

The Impact of the Coronavirus Lockdown on the Electricity Sectors in Saudi Arabia and India

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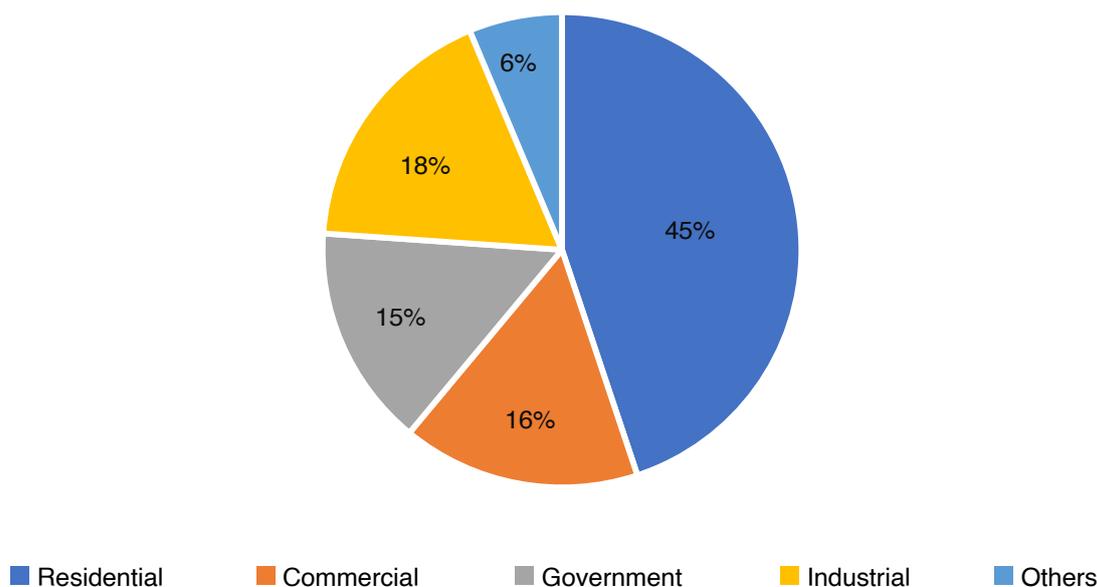
Currently, an estimated third of the global population is under some form of government-imposed lockdown measure aimed at curbing the spread of COVID-19. These lockdown measures have had various negative economic effects and could decrease electricity demand (Business Insider 2020). This insight compares the effects of Saudi Arabia’s and India’s COVID-19 lockdowns on their respective electricity sectors.

Saudi Arabia’s Electricity Sector

The government of Saudi Arabia imposed a national curfew on March 23, 2020, from 7 pm until 6 am, to slow the spread of COVID-19 in the country. Only essential service providers were exempt from the curfew, including those working in security, the military, the media, and in sensitive health and service sectors (Saudi Press Commission 2020). Further, on April 6, 2020, the government imposed 24-hour curfews and lockdowns in several cities where COVID-19 cases continued to increase.

Saudi Arabia ranks among the largest exporters of petroleum and possesses around 18% of the world’s proven petroleum reserves (OPEC 2019). Electricity generation in Saudi Arabia is heavily dependent on hydrocarbons, with natural gas accounting for about 57% of the input into electricity generation. The remainder comprises crude oil (22%), heavy fuel oil (18%) and diesel (2%) (ECRA 2018). The Saudi Electricity Company (SEC) is the leading producer of electricity within the Kingdom. It generates about 74% of the country’s total electricity demand and is the sole owner of the country’s entire transmission and distribution network. Most of Saudi Arabia’s electricity demand (45%) comes from the residential sector (Figure 1), with the remainder being split among industry, the commercial sector, and governmental agencies (SEC 2018).

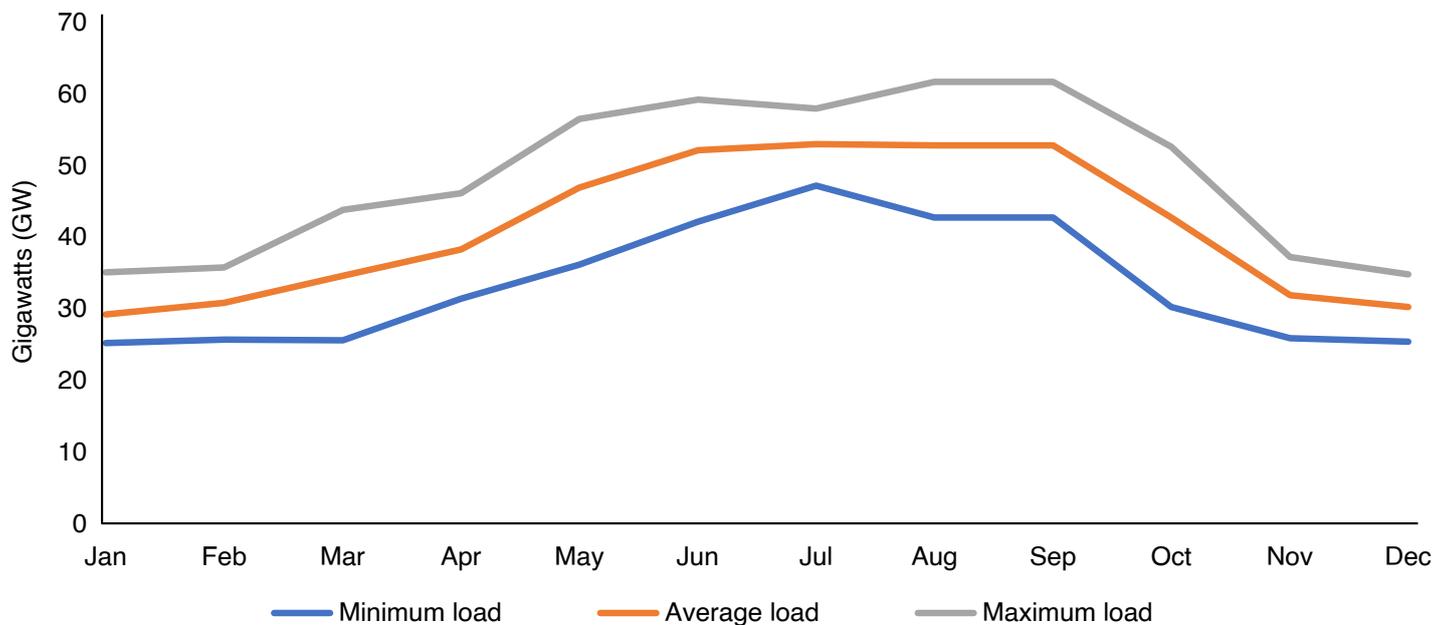
Figure 1. SEC energy sales by category.



Source: ECRA (2018).

Figure 2, below, depicts the monthly load curve for Saudi Arabia in 2018. There is considerable variation in the daily load curves during summer and winter and a shift in demand between weekdays and weekends.

Figure 2. Monthly electricity demand variation in Saudi Arabia, 2018.



Source: ECRA (2018).

On a typical Friday before the country began implementing lockdown measures, commercial establishments such as malls, restaurants and other general stores operated at high capacities. However, the curfews slowed the economic activities of many commercial businesses or brought them to a complete halt. This impacted the load curve and end-user consumption, with electricity demand in the government and commercial sectors declining on both weekdays and weekends. Furthermore, since all non-essential workers began working from home, there would have been a significant increase in electricity demand from the residential sector, which already comprised 45% of Saudi Arabia's overall demand (Figure 1). An estimated 73% of people in the country already use air conditioners (ACs) between 10 and 24 hours a day year-round. ACs are in constant use between May and September to counter the heat of the summer (Howarth et al. 2020). Electricity demand from ACs is fairly predictable and should not have changed greatly due to the lockdown measures. However, electricity demand for other appliances should increase with more people working from home. Therefore, the lockdown measures might have increased electricity demand in the country above the typical load curves of a typical workday or weekend.

We compared the average power load for Saudi Arabia's national grid for March (34.6 GW) and April 2018 (38.3 GW) with March and April 2020, during the COVID-19 lockdown period. We would assume that the average power demand in Saudi Arabia in March and April 2020, under the lockdown, would be less than the average power demand in March and April 2018 due to the reasons cited above. However, even with

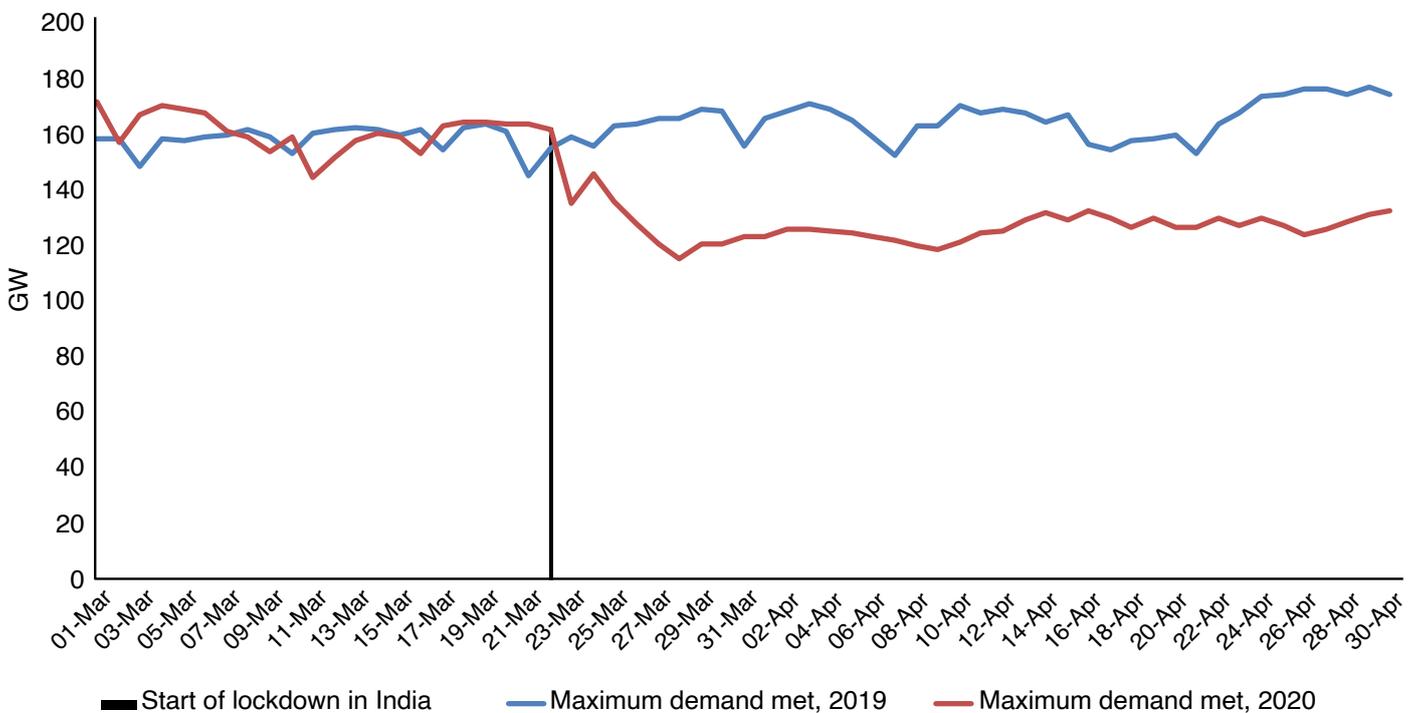
this change in demand, Saudi Arabia’s power sector composition (the SEC is the sole owner of transmission and distribution of electricity) can facilitate the balancing of supply and demand in real time, as it has the exclusive right to buy and sell electricity.

India’s Electricity Sector

On March 24, 2020, India’s prime minister ordered a nationwide lockdown to contain the spread of the coronavirus and ensure the safety of the country’s population of approximately 1.3 billion people. This lockdown was ordered after 14 hours of a national voluntary public curfew on March 22, 2020. Workers in essential services were exempt from the lockdown, including those delivering essential goods, and those working in healthcare, the emergency services, banks, gas stations and convenience stores (Ministry of Home Affairs 2020).

Unlike in Saudi Arabia, the composition and fuel mix of India’s electricity sector relies heavily on coal-fired power plants, with renewables, hydropower, natural gas and nuclear power making up small portions of the country’s energy mix. India’s power utilities are beginning to see a temporary load impact due to the lockdown measures. With the commercial and industrial sectors shutdown, India’s maximum power demand will continue to decline.

Figure 3. Maximum power demand in March and April (2019 vs. 2020).



Sources: Power System Operation Corporation Limited; Government of India.

It is worth noting that, due to the national lockdown, the maximum demand met dropped to about 133 gigawatts (GW) on April 30, 2020, from about 162 GW on March 22 (Figure 4). India's maximum demand met in March 2019 did not decline below 145 GW with a high of 169 GW on March 29, 2019, declining only slightly to about 152 GW in April 2019 (Power System Operation Corporation Limited 2019). Further, the maximum power demand decreased by 5% between March 1 and March 31, 2020. During the lockdown from March 23 to April 30, 2020, the total power supply decreased by about 23% year-on-year compared with the same period in 2019.

As of February 29, 2020, the total installed generation capacity in India was about 370 GW (Central Electricity Authority 2020). The pandemic has affected certain parts of India's electricity sector more than others. The power distribution companies (DISCOMs) have come out as the weakest link, with huge financial losses and operational sustainability issues. As of December 2019, the total outstanding dues of DISCOMs payable to generation companies stood at some 881.77 billion Indian rupees (INR) (approximately 11.58 billion US\$) (The Economic Times 2020).

DISCOMs collect payments from consumers for their energy supplies purchased from generation companies. These bills fund the operational and maintenance costs of the generation and transmission companies.

The DISCOMs' finances could worsen further due to the lockdown. India's electricity demand has declined, with reduced demand from the commercial and industrial sectors after many factories were shut down. Residential consumption, which accounts for an estimated 25% of India's power demand, has risen. Demand shifting from the commercial and industrial sectors to the residential sector will have further negative impacts on DISCOMs' finances, since the residential sector is cross-subsidized by the industrial and commercial sectors.

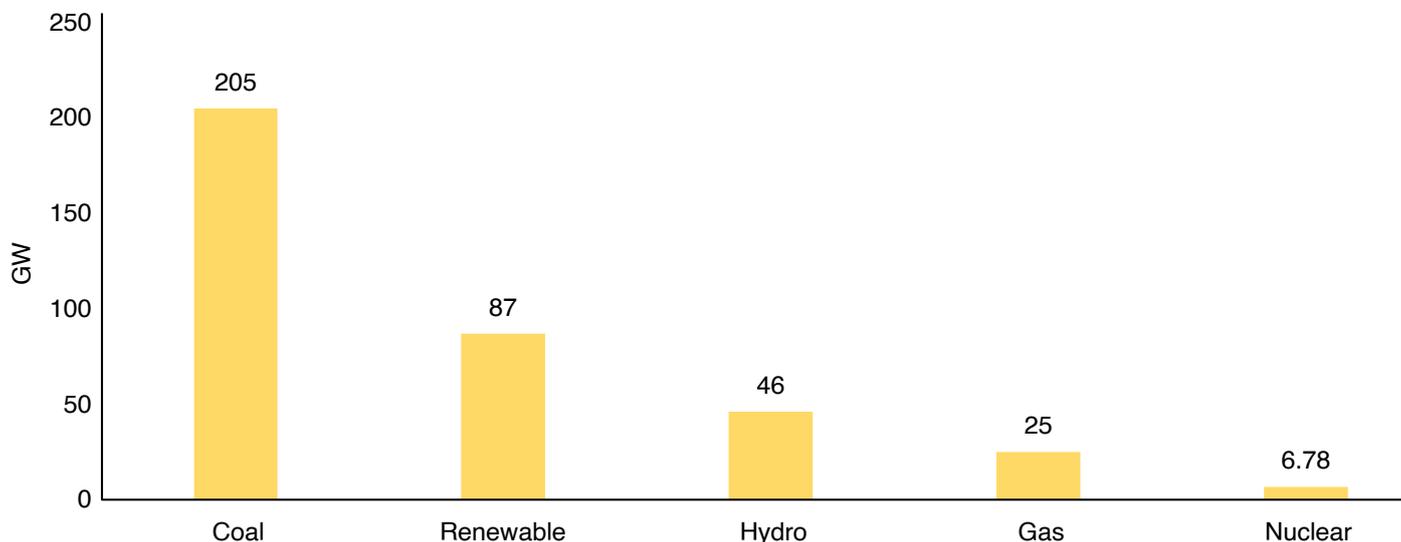
With the lockdown measures still in place, residential consumption is expected to increase at the cost of commercial and industrial consumption. Overall demand is expected to decrease, resulting in financial losses for DISCOMs, as the gap between the cost of electricity bought and sold will continue to widen. It is expected that DISCOMs could suffer a net revenue loss of around 30 billion INR (approximately 0.4 billion US\$) and a liquidity crunch of about 50 billion INR (approximately 0.67 billion US\$) due to the nationwide lockdown (The New Indian Express 2020).

Indian DISCOMs are often unable to make timely payments for their energy purchases from the generation companies due to delayed payments from consumers. This gap is met by borrowing, government subsidies, and reduced expenditure. This increases the DISCOMs' borrowing costs, which is inevitably borne by the consumer (Nirula 2019).

The Indian government started an ambitious drive to add renewable energy capacity to its energy mix. As of February 29, 2020, India had about 86.76 GW of renewable power generation capacity. Most of these renewable energy projects enjoy a 'must-run' status, meaning that the grid should accept any power generated by these renewable energy power plants. Renewables have already achieved grid parity in India

due mainly to subsidies for renewable energy projects. Power generated from renewables is less likely to be curtailed, unlike cheaper alternatives such as coal power plants.

Figure 4. India's installed power station capacity as of February 2020.



Source: Central Electricity Authority, Government of India.

Ultimately, the current dramatic falls in electricity demand are unprecedented. There is little scope in the short term for a pick-up in demand due to the necessary preventative measures that countries have introduced to contain the spread of the virus. The containment measures, including working from home, have shifted the bulk of the demand for power from the government and commercial sectors to the residential sector. Once the COVID-19 pandemic is under control, India's and Saudi Arabia's governments need to establish strategies that guarantee the financial and operational sustainability of their respective electricity sectors. They should consider the sectors' revenue losses due to falling demand. Given the different composition of the electricity sectors of both countries, these losses will depend on government measures that address the fall in electricity demand. This will be a challenge not only during the lockdown period but also afterward, when utilities start to recover.

References

Anwer, Murad, and Walid Matar. 2017. "Reforming Industrial Fuel and Residential Electricity Prices in Saudi Arabia." KAPSARC Discussion Paper.

Arab News. 2020. "Saudi Arabia extends curfew as fight against COVID-19 continues." April 12. Accessed April 18, 2020. <https://arab.news/8kdgb>

Central Electricity Authority. 2020. "All India installed capacity of power stations."

Electricity and Cogeneration Regulatory Authority (ECRA). 2018. "Annual statistical booklet for electricity and seawater desalination industries."

GlobalData Energy. 2020. "Covid-19 update: Power sector situation in lockdown countries." Power Technology, March 24.

Howarth, Nicholas, Natalia Odnoletkova, Thamir Alshehri, Abdullah Almadani, Alessandro Lanza, and Tadeusz Patzek. 2020. "Staying Cool in A Warming Climate: Temperature, Electricity and Air Conditioning in Saudi Arabia." MDPI 1-3.

Jadhav, Narendra, Partha Ray, Dhritidyuti Bose, and Indranil Sen Gupta. 2003. "The Reserve Bank of India's Balance Sheet: Analytics and Dynamics of Evolution." Reserve Bank of India Occasional Papers.

KAPSARC. 2018. "Electricity Market Integration in the GCC and MENA: Imperatives and Challenges." Workshop Brief.

LiveMint. 2020. "Low power demand exposes risk of blackout." March 27.

Ministry of Home Affairs. 2020. "Consolidated Guidelines of MHA on Lockdown measures on containment of COVID-19."

Nachet, Said, and Marie-Claire Aoun. 2015. "The Saudi electricity sector: pressing issues and challenges." Institut français des relations internationales.

Nirula, Ajai. 2019. "India's Power Distribution Sector: An assessment of financial and operational sustainability." Brookings India.

OPEC. 2019. "The Annual Statistical Bulletin."

Power System Operation Corporation Limited. 2019. "Monthly Operation Report."

Saudi Electricity Company (SEC). 2018. "Annual Report 2018."

———. 2020. "Background on core business." April 20. Accessed April 20, 2020. <https://www.se.com.sa/en-us/invshareholder/Pages/BackgroundOnBusinessSegment.aspx>

Saudi Press Commission. 2020. "Custodian of the Two Holy Mosques issues curfew order to limit spread of Novel Coronavirus from seven in the evening until six in the morning for 21 days starting in the evening of Monday 23 March." March 22. Accessed April 28, 2020. <https://www.spa.gov.sa/viewfullstory.php?lang=en&newsid=2050402>

Stanley, Andrew. 2020. "The World Needs OPEC, but OPEC Can't Go It Alone." KAPSARC Instant Insight.

The Economic Times. 2020. "Discoms' outstanding dues to power gencos rise nearly 50% to Rs 88,177 cr." February 16.



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