

# Powering Up

## Assessing utility preparedness to meet the summer demand

The government is taking proactive steps to meet the summer power demand by directing gas- and coal-based plants to maximise output, and scheduling maintenance strategically. Efforts to enhance capacity across various energy sources are under way. Going forward, economic expansion and climate change will further drive the demand for power, necessitating a focus on renewable energy and dynamic planning for reliable supply. Industry experts share their views on the upcoming power demand...

**According to you, are the power utilities prepared to meet the country's power demand in the upcoming summer season? What more needs to be done?**

### Pankaj Batra

The country's power demand is the highest during the months of May, June, July and August. It has been seen that some months during this period get good rains, which are either pre-monsoon showers or monsoon rains. The exact month/s when this would happen changes from year to year. For example, in 2022, the higher quantum of rain was during the months of August and September, whereas in 2023, the higher quantum was in the month of April. Consequently, the demand in 2022 was relatively higher in April, and relatively lower during August and September, as compared to 2023. The peak demand in 2022 was seen in April, at 215,888 MW, whereas the peak demand in 2023 was observed in September, at 243,271 MW. The average rise of month-

ly peak demand over the year was about 10 per cent.

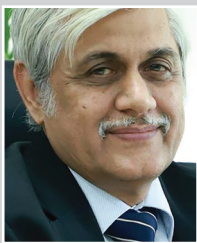
Irrigation of crops creates a substantial power demand in India. This is about 18 per cent of the total consumption on a yearly basis. However, during the cropping season, this doubles, going up to 37 per cent. The irrigation demand gets mitigated substantially when there are good rains. On the basis of seasons, the crops in the country are divided into two types – kharif, the summer crop, and rabi, the winter crop. The irrigation requirement for the kharif crop is from July to October, and for the rabi crop, from October to March. The electricity requirement peaks during May-August, when air conditioners are used to the maximum extent in homes, offices and commercial establishments, and there is irrigation demand as well. The rains, therefore, bring down the power demand substantially during the monsoon season, but in the absence of rains, the power demand peaks. This situation is compounded by

the fact that wind generation also reduces when the rains stop.

The central government has taken substantial steps to ensure that the mainstay of electricity generation, that is, coal, is available in substantial quantity both as a mining output and for supply to the power stations. Thermal power plants started 2024-25 with 50.5 million tonnes of coal stock, about 37 per cent higher year on year.

According to the Indian Meteorological Department (IMD), there is going to be a good monsoon. Even with a nominal monsoon, the country is well prepared to meet the summer demand.

Besides, the hydropower plants in Bhutan and Nepal which generate substantial power during their monsoon seasons (which coincides with the peak demand months in India), are gearing up to supply power to India through long-term power purchase agreements



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**Satyajit Ganguly**

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“I am confident that the utilities are prepared to meet the power demand this summer.”

**Pankaj Batra**

(PPAs). As a measure of adequate caution, the central government has taken proactive steps to ensure that adequate power is available to meet the summer demand. Directions were given in April 2024, by the Ministry of Power (MoP), under Section 11 of the Electricity Act, 2003, that the appropriate government may specify a generating company, in extraordinary circumstances, to operate and maintain any generating station in accordance with the directions of that government, to direct all imported coal-based power plants to continue operating at full capacity till September 2024, and to instruct all gas-based stations to provide power to the extent of requirement, as requisitioned by Grid-India, the national power system operator, till June 2024. Gas-based generating stations (which are under utilised because of costly imported gas and insufficient domestic gas quantum) having PPAs with distribution licensees are to first offer their power to the PPA holders. If the power offered is not utilised by any PPA holder, then it is to be offered in the power market. Gas-based generating stations not tied to PPAs must offer

their power output in the power market. Additionally, planned maintenance of non-hydro-based power plants is to be shifted away from the summer season, to the monsoon season.

Having said that, I am confident that the utilities are prepared to meet the power demand this summer.

**Somit Dasgupta**

The central government has taken a number of steps to ensure adequate power availability during the summer months. The latest is the directive given to all gas-based plants to keep their units running at full capacity till the end of September 2024. The gas plants, which are about 25 GW in capacity, are mostly lying idle due to high gas prices. As per the directive, given to gas-based plants by invoking Section 11 of the Electricity Act 2003, PPA holders will have the first right to this power and any power forgone by the PPA holders will have to be offered in the electricity exchanges. This is similar to the directive issued in respect of imported coal-based plants that have been asked to generate power at full capacity till October 15, 2024. Here again, power not used by the PPA holders will have to be sold in the exchanges. In case there is a generator who does not have a PPA, the entire power will need to be sold in the exchanges. The directive to sell power in the exchanges will keep the spot prices in the day-ahead market in check. During the last one month (ending on April 17, 2024), the average

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market clearing price hovered between less than Rs 3 and Rs 6.50 per unit. In the latter part of this time period, however, there were some time blocks where the price touched the ceiling of Rs 10 per unit.

Meanwhile, in order to ensure adequate availability of coal (and this power), all domestic coal-based generators have been directed to import at least 6 per cent of the coal requirement (by weight). This is expected to improve the availability of coal in power stations. One may also mention the proposal of the government to pool the power of all coal-based plants after they are 25 years old. This would ensure that old coal plants are kept running. Of course, this proposal has other dimensions as well as it is believed that this was initiated at the behest of central generators as they did not want to lose access to the fixed charge. The scheme of pooling, however, is subject to acceptance by the Central Electricity Regulatory Commission.

The discoms too can contribute towards meeting the surge in power demand in the summer months by cutting down losses, which would lower their quantum of power purchase, installing smart meters whereby they can implement demand response measures, as well as by rationalising tariffs so as to introduce time-of-day metering for residential consumers, wherever feasible. All these measures, however, are long term and cannot be implemented overnight to combat the problems that may spring up in summer.



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**Dr Rahul Tongia**  
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“The multi-pronged approach adopted by the MoP to meet the growing power demand in the country is expected to support economic growth while ensuring reliable and quality power supply.”

**Satyajit Ganguly**

### **Satyajit Ganguly**

With increased economic growth, India's electricity demand has grown by leaps and bounds. In September 2023 and August 2023, power demand increased by 10 per cent and 16 per cent, respectively. Moreover, the peak demand surged to a new high of 239 GW in September 2023. Even in October 2023, power demand recorded an increase of 21 per cent over the corresponding period of the previous year.

The MoP is taking all necessary steps to ensure that electricity demand in the upcoming summer season is met. Some of these measures are:

- Review of non-operational thermal capacity of nearly 5.2 GW to make it operational.
- Planned maintenance of power plants to be shifted to the monsoon season – nearly 1.7 GW of capacity was up for planned maintenance in April, and 6-9 GW in the month of June; however, these plants have been informed to schedule/shift planned outages to the monsoon season.
- Expediting new capacity additions – in coal, hydro, nuclear, solar and wind for commissioning.
- Utilisation of surplus power from captive generating stations.
- Surplus power to be offered for sale in power exchanges - all thermal power generating stations must offer their un-requisitioned/surplus power in power exchanges.
- Uniform technical minimum load

of 55 per cent of unit capacity for all coal-based thermal power plants.

- Operationalisation of gas-based capacity – the MoP implemented Section 11 to ensure their operationalisation during the upcoming summer season.
- Extension of the directions for imported coal-based plants under Section 11 till September 2024, as directed by the MoP.

The multi-pronged approach adopted by the MoP to meet the growing power demand in the country is expected to support economic growth while ensuring reliable and quality power supply. During the past four years, electricity demand has increased annually and PXIL has been at the forefront of developing and introducing new contracts to fulfill power trading requirements of market participants. One of the key reasons for PXIL's success is its commitment to innovation and technological advancements. It has invested significantly in building a robust and reliable trading platform that facilitates transparent and secure price discovery. The trading platform by PXIL is designed to cater to the unique requirements of Indian power markets and is capable of handling high volumes of transactions.

The exchange has introduced new products and services that cater to the needs of market participants. For instance, it launched the Green Term Ahead Market in March 2021, longer tenure contracts in September 2022 wherein the delivery time has increased from the previous 11 days to 90 days/12 weeks/three months ahead, and the high price DAM and TAM markets in October 2023. We are in the process of receiving approval from the CERC to increase the tenure of longer tenure contracts wherein the delivery duration would be up to 11 months ahead. The longer tenure contracts introduced by PXIL have found good traction since their introduction.

Further, the different contracts offered on the power exchange platform enable the utilities to purchase power from different energy sources such as thermal,

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wind, solar and hydro. Thus, utilities can enter into different types of contracts to meet the power supply requirements of their consumers.

### **Girishkumar Kadam**

The electricity demand has witnessed a healthy growth trend over the past three years, recording an 8.2 per cent increase during 2021-22, 9.6 per cent during 2022-23 and 7.0-7.5 per cent during 2023-24. The electricity supply has been able to keep up with the demand growth as reflected in the relatively low energy and peak deficit levels. While the deficit levels went up in April 2022 amid the sharp demand growth and concerns over coal availability, these levels have come down ever since and have largely remained well below 1 per cent. During 2023-24, hydropower generation declined by 17-18 per cent vis-à-vis the 2022-23 level, owing to water availability issues. However, the sharp decline in hydropower generation was offset by higher generation from thermal, renewable and nuclear energy sources thereby keeping the deficit levels low.

### **Dr Rahul Tongia**

Given the nature of real-time electricity, supply must equal or exceed demand at all times. This requires not only sufficient capacity but also fuel, that is, coal, in India's case. However, there is also an element of luck, encompassing temperature, rainfall, windiness, etc., affecting both demand and supply. There is relatively little that can be done in the short run – we can't build new infrastructure instantly – but our real objective must be to avoid any crisis in the future. This will require major overhauls in the planning process, where we not only need enough energy (kWh) but energy at the right time

(and place), meaning instantaneous capacity (kW).

In the short run, the trillion rupee question becomes, how high will peak demand be this year and at what time? The CSEP has a free public tool (carbontracker.in) that shows real-time demand and supply by fuel across India. If one only looks at the peak demand, as of late April 2024, we are actually a few tens of GW below the all-time peak of about 240 GW. But this is misleading, because we have to look at individual fuel contributions.

Coal supply at the busbar has exceeded 172 GW, which means capacity of over 185 GW of plants in operation (post auxiliary consumption). This is very close to the installed capacity (and some plants will always be under outages or maintenance). While fuel supply is relatively stable, more so compared to some recent periods, capacity may be a challenge. The good news is that hydro is not yet being exhausted. In addition, there is under used gas capacity, but that requires gas, ideally at a low price, else we have to be willing to pay the premium for imported liquefied natural gas and corresponding high power prices.

Ultimately, if there are unplanned peaks, some controlled load, shedding may be part of the solution, along with limitations on power supply to the agricultural sector. However, these are not ideal solutions, neither politically nor development-wise.

A more important question becomes how do we improve planning so that such coping mechanisms are never required? Simply saying build more capacity isn't sufficient, because one has to ask, which type of capacity? The central government has asked all the states to undertake resource adequacy planning, a very useful exercise. But doing such planning correctly requires time-period assessments of both demand and supply. And even a cursory examination of demand curves over the years shows that the shapes are evolving.

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A complementary tool for planning is to examine not only the demand but the net demand, which is the demand minus variable renewable energy such as wind and solar. This is also called net load. This peaks in the evening, when solar is unavailable.

What this tells us is that while we must aggressively grow our renewable energy capacity, and we are still behind both our targets as well as volumes that can be absorbed cost-effectively, plain solar and wind aren't sufficient for long-term needs. We would also need a combination of storage (which is very expensive), demand response and other tools for managing demand (excluding load shedding!), and some form of peaking supply (which is typically gas or diesel/biodiesel).

Another major change is for planning to incorporate much greater uncertainty than before. While the CEA and other entities have a range of scenarios, uncertainty is far better modelled in a stochastic or probabilistic manner instead of a deterministic manner like mostly done today. Both supply and demand can vary randomly based on the factors listed above (mostly climatological), plus we have other changes we must plan for. These include organic growth and secular trends such as the rise of air conditioners. In addition, there are new loads to plan for, including electric vehicles and green hydrogen. Modelling those as an energy requirement (kWh) instead of incorporating time-of-day planning is unwise.

**What is your outlook for power demand going forward?**

**Pankaj Batra**

Although the latest Electric Power Survey by the Mop CEA, predicted a CAGR of 6.42 per cent for peak demand from 2021-22 to 2026-27, the growth rate during the previous calendar year, that is, 2023, was about 10 per cent over 2022. It is felt that this was due to the revival of industrial activity, which picked up after Covid-19. However, it is estimated that the growth rate during this summer would be in the range forecast by the CEA, that is, 6-7 per cent over the summer demand of the previous year, which was 257,000 MW to 260,000 MW.

Factors that could drive demand would be increased shift to electric vehicles, and more Make in India initiatives by the Government of India. However, the factors that could bring down this power demand, range from increased installation of rooftop solar PV in residential areas due to the incentives under the PM Surya Ghar Muft Bijli Yojana, increased efficiency in all areas of the power sector (from generation, transmission, distribution to utilisation), to the Perform, Achieve and Trade scheme.

**Somit Dasgupta**

Power demand is growing at a rapid rate and can be anywhere between 7 per cent and 8 per cent. Coupled with the fact that the earth's temperature is on the rise due to climate change issues, the situation can get out of control unless there is adequate generation. The World Meteorological Organisation has already termed 2023 to be the hottest year ever. Speaking of a few facts back home, based on the latest data available on the website of Grid India, the peak demand in India which was met (at 7 pm) in February 2024 was about 197 GW; this is about 8 per cent higher than that in February 2023. We have, in any case, touched a maximum demand of 240 GW and this was not very long ago. Experts feel that this figure can go up to 260 GW this year. Moreover, there are going to be fresh growth areas if demand for green





hydrogen picks up. India has set a target of 5 MMT of green hydrogen by 2030 which alone would require 125 GW of renewable power. The country's current capacity of solar and wind is about 136 GW which gives an idea of the difficult task ahead.

### **Satyajit Ganguly**

For the upcoming summer season, the Indian Metrological Department has projected higher-than-normal maximum and minimum temperatures across the country, except over some isolated areas of northwest, northeast, central and peninsular India. This is expected to be higher than the previous year, and will also be reflected in the rising trend of peak demand in recent months, during both solar and non-solar hours.

The CEA estimates India's power requirement to grow to 817 GW by 2030. Also, by 2029-30, the CEA estimates that the share of renewable energy generation would increase from 18 per cent to 44 per cent, while that of thermal energy is expected to decrease from 78 per cent to 52 per cent.

The country is prepared to meet the growing power demand in the years to come, and it has planned capacity additions five to ten years in advance. The peak demand reached 240 GW in August 2023, which was unusual for that time period of the year. However, even at 240 GW, the shortfall was less than 1,000

MW (or less than 1 per cent), this is due to the fact that nearly 70 GW of solar plants are commissioned. In the future, solar capacity addition would continue while simultaneous efforts would be made to shift the evening peak loads to day hours. This would suit the solar profile, helping us to go green and aiding energy transition, while ensuring that the demand is met during solar hours.

The forthcoming peak summer period also coincides with the general elections 2024, resulting in discoms exploring different contracts on the PXIL platform to meet the increased electricity demand during this multi-phase election period.

In the current decade (2020-29), the Indian electricity sector is likely to witness a major transformation with respect to demand growth, energy mix and market operations. India wants to ensure that everyone has access to sufficient electricity at all times, while also accelerating the clean energy transition by lowering its reliance on dirty fossil fuels and moving towards more environmentally friendly, renewable sources of energy. Future investments will benefit from strong demand fundamentals, policy support and increased government focus on infrastructure; all this will go a long way in pushing economic growth.

### **Girishkumar Kadam**

The electricity demand growth is expected to remain healthy at 5.5-6 per cent during 2024-25 although it will be

moderate compared to 2023-24, slightly trailing behind ICRA's expectation of a GDP growth of 6.5 per cent. On the supply side, the coal stock levels have improved over the past few months and remain satisfactory at over 17 days as on April 1, 2024 and higher than 13 days as seen on March 31, 2023. This and the growing power generation capacity should aid in meeting the higher demand in 2024-25.

### **Dr Rahul Tongia**

Going forward, we must incorporate time-of-day planning when we consider choosing the optimal fuel mix. Most comparisons have been silo based relying on levelised cost of energy (LCOE). Thus, we have historically looked for the cheapest solar or wind without examining how much of each makes the most sense. Solar is cheaper than wind based on LCOE, but wind offers more diversity of output and thus has a higher system or portfolio value. In addition, system-wide planning must factor in issues such as transmission, and implications on other generators (like coal backing down). Recent round-the-clock, firm and despatchable renewable energy bids aren't quite as firm or round-the-clock as one might imagine.

As we move towards a more dynamic power system, we have to recognise that cost, price and value are not the same. In just a few years, we may have surplus energy, at least at some times of the day or year. We will then need to curtail or throw away renewable energy a little, which is considered routine in parts of the world (up to a point). What storage we need will be based more on meeting the evening peak or other periods of high net demand instead of worrying about occasional surplus renewable energy per se. We already have huge variety in power exchange prices by time of day, and mid-day prices will eventually drop to zero. It will be a very different world in just a few years, but it will also be one that will be greener, hopefully cheaper and ideally more secure than before. This energy trilemma is the ultimate balancing act we must plan for. ■