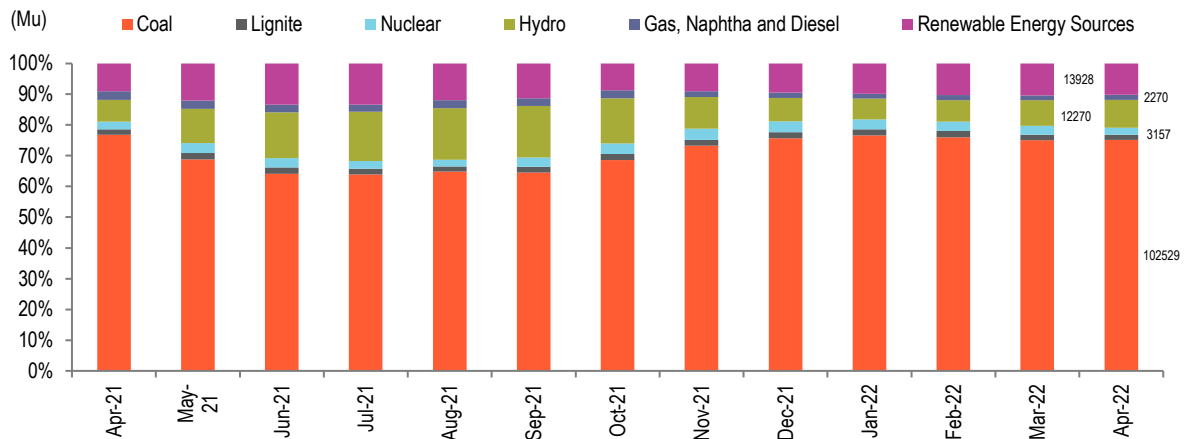


The Coal-Power crisis explained

(Authors: Aditi, Dipanwita, Jahnavi)

In India, power is generated from conventional (Thermal, Nuclear & Hydro) and renewable sources (Wind, Solar, Biomass etc.). 75% of the electricity is generated in the country through thermal plants which use coal. Figure 1 below gives the shares of different fuels that are used to generate power in India over the last one year or so. India is also the second-largest importer of coal after China. The country has large domestic and imported coal reserves to meet these enormous requirements.

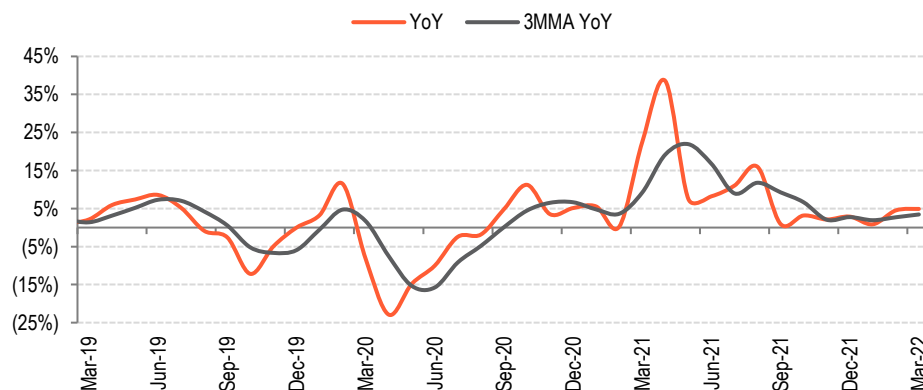
Fig: 1 Electricity generation by various sources



Source: CEIC, Bank of Baroda Research

Figure 2 below gives the growth in power generation for the last 3 years on a monthly basis. As can be seen the pattern is uneven as production is based on demand which varies depending on the state of the economy and the season.

Fig: 2 Production of Electricity over the years



Source: CEIC, Bank of Baroda Research

What is behind the crisis?

The crisis has resulted in the form of shortages of power in several states in April which continues in May. This has led to outages which has the potential to disrupt overall production in the economy as

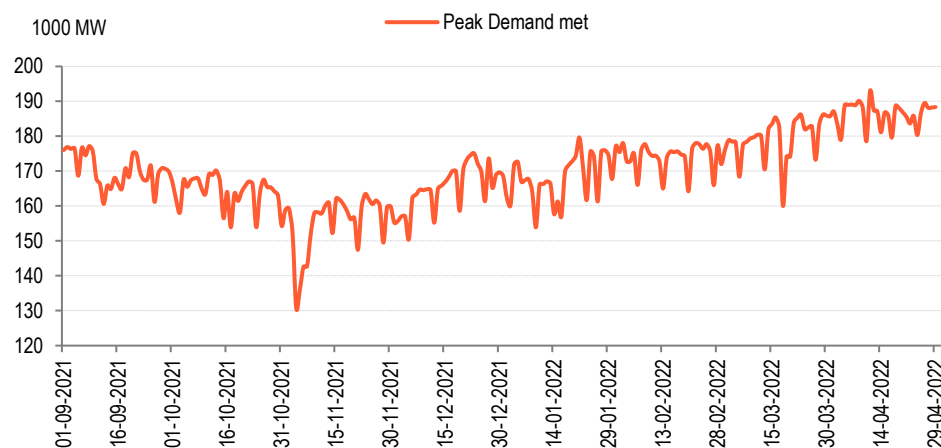
both manufacturing and services require power to operate in an efficient manner. If not resolved, there can be an impact on overall growth in the economy.

High electricity demand:

- India’s average electricity demand (peak demand) for the month of Apr’22 stands at around 192,989 MW, highest in the last 10 years compared with average demand of 186,172 MW in Mar’22.
- There has been significant increase in energy demand lately on the back of pickup in economic activity.
- Further, aggravating heat wave conditions across the country has added to this demand requirement.
- The heat conditions are likely to subside in the coming week and pick up again in Jul’22 and Aug’22.

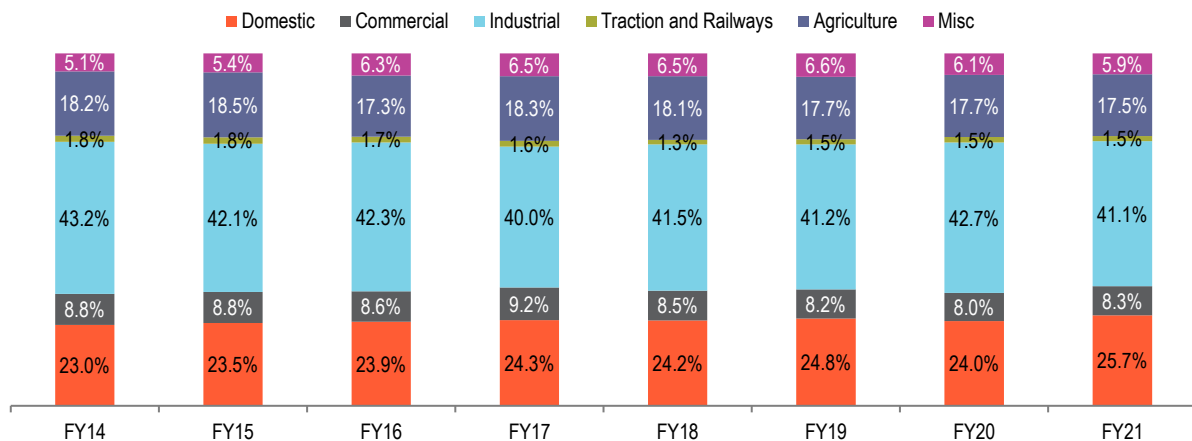
Figure 3 traces the peak demand for electricity in the last few months. While the pattern is jagged, there has been a tendency for peak demand to increase since mid-January. Figure 4 gives the distribution of consumption across segments.

Fig 3: Peak Demand for electricity over the last few months



Source: CEIC, Bank of Baroda Research

Fig4: Electricity consumption by segment

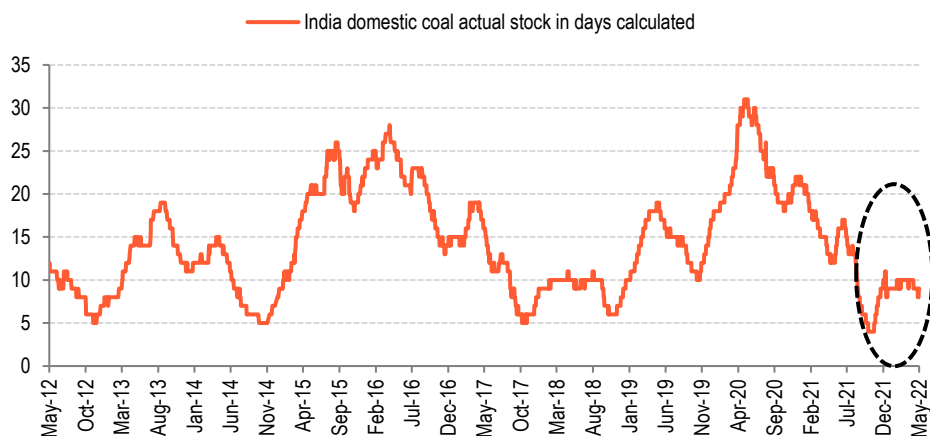


Source: CEIC, Bank of Baroda Research

Supply side problem: shortage of coal:

Given the importance of coal in total power generation any supply side disruptions in terms of availability of feedstock can affect production. This has been an issue in the last month or so as domestic coal actual stock (in days calculated in terms of domestic coal actual stocks-000 metric tonnes/ Power plants daily coal requirement) fell to just 9 days from a high of 31 days seen during May’20 (Figure 5).

Fig 5: Coal stocks dwindling:



Source: Bloomberg, Bank of Baroda Research

- In 88 out of 136 thermal power plants, inventory in terms of actual coal stock (in number of days) fell as on 28 Apr 2022 compared to 31 Mar 2022.
- Around 43 thermal plants have stocks lasting not more than 3 days, 58 thermal plants have stocks lasting not more than 4 days which is generally the definition of criticality in thermal plants. Hence 101 plants would come under the super critical stock category.

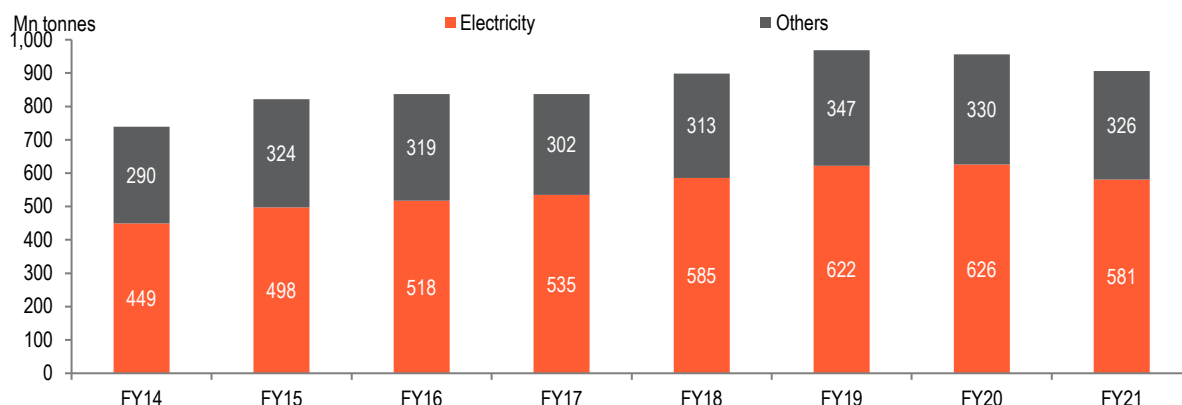
Criticality	Plants	Criteria
Critical stock	Pit-head plants	Coal stock less than 5 days
	Non Pit-head plants	Coal stock less than 7 days
Super critical stock	Pit-head plants	Coal stock less than 3 days
	Non Pit-head plants	Coal stock less than 4 days

Source: CEA, Bank of Baroda Research

Figure 6 below gives the consumption of coal based on purpose for the last 8 years. As can be seen there was a fall in coal consumption for power production in FY21 due to the pandemic.

- Coal India Ltd. (CIL) has increased the production of coal (up by 8.6% in FY22 from a dip of (-) 2.1% in FY21).
- In Apr’22, India’s total coal production stood at 661.54 lakh tons. While Coal India Ltd (CIL) and its subsidiaries produced 534.7 lakh ton coal, production by Singareni Collieries Company Ltd (SCCL) stood at 53.23 lakh ton and production from captive mines touched 73.61 lakh ton during last month.
- In addition, unusual heavy rains can also impact the supply of coal led by difficulty in mining. This was the case in in Oct’21, a similar situation of coal shortage was witnessed led by heavy rains that disrupted coal mining.

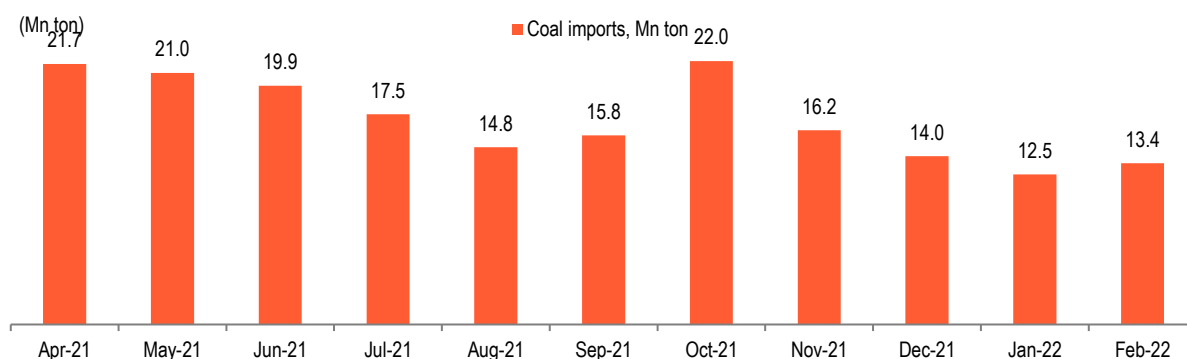
Fig 6 : Domestic coal consumption dipped in FY21 due to the COvid-19 pandemic



Source: CEIC, Bank of Baroda Research

Figure 7 presents data on coal imports which can be used to substitute for domestic production in the last one year on a monthly basis. As can be seen there has been a tendency for coal imports to come down post October when there was a crisis. A factor influencing this was the rising price of imported coal which adds to the cost of production which cannot be easily passed on.

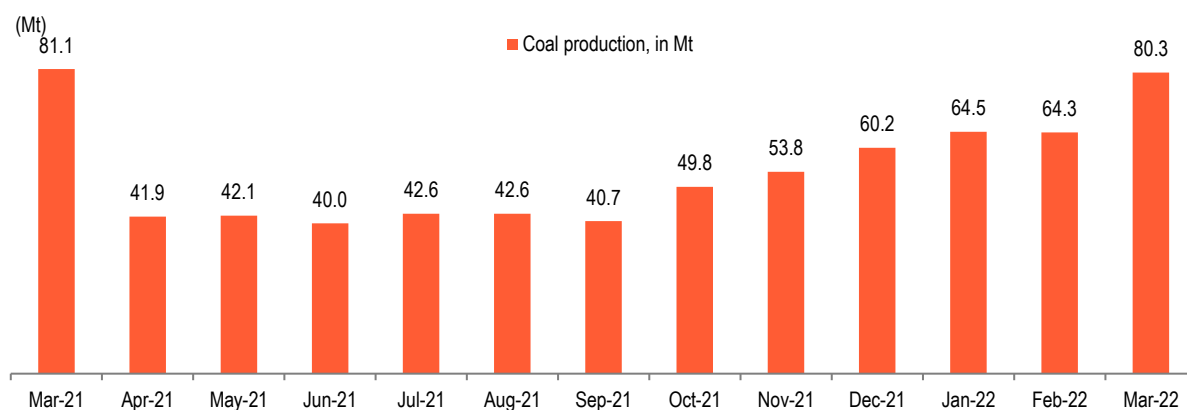
Fig 6: Coal imports have declined since Oct'21 due to higher international coal prices



Source: CEIC, Bank of Baroda Research

On the other hand domestic production has been up as can be seen in the chart below.

Fig 8: Domestic coal production has been rising steadily



Source: CEIC, Bank of Baroda Research | Note: Production by Coal India Ltd.

If domestic production has been steady, are there any other impediments for the power sector?

Three issues can be singled out.

Problems in coal transport:

- As per reports, Indian railways has already increased the number of rakes for supply of coal to 410 per day in Apr'22 from 305 rakes per day in Sep'21 to accelerate the supply of coal to thermal plants. These 410 rakes account for around 45% of the maximum capacity available with the Indian Railways on a daily basis. However, this too seems too low to meet the surging demand.
- As a result, Railways had to cancel certain passenger trains to prioritise coal transport.
- After the cancellations, the number of rakes for coal supply were increased to over 425 a day, carrying 1.62 million tonnes of coal, the highest allocation for the transportation of coal in the past 5 years.
- Last week, the coal ministry requested the railways to run around 422 coal rakes daily to meet the power demand.
- Railway Board officials also said the national transporter set aside 533 rakes a day for coal freight and daily coal rakes would be increased steadily in the coming few weeks.

DISCOMs:

- Power generation companies (GENCOs) owe about Rs 12,300 crore to state-owned CIL, whereas GENCOs are owed over Rs 1.1 lakh crore by power distribution companies (DISCOMs). Yet, CIL continues to supply coal to GENCOs which in turn continue to supply electricity to DISCOMs and hence customers. However, the non-payment of dues by DISCOMs has affected power generation companies.
- DISCOMs have accumulated losses of over Rs 5 lakh crore and regulatory assets, which represent costs that are deferred for recovery through future tariff revisions, worth Rs 1.25 lakh crore.
- The non-payment of dues by DISCOMs has affected power generation companies, which have defaulted on payments for no fault of theirs and are dragged to insolvency court
- There has been a moderation in coal supply towards certain GENCOs because of the overdue or delays in the payments. As a result, DISCOMs/state governments will either have to absorb the cost burden with increased imported coal-based generation and pass on the same through tariff hikes or they could be constrained to offtake power, resulting in load shedding, which has been visible in a few states recently.

Higher prices of coal:

- International prices for coal have been inching up since CY21 due to recovery in industrial demand across the globe as the global economy recovered from the pandemic. More recently, the Russia-Ukraine war has impacted the international prices of coal.
- The price of Australian coal for March delivery had hit an all-time high of about US\$ 330 per tonne. Australia and Indonesia are key sources of coal import for Indian thermal power generation companies using imported coal.
- Even in the domestic market, prices have surged. In fact, premiums over baseline prices set by Coal India Ltd. (CIL) rose to an all-time high of 270% in Feb'22 in spot e-auctions, which have reportedly increased further to about 300% in Mar'22 which continued in Apr'22.

In order to meet the growing demand for coal, the centre has asked states owned utilities to import over 22 million tonnes of coal and private power plants to import 15.94 million tonnes. Further, delivery of 50% of the allocated quantity has to be ensured by Jun'22, another 40% by Aug'22 and the remaining 10% by Oct'22.

Impact on sectors:

The shortage of power can disrupt the economy. It is not just at the retail end that there are challenges for households. All the three major segments of the economy would be affected.

- Agriculture is largely monsoon dependent during the kharif season with 60-65% of crops under this category. However, power shortage will affect irrigation that is used by farmers and this will in turn increase demand for diesel to operate DG sets which can also push up cost of cultivation.
- Manufacturing is also dependent on regular power supply to keep the factories running and outages can push back production.
- Services are in general less dependent on power except for probably hotels and tourism which have been showing signs of recovery post the lockdowns.

Therefore, power disruptions can come further in the way of growth of the economy at a time when there are already other disruptions flowing from the war which does not seem to be ending. Commodity prices have been rising, including that of coal, and the power sector too may consider raising the price of electricity in the coming months if order is not restored. This can have a secondary round of impact on inflation which is already reigning quite high.

Below is the list of sectors which are more fuel intensive, which in turn can be impacted due to coal shortage.

The direct hit will be on electricity generation which is the most fossil fuel intensive sector. Apart from this, transport services, communication and construction sectors will be impacted.

Power & fuel cost/total expenditure							
Sectors	No: of companies	Mar-16	Mar-17	Mar-18	Mar-19	Mar-20	Mar-21
Electricity	157	83.4%	82.9%	80.5%	82.2%	81.1%	80.4%
Glass & glassware	7	15.6%	15.4%	17.0%	19.8%	18.5%	16.8%
Transport Service	52	23.5%	23.7%	24.3%	28.1%	28.6%	15.5%
Misc Services	409	19.3%	17.6%	15.8%	14.0%	13.3%	13.2%
Paper and paper products	115	13.3%	12.9%	12.9%	13.6%	12.9%	13.0%
Construction	270	13.0%	12.6%	12.0%	12.9%	11.8%	11.8%
Communication	69	7.9%	7.1%	7.2%	8.0%	8.6%	10.1%
Metals and product	376	10.0%	9.7%	9.3%	9.8%	10.4%	9.4%
Textiles	553	7.1%	7.0%	7.1%	7.6%	7.8%	7.8%
Hotels and tourism	121	9.1%	8.4%	7.8%	7.6%	7.7%	7.0%
Rubber products	54	4.1%	4.0%	3.9%	3.9%	3.9%	4.0%
Mining	67	4.5%	4.1%	4.9%	4.8%	3.8%	3.8%
Wood & wood products	6	3.7%	3.8%	3.0%	3.7%	3.8%	3.7%
Machinery	761	2.1%	2.4%	2.8%	2.8%	3.0%	3.4%

Misc Manufacturing	15	2.9%	3.1%	2.9%	2.8%	2.8%	3.2%
Chemicals and products	696	3.3%	3.1%	3.2%	2.9%	2.9%	3.2%
Food Processing	327	2.5%	2.1%	2.2%	2.3%	2.0%	1.7%
Transport Equipment	547	1.9%	1.7%	1.7%	1.7%	1.7%	1.6%
IT	380	1.2%	1.1%	1.0%	1.0%	0.9%	0.7%
Consumer goods	185	0.7%	0.7%	0.6%	0.6%	0.6%	0.5%
Financial Services	584	0.1%	0.1%	0.2%	0.2%	0.5%	0.4%

Source: Ace Equity, Bank of Baroda Research, Note: Highlighted ones are the most fossil fuel intensive sectors

The Need to focus on Renewable energy:

- Renewables offer a cheaper and more reliable alternate source of energy generation.
- India has about 110 gigawatts (GW) of renewables capacity, which account for about 25% of the total power supply. However, it is lower than government's target of 175GW for FY22.
- The government plans on augmenting renewable energy. India has set huge targets for renewable energy by 2030 and net zero by 2070.
- In Karnataka over half of the total energy requirements is met through renewable sources and it is also the country's highest seller in this category. According to data from the energy department, renewable energy accounts for 52% of the state's power needs, followed by thermal, hydro and nuclear at 34%, 12% and 3%, respectively.

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