Volume I – 2019
April –June

AERC Consumer Grid

Message from the Chair

Our country is progressing well on its path of installing 40 per cent of renewable power generation capacity by 2030. The installed capacity of renewable energy has crossed 78 GW by June, 2019 which is 22 % of the overall generation capacity of 357 GW as in June, 2019. An extensive network of transmission lines has been developed over the years for evacuating power produced by different electricity generating stations and distributing the same to the consumers. Remarkable progress has been made in electricity distribution too over the years. India has made enormous progress in expanding household access to electricity and reducing power shortages over the last few years. In 2018, India achieved 100 per cent village electrification. Despite this growth, India still faces challenges to meet its growing demand for power and reliable supply still remains low in the country.

According to a World Bank Report, demand for electricity in India will almost triple between 2018 and 2040, with growing population, rapid urbanisation and an economy that is expected to grow at an average of 7 per cent per year. In the backdrop of an evolving power sector, the role of the Power Utilities and Regulators has attained greater significance. The Power Companies need to be more proactive and adaptive to the changes. The State Regulatory Commission has to play the role of a facilitator for development by making new Regulations which suit the changing power scenario and giving directions to the power sector in achieving the set targets. The consumers on the other hand can help the sector by keeping vigil on the developments and effectively participating in the regulatory functions requiring consumer / stakeholder involvement.

Consumer participation, however, requires an understanding of the electricity sector and this newsletter is an effort to help the reader develop a comprehensive understanding of the electricity sector over a period of time along with the latest developments that are taking place. Hope our readers are benefitted and we are able to achieve our objective of a reliable, efficient, consumer and environment friendly electricity sector in the State.

Subhash Ch. Das
Chairperson, AERC

Contents

PREFACE

Electricity has become a key input to economic growth and has emerged as the bedrock of modern life. Although electricity is one of the most versatile forms of energy, it is far from benign. Its production, transmission and use have impacts on the environment and livelihoods. Everyone should have access to reliable, good quality electricity supply that is affordable and supplied in the most cleanly and environment friendly manner as possible. Sustained engagement of consumers with the sector can work towards this goal and protect long term human and environmental interests. This is one of the main purposes for bringing out this e-newsletter. As already observed by the Hon'ble Chair, AERC in his message, this e-newsletter seeks to make sustained efforts to create better understanding of the sector by its readers. Besides, it will also strive to act as a mouthpiece for the Commission discussing the latest Regulations, and Orders of the Commission.

AERC had attempted to explain the basic concepts, tariff issues and the relevant trends of the power sector in the past through our newsletter titled "The Electricity Consumer Grid". The published issues of this newsletter are available in our official website. With a wide range of concepts to cover and the dynamic nature of the power sector in the State, it was felt that publication of a newsletter from the Commission should be a continuous effort.

Thus, the new version of the newsletter titled the "AERC Consumer Grid" is ready for our esteemed readers. In this first edition, we have incorporated latest power sector news, a write-up on power sector position at the end of FY 2018-19 and two basic concepts in the sector. We have also included an article on the significance of Big data analytics in the power sector. We hope that our readers will benefit. We would welcome comments and suggestions from our readers to improve this e-newsletter.

P. Sharma
Sr. Consultant, AERC

NEWS BRIEFS

Power tariff for FY 2019-20 issued by AERC

The Multi Year Tariff (MYT) Order for FY 2019-20 to FY 2021-22 for Assam Power Distribution Company Limited (APDCL), the only Discom in Assam, was issued in March, 2019. The energy charges for all the LT categories were reduced by Rs 0.05 per unit to Rs 0.30 per unit, with the fixed charges remaining unchanged. For HT categories too, energy charges were reduced by Rs 0.05 per unit to Rs 0.40 per unit. However, fixed charges for HT Commercial, Industries and Tea, Coffee & Rubber categories were hiked by Rs 10/KVA/month to Rs 20/KVA/month.

The new tariffs are designed such that the Aggregate Revenue Requirement (ARR) of APDCL for FY 2019-20 is fully recovered and there is no regulatory asset. The ARR for FY 2020-21 and FY 2021-22 have also been determined in the MYT Order,

The ARR & tariffs for FY 2019-20, ARR for FY 2020-21 and FY 2021-22 have been determined by AERC for the State Generation and Transmission Companies by separate MYT Orders.

The new tariffs became applicable from 01.04.2019. The Orders are available in the official website of the Commission. (Back)

Relaxation of timelines for declaration of contract demand.

The Assam Electricity Regulatory Commission (AERC) received petitions from some of the consumers to relax the time line of 30th September for declaration of contract demand. The consumer cited difficulties in declaration of their contract demand within the time schedule due to lack of awareness about the new provisions incorporated in the AERC (Electricity Supply Code) Regulations, 2017. On consideration of the prayers of the consumers, the Commission decided to extend the time line upto 31st March, 2019. The date of effect will be from 01.06.2019 only. This relaxation will be applicable for the FY 2019-20 only and shall not be permitted in future years. (Back)

AERC notifies draft Regulations on compensation to victims of electrical accidents.

The AERC (Standards of Performance) Regulations for the Transmission and Distribution licensees within the State of Assam were notified in 2005. However, these Regulations do not provide for compensation for death or injury to human beings or animals.

The Commission therefore formulated the draft Assam Electricity Regulatory Commission (Compensation to Victims of Electrical Accidents) Regulations, 2019, in exercise of the powers conferred by Section 181(1) read with Section 57 (2) and Section 57 (3) of the Electricity Act, 2003. These Regulations specifies the quantum of compensation to be paid to victims of electrical accidents, assessment of compensation, procedures to be followed and other related matters.

The draft Regulations has been uploaded in the official website of the Commission as previous publication under sub-section (3) of Section 181 of the Electricity Act, 2003 for comments/ suggestions from stakeholders. (Back)

Delhi Metro starts procuring power from Rewa Solar park

(Source: Renewable Watch)

The Delhi Metro Rail Corporation (DMRC) started procuring solar power from the Rewa Ultra Mega Solar Park in Madhya Pradesh from April 18th, 2019. Under the agreement, DMRC would be procuring about 99 MW of power (345 MUs of energy per annum) from the 750 MW solar park. With this arrangement, DMRC has become the first commercial consumer of its scale and size to procure solar power through the open access route from another state. DMRC expects the tariff to be in the range of Rs 4.50- Rs 5 per unit. The discovered tariff during bidding at Rewa was just Rs 2.97 per unit, but DMRC has to pay charges for interstate transmission, cross subsidy surcharge and transmission losses. DMRC pays a special tariff of Rs 6.80 per unit to Delhi Discoms for its power consumption. (Back)

Cabinet approves recommendations of Group of Ministers to address the Issues of Stressed Thermal Power Projects

(Source: pib.nic.in)

The Cabinet Committee on Economic Affairs chaired by the Prime Minister has approved the recommendations of Group of Ministers (GoM) constituted to examine the specific recommendations of High Level Empowered Committee (HLEC) constituted to address the issues of Stressed Thermal Power Projects in March, 2019.

The CCEA has approved recommendations of the GoM mainly relating to grant of linkage coal for short-term PPA, allowed existing coal linkage to be used in case of termination of PPAs due to payment default by DISCOMs, procurement of bulk power by a nodal agency against pre-declared linkages, Central/State Gencos may act as an aggregator of power, increase in quantity of coal for special forward e-auction for power sector, coal linkage auctions to be held at regular intervals, non-lapsing of short supplies of coal, ACQ to be determined based on efficiency, payment of Late Payment Surcharge (LPS) made mandatory, non-cancellation of PPA/FSA/LTOA post NCLT scenario and non-cancellation of PPA for non-compliance of COD. With the implementation of these recommendations, many of the issues affecting the Thermal Power Sector are likely to get resolved. (Back)

CERC Notified Cross Border Trade of Electricity Regulations

Central Electricity Regulatory Commission (CERC) has notified CERC (Cross Border Trade of Electricity) Regulations, 2019 on 8th March 2019. These Regulations shall be applicable to the participating entities in India and the neighbouring countries.

Cross Border Trade (CBT) between India and the neighbouring country(ies) will be allowed through mutual agreements between Indian entity(ies) and entity(ies) of the neighbouring country(ies) under the overall framework of agreements signed between India and the neighbouring country(ies) consistent with the provisions of the prevailing laws in the respective country(ies).

The tariffs for export /import may be determined either through competitive bidding or mutual agreement between the entities or bilateral agreements between two countries. In case of import of electricity from the hydro generation projects located in any of the neighbouring countries, the tariff thereof shall be determined by the Commission as per the parameters specified in the Tariff Regulations notified from time to time, only if the hydro generator approaches the Commission through the Government of the neighbouring country and is agreed to by the buying Indian entity(ies).

The Participating entity or neighbouring country can trade on the Power Exchange only through Indian trading licensee. The trading licensee is required to take approval from designated authority for specified quantum. There is no restriction on the market DAM/ TAM in which such transaction can be executed. (Back)

Delhi consumers to get paid for power cuts

(Source : The Hindu Business Line / New Delhi)

The Delhi Electricity Regulatory Commission (DERC) has approved a compensation for the consumers of Delhi in case of unscheduled power cuts lasting more than one hour. The consumer will be compensated by ₹50 an hour for the first two hours and ₹100 for every subsequent hour. If an interruption recurs, the compensation will be paid from the initial default.

With this, Delhi has become the first State in the country where consumers will be compensated by power distribution companies (Discoms) in case of unscheduled power cuts. In case of unscheduled power cuts, the compensation shall be payable automatically by the Discom to all the affected consumers, without requiring a claim to be filed by the consumer. After restoration of power supply, a confirmation message will be sent by Discom to the consumer with restoration date and time. (Back)

Israel's Eco Wave Power looks to partner Indian firms

(Source : The Hindu Business Line / Mumbai)

Israel-based Eco Wave Power, one of the few companies that was able to commercialize its technology for generating electricity from waves, is looking for a strategic partner in India to start a pilot project and then scale operations across the country.

According to 2014 report by CRISIL and the Indian Institute of Technology, Madras (IIT-Madras), India's total potential from tidal energy and wave energy is estimated at over 53 GW, which is almost one-fourth of government's target of 227 GW of renewable energy capacity by March 2022. West Bengal, Maharashtra and Gujarat are believed to have the most potential for wave energy.

Eco Wave Power was set up in 2011 by Inna Braverman and her partner David Leb. While even then wave energy was not at all a new concept, none of the existing companies could commercialise the technology. Eco Power currently has two operational power plants. The first commercial project was installed in Gibraltar and has a 5MW PPA with the government utility. It is the only wave energy plant in the world connected to the grid. A smaller plant in Jaffa, Israel is currently used for testing. The cost of wave energy plants

could drop well below $1 million per MW, for larger projects, which is comparable to cost of solar installations globally. (Back)

NITI Aayog says renewable purchase obligations should be strictly enforced

(Source : ETEnergyWorld , New Delhi)

NITI Aayog in its strategy document titled 'Strategy for New India @75' recommended that renewable purchase obligations should be strictly enforced and inter-state sale of renewable energy should be facilitated.

According to the paper, high energy costs resulted in reneging on old power purchase agreements and eroded their sanctity, which led to uncertainty regarding power offtake and consequently endangers further investments.

Apart from flagging issues, the paper also made several recommendations for tackling them. It said that there has to be a mechanism for cost-effective power grid balancing (gas-based, hydro or storage). The paper also said: "It is necessary to have national level markets and regulations for balancing of power.

Speaking of rural areas, NITI Aayog's document recommended that decentralised renewable energy in rural areas in conjunction with the discoms' grid can offer reliability. It also added that hybrid renewable energy systems such as solar photovoltaic + biomass should be explored. (Back)

India looks to lead electric vehicle race with latest push in budget

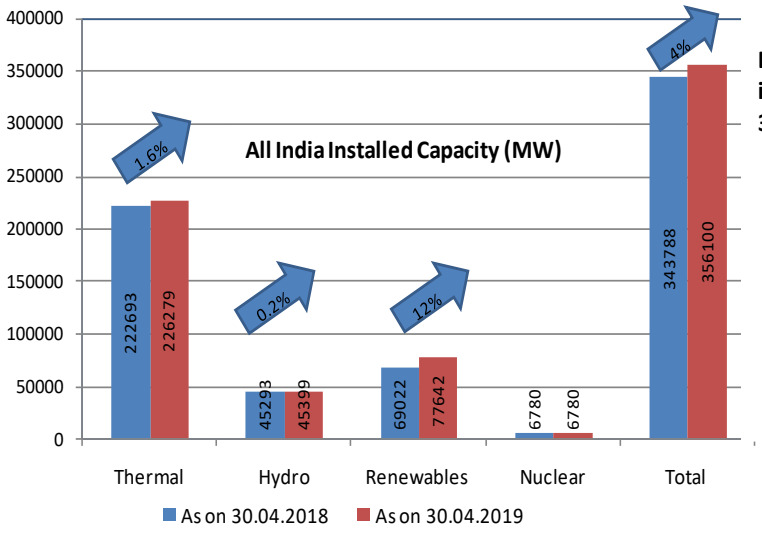
(Source: Union Budget, 2019)

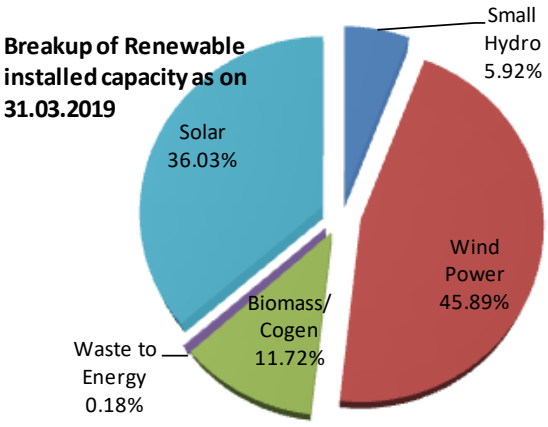
With a host of incentives unveiled in the Union budget for electric vehicles, India has joined governments in China and Europe that have backed the development of the nascent EV industry by offering extensive fiscal incentives and a favourable regulatory environment. While the Indian auto sector did not witness any dramatic changes in tax norms, Finance Minister Nirmala Sitharaman recommended reducing the GST rate on electric vehicles from the current 12 per cent to five per cent in a bid to push the sale of EVs in the country. In addition, there will be an income tax deduction of ₹1.5 lakh on the interest paid on the loans taken to purchase electric vehicles. The push for EV purchase is expected to boost sales for the alternate fuelled vehicles, which has been a major agenda for the government since the previous term.

The Union Budget 2019 also included the proposal for custom duty exemption on import of specific components. The new proposals will be in addition to the ₹10,000 crore allocated for EVs under the FAME II (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles) scheme and includes solar storage batteries and charging infrastructure as well. Although this sum may not be significant compared to some developed countries, the incentives announced in the budget for this sector will go a long way in restoring the confidence of investors and customers alike. (Back)

POWER SECTOR AT A GLANCE

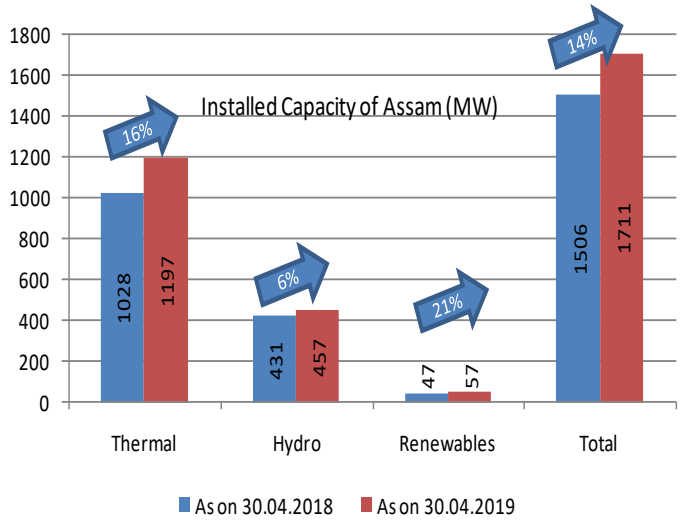
Chart 1: Installed Capacity in India (Central + State + Private Sector)



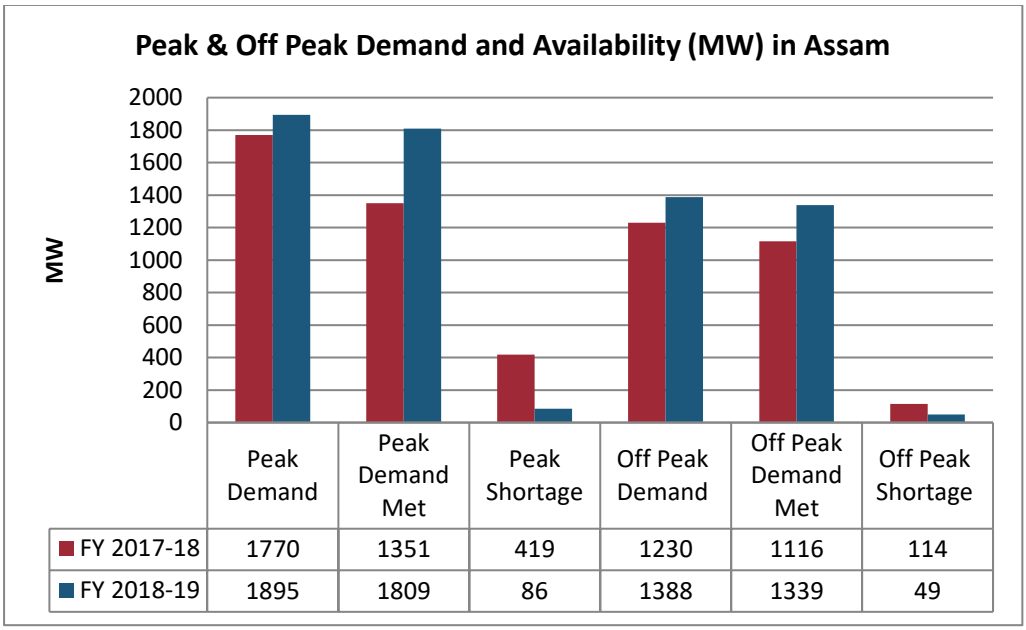


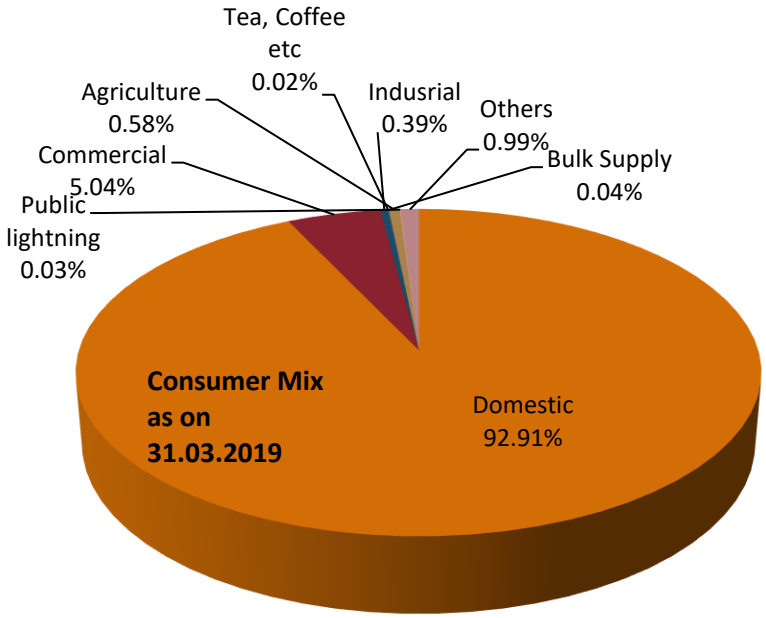
- The All India installed capacity grew by 4% over last one year from 344 GW to 356 GW.
- Thermal capacity increased by 16% while renewable grew by 12 % as can be seen from the chart on the left.

Chart 2: Installed / Allocated Capacity in Assam (Central + State + Private Sector)



- As is obvious from Chart 2, there was an increase in thermal capacity due to commissioning of the 2nd unit (250 MW) NTPC Bongaigaon Thermal Power Project having a nameplate capacity of 750 MW.
- The commissioning of 110 MW Pare Hydro Electric Project led to increase in hydro installed capacity.
- The overall increase in installed capacity is around 14% from 1506 MW by end of April, 2018 to 1711 MW by end of April, 2019.





Category	No. of Consumer
Domestic	5037280
Commercial	273205
Industrial	21071
Tea, Coffee etc	1186
Bulk Supply	2083
Agriculture	31578
Public lightning	1756
Others	53794
TOTAL	**5421953**

From the charts above, it can be seen that –

- Although Peak Demand had increased in FY 2018-19 over FY 2017-18, availability has also increased by 458 MW leading to less peak shortage in FY 2018-19 of only 86 MW compared to 419 MW in FY 2017-18.
- Among electricity consumers in Assam, Domestic consumers comprises the highest number with 92.91%, followed by commercial consumers – 5.04 %. Industrial consumers are only 0.39% which is less than agricultural consumers of 0.58%. (Back)

Big Data Analytics & its Role in Energy Industry

Shri Kishore Rajkumar
Asst. Director (IT), AERC

One way of looking at big data is that it represents the large and rapidly growing volume of information that is mostly untapped by existing analytical applications and data warehousing systems. Examples of this data include high-volume sensor data and social networking information from web sites such as FaceBook and Twitter. Organizations are interested in capturing and analyzing this data because it can add significant value to the decision making process.

It is important to realize that big data comes in many shapes and sizes. It also has many different uses – real-time fraud detection, web display advertising and competitive analysis, call center optimization, social media and sentiment analysis, intelligent traffic management and smart power grids, to name just a few.

Out of the many industries, the energy sector is one such area where there is a significant scope for bigdata analytics. The energy sector collects large amounts of data on a continuous basis with the applications of sensors, wireless transmission, network communication, and cloud computing technologies. The amount of data being collected on both the supply and demand side of the coin is quite staggering. With the advent of the SMART Grid, this amount of data is only expected to increase. A perfect example of this is how much data 1 million SMART meter's collect every 15 minutes over a year. One can start expanding that outwards to include other intelligent devices. Examples of these include sensors and thermostats used throughout the whole process of power generation, transmission, and distribution substations. Then the volumes of data collected increases exponentially.

> Big data is a term that describes the large volume of data but it's not the amount of data that is important. It's what organizations do with the data that matters. Big data can be analyzed for insights that lead to better decisions and strategic business moves.

Data is only valuable if it's used, so the challenge up to now has been to how can businesses and utilities use this "Big Data" in an efficient manner. Through Big Data Analytics, energy utilities can optimize power generation and planning. Renewable energy is another important component that can benefit from Big Data analytics. In the SMART grid, wind power and solar power are two major renewable power generation methods. Yet, weather conditions significantly affect their outputs. Through using data analytics, renewable energy power generation forecasting will be more accurate and efficient. All based on weather data analysis.

The energy utility industry is also an asset intensive industry. They often face many asset management challenges such as resource sharing, asset retirement monitoring, operation and maintenance management, procurement monitoring and inventory management. The efficiency of asset management and collaborative operation can be significantly improved based on energy big data analytics. (Back)

Concept of terms used in power sector

(i) Stressed Assets

There is no sector specific definition of stressed assets/ NPA for power plant projects. The definition for stressed assets are sector agnostic and apply to all sectors. The stressed assets are those accounts where there has been delay in payment of interest/ principal by a stipulated date, as against the repayment schedule, on account of financial difficulty faced by the borrower. Accordingly, such accounts are undertaken for correction action plan (CAP) by the banks under any of three corrective action measurement i.e. rectification, restructuring and recovery.

The economic survey 2016-17 highlighted the twin balance sheet challenge for power generating companies. It was stated that the companies are not earning enough to pay interest on loans from Banks. These loans become NPAs necessitating banks to make substantial provisions. As a consequence, the companies are reluctant to invest in new capacities and bad loan encumbered banks are reluctant to lend. Power sector, thermal in particular, is one of the sectors that contributed the most to the NPAs.

The Electricity Act 2003 created a conducive environment to promote private sector participation and competition in the sector by providing a level playing field. This has led to significant investment in generation, transmission and distribution areas. The share of private sector in overall installed capacity has grown from 13% in March, 2007 to 44% in March, 2017.

Large capacity addition in capacity has led to reduced shortages, lowering overall PLF of thermal units from 78.8% in 2006-07 to 60.01% in 2016-17. The resultant scenario of moderate power off take has affected the IPPs capacities planned without tie up of necessary PPAs with distribution companies. 34 coal based thermal power plants have been categorized as financially 'stressed'.

Reasons for financial stress in these thermal power projects include:

(i) non-availability of fuel (coal),

(ii) lack of enough power purchase agreements (PPAs) by states,

(iii) inability of the promoter to infuse equity and working capital,

(iv) tariff related disputes,

(v) issues related to banks, and

(vi) delays in project implementation leading to cost overruns.

The Cabinet Committee on Economic Affairs chaired by the Prime Minister in March, 2019 approved the recommendations of Group of Ministers (GoM) constituted to address the issues of Stressed Thermal Power Projects, as already discussed in the news briefs above. (Back)

(ii) Merit Order Dispatch

The **merit order** is a way of ranking available sources of electrical generation, based on ascending order of price (which may reflect the order of their short-run marginal costs of production) together with amount of energy that will be generated. Usually, the ranking is such that those with the lowest variable cost (or marginal costs, which is the cost required to generate one additional unit) are the first ones to be brought online to meet demand, and the plants with the highest variable cost are the last to be brought on line. Dispatching generation in this way minimizes the cost of production of electricity.

There are some stations which are 'must run', which means that they have to be dispatched if they are operational. These include renewable energy stations and nuclear stations. Dispatch of hydroelectric stations often depends on water availability, irrigation requirements and need for sudden changes in power generation. Hence, merit order largely is relevant for coal and gas based stations. A typical merit order for APDCL is given in table below.

Table: Merit order of Thermal Power Stations in Assam

Station	Capacity Allocated to State (MW)	Plant Capacity (MW)	Type Of Station	Ownership	Variable Cost (Rs/Unit)	Fixed Cost (Rs/Unit)	Total Cost (Rs/Unit)
AGTPP-CC	55	130	Gas	Central ISGS	1.31	1.38	2.69
AGBPP, NEEPCO	160	291	Gas	Central ISGS	1.31	2.02	3.33
TALCHER	21	1000	Thermal	Central ISGS	1.87	0.93	2.80
KAHALGAON-II	73	1500	Thermal	Central ISGS	2.41	1.10	3.51
KAHALGAON - I	17	840	Thermal	Central ISGS	2.52	1.03	3.55
FARAKKA	38		Thermal	Central ISGS	2.84	0.85	3.70
NTPC BONGAIGAON	131	250	Thermal	Central ISGS	2.97	3.95	6.92

Source: Power Ministry, GOI website on merit order, Assam data accessed on 10th July, 2019.

The schedule is made available to the Load Dispatch Centre (LDC), which conveys the dispatch instruction to the generating station, and the operating staff at the station ensures that it is followed.

The schedule is usually followed until some unforeseen event occurs. This could be a sudden increase or decrease in load (as against what was forecast), a failure of generating station or transformer, or opening up of some transmission lines. The transmission lines and substations are continuously monitored to sense any overloads or abnormal voltages. Since, the LDC has all the information of the whole system, corrective action is initiated here and instructions issued to generating stations and substations to take corrective action. (Back)