mm pitch & cross-section ranges from 0.5 mm² to 2.5 mm² with ratings up to 24A/630V. Multi-level terminal blocks are available to increase the contact density on the PCB. Direct connector with SKEDD technology is also available.

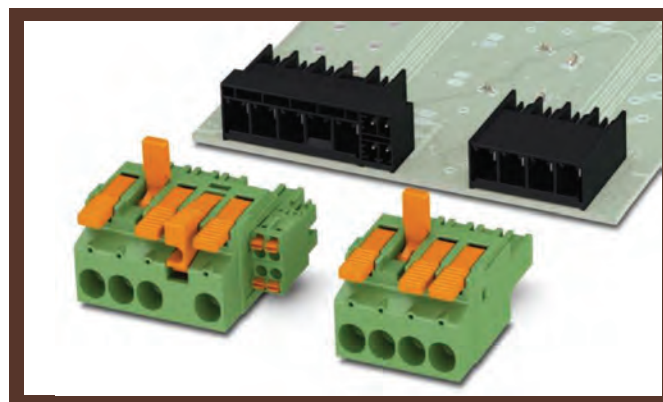
COMBICON Compact

The range provides solutions for all types of applications

in building automation, analytical instruments and telecommunication where space saving is critical. This product line offers pitches ranges from 2.5mm to 7.5mm, with ratings up to 32A/800V and cross-section ranges from 0.5 mm² to 4 mm².

COMBICON Power

This stands for absolute variety for your high current PCB connection. In this range, high-performance PCB terminal blocks and connectors suitable for power electronics with pitches ranges from 5mm to 20mm and ratings up to 232A/1000V and cross-section ranges from 0.2 mm² to 95 mm² in versions for wire-to-board



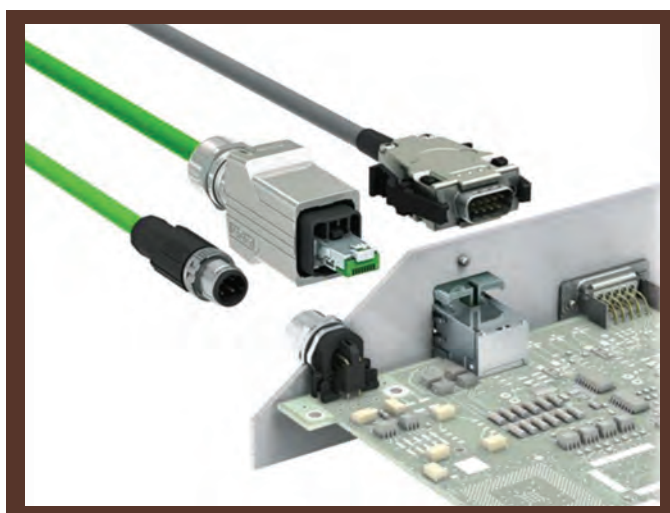
or board-to-board connections, panel feed-through or shielded connections - everything is possible.

The portfolio includes terminal blocks with a cross-section range up to 150 mm² with 309 A/ 1000 V according to IEC and 600 V according to UL

PLUSCON - Field Device Connectors

Complex automation processes call for high volumes of data at ever-increasing transmission speeds. Benefit now from high-performance connectors and cables for on-site assembly. Whether it is future-proof high speed copper cabling up to 10 Gbps, Fiber Optics cabling up to 40 Gbps or innovative hybrid cabling – FDC product range will find the perfect solution for your automation network.

FDC product range offers connection technologies that enable the flexible, modular and efficient implementation of various concepts for all your industrial connections, whether it is Signal, Data & Power, where the application



demands connections to be water & dust proof. It covers up to 65 pin signal connector, up to 150 Amps power connector & the data connectors for copper cabling and fiber optics cabling for networks and fieldbuses like Ethernet, PROFINET, INTERBUS, PROFIBUS, DeviceNet, CANopen etc.

Copper-based data cabling for networks and fieldbuses

Complex automation processes call for high volumes of data at ever increasing transmission speeds. Benefit now from high-performance connectors and cables for on-site assembly. Whether it's future-proof high-speed cabling up to 10 Gbps or innovative, efficient hybrid cabling we will find the perfect solution for your automation network.



Fiber-based data cabling for networks and fieldbuses

High transmission speed, low attenuation, resistance to electromagnetic interference: fiber optic cables are among the modern transmission media for industrial systems and infrastructure applications. Whatever the fiber type or interface – you can choose the right connection technology from our extensive portfolio.

Modular Distribution patch panel in Copper & Fiber(LIU)

The new splice boxes from Phoenix Contact ensure continuously reliable data transmission in real-time. With their compact and uniform design, the splice boxes provide ample interior space for the secure connection of fiber optics.

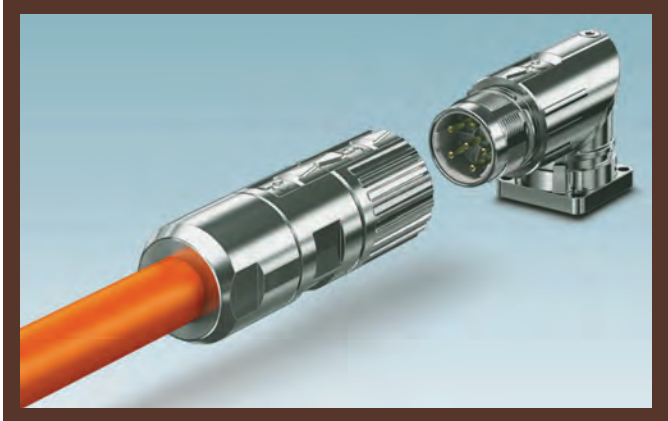


The new “FDX 20 series” (Fiber Distribution Box IP20) splice boxes are characterized by a compact design, flexible mounting on the DIN rail, and an attractive price level. High quality components guarantee optimum use in a wide range of application areas. The design is based on the ICE design blocks, in order to focus more strongly on corporate identity at Phoenix Contact.

Solutions (Special Feature)

Cross-manufacturer compatible circular connectors

Phoenix Contact is launching a new series of circular connectors with a standard system and a fast locking system onto the market. The M17 to M40 PRO series offers uniform solutions for signal and power transmission.



The Oneclick fast locking system enables users to connect their devices quickly and safely.

Enclosure solution

Wide option of enclosures to house your electronics and give it an innovative aesthetic.

ME-PLC multifunctional housings

ME-PLC offers solution for large range of applications which demands plenty of space for electronic components and front-sided PCB connections. Optional DIN rail connector for efficient modular communication makes the whole system flexible and ideal to design complex controllers.



The housing base can be combined with various covers or the upper parts consist of connection technology carriers consist of pre-mounted plug-in connectors FKCN 2,5... series available in up to 36 poles or a connection technology with RJ45 plugin connector series. A universal cover is also available for customer specific connection technology. There is also a generous display area available which facilitates customer to provide an individual marking and processing.



The housings can be snapped onto an NS 105/20 DIN rail. They can be combined with a DIN rail connector to allow cross connection from device to device for reliable data and current transmission without the need of additional wiring. They are available with the number of positions 50/40 and 10/10, i.e. 50-pos. in the DIN rail / 40-pos. into the device or otherwise 10-pos. in the DIN rail / 10-pos. into the device. It is having built-in mechanical coding system which prevents mismatching during installation of device units.

ME-IO

The new ME-IO housing system from Phoenix Contact enables customized electronic assemblies like controllers and I/O modules. It offers an integrated Push-in Spring front connection technology for fast and easy conductor connection allows them to connect directly without any extra tools, saving your time during installation.

To ensure quick, secure communication, the connection technology is equipped with coding profile that prevents mismatching in the device. The modular system is designed for the applications with compact installation space that offers widths of 18.8 mm, 37.6mm and 75.2mm. It can accommodate up to 54 connection terminals per electronic module. The L-type cover is available for optimum integration of data connectors such as RJ45 and D-SUB and also flexible PCB installation, both vertically and horizontally to the DIN rail is possible. Swiveling marking cover permits additional marking. The lock-and-release system makes locking and releasing of the plug easy from the housing system.

ME-IO housings can be snapped on to the NS 35/7.5 DIN rails with the TBUS connectors to provide a bus system for the flow of signals and data and thus reduce wiring.

For further details, please contact:

E-mail- adverts@phoenixcontact.co.in

SSS-NIBE, IBA to Deliver Training on Biogas Technology

Biogas generation from agriculture waste is emerging as a potential area not only for biogas generation but also as climate change concerns in view of recent environmental risk due to burning of paddy straw in the farms of Haryana and Punjab states. Thus, a virtual training programme has been organised to deliver exposure on the latest technological advancement in context of biogas production, enrichment and bottling...

The Ministry of New and Renewable Energy (MNRE) has been supporting programmes for promoting biogas as a clean fuel for domestic cooking, off-grid and grid power generation and bio-CNG for transport applications.

Owing to this backdrop, there is a strong need to take up research and development initiatives for technology development and demonstration to integrate biogas technology for biogas generation and up-gradation for heat and power applications and bio-fertilizer for sustainable energy and agriculture development.

Sardar Swaran Singh National Institute of Bio-Energy is an autonomous Institution of the Ministry of New and Renewable Energy, Govt. of India. The vision of the Institute is to carry out state-of-the-art research and development, demonstration, testing and standardization activities, including human resource development at all levels, post-doctoral research and research for wide promotion of bioenergy in the country.

The Indian Biogas Association (IBA) is the first nationwide and professional biogas association for operators, manufacturers and planners of biogas plants, and representatives from public policy, science and research in India.

Under the aegis of 'Azadi Ka Amrit Mahotsav', now these two organisations together are all set to offer a virtual training programme titled, Biogas Technology and its Implementation (Biogas Generation, Enrichment, Design, Operation & Maintenance, and Policy & Financing).

Aim of the programme

The aim of this programme is to impart training to SNDs/ SNAs/ BDTCs/ KVIC, Manufacturers of Biogas Plants, Purification Systems, Engines, Gas Flow Meters, Project Developers, Implementers, Consultants, Start-ups, Faculty, Researchers, and Students to various aspects of biogas technology like

biogas generation, enrichment, design, operation & maintenance, and policy & financing to familiarize them with the importance of biogas as a fuel and present status of biogas programme, inter-alia details about how biogas is upgraded. The programme is also intended for field supervisory functionaries involved in the implementation of biogas programmes.

How to apply

The interested candidates may fill the form online. URL: <https://biogas-india.com/nibe-biogas-training>

Last date for submission of application forms: Nov 20, 2021.

Training date: Nov 25-26, 2021.

Fees structure		
Themes*	Fees (INR)	
Students/ Research Fellows	Government organizations/ Start ups/ Researchers/ Academia/ Industry Sponsored/ Stakeholders/ Consultants	
1+2+3+4	2000	4000
Any two	1000	2000
Any One	750	1500
+ 18% GST extra		
* Registration to any of the theme individually or in combination may be made.		

For further information

Sardar Swaran Singh National Institute of Bio-Energy
E-mail: sachin.kumar20@gov.in; biogas.nibe@gmail.com
Website: <http://nibe.res.in/event.php>

Phone No. 01822-507415/416; 09988864647/7009127569 (M)

Or

Indian Biogas Association

Phone No: 0124-4988622

Website: <https://biogas-india.com/nibe-biogas-training> ⓘ

BECOMING NET ENERGY NEUTRAL

BLR Airport began the Financial Year 2021-22 on a good note, meeting 98% of its energy requirement of 20-21 through renewable sources...



As part of its sustainability goals, Bangalore International Airport Limited (BIAL) had set the target to become Net Energy Neutral by 2020-21. Kempegowda International Airport, Bengaluru (BLR Airport) has achieved that target.

As an outcome of energy conservation, BIAL has been able to save nearly 22 lakh units of energy in the FY 2020-21, enough to power nearly 9,000 houses for a month. BIAL saved nearly 5 lakh units (kWH) from lighting, and has implemented chiller plant optimisation in Heating, Ventilation, and Air Conditioning (HVAC), which has resulted in saving of over 17 lakh units (kWH).

Commenting on the achievement, Hari Marar, MD & CEO, BIAL, said, "As we expand our operations

at BLR Airport, we aim to remain the flagbearer of sustainable operations. We have put in place various measures to reduce carbon footprint and protect our environment. Energy security is a very important aspect of our business as it is one of the key indicators to assess our sustainability levels."

BIAL's Energy Management initiative is focused on achieving carbon neutrality through use of renewable, green and clean energy. BLR Airport has achieved energy neutral status since December 2020 through its onsite solar installations as well as Power Purchase Agreements (PPA) from solar and wind energy suppliers.

BIAL has multiple measures in place to make BLR Airport environmentally efficient, with sustainability being



BLR Airport also makes optimal use of natural light with minimum reliance on artificial illumination during day time. BIAL's other energy efficient initiatives include installation of solar street lighting; solar-powered security cabins; solar water heating system for the cafeterias.

Adoption of LED

The streetlights, perimeter lighting and airfield lights at BLR Airport have been converted to LED lighting. All this has further reduced the dependency on non-renewable energy.

100% of existing 400 High Pressure Sodium Vapour Lamps (HPSV) on the Aircraft parking stands have been converted into energy-efficient LEDs to provide enhanced safety for pilots, greater visibility for ground staff and reduce energy consumption.

Along with this, the newly commissioned South Runway Airfield Ground Lighting is powered with LED lights, making it the first airfield in India to be fully powered with LED lighting system. The recently refurbished North Runway is also powered with LED Airfield Ground Lighting. The solar installations, deployed across 53,600 sq. m. on the Airside, will help BLR Airport save 37.5 lakh units of electricity annually, reducing its dependency on non-renewable sources of energy. This will also result in an overall reduction in carbon emissions. 

Strategic Measures at a Glance

- Solar installation at BLR Airport and PPA with third parties to supply renewable energy
- Solar installation at rooftops of utility buildings – 503 kW
- Solar installation at car park – 440 kW
- Ground-mounted solar installation at Airside – 2,500 kW
- Solar installation at rooftops of Cargo buildings, E&M office, Project offices – 3,350 kW
- Solar power purchase through open access – 40 Million units/ annum
- Wind power purchase through open access – 20 Million units/ annum

the key pillar for all its operations to ensure integrity of economic viability, operational excellence and conservation of natural resources.

In an effort to become energy neutral, BLR Airport has increased the consumption from solar power to over 50 million units through on-site and off-site Power Purchase Agreements (PPA). In addition, BIAL has entered into PPA agreement for purchase of additional 20 Million units of Wind Power through Open Access from January 2020.

DEMAND RESPONSE PROGRAM WITH DIFFERENT ELASTICITIES PART - 2

This article presents an overview of new flexible resources for operating a reliable system. It starts with defining the Demand Response (DR) and how electricity consumers can be responsive...

Simulation results

The simulation was done for the IEEE 30 bus system. The system data is presented Table 1.

The load variation was represented by a Load Scaling Factor (LSF) which is shown in table 2 for 24 hours load curve.

Base case simulation results are shown in figure 5.

The price of the base case and the LSF are represented as equilibrium points during each interval. The figure 5 shows clearly that electricity prices are sensitive to increase in demand. By removing line 3 – 4 from network data a contingency was introduced in the system. The

Table 1 Generator Data of 30-Bus System

Generators	#1	#2	#5	#8	#11	#13
$P_{Gi \max}$ (p.u.)	2.00	0.80	0.50	0.35	0.30	0.40
$P_{Gi \min}$ (p.u.)	0.50	0.20	0.15	0.10	0.10	0.12
$Q_{Gi \max}$ (p.u.)	2.50	1.00	0.80	0.60	0.50	0.60
$Q_{Gi \min}$ (p.u.)	-0.20	-0.20	-0.15	-0.15	-0.10	-0.15
Quadratic cost function						
ai	0.00375	0.0175	0.0625	0.0083	0.0250	0.0250
bi	2.00000	1.7500	1.0000	3.2500	3.0000	3.0000
ci	0.00000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 2 Daily Load Curve for IEEE 30-Bus System

Time (hr)	LSF	Time (hr)	LSF	Time (hr)	LSF
1	0.90	9	1.30	17	1.50
2	0.96	10	1.15	18	1.55
3	1.00	11	1.10	19	1.40
4	1.05	12	1.05	20	1.20
5	1.10	13	1.16	21	1.12
6	1.15	14	1.30	22	1.03
7	1.30	15	1.40	23	0.96
8	1.40	16	1.45	24	0.90

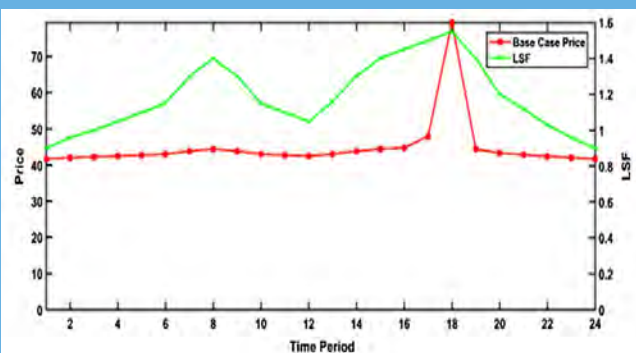


Fig. 5 Base case...

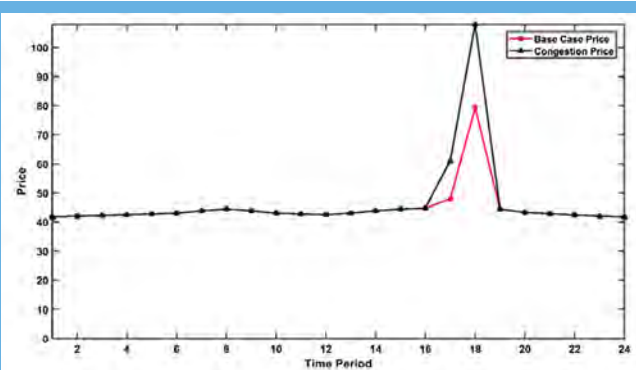


Fig. 6 Contingency case...

figure 6 shows the base case price and contingency case price. The contingency causes a large increase in market price during peak period of hour 16 to 18 which is clearly

Table 3 Demand for Base, Contingency, Fixed Elasticity and Various Elasticity cases

Hour	Demand for Base Case	Demand for Contingency Case	Demand for Fixed Elasticity Case	Demand for Various Elasticity Case
1	255.06	255.06	255.05	255.04
2	272.06	272.06	272.07	272.09
3	283.40	283.40	283.41	283.43
4	297.57	297.57	297.58	297.59
5	311.74	311.74	311.74	311.75
6	325.91	325.91	325.91	325.91
7	368.42	368.42	368.40	368.40
8	396.76	396.76	396.73	396.73
9	368.42	368.42	368.40	368.40
10	325.91	325.91	325.91	325.91
11	311.74	311.74	311.74	311.75
12	297.57	297.57	297.58	297.59
13	328.74	328.74	328.74	328.74
14	368.42	368.42	368.40	368.40
15	396.76	396.76	396.73	396.73
16	410.93	410.93	410.89	410.88
17	425.10	425.10	413.36	408.67
18	439.27	439.27	423.44	417.11
19	396.76	396.76	396.73	396.73
20	340.08	340.08	340.07	340.06
21	317.41	317.41	317.41	317.41
22	291.90	291.90	291.91	291.92
23	272.06	272.06	272.07	272.09
24	255.06	255.06	255.05	255.04

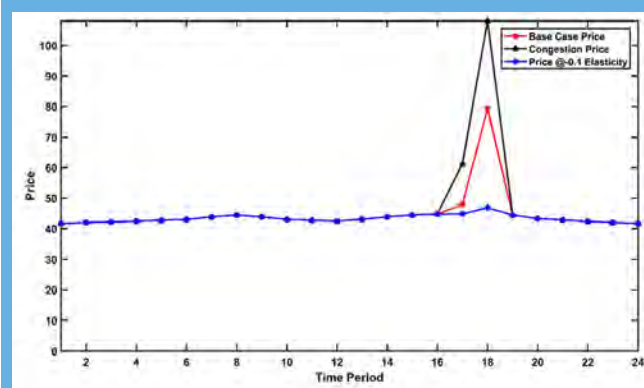


Fig. 7 Fixed elasticity case...

shown in figure 6. These high prices will be announced 24 h ahead. Note that we assume that the operator is aware that such a contingency will happen the next day and will last for the whole day.

Now we introduce a self elasticity value of -0.1 for all loads. That means a 100% change in price will reduce

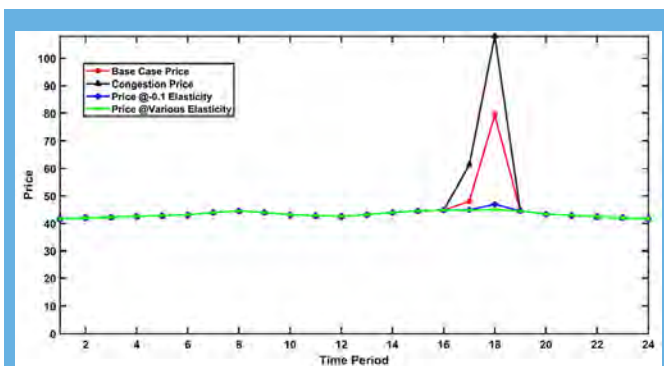


Fig. 8 Different elasticity case...

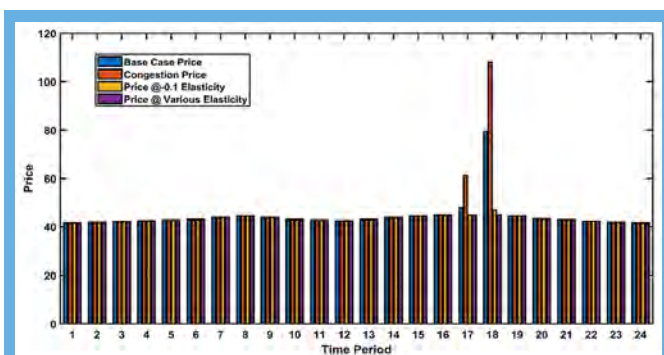


Fig. 9 Comparison of prices...

the load by 10%. Consider all customers are SR type. By using the formula of elasticity new demand values are calculated. That new demand values for each hour is shown in table 3.

Figure 9 and table 5 clearly shows that prices of elasticity case were below than base and contingency case prices.

Moreover, due to the assumption that customers react in response to the day-ahead published prices, the expected high prices of the peak periods were actually reduced even below the base case prices. However, this will not happen in practice because elasticity is not constant, and it has a lower value during peak periods.

Conclusion

The normal patterns for electricity consumption of customer is changed by demand response. The price of electricity is changed over time. The payment of incentive for the lower use of electricity at high market price time and when system reliability is in danger reduces power consumption in peak periods. All electricity consumers are profited because of Demand Response program. Demand Response program improves system reliability and reduces electricity price and price volatility. Demand Response program's execution is evaluated by reduction

Table 4 Price for Base, Contingency, Fixed Elasticity and Various Elasticity cases

Hour	Price for Base Case	Price for Contingency Case	Price for Fixed Elasticity Case	Price for Various Elasticity Case
1	41.70	41.70	41.70	41.70
2	42.03	42.02	42.03	42.03
3	42.23	42.22	42.23	42.23
4	42.49	42.48	42.49	42.49
5	42.76	42.75	42.76	42.76
6	43.03	43.03	43.03	43.03
7	43.86	43.88	43.86	43.86
8	44.46	44.49	44.46	44.46
9	43.86	43.88	43.86	43.86
10	43.03	43.03	43.03	43.03
11	42.76	42.75	42.76	42.76
12	42.49	42.48	42.49	42.49
13	43.08	43.08	43.08	43.08
14	43.86	43.88	43.86	43.86
15	44.46	44.49	44.46	44.46
16	44.77	44.81	44.77	44.77
17	47.97	61.22	44.83	44.72
18	79.39	108.00	46.91	44.91
19	44.46	44.49	44.46	44.46
20	43.30	43.31	43.30	43.30
21	42.86	42.86	42.86	42.86
22	42.39	42.38	42.39	42.39
23	42.03	42.02	42.03	42.03
24	41.70	41.70	41.70	41.70

of peak load and demand elasticity. The above case study simulating the effect of demand elasticity in electricity prices demonstrates the effect of Demand Response program in cases of system contingency.

...concluded 



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C. K. Babulal is Thiagarajar College of Engineering, Madurai, Tamil Nadu, India

ALL INDIA INSTALLED CAPACITY (IN MW) OF POWER STATIONS
(As on 30.09.2021)

Region	Ownership/ Sector	Mode wise breakup								Grand Total
		Thermal					Nuclear	Hydro	RES * NRE)	
		Coal	Lignite	Gas	Diesel	Total				
Northern Region	State	16659.00	250.00	2879.20	0.00	19788.20	0.00	5888.25	725.51	26401.96
	Private	22425.83	1080.00	558.00	0.00	24063.83	0.00	3061.00	20852.23	47977.06
	Central	15662.48	250.00	2344.06	0.00	18256.54	1620.00	11484.52	379.00	31740.06
	Sub Total	54747.31	1580.00	5781.26	0.00	62108.57	1620.00	20433.77	21956.74	106119.08
Western Region	State	21290.00	900.00	2849.82	0.00	25039.82	0.00	5446.50	569.28	31055.60
	Private	32847.17	500.00	4676.00	0.00	38023.17	0.00	481.00	30613.15	69117.32
	Central	20479.10	0.00	3280.67	0.00	23759.77	1840.00	1635.00	666.30	27901.07
	Sub Total	74616.27	1400.00	10806.49	0.00	86822.76	1840.00	7562.50	31848.73	128073.99
Southern Region	State	20322.50	0.00	791.98	159.96	21274.44	0.00	11819.83	594.88	33689.15
	Private	12747.00	250.00	5340.24	273.70	18610.95	0.00	0.00	44436.85	63047.80
	Central	11835.02	3390.00	359.58	0.00	15584.60	3320.00	0.00	541.90	19446.50
	Sub Total	44904.52	3640.00	6491.80	433.66	55469.99	3320.00	11819.83	45573.63	116183.45
Eastern Region	State	7450.00	0.00	100.00	0.00	7550.00	0.00	3537.92	275.11	11363.03
	Private	5553.00	0.00	0.00	0.00	5553.00	0.00	209.00	1406.73	7168.73
	Central	13953.38	0.00	0.00	0.00	13953.38	0.00	1005.20	10.00	14968.58
	Sub Total	26956.38	0.00	100.00	0.00	27056.38	0.00	4752.12	1691.84	33500.34
North Eastern Region	State	0.00	0.00	466.36	36.00	502.36	0.00	422.00	233.25	1157.60
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	160.65	160.65
	Central	770.02	0.00	1253.60	0.00	2023.62	0.00	1522.00	30.00	3575.62
	Sub Total	770.02	0.00	1719.96	36.00	2525.98	0.00	1944.00	423.90	4893.87
Islands	State	0.00	0.00	0.00	40.05	40.05	0.00	0.00	5.25	45.30
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.66	27.66
	Central	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.10	5.10
	Sub Total	0.00	0.00	0.00	40.05	40.05	0.00	0.00	38.01	78.06
ALL INDIA	State	65721.50	1150.00	7087.36	236.01	74194.86	0.00	27114.50	2403.27	103712.64
	Private	73573.00	1830.00	10574.24	273.70	86250.95	0.00	3751.00	97497.27	187499.22
	Central	62700.00	3640.00	7237.91	0.00	73577.91	6780.00	15646.72	1632.30	97636.93
	Total	201994.50	6620.00	24899.51	509.71	234023.72	6780.00	46512.22	101532.85	388848.78

Figures at decimal may not tally due to rounding off

Source: CEA



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5 YEARS	30	3000.00	4500.00	5500.00	3000.00	6000.00	7000.00
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3 YEARS	18	2000.00	2900.00	3500.00	2000.00	3900.00	4500.00
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They rotate by 7,000 degrees, travel at speeds of up to ten metres per second and move three-dimensionally like snakes: energy chains are made of high-performance plastics. Every two years, a panel of expert judges presents the vector award and up to 5,000 euros of prize money to the most fascinating projects and their developers.

Classical mechanical engineering is no longer the only place energy chains made of plastic are found. All over the world, they ensure that cables and hoses are guided safely – in space, at sea, and underground. In thousands of projects, energy supply systems and cables perform their tasks, overcoming great challenges – from strict particle-free requirements in cleanrooms, in the semiconductor industry to high chemical resistance in electroplating, to dirt resistance in mining to chips and sparks in woodworking. Then there is compact



installation space, high speeds, and even acrobatic torsional movements. The vector award honours precisely these unique applications of energy supply solutions and e-chain systems with cables. “The competition is a great opportunity for us as a manufacturer to use our products in the finished machines and systems and learn even more exciting stories about the applications,” said Michael Blass, e-chain systems CEO at igus GmbH and one of

the judges. “Fittingly, we are celebrating the plastic energy chain’s 50th anniversary with our customers.”

The winners will be selected by a panel of expert judges from the fields of science, industry, and specialist media and associations and will receive their awards at the 2022 Hannover Trade Show. Compete for the award now at: www.igus.eu/vector

For further information, Website: www.igus.de/presse

“Kusam-Meco” True RMS Digital Clampmeter Model Km 2719

KUSAM-MECO has introduced a new Clampmeter Model KM 2719 which is an upgraded version of their earlier Model KM-2718. The instrument is suitable for HVAC measurements. The new Clampmeter has 11 functions & 37 Ranges. It has 4000 counts display. The Measurement is True RMS measurement. It measures AC current upto 400 amperes (frequency response 50Hz -100Hz). It has AC Voltage range upto 600 Volts (Frequency response 10Hz - 10KHz) with a resolution 1mV. It has DC Voltage Range upto 600 Volts with resolution 0.1mV. The Resistance measuring range is 40 mega with a resolution 0.1 Ohm. The Capacitance range is upto 4.000 mF with a resolution of 0.001 nF. It also has Diode & Continuity test function.



It can measure Frequency upto 10MHz with resolution 0.01Hz. It also has Temperature measurement function with K-type Thermocouple having range upto 1000 degree C. The Thermocouple supplied along with the clampmeter is suitable upto 250 degree C. Additionally it has Non-Contact Voltage Detection function.

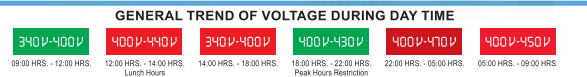
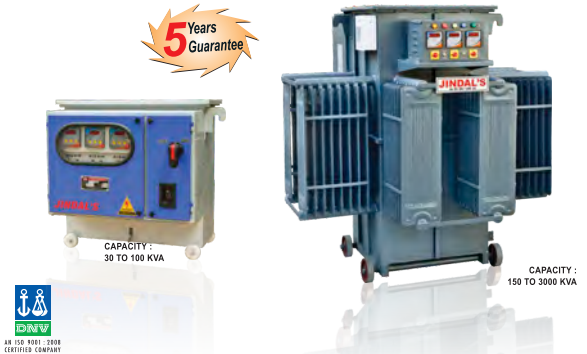
The Jaw opening is 28mm diameter. Over load input signal is displayed by “OL”. If there is no operation of any function switch or any button for 15 minutes the instrument will be automatically power off. It is light in weight (approximately 248g including batteries). The clampmeter is supplied with Test lead, Battery, User Manual, K-Type Temperature Probe range upto 250 degree C & Carrying case. Optionally, thermocouple upto 1000 degree C can be supplied.

For further information, Email: sales@kusam-meco.co.in, Website: www.kusamelectrical.com

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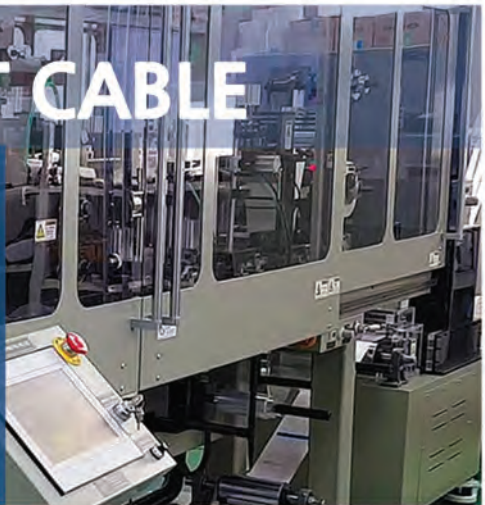
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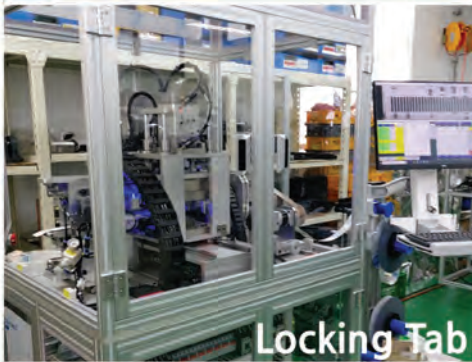


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