







Table 5: AT&C losses for states participating in UDAY (in %) State 2015-16 (base figures) 2016-17 2017-18 As on September 2019 Andhra Pradesh 64.27 35.88 65.45 NA Assam 25.51 23.81 15.71 22.13 Bihar 43.74 38.97 33.19 27.39 Chhattisgarh 21.79 19.34 18.8 23.28 Goa 17.12 16.79 16.12 26.03 Gujarat 15.04 12.28 11.71 13.09 Haryana 29.83 25.43 20.29 26.18 Himachal Pradesh 12.92 8.48 12.14 8 Jammu & Kashmir 61.6 61.34 53.78 49.76 Jharkhand 34.71 31.8 31.78 31.95 Karnataka 14.94 15.36 14.48 16.1 Kerala 16.03 17.28 12.05 10.29 Madhya Pradesh 23.97 26.53 29.74 29.05 Maharashtra 19.07 18.88 17.41 16.95 Manipur 44.21 36.89 24.61

34.64 37.76 Punjab 15.9 14.46 17.26 12.04 Rajasthan 30.41 26.02 20.02 29.34 Sikkim 38.06 40.59 32.57 33.04 Tamil Nadu 14.58 14.53 14.23 14.02 Telangana 13.95 15.88 13.5 9.99 Tripura 20.94 16.61 15.52 15.24 Uttar Pradesh 26.47 30.21 27.67 37.95 Uttarakhand 17.19 14.02 15.73 12.64 Dadra & Nagar Haveli 9.23 6.09 NA Daman & Diu 13.25 10.65 10.34 NA Puducherry 19.88 18.98 19.56 16.41 Average for UDAY scheme. The data is self-reported by the state discoms. The northern, northeastern, and western regions of India accounted for the fastest growth in India's generation capacity. In FY 2017-18, power generation in the northern region by 4.73 percent, in the southern region by 4.74 percent. additions during calendar year 2017, with installed capacity of approximately 9.5 GW accounting for 45 percent of total power capacity additions. LoA holders that met certain milestones were entitled to enter into Fuel Supply Agreements (FSAs) with coal companies for the long-term supply of coal. However, the sector continues to face several issues. Access to power and the quality of power supplied to consumers is still poor. India also continues to face both energy deficit (0.7%) and peak deficit (2%). The deficit situation is worse in certain states such as Jammu and Kashmir, and the north-eastern states. Further, data shows that, in 2018, about 53% of the villages received electricity for domestic use for less than 12 hours in a day.[2] Despite all villages being electricity distribution companies, which is affecting their ability to buy power and improve the supply network. While their debt to banks was addressed to a certain extent by UDAY, the debt they owe to power plants is also a concern. As per the Standing Committee on Energy, as on June 2017 (post-UDAY period), there were 34 stressed thermal power plants with an outstanding debt of Rs 1.74 lakh crore.[3] These trends suggest that surplus power capacity, or electrifying villages may not imply continuous, and good quality power supply across the country. In the first budget of the 17th Lok Sabha, the central government mentioned that a package of power sector tariff and structural reforms will be announced soon. In this context, this note looks at how the power sector is regulated, current status of the power sector, key issues in the sector, recommendations on reforming the sector. POWER SECTOR IN INDIA There are three primary segments in the electricity sector: generation, transmission and distribution. Generation is the process of producing power using different fuels and is carried out in generating stations (generation plants). Transmission utilities carry bulk power from the generation plants to the distribution substations through a grid and at high voltages. [34]. Dharani Sugars and Chemicals Ltd. DISCLAIMER: This document is being furnished to you for your information. You may choose to reproduce or redistribute this report for non-commercial purposes in part or in full to any other person with due acknowledgement of PRS Legislative Research ("PRS"). The opinions expressed herein are entirely those of the author(s). PRS makes every effort to use reliable and comprehensive information, but PRS does not represent that the contents of the report are accurate or complete. PRS is an independent, not-for-profit group. This document has been prepared without regard to the objectives or opinions of those who may receive it. [54]. Electricity (Amendment) Bill, 2014, 28A%29 bill%2C 2014.pdf. Figure 10: Region-wise power deficit (2017-18) In 2017-18, energy deficit in the country was 0.7%, and peak surplus of 4.6% and peak surplus of 2.5%. Sources: Central Electricity Authority; PRS. The deficit situation is worse in certain states such as Jammu and Kashmir (both energy and peak deficit of 4.1%). Further, certain states such as Chhattisgarh, Odisha, and Uttar Pradesh continue facing high peak deficit despite having significant generation capacity. These states have generation capacity of 13.5 GW, 7.6 GW, and 25 GW respectively. Figure 11: State-wise deficits at 6.8%, 5.4%, and 10.9% respectively. Figure 11: State-wise deficits at 6.8%, 5.4%, and 10.9% respectively. capacity has been steadily increasing, the capacity utilisation of thermal power plants (also called Plant Load factor or PLF) has declined from 78% in 2009-10 to 61% in 2018-19.[21] Among the three types of generators (in terms of ownership), the private and state ones have poorer PLF as compared to the central ones. Table 3 shows details of PLF across the different types of generators. The High Level Empowered Committee (HLEC) on Stressed Assets (2018) noted that in the last six years, 110 GW is from coal-based plants. However, the demand has not increased at the same pace. Consequently, the available capacity is more than the demand and peak power shortage has reduced. Therefore, large capacity is lying underutilised. Low PLF implies that thermal plants have been lying idle, which could be due to non-availability of fuel (gas or coal), surplus capacity (in some parts of the country), or demand for power being low, or demand being met through other sources. Thermal plants require significant fixed costs, and they incur such costs even when the plant is lying idle. Therefore, it may be pertinent to look at current capacity growth. Figure 12: Plant load factor (in %) Table 3: Sector-wise PLF (in %) Year Central State Private 2009-10 86 71 84 2010-11 8 67 81 2011-12 82 68 70 2012-13 79 66 64 2013-14 76 59 62 2014-15 74 60 61 2015-16 73 55 60 2016-17 72 54 56 2017-18 72 57 55 2018-19\* 72 58 56 \* indicates provisional numbers (till January 2019) Sources: Ministry of Power, PRS. [44]. National Smart Grid Mission, Ministry of Power, March 27, 2015, . But, the peak power deficit was 2.1 per cent, while overall electricity deficit was 0.7 per cent across the country in that financial year. Note that for discoms the cost of power can significantly affect the retail tariff. [59]. "Office memorandum: Deendayal Upadhyaya Gram Jyoti Yojana", Ministry of Power, December 3, 2014, . High AT&C losses Aggregate Technical (AT&C) loss is the ratio of power for which the discom did not receive any payment to the total electricity procured by the utility. AT&C losses can be divided into technical (transmission) losses and non-technical (commercial) losses. Low levels of investment in distribution have resulted in overloaded systems, leading to higher technical losses. Theft and pilferage of power is a key reason for high commercial losses for discoms. Lack of metering and poor billing and collection systems also contribute to commercial losses. Figure 17: AT&C losses The national average for AT&C losses for 2014-15 was 25% (for 36 discoms out of a total of 55).[50] In comparison, transmission and distribution losses are at about 6% in the US and about 7.2% in the UK.[51],[52] Sources: Central Electricity Authority; PRS. The central government had launched the Accelerated Power Development Program in 2001 (later changed to the Restructured -Accelerated Power Development and Reform Programme (R-APDRP)) to improve the working of state power discoms, including reducing AT&C levels. In 2014, the scheme was subsumed under the Integrated Power Development Scheme (IPDS). Despite the attempts at reforms, reduction in AT&C losses (1.1% per annum between 2001-02 and 2013). 14) has been slower than the target.[53] UDAY also mandated states to reduce AT&C losses to 15% by 2018-19. As of September 2019, the AT&C losses for 13 states participating in UDAY is 21.4%. It recommended that a power plant should be able to terminate a PPA in case of default in payment from the discoms. [7]. All India Installed Capacity (in MW) of Power Stations, Central Electricity Authority, Ministry of Power, As on February 28, 2019, . \* indicates provisional numbers (till January 2019) Sources: Ministry of Power, PRS. The variable cost primarily includes fuel cost (cost of electricity purchased from other utilities, cost of power lost in transmission and distribution, and state levies such as surcharge, tax are also included in certain cases). Discoms/ utilities are required to file their tariff petitions (annually) with the relevant SERC, who then approves such tariff based on the specified criteria. However, it has been observed in the past that state discoms do not necessarily work on market principles, i.e., they do not price electricity to cover costs and reasonable profit. In October 2018, the Supreme Court ruled that CERC must decide on changes to the Power Purchase Agreements (PPAs) reflecting the increased cost of coal.[29] However, it also allowed the petitioners (a consumer rights group) to raise objections to any proposed amendments with the CERC. [50] Lok Sabha Questions, Untarred Question no 1672, March 5, 2015, . The Committee noted that running power plants at lower PLF also escalates the generation cost. There is a latent demand for power, which will surface once tariff is made more affordable. It suggested that generation cost can be reduced by improving the availability of cheaper indigenous coal, rationalising coal supply sources, and adapting new technology as per indigenous coal. Imported coal is 35-55% costlier than domestic coal). Further, there are certain technical limits on the usage of imported coal. [26], [27] Imported coal: Mundra UMPP, Gujarat Coastal Gujarat beneficiaries to carry out even small electricity based commercial activities. On the other hand, discoms who provide such connections perceive rural areas that are capable of carrying out some commercial activities. The plants must be commissioned before March 31, 2022. Regulatory structure With growth in the industrial and services sector in the 80s and the 90s, the power sector has changed significantly. Regulatory changes during this period sought to increase private sector participation in the sector, and bring in more competition and efficiency (more details in Table 2). This resulted in the state owned electricity boards being restructured. The generation segment was delicensed, and gradually witnessed increased private participation. Independent regulators were set up at both the central and state level, and Appellate Tribunals were established to hear appeals against these commissions. Currently, the Electricity Regulatory Commissions (SERCs), and the Central Electricity Regulatory Commission, trading and distribution of power. One of the key roles of the Commissions (typically SERCs) is to approve the tariff for retail sale of electricity. Tariff determination: Typically, electricity tariff consists of two parts: (i) Fixed Cost, and (ii) Variable Cost. It recommended that the Ministry may engage with the regulators to ensure that the late payment surcharge is mandatorily paid. Base year corresponds to the year when the UDAY scheme was started. Source: UDAY Portal, Ministry of Power; Lok Sabha Unstarred Question No. 1043, June 27, 2019; PRS. Table 6:State-wise details of ACS-ARR Gap Achievement (in Rs/Unit) State 2015-16 (base figures) 2016-17 2017-18 As on September 2019 Andhra Pradesh 0.82 0.44 0.02 -0.67 Arunachal Pradesh 3.76 5.22 4.32 NA Assam 0.58 0.3 0.43 1.21 Bihar 0.65 0.59 0.39 0.41 Chhattisgarh 0.18 -0.02 -0.03 -0.04 Goa 1.5 0.95 0.41 Okashmir 2.55 2.15 1.96 2.13 Jharkhand 1.22 1.39 0.57 0.54 Karnataka 0.06 0.06 0.07 -0.33 Kerala 0.23 0.53 0.27 0.49 Madhya Pradesh 0.92 0.24 0.33 0.88 Maharashtra 0.3 0.28 -0.07 -0.21 Manipur 1.31 0.1 0.08 0.24 Meghalaya 0.88 1.99 1.3 0.68 Punjab 0.53 0.65 0.42 Tripura 0.24 0.02 0.08 0.05 0.42 Tripura 0.24 0.02 0.08 0.05 0.42 Tripura 0.24 0.02 0.08 0.05 0.48 0.05 Rajasthan 1.65 0.36 -0.33 1.16 Sikkim 7.96 4.62 6.93 0.79 Tamil Nadu 0.6 0.39 0.28 0.85 Telangana 0.69 1.24 0.55 0.42 Tripura 0.24 0.02 0.08 0.05 0.48 0.05 Rajasthan 1.65 0.36 -0.33 1.16 Sikkim 7.96 4.62 6.93 0.79 Tamil Nadu 0.6 0.39 0.28 0.85 Telangana 0.69 1.24 0.55 0.42 Tripura 0.24 0.02 0.08 0.05 0.48 0.05 Rajasthan 1.65 0.36 -0.33 1.16 Sikkim 7.96 4.62 6.93 0.79 Tamil Nadu 0.6 0.39 0.28 0.85 Telangana 0.69 1.24 0.55 0.42 Tripura 0.24 0.02 0.08 0.05 0.48 0.05 Rajasthan 1.65 0.36 -0.33 1.16 Sikkim 7.96 4.62 6.93 0.79 Tamil Nadu 0.6 0.39 0.28 0.85 Telangana 0.69 1.24 0.55 0.42 Tripura 0.24 0.02 0.08 0.05 0.48 0.05 Rajasthan 1.65 0.36 -0.33 1.16 Sikkim 7.96 4.62 6.93 0.79 Tamil Nadu 0.6 0.39 0.28 0.85 Telangana 0.69 1.24 0.55 0.42 Tripura 0.24 0.02 0.08 0.05 Rajasthan 1.65 0.36 -0.33 1.16 Sikkim 7.96 4.62 6.93 0.79 Tamil Nadu 0.6 0.39 0.28 0.85 Telangana 0.69 1.24 0.55 0.42 Tripura 0.24 0.02 0.08 0.05 Rajasthan 1.65 0.36 -0.33 1.16 Sikkim 7.96 4.62 6.93 0.79 Tamil Nadu 0.6 0.39 0.28 0.85 Telangana 0.69 1.24 0.55 0.42 Tripura 0.24 0.02 0.08 0.05 Rajasthan 1.65 0.36 -0.39 0.58 Rajasthan 1.65 0.36 -0.39 0.58 Rajasthan 1.65 0.36 -0.39 Rajasthan 1.65 Uttar Pradesh 0.88 0.62 0.28 0.61 Uttarakhand 0.1 0.22 0.17 0.22 Dadra & Nagar Haveli - 0.27 0.06 NA Daman & Diu -0.11 -0.02 NA Puducherry 0.03 -0.11 0 0.04 Average for UDAY states 0.6 0.42 0.17 0.25 Note: Depicts data of states that have participated in the UDAY scheme. The data is self-reported by the state discoms. Base year corresponds to the year when the UDAY scheme was started. Source: UDAY Portal, Ministry of Power; Lok Sabha Unstarred Question No. 1043, June 27, 2019; PRS. Table 7: Estimated requirement of electricity in the year 2019-20. Table 7: Estimated requirement of electricity in the year 2019-20. Table 7: Estimated requirement of electricity in the year 2019-20. Table 7: Estimated requirement of electricity in 2019-20 (in million units) State/UTs 2019-20 Andhra Pradesh 68,034 Arunachal Pradesh 1,210 Assam 11,894 Bihar 31,017 Chhattisgarh 33,463 Delhi 35,380 Goa 5,068 Gujarat 1,20,693 Haryana 57,083 Himachal Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,949 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,532 Kerala 28,535 Madhya Pradesh 10,948 Jammu & Kashmir 17,109 Jharkhand 27,488 Karnataka 77,535 Madhya Pradesh 10,948 Jammu & Kashmir 17,109 Jharkhand 10, Nagaland 992 Odisha 30,302 Punjab 64,730 Rajasthan 83,168 Sikkim 577 Tamil Nadu 1,23,724 Telangana 75,164 Tripura 1,456 Uttar Pradesh 1,32,476 Uttarakhand 17,007 West Bengal 63,979 Andaman & Nicobar Islands 414 Chandigarh 2,145 Dadra & Nagar Haveli 8,210 Daman & Diu 2,449 Lakshadweep 57 Puducherry 3,387 All India 13,99,913 Sources: Unstarred Question No. 5371, Lok Sabha Questions, July 25, 2019. [1]. "Three Years' Achievements & Initiatives of the Ministry of Power, June 12, 2017, . Differential tariff structure Currently, different consumers buy electricity at different rates As of September 2019, the gap between average cost of supply and the average revenue realised is Rs 0.25/unit.49 One of the key reasons for this gap between ACS and ARR is different tariff structure for different tari subsidies to most discoms to allow them to charge such differential tariff (from low paying consumers). In addition to these direct subsidies from the state governments, low paying consumers (commercial and industrial). In case of cross-subsidies, subsidisation is inbuilt in the tariff. However, the overall revenue realisation may not meet the total cost of supply. Change in tariffs post UDAY: Punjab In 2013-14, Punjab In 2013-14, Punjab was providing free electricity to agricultural consumers, while commercial consumers, while commercial consumers were paying Rs 6.2/kWh. Post UDAY: Punjab In 2013-14, Punj tariff order that the number for commercial category for the year 2017-18 may be erroneous based on the bills submitted by the discom, and has requested the discom, and has requested the discom to submit correct consumption figures. Sources: PSERC Tariff Orders from 2015-16 to 2019-20; Annual Report (2013-14) on the Working of State Power Utilities & Electricity Departments, Planning Commission, February 2014; PRS. Figure 14: Tariffs in Punjab (in Rs/MU) Increasing tariffs for low paying consumers may be a challenging task for discoms. However, the ACS and ARR gap means that discoms will continue to not recover their costs, and make losses. Figure 15: Gap between average cost of supply and tariff (in Rs/kWh) Sources: Power Finance Corporation; PRS. ISSUES IN THE POWER SECTOR While the overall power situation in the country has improved, several issues within each segment of the sector. GENERATION Peak deficit continues to persist Generation capacity has increased over the years. Thermal generation capacity has had an average annual growth of 7% between 2005-06 and 2018-19. Power Purchase Agreement (PPA): As per the 2003 Act, distribution licensees enter into PPAs with generators between the procurers (discoms) and the generators (power plants). However, the country continues to face a peak deficit of 2%. This implies that in 2017, while the available capacity was 330 GW, the entire peak demand of 164 GW could not be met. This deficit situation is more pronounced in certain regions and states (see Figure 10 and Figure 11). [8]. "Tentative State-wise break-up of Renewable Power target to be achieved by the year 2022", Ministry of New and Renewable Energy, . In its load generation balancing report (LGBR) for 2018-19, the Central Electricity Authority (CEA) had pegged overall energy and peak power surpluses at 4.6 per cent and 2.5 per cent, respectively, indicating that India would be a power-surplus country in the financial year. Versus Union of India & Others, Transferred case (Civil) No.66 of 2018 in Transfer Petition (Civil) No.1399 of 2018, Supreme Court of India, April 2, 2019, . [30]. "Methodology for Linkage Rationalization for Independent Power Producers (IPPs)", Press Information Bureau, Ministry of Coal, May 16, 2018. Recently, there have been proposals to bring in more private sector participation in the power distribution segment. The Electricity (Amendment) Bill, 2014, (which has now lapsed), and subsequent draft amendments proposed framework, the distribution business will be segregated into the supply and network business. Consumers will have the choice to buy electricity from multiple power suppliers, as opposed to buying from a single distribution company currently. As much as 108.19 BUs of electricity was supplied against the demand of 108.66 BUs in March. [43]. "Large Scale Grid Integration of Renewable Energy Sources - Way Forward", Central Electricity Authority, November 2013, . In 2017 also, the CEA in its LGBR had projected that India would become a power-surplus nation in 2017-18. Further, there have been very few bids by the discoms for long/medium term PPAs, because of the high fixed costs associated with them. [18]. Electricity Act, 2003, Section 14, Proviso 6. This further affects the viability of generators. 2015-2017 As of March 2015, the state discoms had accumulated losses of approximately Rs 3.8 lakh crore and outstanding debt of approximately Rs 4.3 lakh crore. The Ujwal Discom Assurance Yojana (UDAY) was introduced to allow states to help the discoms by taking over their debt. 2017 - now India declared as a power surplus country. All villages have been electrification scheme, Saubhagya, launched. Draft amendments to the 2003 Act propose to segregate the network and supply business, and introduce a system of direct benefit transfers with regard to subsidies. Coal linkages are being allocated through auction (SHAKTI). Sources: Electricity Regulatory Commission Act, 1998; Electricity Act, 2003; 14th Report: Transmission and Distribution Systems and Networks, Standing Committee on Energy; Power Sector Reforms in Odisha: Major Issues and Challenges, Government of Odisha; PRS. Table 1: Installed generation capacity in MW (as on January 2019) Thermal Nuclear Hydro (renewable) Renewable sources Grand total Coal Lignite Gas Oil Total capacity 54.7% 1.8% 7.1% 0.2% 63.9% 1.9% 13.0% 21.2% 100% Sources: Ministry of Power; PRS. Note: Small Hydro, and Hydro projects are classified as Renewable energy Renewable energy Renewable energy Renewable energy sources include wind, solar, bio power, and small hydro power, and small hydro power projects will be also classified as renewable energy Renew the grid, or be off-grid systems. Off-grid systems help in meeting the energy requirements of remote areas, and areas which are not likely to be electrified in the near future. Examples of off-grid systems include biomass-based heat and power projects, industrial waste-to-energy projects, and solar roof-top systems. However, regulators often insist that the generators forego the late payment surcharge on the delayed payments. The power generation can be doubled provided distribution companies (discoms) pay their dues promptly. [35]. Climate Change 2013: The Physical Science Basis, Fifth Assessment Report, Intergovernmental Panel on Climate Change, 2013; . During March 2019, the overall energy deficit was 0.4 per cent. Future coal linkages will be granted as per the following: Central and state generating companies: On the recommendation of the Ministry of Power; Independent power producers without PPA: Auction where bidding for linkage will be done over the Notified Price of Coal Company. Power Purchase Agreements (PPAs) PPAs are bilateral contracts between the procurers (discoms) and the generators (power plants). Their total outstanding due was Rs 40,698 crore toward power generators till January this year." He added that India can be a power-surplus state as its installed power generation capacity is around 356 GW against the peak demand of about 177 GW. These power on the power exchange or through short-term PPAs. This adversely affects the latter's liquidity and ability to service their debt and operate the plant. [26]. Based on benchmark coal price and calorific value for Australia (Newcastle), South Africa (Richards Bay), USA (CME) and Indonesia (McCloskey-CME). [38]. "India's Intended Nationally Determined Contributions - Towards Climate Justice", Ministry of Environment, Forest and Climate Change, 20PPT%20Press%20Conference%20INDC%20v5.pdf. [9]. Lok Sabha Unstarred Question No. 2606, Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry of New and Renewable Energy, August 2, 2018, . In April 2018, the Ministry utilisation of power generated from renewable sources. Transmission lines are 4.07 lakh circuit km long. Since 2007, the transmission lines are 4.07 lakh circuit km long. Since 2007, the transmission lines are with the state governments 38% with the centre, and remaining are with private companies. Figure 13: Length of Transmission lines (in circuit km) Sources: Central Electricity Authority; PRS. Bottlenecks in the transmission network cause issues with evacuation of generation capacity. Congestion means a situation where the demand for transmission capacity exceeds the available transfer capability. The Working Group on Power (2012) had noted that some of the state transmission utilities require financial support, especially for building transmission systems for renewable energy sources. [42] It had recommended providing viability gap funding on a case-to-case basis for building intra-state transmission systems. Scheme for Harnessing and Allocating Koyala (Coal) Transparently in India (SHAKTI): The scheme, launched in May 2017, provides for a coal linkage policy for the allocation of coal among thermal power plants in a transparent and objective manner. According to the latest CEA data, during peak hours, as much as 175.52 gigawatt (GW) was supplied against demand of 177.02 GW leaving a deficit of 1.49 GW or 0.8 per cent as 168.74 GW power was supplied against the demand of 169.46 GW. INSIGHTS Surplus generation capacity but deficits continue, capacity utilisation declining Two years ago, the central government announced that India has become a power surplus country, and all the villages have been electrified. However, since then, several issues have come up in the sector, and a few others remain to be addressed. NEW DELHI: India has become a power surplus country, and all the villages have been electricity. surplus nation by a whisker as its peak power deficit stood at 0.8 per cent and the overall energy deficit remained 0.6 per cent in 2018-19. [25]. Provisional Coal Statistics (2008-2017), Coal Controller Organisation, . Smart Grid is an electricity network that uses information and communication technology to gather information and act intelligently in automated manner to improve the efficiency, reliability, economics, and sustainability of generation, transmission and distribution of electricity. Tariff petitions with regulators are issued in a tariff order. Typically tariff petitions should be filed annually. The UMPP project supplies power to the five states of Gujarat, Rajasthan, Maharashtra, Haryana, and Punjab. These companies were generating power through coal being exported from the country increased, and hence affected the commercial viability of the generating plants in India. According to the report, India had been expecting to the report, power generation in India grew by 3.95 percent in FY 2017-18. Plant Load Factor (PLF): PLF is a measure of the output of a power plant compared to the maximum output it could produce. Rural electrification numbers have improved, but the quality of supply is questionable In April 2018, the central government announced that all villages have been electrified. Under the Saubhagya scheme, 18,374 households remain to be electrified as on March 31, 2019. However, continuous supply of electricity continues to remain a challenge. Data also shows that about 53% of the villages receive electricity for less than 12 hours in a day for domestic use. Further, supply to rural areas has to be carried out by discoms, many of which are in poor financial health. The Electricity Act, 2003 allows for open access which enables consumers to buy power from any power generating plant through non-discriminatory access to transmission and dispatch of electricity over inter-regional links in accordance with grid standards, and monitors the national transmission grid. It is also the nodal agency providing transmission access to the power system grid in the respective regions. India's transmission lines have grown at an average annual rate of 6.5% between 2007 and 2019 (till March 2019); substation capacity has grown during the same period at 11.2%.[10],[11] Inter-regional transmission capacity has grown from 14 GW in 2007 to 95 GW till January 2019.[12] Distribution Distribution Distribution includes maintenance of the distribution network and retail supply of electricity to the consumers. It is mostly carried out by state-owned distribution companies (discoms). However, in cities such as Delhi, Mumbai, Ahmedabad, and Kolkata, private entities own the distribution business. Discoms (or distribution business. Discoms (or distribution business) and supply it to their consumers (in the area of distribution). One of the key issues with the power for supply, and the ability to invest in improving the distribution infrastructure. Consequently, this impacts the quality of electricity that consumers receive. Power consumption India's per capita power consumption was 1,149 kWh as on March 31, 2018.[13] This consumption has increased at an average annual rate of 4.6% since 1990. However, it is much lower as compared to several other consumption by the agriculture sector in India is higher as compared to other countries. On the other hand, in India, the consumption by the commercial sector is lower as compared to other countries (see Figure 6). [45]. Reports on the performance of state power utilities for the years 2004-05 to 2013-14, Power Finance Corporation, . [27]. of Blending of Imported Coal with Domestic Coal, Central Electricity Authority, April 2012, www.cea.nic.in/reports/articles/thermal/blending coal.pdf. Figure 16: Consumer category-wise electricity tariff (in Rs/kWh) Sources: Power Finance Corporation; PRS. [19]. 14th Report: Transmission and Distribution Systems and Networks, Standing Committee on Energy, March 18, 2011, . Resolution of Stressed Assets - Revised Framework, RBI/2017-18/131, Reserve Bank of India, February 12, 2018, . India's power supply deficit held steady at 0.7 percent during financial year (FY) 2017-18, coming in roughly unchanged from the figures reported during financial year FY 2016-17. During 2017-18, coming in roughly unchanged from the figures reported during financial year FY 2016-17. During 2017-18, coming in roughly unchanged from the figures reported during financial year FY 2016-17. During 2017-18, coming in roughly unchanged from the figures reported during financial year FY 2016-17. During 2017-18, coming in roughly unchanged from the figures reported during financial year FY 2016-17. During 2017-18, coming in roughly unchanged from the figures reported during financial year (FY) 2017-18, coming in roughly unchanged from the figures reported during financial year (FY) 2017-18, coming in roughly unchanged from the figures reported during financial year (FY) 2017-18, coming in roughly unchanged from the figures reported during financial year (FY) 2017-18, coming in roughly unchanged from the figures reported during financial year (FY) 2017-18, coming in roughly unchanged from the figures reported during financial year (FY) 2017-18, coming in roughly unchanged from the figures reported during financial year (FY) 2017-18, coming in roughly unchanged from the figures reported during financial year (FY) 2017-18, coming in roughly unchanged from the figures reported during financial year (FY) 2017-18, coming in roughly unchanged from the figures reported during financial year (FY) 2017-18, coming in roughly unchanged from the figures reported during financial year (FY) 2017-18, coming in roughly unchanged from the figures reported during financial year (FY) 2017-18, coming in roughly unchanged from the figures reported during financial year (FY) 2017-18, coming in roughly unchanged from the figures reported during financial year (FY) 2017-18, coming in roughly uncha 18, 1,203,567 million units (MUs) of electricity were supplied against the requirement of 1,212,134 MUs. This was 8,567 MU less than the targeted energy requirement, according to the Central Electricity Authority (CEA). But even though the power supply deficit was unchanged year-over-year, the peak deficit which is a measure of the supply deficit during peak demand hours, rose to 2 percent from the 1.6 percent recorded in FY 2016-17. The power supply deficit and peak power deficit listed by region at 1.7 percent, and the eastern region at 0.7 percent. [11]. "Progress of Substations in the Country up to Aug-19", Central Electricity Authority, . It is also called as Two Part Tariff. [15] Fixed cost includes interest, depreciation, operations and maintenance costs, return on equity (profit) and tax liabilities of power generation, transmission and distribution network. [5]. Provisional Coal Statistics 2017-18, Coal Controller's Organisation, Ministry of Coal, December 2018, . [37]. CO2 emissions (kg per PPP \$ of GDP), The World Bank, last accessed in August 2019, . The capacity utilisation of thermal power plants (also called Plant Load factor or PLF) has declined from 78% in 2009-10 to 61% in 2018-19. Low PLF implies that thermal plants have been lying idle, which could be due to non-availability of fuel, surplus capacity (in certain regions of the key reasons behind poor capacity utilisation of thermal plants is the planned shift in the energy mix. With renewable energy seeing a push through government policies, its tariff has decreased significantly. This poses a challenge to the existing thermal sector, where plants are already operating at lower capacities and facing insolvency, in certain cases. The RBI's report on state finances for 2015-16 observed that FRP improved the liquidity of discoms by providing a moratorium on debt repayments. reduction targets. In November 2015, the central government announced another bailout scheme for the distressed state discoms, the Ujwal Discom Assurance Yojana (UDAY). The scheme was optional for states - 27 states signed up for it. Under the scheme, states had to take over 75% of discoms debt (as on September 30, 2015) over two years (50% in the first year and 25% in the second year). The debt taken over by the states was not counted in their fiscal deficit for the first two years. States that accepted the scheme are to receive additional benefits from the central government. These include: (i) additional or priority funding through Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY), Integrated Power Development Scheme (IPDS), Power System Development Fund (PSDF) or any other such schemes, and (ii) supply of additional coal at notified prices and low cost power from NTPC and other central PSUs (depending on availability). improvements such as compulsory smart metering, and upgradation of transformers. States not meeting these operational milestones will have to forfeit their claim on the IPDS and DDUGJY grants. The part of discom debt not taken over by the states would be converted by banks and financial institutions into loans or bonds, or it may be fully or partly issued by the discom as state guaranteed discom bonds at the prevailing market rates. States will take over the future losses of discoms, it is unclear whether it will help reduce the losses in the long term. The RBI's report on state finances for 2015-16 noted that while UDAY may alleviate the non-performing asset (NPA) problem of banks, it will increase the liabilities of participating states. UDAY is expected to help improve the liquidity of the discoms as well as reduce the losses by lowering the interest burden on them. Further, by involving the states, UDAY may be able to address the issue of efficiency improvement and cost-reflective tariff hikes. However, the report noted that this scheme may reduce the fiscal space of states may not be able to shrink their deficits, which may put an additional burden on the centre. The Ministry of Power had mentioned that, post UDAY, AT&C losses have reduced to 18.8% in 2017-18 from 20.8% in 2017-16 (only for the states participating in UDAY).[48] The gap between average cost of supply (ACS) and average cost of supply (ACS) and average revenue realised (ARR) has reduced from Rs 0.6/unit in 2015-16 to Rs 0.17/unit in 2017-18.48 However, as per the latest available information these levels seemed to have increased again. As of September 2019, the AT&C losses are at 21.4%, and ACS-ARR gap is at Rs 0.25/unit.[49] Note that, all these numbers are self reported by the states participating in the scheme. As of July 31, 2019, the outstanding dues of power utilities payable to the central public sector undertakings (such as NTPC) were at Rs 32,968 crore. While discoms may be able to address some operational issues, there will be challenges to address some core issues such as (i) differential tariff revisions and subsidy payments, and (iii) high levels of Aggregate Technical and Commercial (AT&C) losses. We discuss some of these issues. [13]. Growth of Electricity Sector in India from 1947-2018, Central Electricity Authority, June 2018, . In December 2016, CERC noted that since the companies had Coal Sales Agreements for imported coal for the entire guantum of coal required for supply of power, the change in regulations completely changed the premises on which they had guoted tariffs in their bids to their consumers.[28] CERC ruled that the companies can invoke 'force majeure' (unforeseeable circumstances that prevents a contract from being fulfilled). Losses arising due to the increase in price of coal will be paid up by the consumers (through higher power tariff). It also ordered the companies to source domestic coal and reduce dependence on imported coal, subject to technical feasibility. [33]. 40th Report: Impact of RBI's Revised Framework for Resolution of Stressed Assets on NPAs in the Electricity Act, 2003, the central and state governments have a joint responsibility in providing electricity to rural areas. Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY), launched in 2005, was the first scheme looking at rural electrification. Under the scheme, an electrification of basic infrastructure such as distribution transformers and lines the inhabited locality, (ii) provision of electricity in public places such as schools, panchayat office, health centres, etc., and (iii) at least 10% of the total number of households in the village are electrified.[58] In December 2014, the Ministry of Power launched the Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY). [59] Components of RGGVY were subsumed under DDUGJY. In April 2018, the Ministry of Power announced that all villages have been electrified. Just prior to this, the Pradhan Mantri Sahaj Bijli Har Ghar Yojana (or Saubhagya) was launched. The scheme seeks to ensure universal household electrification (in both rural and urban areas) by providing last mile connectivity. [17]. Power sector operations and impact on state finances, Volume I: All India summary of key aspects of power sector, 14th Finance Commission and distribution in the United States, Frequently Asked Questions, US Energy Information Administration, July 10, 2015, . A power sector expert said, "The deficit is primarily due to discoms not being able to buy power. The regulator must ensure the sustainable operation of the power sector. The data showed that as much as 1,267.29 billion units (BUs) of electricity was supplied against the demand of 1,274.56 BUs leaving an overall electricity or energy deficit of 7.35 BUs or 0.6 per cent during 2018-19. Following the judgement, it was observed that between 2012 and 2014, more than 20 states revised their tariffs.[17] Competition in retail supply of electricity: The 2003 Act also provides for multiple distribution licensees to set up their own parallel network in the same area, thus allowing competition in the distribution segment.[18], Parallel licensing is when multiple licenses are issued to distribution (barring a few areas like Mumbai, and Delhi). [29]. M.A. Nos.2705-2706 of 2018, Civil Appeal Nos.5399-5400 of 2016, Supreme Court of India, October 29, 2018, . [41]. "Flexibility in Generation and Scheduling of Thermal Power Stations to reduce emissions.", No.23/70/2017-R&R, Ministry of Power, April 5, 2018, . Table 4: Power generation capacity and deficit State/UT Installed generation capacity (in MW, as on December 31, 2018) Energy deficit (2017-18) Peak deficit (2017-18) State Private Central Total (in %) (in %) Andhra Pradesh 6,968 14,707 2,052 23,726 -0.2% -0.1% Arunachal Pradesh 107 5 188 301 -1.3% 0.0% Assam 433 45 1,097 1,575 -3.5% -4.2% Bihar 781 536 3,024 4,341 -1.5% -0.1% Chhattisgarh 2,411 9,014 2,101 13,527 -0.3% -6.8% Goa 0 50 500 550 0.0% -0.2% Gujarat 7,714 19,356 4,312 31,382 0.0% 0.0% Haryana 4,032 4,628 2,600 11,261 0.0% -1.4% Himachal Pradesh 951 1,600 1,498 4,049 -0.6% 0.0% Jammu and Kashmir 1,534 60 1,795 3,389 -20.0% Jharkhand 554 762 455 1,771 -1.9% -5.4% Karnataka 8,890 14,782 3,527 27,199 -0.2% -0.5% Kerala 2,170 998 1,915 5,083 -0.4% -0.6% Madhya Pradesh 6,528 10,200 5,144 21,873 0.0% -0.3% Maharashtra 13,901 22,458 7,420 43,779 -0.2% -0.3% Mizoram 36 0 159 196 -1.8% -8.6% Nagaland 31 1 128 159 -2.9% -5.8% Odisha 2,488 3,427 1,733 7,648 -0.3% -5.4% Punjab 4,636 6,558 2,239 13,432 0.0% 0.0% Rajasthan 7,574 11,242 3,017 21,833 -0.8% -1.3% Sikkim 412 399 151 962 -0.2% 0.0% Telangana 8,403 5,427 2,115 15,944 -0.1% -0.1% Tripura 186 0 548 733 -1.8% 0.0% Uttarakhand 1,320 1,160 920 3,399 -0.2% 0.0% Uttar Pradesh 6,218 12,375 6,468 25,061 -1.5% -10.9% West Bengal 6,578 2,774 1,171 10,523 -0.4% -0.3% Andaman and Nicobar Islands 45 1 5 52 -9.1% -6.9% Chandigarh - 32 163 195 -0.6% 0.0% Dadra and Nagar Haveli - 5 250 255 0.0% Dadra and Nagar Hav 0.0% 0.0% Puducherry 33 2 334 369 -0.3% -0.8% Total 1,04,408 1,60,958 83,922 3,49,288 -0.7% -2.0% Source: Central Electricity Authority; Power Finance Corporation; PRS. Tables 5 and 6 show the following: (i) the AT&C losses, and (ii) the gap between the average cost of supplying power (ACS) and the average revenue realised (ARR) from the sale of power, for the states participating in the UDAY scheme. Quality of rural electricity to households for the limited purpose of illumination. Fuel Supply Agreement (FSA): Agreement between coal company and power producer for the buying and sale of coal. Average Revenue Realised (ARR): The average revenue realised by a discom from the sale of one unit of power to its consumers. AT&C losses: Aggregate Technical and Commercial (AT&C) loss is the ratio of power to its consumers. losses are incurred due to heat and energy loss in the wires and other equipment. Commercial losses include non-collection of revenue, and pilferage of electricity. Cross-subsidy for a consumer category is the difference between the cost to serve that category of consumers and the average tariff realised from that category of consumers. Discom/ Distribution utility: Distribution includes maintenance of the distribution network and retail supply of electricity to the consumers. It is mostly carried out by state-owned distribution network and retail supply of electricity to the consumers. power. These include coal, natural gas, hydro, nuclear, and renewable (includes solar, wind, small hydro, biomass). As on December 2018, the power generation capacity has increased considerably. This increase is attributed to the delicensing of power generation in 2003, which enabled unrestricted participation of private sector companies. Today, private utilities (30%), and central generating utilities (24%). Figure 1: Structure of the power sector Coal accounts for a majority of power generation at 55%. Overall thermal power generation (including coal, and natural gas) is at 64%. Renewable energy accounts for around 21% of the total generation capacity. Hydro power accounts for 13% of generation capacity are provided in Figure 2 and Table 1 below. Power sector is the largest user of coal. In 2017-18, 576 MT of coal was dispatched to the power sector (84% of the total coal dispatched in the country).[5] Figure 2: All India power generation capacity (as on January 2019) Sources: Ministry of New and Renewable Energy; PRS. In April 2016, India, as a member

country of the United Nations Framework Convention on Climate Change, signed on to undertake certain climate actions known as Intended Nationally Determined Contributions (INDCs). India's INDCs include achieving the following targets by 2030: (i) reducing greenhouse gas emissions per unit of GDP by 33-35% from 2005 levels; (ii) achieving the following targets by 2030: (i) reducing greenhouse gas emissions per unit of GDP by 33-35% from 2005 levels; (ii) achieving the following targets by 2030: (i) reducing greenhouse gas emissions per unit of GDP by 33-35% from 2005 levels; (ii) achieving the following targets by 2030: (i) reducing greenhouse gas emissions per unit of GDP by 33-35% from 2005 levels; (ii) 40% of installed electric power capacity from non-fuel based energy sources (such as solar, wind, hydropower); and (iii) creating additional carbon storage and absorption capacity for 2.5-3 billion tonnes of CO2 by increasing forest and tree cover. With regard to these specific INDCs, note that between 2005 and 2014, greenhouse gas emissions per unit of GDP decreased by 19%.[37] However, with about 64% of India's power coming from thermal sources, and a focus on increasing thermal generation capacity through UMPPs and captive mining, it is unclear how a 35% reduction in greenhouse gas emissions will be achieved. As on January 2019, the share of renewable energy (including hydro) in power generation is 34%. This share has to be increased up to 40% by 2030, and simultaneously the share of thermal power has to decrease from the current share of 64%. The Ministries of Power, and Non and Renewable Energy have set a few targets in order to achieve some of these include: (i) achieving 40% of electric power installed capacity from non-fossil fuel by 2030; (ii) generating 175 GW of renewable energy by 2022, and increasing capacity under the National Smart Grid Mission & Green Energy Corridor for efficient transmission & distribution network; (iv) reduction in fossil fuel subsidies; and (v) providing tax free infrastructure bonds introduced for renewable energy.[38] The central government also increased the coal cess from Rs 50 to Rs 200 per ton in 2016-17. Guidelines for thermal power plants The Ministry of Environmental guidelines for thermal power plants The Ministry of Environment also increased the coal cess from Rs 50 to Rs 200 per ton in 2016-17. plants in December 2015.[39] As per these guidelines, these plants were required to retrofit or install equipment that would help reduce their emission levels. The MoEFCC allowed the thermal power plants into three categories for compliance purposes. These are plants installed: (i) before December 31, 2003, (ii) after 2003, and before December 31, 2016. However, these guidelines were opposed by the industry of Power extended the deadline to December 2022.[40] It also noted that the guidelines will be considered as a change in the law in certain cases. In such cases, any additional cost implication due to installation of emission control equipment can be passed through to consumers, in the form of higher tariffs. [15]. A consumer's guide to electricity tariff determination, Karnataka Electricity Regulatory Commission, 20Advocacy/ELECTRICITY-TARIFF-DETERMINATION.pdf. [28]. Petition No. 155/MP/2012, Central Electricity regulatory Commission, December 6, 2016, . Figure 1 shows the overall structure of the power sector. With respect to renewable energy, the rapidly falling price of power generation due to technological advancements may pose risk to projects which were set up earlier at higher costs. Under this policy, a Standing Linkage Committee (under the Ministry of Power) recommended the issuance of Letters of Assurance (LoAs) to power plants. [2]. Antyodaya, Ministry of Rural Development, last accessed on September 20, 2019, . It also noted that the most severe shock to the power sector will cause the banking system NPAs to rise by about 68 bps. [31] The Standing Committee on Energy (2018), had examined 34 independent power producers (IPPs), with a capacity of 40 GW, that had turned into NPAs. As of June 2017, there were 34 stressed thermal power plants with an outstanding debt of Rs 1.74 lakh crore.3 There are several reasons for financial stress in these thermal power projects, some of which are explained below. Resolving NPAs RBI circular: In February 2018, the RBI released a framework for restructuring of stressed assets of over Rs 2,000 crore on or after March 1, 2018.[32] The framework provided that the resolution plan for restructuring must be unanimously approved by all lenders and implemented within the stipulated time period, the stressed assets must be referred to the NCLT under the IBC within 15 days. Various power producers appealed to courts against the RBI circular. Standing Committee's observations: The Standing Committee's observations: The Standing Committee's observations against the RBI circular. These new guidelines will worsen the NPA crisis in the sector. It recommended that instead of adopting a sector agnostic approach towards stress resolution, more specific and sector friendly approaches should be used. Supreme Court's order: The Court held that the circular issued by RBI was outside the scope of the power given to it under section 35AA of the Banking Regulation (Amendment) Act, 2017.[34] Consequently, all IBC proceedings, several power companies provided that their reasons for delays in payment of bank dues include: (i) cancellation of coal blocks by the Supreme Court leading to nonavailability of fuel, (ii) lack of enough PPAs by states, (iii) non-payment of dues by discoms, and (iv) delays in project implementation leading to cost overruns. Availability is critical in several plants of the National Thermal Power Corporation. It recommended that CIL should ensure that every generator must be provided with the coal required in a time-bound manner. Further, power plants should be provided enough coal to enable them to run at 85% efficiency. Power plants should primarily use domestic coal. They may be allowed to use 15-20% of imported coal, only if they can remain economically viable [58]. Rural Electrification Policy, Ministry of Power, August 23, 2006, 20Policy 1.pdf. 100% metering of all connections will help in better energy auditing accountability. Figure 18: Transmission and Distribution losses across several countries in 2015 (in %) Sources: Central Electricity Authority; PRS. Proposed segregation of the distribution function The Electricity (Amendment) Bill, 2014 was introduced in Lok Sabha in December 2014, and lapsed with the dissolution of the 16th Lok Sabha. The 2014 Bill sought to: (i) increase competition in the sector by segregating the distribution and supply, (ii) rationalise tariff determination, and (iii) promotement of the 16th Lok Sabha. renewable energy.[54] The 2014 Bill was examined by the Standing Committee on Energy (2015), which suggested certain changes to the Bill.[55] In 2018, the Ministry of Power then proposed draft amendments based on the Committee's recommendations and other stakeholder consultations.[56] The 2018 draft amendments retained the segregation of distribution into the network and supply business. This would allow for multiple supply licensees in an area of supply, and consumers may choose to buy electricity from multiple suppliers will work were not provided in the amendments. The southern and western regions recorded the lowest supply deficits of 0.2 percent and 0.1 percent, respectively. The recorded figures fell short of targets set by CEA in its 2017 Load Generation Balance Report (LGBR), a study on the anticipated power supply for FY 2017-18. While free or subsidised electricity could continue to be provided in rural areas it should be metered to better understand the level of consumption and losses, if any. Saubhagya scheme - household electricity across all households in the country, the supply of electricity continues to be the challenge. If the discoms do not have enough fiscal space to buy power, then the power supply situation will continue to remain poor. Also, note that these are rural areas, or areas with more domestic consumers may lead to increased losses unless the discoms are compensated by the government. ANNEXURE Power sector schemes Accelerated Power Development and Reforms Programme (APDRP): The APDRP was launched in 2002-03, with the primary objective of reducing the revenue realisation by the state discoms. Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY): Launched in December, 2014, the scheme provides for rural electrification. It also provides for separation of agriculture feeders, strengthening and augmentation of sub-transmission and distribution infrastructure, and electrification of villages across the country. The previous rural electrification of sub-transmission and distribution infrastructure, and electrification of sub-transmission and distribution infrastructure. Restructuring Package (FRP): In 2012, the central government had announced the FRP to solve the immediate funding needs of the highly distressed state discoms. [31]. Financial Stability Report Issue No. 17, Reserve Bank of India, June 2018, [32]. Duration of electricity supply Currently, 4.3% of villages in India do not receive electricity for domestic use (most of these villages are in the north-eastern region). 4.7% of villages receive electricity (for domestic use) for one to four hours in a day. As per data collected under Mission Antyodaya implemented by the Ministry of Rural Development, in 2018 about 53% of the villages receive electricity for less than 12 hours a day. Therefore, while villages have been electrified, the duration and quality of electricity they receive is poor. [46]. "UDAY (Ujwal DISCOM Assurance Yojana) for financial turnaround of Power Distribution Companies", Press Information Bureau, Ministry of Power, November 5, 2015. [47]. (Discoms)", Ministry of Power, October 5, 2012. The Committee also recommended that every connection provided by the discoms, irrespective of the purpose, type or category, must be metered. The new scheme SHAKTI, proposes to move towards an auction based system for allocation of such linkages (except for central and state generation companies, and certain exemptions provided in the Tariff Policy, 2016). For example, if solar energy is being used in an area, it will require an alternate source for the night time requirement. This balancing power could come from gas or hydro based power. As gas is a scarcely available resource, hydro power becomes a more obvious choice. Thirdly, the share of hydro power has reduced from 25% in 2007-08, to about 13% in 2018-19. Harnessing hydro potential will also help boost economic growth in these states. Therefore, the Committee recommended that the growth of various sectors should be such that electricity. The NITI Aayog had observed that electricity. buyers in renewable poor states are relatively less willing to purchase renewable electricity due to higher costs than the conventional sources.[23] On the other hand, discoms in renewable states have indicated that they would support additional renewable renew Committee on Energy (2015) had noted that due to the intermittent nature of renewable energy, making renewable energy resources until grid parity is achieved.23 While renewable tariffs have decreased significantly in some state in the recent years, now the issue is with certain discoms hesitating to honour their renewable PPAs that were based on higher tariffs. Note that the 2018 draft amendments to the Electricity Act, 2003, make the generation and purchase of a certain amount of renewable energy mandatory. Renewable generation is defined as the minimum percentage of electricity that must be procured by supply licensees from renewable sources, or an instrument representing renewable energy (such as renewable energy (such as renewable energy (certificates). High cost of power The Standing Committee on Energy (2017) noted that higher tariff is also a key reason for lower electricity demand. Setting up of a new network requires significant capital investment and has acted as an entry barrier for new participants. Figure 9: Power deficit in India \* Anticipated surplus Sources: Central Electricity Authority; PRS. More articles from Saumy Prateek. As per the Ministry of Power, the aggregate overdue of discoms to all generators is Rs 54,599 crore, as on July 31, 2019. While UDAY addressed the outstanding debt of discoms partially, they have not been able to achieve all the goals they were mandated to, under the scheme. Aggregate Technical and Commercial Losses (includes theft and billing issues) are at 20%, as opposed to the target of being eliminated. Note that one of the key reasons for this revenue gap is the under-pricing of tariff for agricultural and residential consumers. Further, the RBI has noted that UDAY will increase the liabilities of the states, who are taking on the losses of the state discoms. Figure 5: Per capita power consumption in 2015 (in kWh) Sources: Central Electricity Authority; PRS. Figure 6: Category-wise consumption across countries (in 2015) Sources: Central Electricity Authority; PRS. Coal linkages for thermal power plants - Scheme for coal linkages and purchase of power announced a new scheme for coal linkages for thermal power plants - Scheme for coal linkages and purchase of power Coal linkages and purchase of power announced a new scheme for coal linkages for thermal power plants (SHAKTI).[14] Prior to this, coal was supplied to thermal power plants as per the National Coal Distribution Policy, 2007 (NCDP). [3]. 37th Report: Stressed /Non-performing Assets in Electricity Sector, Standing Committee on Energy, March 7, 2018, . Under the scheme, thermal power plants with LoAs will be eligible to sign FSAs after ensuring tha the plants are commissioned, respective milestones are met, and all specified conditions of the LoA are fulfilled within a specified timeframe. [22]. 30th Report: National Electricity Policy - A Review, Standing Committee on Energy, August 9, 2017, . The Standing Committee on Energy examining the 2014 Bill had suggested that the law should provide certain details regarding consumer switching between supply licensees. These include: (i) the mechanism for providing the consumer, and the cost involved in such choice and transfer. Removing cross-subsidies in the sector As discussed earlier, currently, consumers are charged different tariff rates based on their consumption category. While state governments provide direct subsidies, low paying consumers (agricultural and residential) are also cross-subsidies, subsidisation is inbuilt in the tariff. Such differential pricing and subsequent cross-subsidising raises the input costs for manufacturing and service sectors. The draft amendments provided that any subsidy to any category of consumer will be provided by the state or central government through direct benefit transfer (DBT). Further, the crosssubsidisation within a distribution area will not exceed 20%, and will be progressively reduced and eliminated within three years. The cross-subsidy for a consumer category is the difference between the cost to serve that category of consumers and the average tariff realised from that category of consumers. Two possibilities may arise due to removal of such cross-subsidy. First, it could increase the tariffs for the currently low paying consumers (agricultural and residential) who are being subsidised. in their tariffs by giving them explicit subsidies through DBT. This could increase the subsidy burden on the exchequer (either through the Union budget or state budgets or a combination of both). Note that in August 2018, the Ministry of Power had also proposed amendments to the Tariff categories and rationalise retail tariff. The draft suggested that the tariff for different tariff. in higher load and consumption brackets. REGULATORS Electricity Regulatory Commissions Act, 1998. The primary objective of setting up the Commissions was to have an independent body regulating tariffs. The 2003 Act broadened the mandate of the Commissions by providing them the powers to grant licenses for inter-state transmission and trading of power and to amend, suspend and revoke these licences. The broader objective of the Commissions was to bring in transparency, accountability, and a professional approach to regulate the sector, and also to impartially balance the interests of investors as well as consumers. Saumy is a senior staff reporter with MercomIndia.com covering business and energy news since 2016. Overview of the Power Sector With India looking at rapid industrialisation and urbanisation over the next three decades, the demand for power in the country is going to increase. The power generation situation in the country has improved in the last few years. In June 2017, the Minister of Power announced that India has become a power surplus country, with no shortage of electricity or coal.[1] Currently, India produces a majority of its energy from thermal sources. As of January 2019, the total grid-interactive renewable power capacity is at 45 GW. The government has set a target of installing 175 GW of renewable energy capacity by 2022 (excluding hydro).[8] This includes 100 GW from solar, 60 GW from wind, 10 GW from bio-power and 5 GW from small hydro power.[9] Roughly, this would translate into an average capacity addition is at around 24 GW per year. Note that wind and solar power fave a lower plant load factor (PLF) than thermal power given the intermittent wind speed and sunlight, often averaging at 20-25%. Therefore, renewable capacity addition needs to be higher than for thermal plants to generate the same amount of electricity. Figure 4 below shows the mode-wise electricity generation across several countries. countries. Few countries such as Brazil and Canada generate most of their electricity from cleaner sources of energy such as hydro power. Several countries such as Japan, Russia, UK and the US also generate a significant amount of gas-based power, which is cleaner as compared to coal. Figure 4: Gross electricity generation in various countries such as Japan, Russia, UK and the US also generate a significant amount of gas-based power. mode-wise (2015) Sources: Central Electricity Authority; PRS. Transmission is carried out primarily by central and state companies and largely remains a government controlled activity. The transmission is carried out primarily by central and state companies and largely remains a government controlled activity. Powergrid is responsible for the planning, implementation, operation and maintenance of inter-state transmission system, and the operation of national and regional power grids. [56]. Draft amendments to Electricity Act, 2003 for stakeholder consultation, September 7, 2018, 20Electricity%20Bill%202018.pdf. [12]. Growth of Transmission Lines and Transformation Capacity, Central Electricity Authority, As on January 2019, . [52]. Energy Efficiency Directive: An assessment of the energy efficiency potential of Great Britain's gas and electricity infrastructure, Office of Gas and Electricity Markets, June 16, 2015, . [6]. "Cabinet approves Measures to promote Hydro Power Sector", Press Information Bureau, Cabinet, March 7, 2019, . [14]. "Cabinet approves Signing of Fuel Supply Agreement (FSA) with Letter of Assurance (LoA) holders of Thermal Power Plants (TPPs)", Press Information Bureau, Ministry of Coal, May 17, 2017. [24]. 4th Report: Electricity (Amendment) Bill, 2014, Standing Committee on Energy, May 7, 2015, 20report-Electricity.pdf. Saumy earned his Bachelors Degree in Journalism & Mass Communication from the Manipal Institute of Communication at both the central and state levels through the Electricity Regulatory Commissions at both the central and state levels through the Electricity Regulatory Commission Act, 1998. These Commissions regulate inter-state and intra-state matters in generation, transmission, and distribution of power. 2003 Electricity Act, 2003: Gave more powers to the Regulatory Commissions; provided for elimination of cross-subsidies in the sector. The 1948 Act, and 1998 Acts were repealed. 2014 Electricity (Amendment) Bill, 2014 to segregate retail supply from distribution, and bring in multiple supply licensees. [21]. "Energy Generation, Programme, and Plant Load Factor", Central Electricity Authority, May 1, 2015, . Ujwal Discom Assurance Yojana (UDAY): The scheme was launched in November 2015 for the financial and operational turnaround of state-owned power distribution companies (discoms). Glossary of key terms Average Cost of Supply (ACS): The average cost incurred by a discom to supply one unit of power to its consumers. This includes both fixed and variable costs. (Catch all the Business News, Breaking News Events and Latest News Updates on The Economic Times.) Download The Economic Times News App to get Daily Market Updates & Live Business News. Capacity to buy still remains weak as discoms has a significant impact on the power sector. Their poor financial health they are unable to buy power, and invest in the transmission and distribution infrastructure (including investment for renewable energy). This affects retail consumers and power producers are unable to sell power in the market, thereby facing losses, and default on their loans. Regulatory issues The HLEC (2018) noted that delays in payments by discoms hurts the viability of generators. Prior to Mercom, Saumy was a copy editor at Thomson Reuters. [53]. 77th Report: Accelerated Power Development And Reform Programme (APDRP), Public Accounts / 14 Public%20Accounts / 14 Public%20Accounts / 17.pdf. Under the scheme, state governments were to assume 50% of respective utility's short-term debt while the balance 50% would be restructured. States were also expected to enact a legislation mandating prudent management of their utilities. Integrated Power Development Scheme (IPDS): The scheme was launched in November 2014, to provide quality and reliable power supply in urban areas. Components of the scheme include strengthening of the sub-transmission and distribution network in urban areas, and metering of feeders/ distribution transformers/ consumers in urban areas. [23]. "Report on India's Renewable Electricity Roadmap 2030", NITI Aayog, February 2015, . [20]. Load Generation Balance Report 2018-19, Central Electricity Authority, Ministry of Power, July 2018, . [16]. OP No.1 Of 2011, Appellate Tribunal for Electricity, November 11, 2011, pages 8 and 9, 20NO.1%20OF%202011.pdf. Environmental concerns of thermal generation across the world. Studies have indicated a rapid increase in the amount of greenhouse gases including carbon dioxide, methane and nitrous oxide in the atmosphere over the last few decades, primarily from fossil fuel emissions.[35] In 2012, India contributed to about 6% of the world's CO2 emissions.[36] The annual per capita emission of CO2 in India is about 1.6 tonnes as compared to the world average of 4.9 tonnes.36 With the push towards more domestic manufacturing and industrialisation, majority of the energy in India being generated from thermal sources, and increasing levels of consumption, environmental sustainability could become a much bigger concern in the years to come. Energy mix needs to be balanced for efficient capacity utilisation is due to several issues in the power sector.[22] Firstly, while there is enough generation capacity, the poor financial condition of discoms is resulting in suppressed demand for power, which leads to lesser utilisation of capacities. Secondly, the substantive fall in solar tariff and its very low gestation period is posing a threat to the economic viability of thermal power plants. Sources: Central Electricity Authority; PRS. In the absence of long/medium term PPAs, these plants are not able to operate because such linkage coal cannot be used against short term PPAs. The Committee recommended that such linkage coal may be allowed to be used against short term PPAs. In March 2019, the Union Cabinet allowed payments by discoms The HLEC also noted that one of the major reasons for stress is the delay in payments by the discoms to the power plants. Units: Mega Unit (MU) is one million units of electricity where one unit is equal to billion (109). The discoms will maintain the retail networks which will be used by the supply companies on payment of usage charges. Figure 7: Key stakeholders in the ower sector Table 2: Developments in the power sector Year Key developments 1948 Electricity Supply Act, 1948: Created state-level vertically integrated utilities responsible for power generation, transmission, and distribution, and for setting tariffs. [19] 1948 Act amended to allow private companies to set up their power generation plants 1996-98 Some states (Odisha, Haryana) started restructuring their state electricity boards. Restructuring included segregating generation, transmission, and distribution segments, and allowing private participation in the distribution segments. Adani Group has also developed almost similar capacity in Gujarat. [55]. 4th Report: The Electricity (Amendment) Bill, 2014, Standing Committee on Energy, May 7, 2015, . Re-structured Accelerated Power Development and Reforms Programme was launched in 2008, to help reduce losses of the state discoms. Under this, discoms had to achieve reduction in AT&C losses at a specified rate. [49]. UDAY National Dashboard, Ministry of Power, Last accessed on September 9, 2019, . However, with the commitment to the Paris Agreement (on climate change), there has been a push towards increasing the renewable generation capacity in the country. With solar and wind power becoming cheaper, cleaner sources of energy have also become affordable. As per the Standing Committee on Energy, as on June 2017, there were 34 stressed thermal power plants with an outstanding debt of Rs 1.74 lakh crore. These thermal power plants, lack of long term power plants are becoming NPAs due to non-availability of coal at power plants. payments. The 12th Plan had envisaged a growing role for the private sector in transmission, especially in the intra-state networks. However, private sector transmission projects face challenges such as difficulties in acquiring right of way and delays in land acquisition and forest clearances, cost escalation due to such delays, and unavailability of bank credit.42 To mitigate these issues, the Working Group on Power (2012) had recommended identifying and reserving transmission corridors in areas with high population density to meet the future growing demand. Connecting renewable energy sources with the grid An insufficient transmission network and non-synchronised generation also causes issues with renewable energy.[43] While renewable resources are abundant, the output is variable and subject to uncertainty. Intermittence of renewable sources along with absence of a proper transmission network and poor grid discipline, the generated renewable power may remain unutilised.23 In contrast, fossil-fired power plants rely on fuels that can be stored (although they may be subject to supply shortages).23 The Ministry of New and Renewable Energy has proposed the development of a National Smart Grid Mission & Green Energy Corridor for efficient transmission & distribution network.[44] Increased deployment of large-scale solar, wind power, and small-scale decentralized renewable energy could lead to several complexities with regard to load balancing.23 These would arise due to the variability in supply and demand caused by seasonal changes in the weather. However, if wind and solar energy is taken as an aggregated whole, the variance in output would be more gradual.23 Therefore, if the geographic size of the system to absorb and respond to the variability of renewable energy could be improved. However, this may affect the amount of flexibility of using such power, and the time at which it is needed in the system.23 DISTRIBUTION Poor financial situation of the distribution utilities Discoms buy power from generation companies and supply it to the consumers. Therefore, for consumers to receive good quality of electricity it is important that the discoms function well. the country have been facing high levels of losses and are struggling with debt. This makes it difficult for them to purchase power, and invest in the distribution infrastructure. The accumulated losses of state discoms (after adjusting for subsidies received from state governments) had increased from Rs 11,699 crore in 2004-05 to Rs 71,271 crore in 2013-14.[45] During the same period, their borrowings increased from Rs 1,06,509 crore to Rs 4,59,145 crore. As of March 2015, the state discoms had accumulated losses of approximately Rs 3.8 lakh crore and outstanding debt of approximately Rs. 4.3 lakh crore. [46] In the last two decades, several measures have been undertaken to address the debt of the discoms and improve their financial situation, the latest one being UDAY. However, these measures have simply addressed part of the problem, and helped the discoms clear their books. Post the bail-outs, discoms tend to accumulate losses again, and the same cycle repeats. Financial restructuring and bail-out of the discoms - UDAY In 2012, the central government had announced a Financial Restructuring Package (FRP) to solve the immediate funding needs of the highly distressed state discoms.[47] Under the scheme, state governments were to assume 50% of respective utility's short-term debt while the balance 50% would be restructured. States were also expected to enact a legislation mandating prudent management of their utilities. The central government would provide a grant for AT&C loss reduction in excess of the targets under the Restructured Accelerated Power Development and Reforms Programme (R-APDRP). The country continues to face both energy deficit and peak deficit, although at a marginal level. In 2017-18, energy deficit in the country was 0.7%, and peak deficit situation is exaggerated in certain states, and the north-eastern region, in particular. [39]. "Directions under Section 5 of the Environmental (Protection) Act, 1986 regarding compliance of emission limit notified vide notification No.S.O.3305 dated 07.12.2015-reg", B-33014/07/2018/IPC-II/TPP/395, Central Pollution Control Board, . [40]. "Mechanism for Implementation of New Environmental Norms for Thermal Power Plants (TPPs) supplying power to distribution licensees under concluded long term and medium term Power Purchase Agreement (PPA)", No. 23/22/2018-R&R, Ministry of Power, May 30, 2018, . Many state-owned discoms in states such as Bihar, Karnataka and Punjab did not revise their tariff between 2008 and 2011, in spite of an increase in the cost of electricity. During the same time period, the cost of power supply in these states went up by 12%, 10%, and 29% respectively. In 2011, the Appellate Tribunal for Electricity passed a judgment requiring SERCs to ensure that tariffs are revised in a timely manner by discoms. Peak deficit: Shortfall in supply during highest consumption period in a day. [42]. "Report of The Working Group on Power for Twelfth Plan (2012-17)", Planning Commission, January 2012, . [10]. "Progress of Transmission Sector, Central Electricity Authority, Ministry of Power, January 2019, . [36]. India's Intended Nationally Determined Contributions, Ministry of Environment, Forest and Climate Change, October 2, 2015, . Availability of Power Purchase Agreements The HLEC on stressed assets in the power sector (2018) observed that while several coal based power plants have FSAs (agreement between coal company and power plant to buy coal) they do not have medium term/long term PPAs (agreement between power plant and discom to sell power). The Standing Committee on Energy (2012) had noted that the government should appoint an independent expert committee to: (i) review the functioning of the CERC, (ii) identify areas to improve the working and autonomy of the organization, and (iii) limitations of the law. The Committee had also recommended that the forum of regulators should ensure that adequate steps are taken by all the SERCs and state discomes to rationalize their tariff annually. The Committee had observed that the pay structure, service conditions and other amenities available to CERC employees are discouraging. In addition, there is a shortage of manpower in the commission. It had recommended that the personnel policy of the organization should be well laid down having its own cadre with adequate promotional prospects and better amenities to the officials of the Commission corresponding to their job profile. NPAs in the sector have been increasing As per the RBI, public sector banks have the highest NPAs, most of which are in the power and the telecom sector. Jawaharlal Nehru National Solar Mission (JNNSM): JNNSM was launched in 2010 and seeks to have 20 GW of grid-connected solar generation capacity in India by 2022. In 2015, the central government increased the overall target under the mission to 100 GW by 2021-22. National Smart Grid. Pradhan Mantri Sahaj Bijli Har Ghar Yojana (Saubhagya): This scheme was launched in October 2017 to achieve universal households in rural areas, and all poor households in rural areas by March, 2019. While growth in solar energy is a good sign for the country, thermal energy has been the primary source for the power sector, and will continue to remain an important source of power in the future. Further, given that renewable energy sources are intermittent in nature, a balancing power will be needed to support the grid and even out the fluctuations. State-wise data Table 4 below illustrates the power generation capacity and deficit data across states. Maharashtra has the maximum generation capacity across all states, followed by Gujarat and Tamil Nadu. The highest energy deficit is seen in the states of Jammu and Kashmir and Manipur, and in the Union Territory of Andaman and Nicobar Islands. The linkages will be granted by Coal India Limited (CIL) or Singareni Collieries Company Limited (SCCL). [57]. "30th Report: Functioning of Central Electricity Regulatory Commission (CERC)", Standing committee on Energy, August 24, 2012, . Such transfer will be based on the existing availability of coal and the future coal production plan of the coal company. This would help link coal mines closer to the power plants, reducing coal transportation costs, resulting in lower coal costs for the power producers. Further, the government should also provide for the supply does not make sense. Figure 8: Total installed generation capacity (in MW) Note: Generation figures are for the end of the financial year. Each PPA has specific terms and conditions for risk sharing and termination of the PPAs. Typically, PPAs tend to be long-term in nature, i.e., around 20-25 years. [48]. Lok Sabha Unstarred Question No. 1043, Ministry of Power and Coal have been trying to address some of these concerns. For example, the Standing Committee on Coal (2018) noted that between 2014 and 2016, the rationalisation of coal linkages (buying coal from a mine closer to the power plant) has resulted in estimated savings of Rs 3,000 crore per annum on transportation costs. It further noted that auctioning coal linkages through SHAKTI will give consumers the option to bid for a source of their choice, thereby reducing coal transportation costs. The Ministry of Coal had constituted an inter-ministerial group to review the existing sources of coal for independent power producers (IPPs) with coal linkages in October 2017.[30] This group suggested that the coal linkage of an IPP may be transferred from one coal company to another.



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