

Code still amber

Coal scarcity is a clear and present risk

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India Inc unscathed for now, but power prospects hinge on coal availability

Regulated coal supplies to non-power sectors and allowing participation of captive miners amid an increase in production by the key supplier – Coal India – may help corporate India avoid what appeared to be a major power crisis in the making until recently, but the threat still looms when power demand picks up from here.

To recall, a surge in power demand amid rapidly dwindling coal inventories, higher prices of imported coal, delayed payments to power producers, long dry spells impacting hydro power generation, and maintenance shutdowns at nuclear plants has had a domino effect on the sector in recent months. Storms in some coal mining belts have impacted supply further, worsening the situation.

Coal stocks are unlikely to improve to the previous level of 15-18 days inventory anytime soon. Also, availability of rakes and a pick-up in power demand in March-May will be the key monitorables from here.

Power demand has recovered sharply, peak demand sharper

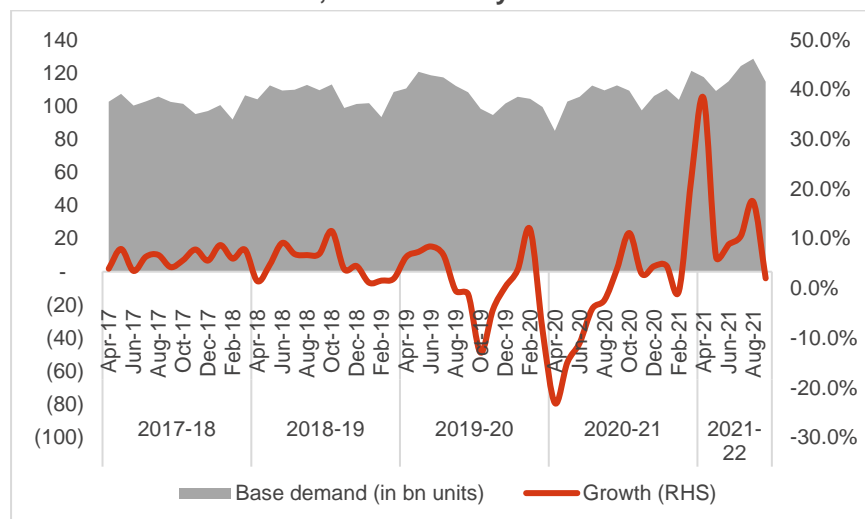
In the five years through September, growth in India’s monthly power demand averaged 4%, though it did exceed 12% in a few months of fiscal 2020.

In recent past, power demand has surged again. Base demand has clocked 13% growth year-to-date. Volatility in base demand has also risen sharply over the past two years. Peak demand growth has been higher at nearly 15%, while volatility has spiked here, too.

CRISIL Research estimates overall growth in power demand for the current fiscal at close to 7%.

Over the next three months, given the criticality of the current coal crisis, average demand would be lower than in the past few months, an analysis of five-year data trends shows. While this may offer temporary respite, the real monitorable for power availability would be the March-May period when temperatures begin to soar. Therefore, a build-up in coal inventories before end-February is crucial.

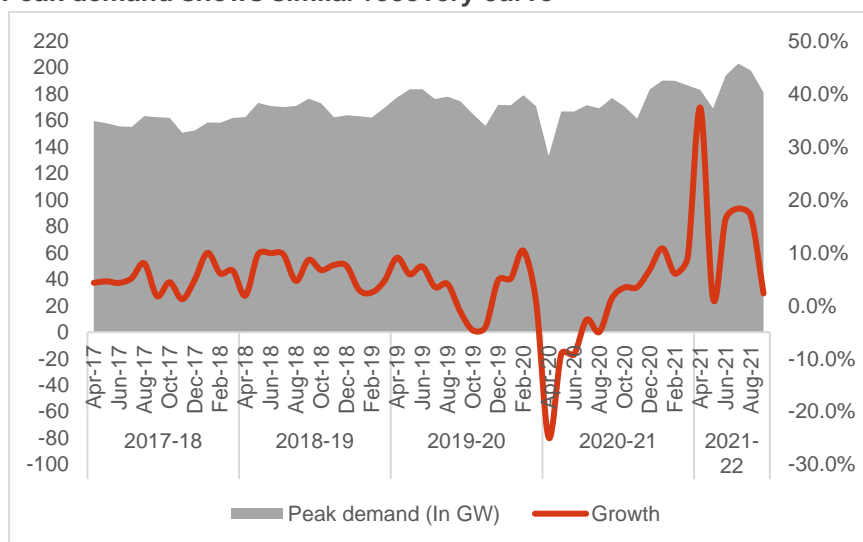
Base demand on the rise, so is volatility



- Average monthly base demand over the past 60 months has been 104 billion units.
- Five out of six months this year clocked growth over 10% higher than the monthly average consumption of 104 billion units.
- An analysis of the past 60 months shows monthly average demand from October-December is 97-98% of the year’s monthly average demand

Source: CEA, POSOCO

Peak demand shows similar recovery curve



- Peak demand has higher structural volatility than base demand
- The peak monthly average is pegged at 155 GW over the past 60 months
- Peak demand from October-December is more or less in line with the year's monthly average demand

Source: CEA, POSOCO

Highly industrialised states drive power demand growth, face moderate risk

A state-level monthly demand assessment indicates that on average, monthly power demand growth was close to 20% for highly industrialised states such as Maharashtra, Tamil Nadu and Gujarat (which account for close to 30% of overall power demand). This can be attributed to a sharp rebound in economic activity that has led to a revival among larger power consumers such as industries and commercial complexes compared with last year.

Growth from moderately industrialised states has been close to 15% year-to-date, while states with more residential or agricultural consumers saw growth of less than 10%.

Further, pent-up post-pandemic demand has caused power demand to be 3% higher than even pre-pandemic fiscal 2020.

That said, in addition to demand, supply sources also play a role in power generation. Supply of coal, in particular, plays a decisive role.

Below, we have outlined the share of coal in the generation mix and the proportion purchased from the short-term power market by key states that comprise ~70% of India's power consumption.

State-level perspective by consumption profile and power supply mix

	Key states	Industrial + Commercial share	Dependence on short-term power purchases	Dependence on thermal	Base demand avg. monthly growth trends		
					FY20	FY21	FY22 YTD
Highly industrial states	GJ	56%	6.4%	80%	(2%)	0%	22%
	MH	41%	3%	82%	(1%)	(2%)	23%
	TN	40%	8.3%	68%	(1%)	(6%)	15%
Moderately industrial states	PUN	43%			2%	5%	16%
	AP	39%	5.3%	74%	3%	(5%)	15%
	TEL	33%	7.3%	90%	4%	(3%)	13%
	KAR	32%	1%	58%	2%	(5%)	10%
	RJ	31%	0.9%	79%	2%	5%	9%
Less industrial states	UP	27%	(1%)	87%	4%	3%	5%
	MP	26%	0%	78%	2%	10%	8%
	BH	25%	18%	54%	5%	9%	15%

Source: CEA, POSOCO

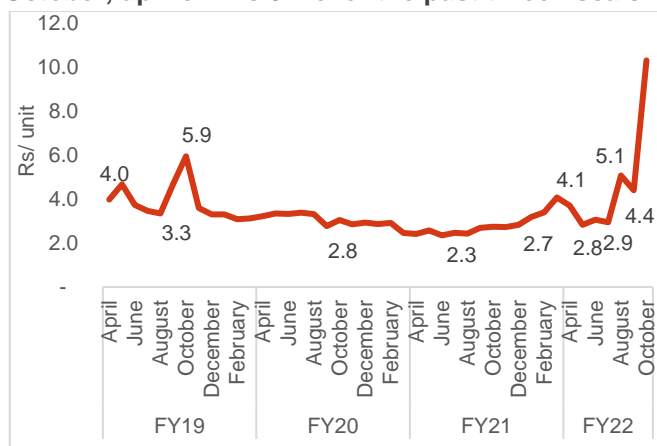
At a pan-India level, over 70% of power produced is via the coal route. The dependence on coal-based generation, however, varies widely between states.

Our assessment shows that Bihar, Telangana, Tamil Nadu, Uttar Pradesh and Maharashtra and to a certain extent Gujarat are structurally at higher risk of being impacted by disruptions in coal purchases, either due to higher dependence on the fuel type or higher short-term purchases impacting overall pick-up.

Telangana, Uttar Pradesh and Maharashtra have higher dependence on coal compared with the rest of India. Bihar, on its part, is vulnerable because while it meets 54% of its need directly via coal-based generation, a further 18% comes via short-term power purchases from other states, which would also be coal-based primarily.

Short-term market booms, long-term sources fall short as demand surges

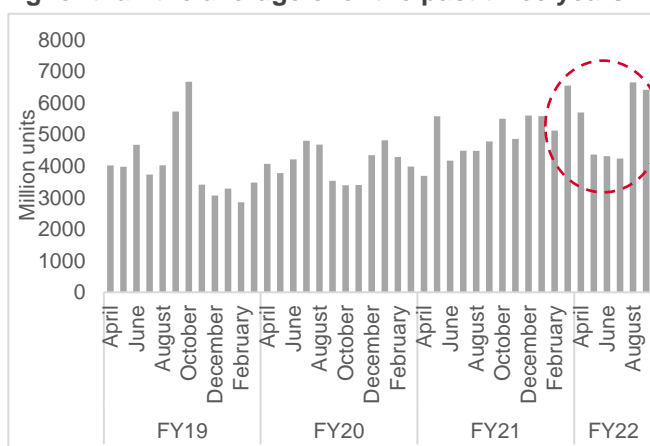
Power price averaged Rs 4.6 per unit over April-October, up from Rs 3.2 over the past three fiscals



Note: Data for September is provisional, Data for October is only for first 20 days

Source: CEA, CERC, IEX, CRISIL Research

Short-term market cleared volumes were 20% higher than the average over the past three years



Note: Data for September is provisional

Source: IEX, CRISIL Research

Gujarat, Andhra Pradesh, Punjab and Haryana have been key buyers in the short-term market.

Further, data for the past few months indicates that while purchase bids have been on a rise for a while, sell bids have seen a continuous decline, resulting a sharp spike in power spot prices.

Higher dependence on coal-based power seen in the first half of this fiscal may continue into the second half

The massive increase in power demand in April-September was not distributed equally among the different sources of power.

- Coal-based power generation rose 19.1% on-year , while generation from other conventional sources saw a 15.5% on-year decline
- Generation from renewable sources rose 16.7% on-year
- Hydro, gas and nuclear, which typically comprise 16-17% of generation, saw a steep decline due to a combination of factors
- Hydro generation, which accounts for 12-13% of monthly generation on average, declined 15.3% on-year during April-September 2021 due to deficient and uneven monsoons. Gas generation, which accounts for 3-4% of monthly generation on average, saw a 26.4% on-year decline as gas prices increased by nearly 1.5-2.5 times (contracted and spot, respectively, for LNG)
- Nuclear generation, which accounts for 2.5-3.5% of monthly generation on average, declined 2.4% on-year due to maintenance shutdowns at three NPCIL plants in South India

Consequently, a ramp-up in coal generation pushed up its share in the overall power pie to ~71%, compared with a 67% last year and an average of 70% over fiscal 2019-2021. This meant an additional 7.5-8 billion units being generated via coal over this period.

The consumption rate has also intensified as usage of domestic coal of lower calorific value increased, given a decline in imports (higher calorific value) over the period.

Amid the surge in demand, stocks at power plants reached critical levels of less than 17 MT as of August, 8 MT as of September, and 7.5 MT by October 15.

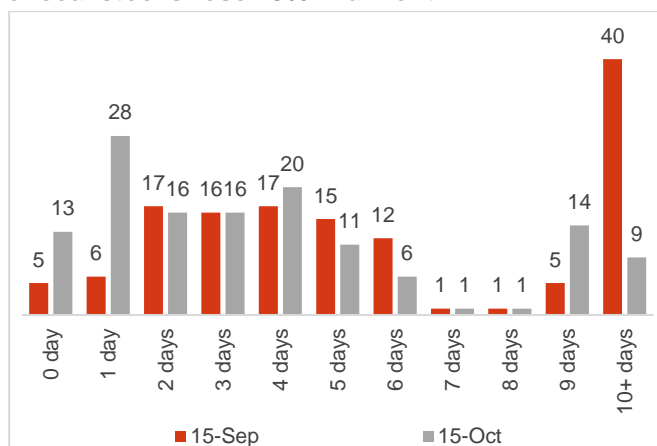
To be specific, of 135 plants with a capacity of 165 GW, nearly 70% of plants and 73% of the capacity were at a critical stage with less than 10 days of coal stocks.

As the situation started turning acute, a core management team was set up in August to ensure the supply of coal to plants with stocks at critical levels. Further, in early October, the Ministry of Coal declared that coal supply to non-power sectors would be regulated.

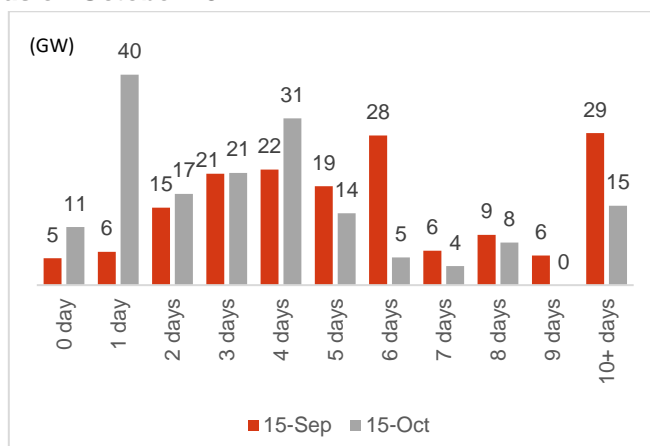
Overall stock, meanwhile, fell from 6 days as on September 15 to 4 days as on October 15, 2021. Our interactions indicate that supply should ease by end-October when the supply regulations are expected to be moderated.

Nearly 73% of coal capacities at critical shortage levels

Number of thermal plants at a critical stage in terms of coal stocks rose 25% in a month



73% of power capacity had coal stocks below 5 days as on October 15



Source: CRISIL Research

At an overall state level, stock levels are most critical in Bihar, followed by Karnataka, Maharashtra and Rajasthan.

Coal stocks in key states

Top 10 states	Total power demand (%)	Coal inventory days (15th Sept)	Coal inventory days (Sep 30)	Coal inventory days (Oct 15)	Power cuts
Maharashtra	11%	3	2	2	13 plants in Maharashtra were shut down due to coal shortage
Gujarat	9%	8	6	5	No major power cuts in Gujarat. Some places experience cuts in clusters of Surat
Tamil Nadu	8%	9	5	4	No major industrial units complain of power cuts in Tamil Nadu
Andhra Pradesh	5%	4	3	3	No major industrial units complain of power cuts in Andhra Pradesh
Bihar	3%	3	3	1	Several districts in Bihar are facing power cuts of more than 4-8 hours a day for the last couple of weeks.
Karnataka	5%	5	2	2	Bengaluru saw massive power cuts on October 12-13
Madhya Pradesh	5%	6	4	4	Power surplus MP has been buying electricity to avoid cuts
Rajasthan	6%	4	2	3	Power cuts were forced on a rotational basis across the state, with a one hour cut in cities and 4-6 hour cuts in rural areas.
Telangana	5%	8	8	6	No major units reported power cuts in Telangana
Uttar Pradesh	10%	5	3	3	Several villages in western UP saw power cuts, with several villages getting only 10 to 15 hours of electricity a day

7 & above days of coal inventory
 4-6 days of coal inventory
 0-3 days of coal inventory

















Source: CEA, Ministry of Power

Power-intensive sectors at moderate risk before festive season

Industrial demand constitutes 30% of total power consumption (excluding captives), specifically from grid-based power. Industries follow a combination of captive power plants (CPPs) or grid power. Our assessment of 10 sectors in the manufacturing space indicates that, excluding captive consumption, these sectors may account for nearly 55% of total grid industrial power consumption.

Our interactions with-sources across key clusters in these 10 sectors indicate no major impact on production just before the festive season. Nevertheless, for instance, south-based cement players and, to a certain extent, non-power users like aluminium players are bearing a part of the brunt. While segments like cotton yarn are facing power cuts, these cuts are limited, dispersed and not meaningful enough to impact revenue. Smaller ceramic units that import coal have, however, been facing issues in terms of price and availability.

A sectoral snapshot

	Power intensity	Power cost as % of sales	Key energy source	Reliance on captive power plant	Key production clusters	Probability of power cuts
Aluminium 	High	35-40%	Non-coking coal	100% captive	Odisha and Chhattisgarh	
Automobiles 	Medium	1-2%	Grid power with DG genset back up	Non-captive sources	Maharashtra, Tamil Nadu, NCR, Gujarat	
Auto components 	Medium	2-5%	Grid power with DG genset back up	Non-captive sources	Maharashtra, Tamil Nadu, NCR, Gujarat	
Cement 	High	20%	Non-coking coal for captive, grid power, heat waste units	75-80% captive	Rajasthan, Karnataka, MP, TN and AP	
Ceramics 	High	15-16%	Gas-based for 80%, remaining coal, grid power	Captive for large players	Gujarat (80% of production), NCR	
Steel 	High	7-9%	Non-coking coal for captive power consumption	Captive for large players	Odisha, Chhattisgarh, Jharkhand, Gujarat and Maharashtra	
Textile cotton yarn 	High	~ 10%	Grid power	Non-captive sources	Tamil Nadu, Gujarat	
Telecom towers 	High	34-37%	Grid power, DG sets	Non-captive sources	Not applicable	



Source: CRISIL Research

Takeaways for stakeholders

In the evolving milieu, different categories of stakeholders in the power value chain will be impacted differently. Here is how we see it playing out:

- **Thermal power producers** will wait for supply of coal to normalise. They will continue to rely on domestic coal unless discoms compensate them for higher prices of imported coal via variable cost pass throughs
- **Discoms** will behave differently, depending mainly on their financial positions. Weaker discoms will go for power cuts rather than continue to buy from the short-term markets at higher prices. Better-placed ones will either enter short-term PPAs with players compensating for higher variable cost or continue to purchase from short-term markets. Punjab and Gujarat, for instance, have done this
- **Consumers in the** two key categories – industrial and residential – will feel the impact differently:
 - **Industrial consumers** purchasing power from short-term markets will see an increase their costs, though such purchases are limited. Industrial consumers with captive power plants will bear the brunt of lower supplies of coal. Substitution of domestic with imported coal, or vice versa, may be possible to a limited extent given different technical configurations needed for their usage. While players in cement sector are going for more pet-coke usage, smaller cement players are bearing the brunt of both shortage and higher prices. Also, smaller players in sectors such as sponge iron and ceramics, who are dependent on spot allocations or imports, may bear the brunt of higher coal prices as well as low availability
 - **Residential consumers:** As things stand, most discoms have come out with their tariff orders for the current fiscal. Hence, any sudden short-term increase in power prices may not result in an immediate increase in cost to the final consumers

That said, with the harvesting season on, improvement in availability of rakes and trajectory of power demand in March-May will be the key monitorables as coal stocks at thermal power plants will take time to top the 10-15 days mark.

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