



POWER PERSPECTIVES



## State overview: Andhra Pradesh

*Part of Power Perspectives*

An Initiative by Prayas (Energy Group), Pune

Author: Sreekumar Nhalur

March 2021



Prayas (Energy Group)

## About Prayas

Prayas (Initiatives in Health, Energy, Learning and Parenthood) is a non-governmental, non-profit organisation based in Pune, India. Members of Prayas are professionals working to protect and promote public interest in general, and interests of the disadvantaged sections of society, in particular. Prayas (Energy Group) works on theoretical, conceptual, regulatory and policy issues in the energy and electricity sectors. Our activities cover research and engagement in policy and regulatory areas, as well as training, awareness, and support to civil society organisations. Prayas (Energy Group) has contributed in the development of energy sector policy as part of several official committees constituted by ministries, the erstwhile Planning Commission and NITI Aayog. Prayas is registered as SIRO (Scientific and Industrial Research Organization) with the Department of Scientific and Industrial Research, Ministry of Science and Technology, Government of India.

## Prayas (Energy Group)

Unit III A & B, Devgiri,  
Kothrud Industrial Area,  
Joshi Railway Museum Lane, Kothrud,  
Pune 411 038  
Maharashtra  
Phone: 020 – 2542 0720  
Website: <http://www.prayaspune.org/peg>

## About Power Perspectives

Power Perspectives is an initiative by Prayas (Energy Group) to provide brief commentaries and analyses on important developments in the Indian power sector in various states and at the national level. The portal hosts articles on a wide-ranging set of issues to inform policy makers, regulators, researchers, journalists and civil society organisations about sector developments from a public interest perspective. The initiative focuses on critical developments that are not adequately reported.

As part of the initiative, developments in focus states are tracked. In addition to articles, each focus state has a "State Overview" document which provides a brief background of the state and infographics with key statistics. The portal can be accessed here: <https://prayaspune.org/peg/resources/power-perspective-portal>

Comments and suggestions are welcome at [powerperspectives@prayaspune.org](mailto:powerperspectives@prayaspune.org).

## Acknowledgements

I thank the various experts who have shared their insights and feedback on the analysis in this state overview. Special thanks to M Venugopala Rao (Centre for Power Studies) and M Thimma Reddy (People's Monitoring Group on Electricity Regulation) for their detailed review comments, and D.Ramanaiah Setty for some broad pointers, all of which have enriched this report. I am grateful to colleagues at Prayas, particularly Sharmila Ghodke for data preparation support, as well as Manabika Mandal and Ann Josey for support at all stages of preparation of this report. Any shortcomings in the report are of course mine.

**Suggested citation:** Prayas (Energy Group), (2020), Power Perspectives: Andhra Pradesh Overview

**Copyright:** Any part of this report can be reproduced for non-commercial use without prior permission, provided that Prayas is clearly acknowledged, and a copy of the published document is sent to Prayas

## Contents

1.	Introduction.....	1
2.	Power procurement planning and capacity addition .....	5
2.1	Ambitious plans.....	5
2.2	Capacity addition .....	6
2.3	Capacity addition plans.....	11
3.	Demand and sources of revenue .....	13
3.1	Demand profile.....	13
3.2	Agriculture consumption.....	14
3.3	Distribution loss.....	15
3.4	Energy efficiency measures .....	16
3.5	Revenue from sales and subsidy .....	16
4.	Distribution business and quality of supply and service .....	17
4.1	Power outages .....	18
4.2	Electricity accidents .....	18
4.3	Consumer complaint handling.....	19
5.	DISCOM finances .....	19
6.	SERC functioning and effectiveness of accountability.....	22

## List of tables

Table 1:	Organisation structure of electricity sector in Andhra Pradesh .....	2
Table 2:	Energy and peak requirement for 2019, from different sources .....	5
Table 3:	Growth in contracted capacity .....	10
Table 4:	Projects under implementation/planned .....	12
Table 5:	Proportion of generation capacity from different sources FY20 and FY24 .....	13
Table 6:	Coverage of energy efficiency efforts.....	16
Table 7:	Average Billing Rate trends .....	17
Table 8:	State subsidy commitment and receipts .....	17
Table 9:	Increasing fatal human electricity accidents.....	19
Table 10:	Rising financial losses of the DISCOMs .....	20
Table 11:	Increasing cumulative financial losses .....	22
Table 12:	Overview of key APERC processes from 2014 to 2020 .....	23

## List of figures

Figure 1:	Ambitious energy projections .....	6
Figure 2:	Change in ownership mix in generation in percentage terms .....	8
Figure 3:	Change in fuel-mix in generation – FY15-FY20 .....	8
Figure 4:	Trend of power purchase from different sources FY15, FY17, and FY20.....	9
Figure 5:	Consumption by different consumer categories in AP.....	14
Figure 6:	Trends of APPC, ACOS and ABR.....	21

# State Overview: Andhra Pradesh

## 1. Introduction

Andhra Pradesh (AP) State was formed in 1956, and Telangana state was carved out of it in 2014. This overview tracks the progress of the electricity sector, primarily in distribution, in the residual state of AP after the bifurcation. The history of the electricity sector before 2014 is also important to understand the context, but there are other publications which cover this.<sup>1</sup>

After many years of agitation in the Telangana areas of the united AP state, the Telangana state was carved out as the 29<sup>th</sup> State of India on June 02, 2014, as per the Andhra Pradesh Reorganisation Act 2014<sup>2</sup> (March 2014). There was severe opposition to the Telangana agitation and bifurcation in the non- Telangana areas. In AP, elections were held before the bifurcation, in May 2014. The Telugu Desam Party (TDP), which did not actively support the agitation, won with 102 seats out of 175, with Yuva Jana Sramika Rythu Congress Party (YSRCP), which had taken a neutral stand on Telangana, winning 67 seats. This comfortable majority became near brute majority by 2017, by which time 23 MLAs of YSRCP defected to the TDP. In the elections that were held in Telangana in June 2014, the Telangana Rashtra Samiti (TRS), the party in the forefront of the Telangana movement, won the assembly elections. The relationship between the two newly formed states were far from friendly. The new governments in AP and Telangana took office in June 2014 and the power utilities were divided between the new Telangana (TS) and residual Andhra Pradesh (AP) states.

In 2019, another election was held, in which the YSRCP won an overwhelming 151 of the 175 seats, reducing TDP to a weak opposition with 23 seats. After the new government took office in June 2019, there were many major changes in electricity sector policies.

This overview covers five years of AP State electricity distribution sector from 2014-15 (written as FY15) till 2019-20 (FY20). This is largely based on data collected from tariff and true-up orders, and annual reports of the Andhra Pradesh State Electricity Regulatory Commission (APERC); Annual Revenue Requirement (ARR) submissions, true-up petitions and annual reports by Distribution Companies (DISCOMs); Power For All (PFA) and DISCOM financial bail-out programme (UDAY) agreements; and Power Finance Corporation (PFC) and Central Electricity Authority (CEA) reports. Most of the insights are provided for the period FY15-FY20, using available actual data. Consistent actual break-up of data for sales, distribution losses, revenue, power purchase, subsidy receipts and quality of supply for year 'n' are compiled using DISCOM ARR submissions for year 'n+2', true-up orders (where available) and PFC reports. Load Forecast & Resource plan order of 2019 is used for projections up to 2024.

Table 1 gives the organisational structure of AP electricity sector. A new APERC was set up by the government in October 2014 with a retired High Court judge as the chair, even though the existing SERC of the united AP was operational and as per the state reorganisation act, was expected to regulate AP and TS electricity sectors for a period not exceeding six months.

---

<sup>1</sup> This includes: [India Power sector Reform Update reports](#) (Prayas, 2001-05), [Power Sector Reforms in Andhra Pradesh: their Impact and Policy Gaps](#), CESS GAPS Series Working Paper 11 (2007), [Strengths and Challenges of Andhra Pradesh Power Sector](#), Economic & Political Weekly (2007), [Transforming reforms – hope, hostility and placating in Andhra Pradesh's power sector reforms](#), chapter in CPR publication '[Mapping Power](#)' (2018)

<sup>2</sup> Available at: <http://www.egazette.nic.in/WriteReadData/2014/158325.pdf>

Table 1: Organisation structure of electricity sector in Andhra Pradesh

Area	Organisations	Remarks
Generation	AP Generation Company Limited (APGENCO)	As per the AP state re-organisation Act, power generation was apportioned between TS and AP DISCOMs, based on historical consumption ratio. This applied to all thermal, hydel stations located in both states and share of power from central government stations. For non- conventional energy stations, power was to be available to the DISCOM where the stations are physically located. Following disputes on payment between TS and AP states, from 11/6/2017, power from thermal, hydel and renewable stations are allocated as per location, whereas central power is apportioned.
	Andhra Pradesh Power Development Company Limited (APPDCL)	APPDCL was initially a joint venture company of APGENCO (with 50% equity) and IL&FS (50% equity) formed in 2006 to set up Krishnapatanam thermal power project (2x800 MW) at Nellore. As of now, this 3 x 800 MW station is owned by APGENCO and DISCOMs, and is called Sri Damodaram Sanjeevaiah Thermal Power Station (SDSTPS).
	Central and private generating stations	NTPC has a thermal power plant located in AP (Simhadri), and AP receives share from many NTPC, NLC and NPC stations. There are private generating stations based on natural gas, wind, solar, bio-mass and coal.
	New & Renewable Energy Development Corporation of Andhra Pradesh Ltd. (NREDCAP)	NREDCAP formed in 1986, is the state nodal agency for renewable energy and energy conservation.
	Andhra Pradesh Solar Power Corporation Private Limited (APSPCL)	Joint venture between SECI (Solar Energy Corporation of India), APGENCO and NREDCAP formed in 2014, for development of Solar Parks in Andhra Pradesh.
	Andhra Pradesh Green Energy Corporation Limited (APGECL)	APGECL was set up in 2020, for establishing 10,000 MW of solar power capacity to supply power for agriculture. APGECL is a 100% subsidiary of APGENCO.
Transmission	AP Transmission Corporation Limited (APTRANSCO)	All the substations and transmission lines physically located in AP are within the purview of APTRANSCO. In addition, there are transmission lines of POWERGRID located in the state.
	AP State Load Dispatch Centre (APSLDC)	SLDC is part of APTRANSCO. Renewable Energy Management Centre (REMC) to manage renewable projects is a part of SLDC, and was inaugurated in early 2020.

Distribution	AP Eastern Power Distribution Company Limited (APEPDCL), AP Southern Power Distribution Company Limited (APSPDCL)	There were four DISCOMs in the united AP state – APEPDCL, APSPDCL, APCPDCL and APNPDCL. After bifurcation, first two companies stayed with residual AP and last two with TS, with different names – TSSPDCL and TSNPDCL. Two districts – Kurnool and Anantapur – which formed part of the erstwhile APCPDCL. were transferred to APSPDCL. There are two Rural Electric Supply Cooperatives (RESCO) in APEPDCL license area (Anakapalle and Cheepurupally) and one in APSPDCL area (Kuppam).
	AP Central Power Distribution Company Limited (APCPDCL)	Formed in April 2020, covers Guntur, Krishna and Prakasam districts, which were part of APSPDCL.
Regulation	AP Electricity Regulatory Commission	Separate APERC was set up in October 2014.
	Directorate of Electricity Safety	Office of the Chief Electricity Inspector to the Government (CEIG) oversees electricity safety.
	AP Judicial Preview	Set up through Andhra Pradesh Infrastructure (Transparency through Judicial Preview) Act, 2019, to preview proposals for infrastructure projects by government agencies, before the tendering stage.
Power purchase	AP Power Coordination Committee (APPCC)	As in the united AP state, power purchase is managed by APPCC on behalf of the DISCOMs. This is an internal arrangement with two sub-committees – the Power Trading Committee and the Balancing and Settlement Committee. APPCC is set up through a Government Order. It is headed by the CMD of TRANSCO with TRANSCO Directors (Finance and Commercial) and CMDs of DISCOMs as members. <sup>3</sup> Chief General Manager – Commercial (APTRANSCO) manages the operations, including inviting tenders, though the PPAs are signed by the DISCOM CMDs.

Source: Compiled by Prayas (Energy Group) from various sources

AP was the first state to sign the 'Power For All' agreement with the Government of India in September 2014, which provided a 5-year plan and was the basis for power sector planning in the state.<sup>4</sup> There were power shortages in AP in FY15 (4.9% energy shortage and 5% peak power shortage)<sup>5</sup>, three-phase power was available for agriculture for 7 hours and limited hours in rural areas. There was high proportion of costly short-term power purchase in the initial years – 9,685 MU in FY15 (23% of the total) and 7,628 MU in FY16 (15% of the total), speeding up ongoing state generation projects and competitive bidding for power, requesting more power from Central Government Stations. There were also hectic plans to add new generation capacity,

<sup>3</sup> See GO MS21, dated 12/5/2014, available at: <https://goir.ap.gov.in/>

<sup>4</sup> Available at:

[https://powermin.nic.in/sites/default/files/uploads/joint\\_initiative\\_of\\_govt\\_of\\_india\\_and\\_andhrapradesh\\_0.pdf](https://powermin.nic.in/sites/default/files/uploads/joint_initiative_of_govt_of_india_and_andhrapradesh_0.pdf)

<sup>5</sup> Based on actuals for 2014-15, reported in CEA's LGBR report 2015-16, available at:

<http://cea.nic.in/reports/annual/lgbr/lgbr-2015.pdf>

especially wind and solar. Shortages reduced soon with 0.1% energy and 0.1% peak shortage in 2015-16.<sup>6</sup> Subsequent years have been reporting marginal surplus.

As for rural electrification, all villages have been electrified in the joint state of AP from 1990, though not all hamlets.<sup>7</sup> AP reported household electrification of 95% in 2014, as per the Power For All document. All households were provided connections through Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY) program of the government of India and state initiatives by 2016, with AP claiming as the second state after Gujarat to reach this milestone.<sup>8</sup>

Agriculture power supply has been free from 2004 in the joint state of AP, with some conditions<sup>9</sup>. AP continued this practice without any changes till 2019, when the conditions were relaxed. At the time of state formation, there was a promise to enhance the hours of supply from 7 hours (multiple spells) to nine hours (day time). Nine- hour multiple spell supply was announced in February 2019 (before state elections) and implemented from first half of FY20, while nine-hour day time supply is reported from FY21.

Ujjwal DISCOM Assurance Yojana (UDAY) agreement was signed by AP in June 2016.<sup>10</sup> There were many conditions on debt take over, metering, loss reduction and tariff raise, of which only some were complied with.

In AP, share of Low Tension (LT) sales is high at 62-64% compared to that of High Tension (HT). LT-Agriculture, has major share in the sales, accounting for one-fourth of the total. Sales profiles of the two DISCOMs are marginally different. In FY20, agriculture demand in EPDCL was 19% of the total, whereas it was 30% in SPDCL. Compared to this, Industry and commercial (LT and HT) demand, which typically cross-subsidises domestic and agricultural consumption, together was around 43% in EPDCL, whereas it was around 31% in SPDCL. Thus, state subsidy requirement is high in SPDCL, with state subsidy being around 25% of the Annual Revenue Requirement (ARR), compared to 10% for EPDCL in FY20.

The AP power sector today presents some achievements and many challenges. There is no shortage of power and quality of supply has improved over the years, especially in urban areas. There has been a major increase in renewable power, especially in wind and solar. Providing 9 hours day time free supply to agriculture is projected as a major achievement. But some of the generation capacity additions have led to high power purchase cost. Tariff revisions have been low, true-ups have been delayed and subsidy payments have not been in full. The result has been mounting financial losses of the DISCOMs. This challenge is tough to overcome, considering the poor financial situation of the State, with high debts and many welfare programs.

The next sections provide details of the AP distribution sector, in the areas of power procurement, demand profile, quality of supply, financial health and regulatory oversight.

---

<sup>6</sup> Based on actuals for 2015-16, available at CEA's LGBR report for 2016-17, available at: <http://cea.nic.in/reports/annual/lgbr/lgbr-2016.pdf>

<sup>7</sup> From Page 134A of 'Power Development in Andhra Pradesh (Statistics)', 2018 edition, available at: <https://www.aptransco.co.in/flm-appd-pds-2017-18-3.pdf>

<sup>8</sup> DDUGJY status reports for November 2016, accessed from <http://www.ddugjy.gov.in/>

<sup>9</sup> Free power was provided to non- corporate farmer/IT assesses, having less than 3 connections, owning less than 2.5 acres of wetland and implementing Demand Side Management (DSM) measures.

<sup>10</sup> Agreement is available at [https://powermin.nic.in/pdf/Mou\\_Between\\_MoP\\_and\\_Govt\\_of\\_Andhra\\_Pradesh.pdf](https://powermin.nic.in/pdf/Mou_Between_MoP_and_Govt_of_Andhra_Pradesh.pdf)

## 2. Power procurement planning and capacity addition

Power purchase in the state is managed by the Andhra Pradesh Power Coordination Committee (APPCC – see Table 1) on behalf of the DISCOMs. APTRANSCO CMD is the chair of APPCC and power purchase is thus centrally managed by the state government. Aggressive contracting of power and capacity addition was planned in AP, soon after the state formation, as laid out in the [PFA agreement](#) in 2015, as well as the solar policy in 2015<sup>11</sup> and the wind power policy in 2015.<sup>12</sup> Demand growth and capacity addition projections in PFA as well as the solar and wind policies were ambitious.

### 2.1 Ambitious plans

Capacity addition has been in reaction to the power shortages at the time of state formation and very ambitious plans of energy requirement were presented in the Power For All agreement ([PFA 2014](#)). But the 19<sup>th</sup> Electric Power Survey of the Central Electricity Authority (CEA, 2017) and the actual DISCOM power purchase indicate a much lower energy requirement even though there was no shortage.<sup>13</sup> Table 2 gives FY19 data for energy requirement and peak demand from different sources.

*Table 2: Energy and peak requirement for 2019, from different sources*

Source	Energy Requirement MU	Peak Demand MW
PFA 2014	82,392	13,436
CEA 19 <sup>th</sup> EPS	63,290	9,544
Actual	63,535	9,453

*Source: Compiled by Prayas (Energy Group); projected data Power For All (PFA) agreement, CEA 19<sup>th</sup> EPS; actual energy and peak demand data from the 4<sup>th</sup> quarter report of SRLDC for FY19.*

It can be seen that the projected numbers in PFA are 1.3 to 1.4 times the actual figures. Capacity addition plan followed such ambitious demand projections. For this time period FY14 to FY19, there were no separate regulatory processes on long term load forecast and resource planning – with utilities submitting plans, APERC inviting comments, holding public hearings and issuing orders.

Such an exercise was taken up only in 2018-2019, when the power utilities submitted load forecast and resource plans for the 4<sup>th</sup> control period (FY20 to FY24) to APERC for approval. In the order<sup>14</sup> that was issued in April 2019, APERC criticised the utilities for not complying with the 2006 regulation, which required to submit plans at the beginning of each control period and gave load forecast and resource plans (generation, transmission and distribution) for the next two control periods.

Figure 1 captures the energy scenario in the state from FY15 to FY24. It gives the energy projections as per PFA (FY15-FY19) and projections as per the APERC 2019 load forecast order for 4<sup>th</sup> MYT (FY20-24). It also gives the

<sup>11</sup> The 2015 solar policy is available at: <http://apedb.gov.in/downloads/solar-policy.pdf>. This policy was revised in 2018, available at: [https://nredcap.in/PDFs/Pages/AP\\_Solar\\_Power\\_Policy\\_2018.pdf](https://nredcap.in/PDFs/Pages/AP_Solar_Power_Policy_2018.pdf).

<sup>12</sup> There is significant wind potential in AP, but the installed capacity was around 660 MW wind capacity in 2014. The 2015 wind policy is available at: <http://apedb.gov.in/downloads/wind-power-policy.pdf>. This policy was revised in 2018, available at: [http://nredcap.in/PDFs/Pages/AP\\_Wind\\_Power\\_Policy\\_2018.pdf](http://nredcap.in/PDFs/Pages/AP_Wind_Power_Policy_2018.pdf).

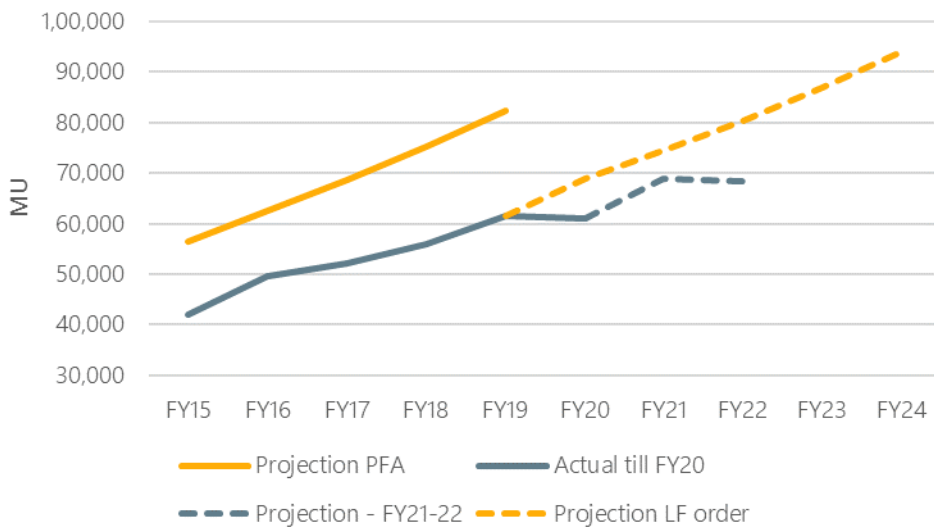
<sup>13</sup> 18<sup>th</sup> EPS was prepared in 2012 before state bifurcation in 2014 and 19<sup>th</sup> EPS in 2017. As per the 18<sup>th</sup> EPS, CAGR of energy demand in the united AP state between 2011 and 2017 is 8.6%.

<sup>14</sup> Available at: <http://aperc.gov.in/admin/upload/LFRev.pdf>



actual energy purchase till FY20 and projections for FY21 and FY22 based on FY21 tariff order and FY22 DISCOM tariff filings.

Figure 1: Ambitious energy projections



Source: Compiled by Prayas (Energy Group) – FY15-20 data from actuals from ARR submitted after 2 years, FY21 from tariff order, FY22 from DISCOM petitions for FY22 tariff process; FY15-19 projections from PFA; FY20-24 projections from APERC Load Forecast order 2019

For the period FY15-19, the energy growth rates assumed in PFA and actual are both around 10% and hence the projections and actual follow similar pattern. But the FY15 energy requirement in PFA is high<sup>15</sup> and hence there is gap between projection and actual. PFA envisaged significant industrial and HT agriculture load growth, increase from 7 to 9 hours of agriculture supply and expected significant capacity addition, right from FY15. Energy CAGR as per Load Forecast order for FY20-24 is 8%, whereas the projected growth between FY20 and FY22, based on currently available data has been around 6%. Hence the actual for FY20, Tariff order figure for FY21 and DISCOM petition for FY22 are much less than the projections. A clearer picture will emerge after true-up process.

## 2.2 Capacity addition

Since the power shortages were high, all possible avenues were explored to add to the power purchase basket. The state benefited from the availability of surplus thermal generation in the country.<sup>16</sup> Steps taken included short-term market purchase, speeding up on-going APGENCO projects, competitive bidding for power from stations in Southern region, following up with Central government to increase the transmission capacity to AP, and initiating new projects, especially in wind and solar.

<sup>15</sup> PFA took the restricted demand for FY13 as 39,900 MU, added 10,900 MU of restrictions to arrive at 50,800 MU as the FY14 demand, considered 8% annual growth, increase from 7 to 9 hours of agriculture supply (1740 MU) and 69 MU energy efficiency savings to arrive at 56,535 MU as the demand for FY15.

<sup>16</sup> As indicated by the LGBR reports of CEA, energy shortage has been reducing from 2014. All India actual energy shortage was 2.1% in 2015 and 0.7% in 2017.

As per the re-organisation Act and a Government Order amending the transfer scheme<sup>17</sup>, existing PPAs and those signed after 28/4/2008 were to be valid and power apportioned between TS and AP DISCOMs based on past 5 years' energy consumption in the ratio of 53.89: 46.1. This applied to all state thermal, hydro stations and shares from central government power stations. Power from non- conventional energy (or Renewable energy) stations was available to the DISCOM where they are physically located. Disputes between states on power purchase payment started in mid- 2014 and from 11/6/2017, power from all thermal, hydel and renewable stations are allocated to the state as per location<sup>18</sup>, whereas central and inter-state power is shared as per the same ratio.

Three units of state-owned Sri Damodaram Sanjeevaiah Thermal Power Plant (SDSTPS – 3 x 800 MW) were commissioned in FY15, FY16 and FY17. Long term competitively bid coal for Thermal Power Tech (500 MW) was finalised in FY16 and 1000 MW through Design, Build, Finance, Own, Operate (DBFOO) in FY17. Hinduja units (2 x 510 MW) came on line in FY17. Wind and solar capacity started picking up from FY17. GVK -1 private gas-based power plant (217 MW) was acquired by the state government in 2018, and renamed as Godavari Gas Power Plant, after the PPA term was over.

The following broad observations can be made by analysing the power purchase trend from FY15 to FY20. In terms of absolute numbers, power purchase from nuclear and hydro plants remained at the same level. There were some fluctuations in gas power. Coal and renewable power purchase kept increasing. Market power purchase was high in FY15 (9,685 MU, 23% of the total), kept reducing till FY17 and then again started increasing to reach around 4000 MU (6.5% of the total) in FY20.

In terms of proportion of the total power purchase, private gas, renewable (other than solar and wind) and central nuclear had similar share in all the years. Proportion of state thermal marginally increased, while that of central thermal and state hydro reduced. There was steady increase of share of private thermal, private wind and private solar. There was a small surplus power sale (3% of total power purchase) in FY18 and FY19.

Figure 2 shows the generation proportion and Average Power Purchase Cost (APPC) figures for FY15 and FY20, based on ownership.

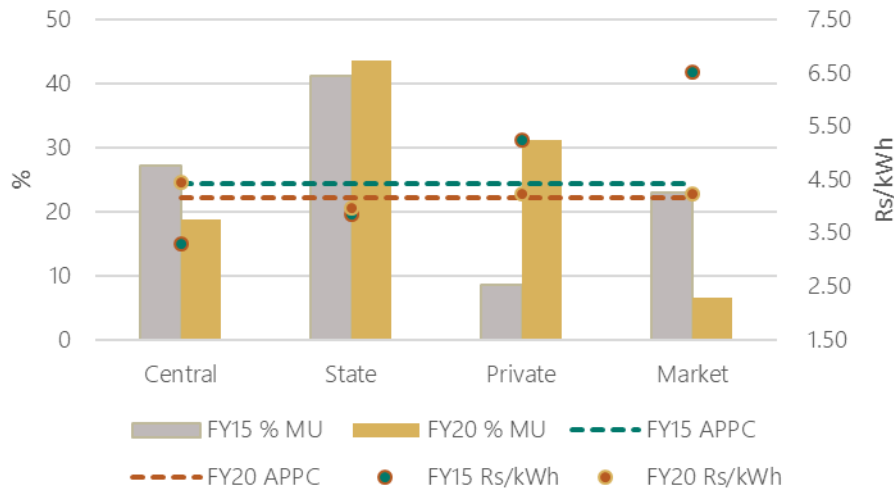
It can be seen that there has been a slight reduction in the percentage contribution of central stations and increase in state stations. The major increase in private capacity has been in private coal and renewable (wind and solar). Market procurement was high in FY15, reduced over the years (not shown in the graph), but has picked up in FY20. Average Power Purchase Cost (APPC) for central stations have increased, while it has reduced for private and market purchases.

---

<sup>17</sup> Search for GO MS20 dated 8/5/2014 of Energy department at: <https://goir.ap.gov.in/>

<sup>18</sup> This follows a letter from GoAP to APGENCO dated 5/6/2017, permitting APGENCO to discontinue supply to TS DISCOMs, based on which AP discontinued power supply to TS and TS reciprocated. A brief summary of the dispute with versions of both states is given in the TSSPDCL annual report for 2017-18 (see pages 93-95). This annual report available at: [https://tssouthernpower.com/ShowProperty/CP\\_CM\\_REPO/Pages/CompanyInformation/Annual%20Reports/Annual%20Report%202017-18](https://tssouthernpower.com/ShowProperty/CP_CM_REPO/Pages/CompanyInformation/Annual%20Reports/Annual%20Report%202017-18)

Figure 2: Change in ownership mix in generation in percentage terms

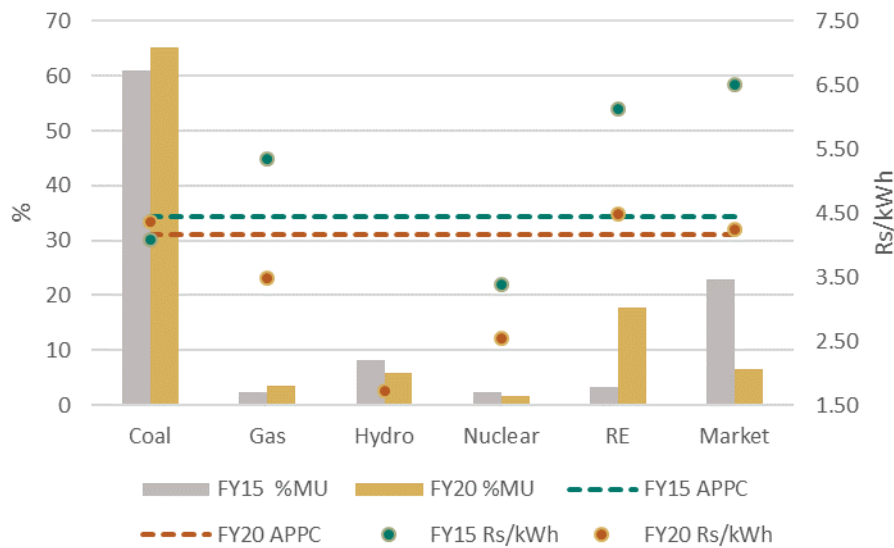


Source: Compiled by Prayas (Energy Group) from actual data for FY15 and FY20 available in the ARR of DISCOMs for FY17 and FY22 respectively.

Note: Markets includes contribution from UI (% of UI or DSM is low in AP), bundled solar power from NTPC and surplus power sale; Central sector includes NTPC coal power plants, Neyveli Lignite Corporation plants and Nuclear plants; State Hydro includes a few interstate projects also - with Odisha and Telangan; APPC = Average Power Purchase Cost

Figure 3 shows the fuel mix for FY15 and FY20, along with the Average Power Purchase Cost (APPC) data.

Figure 3: Change in fuel-mix in generation – FY15-FY20

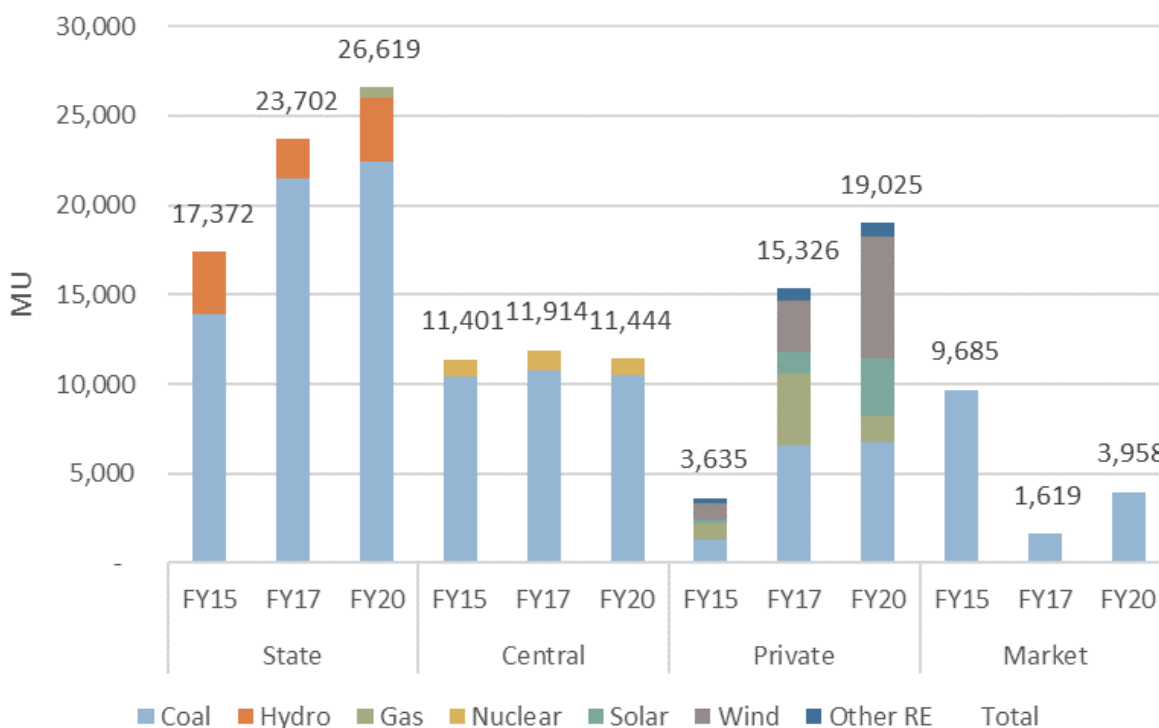


Source: Compiled by Prayas (Energy Group) from actual data for these years from the ARRs DISCOMs for FY17 and FY22

It can be seen that the domination of coal power continues and has marginally increased. Share of RE has significantly increased, while that of market and hydro have reduced. Total APPC is close to coal power APPC, while APPC of gas, RE and market have reduced. The marginal reduction of APPC is because of the reduction of costly market power purchase, which was significant in FY15.

Figure 4 summarises the power purchase pattern from different sources for FY15, FY17 and FY20, based on actual data. This shows similar trends, but with more break-up details. Reduction in the proportion of central thermal and increase in that of private thermal, wind and solar can be seen. There was sale of surplus power in FY 17 (very low) and around 1,500 MU (3%) in FY18 and FY19.

Figure 4: Trend of power purchase from different sources FY15, FY17, and FY20



Source: Compiled by Prayas (Energy Group) using actual data for FY15 (from FY18 ARR), for FY17 (from True-up order) and FY20 (from FY22 ARR)

Table 3 provides a summary of the increase in contracted capacity and capacity additions. Two units of the state-owned Sri Damodaram Sanjeevaiah Thermal Power Station (SDSTPS – 3 x 800 MW) were commissioned in FY15 and FY16. Contracting through competitive bidding for thermal power was taken up in FY16 and FY17. State owned Nagarjuana Sagar Tail pond Hydro station commissioned in FY17. Power sharing from Telangana (TS) power plants was stopped from mid FY18.<sup>19</sup> State owned Rayalseema Thermal Power Plant (RTPP) unit 4 was commissioned, private gas project GVK was taken over by the government<sup>20</sup> and power contracted from costly Kudgi plant (Karnataka) of NTPC in FY19.

<sup>19</sup> This followed a letter from GoAP to APGENCO dated 5/6/2017, permitting APGENCO to discontinue supply to TS DISCOMs, based on which AP discontinued power supply to TS and TS reciprocated. A brief summary of the dispute with versions of both states is given in the TSSPDCL annual report for 2017-18 (see pages 93-95). This annual report available at:

[https://tssouthernpower.com/ShowProperty/CP\\_CM\\_REPO/Pages/CompanyInformation/Annual%20Reports/Annual%20Report%202017-18](https://tssouthernpower.com/ShowProperty/CP_CM_REPO/Pages/CompanyInformation/Annual%20Reports/Annual%20Report%202017-18)

<sup>20</sup> Even though this acquisition was reported in 2018, even in February 2020, it was reported that the formalities of complete transfer of ownership to APGENCO has not happened. In its FY21 tariff order (page 73) APERC directed DISCOMs to complete the transfer process within 6 months.

Purchase from Hinduja power plant commenced after it was commissioned in FY17 and APERC approved an adhoc tariff. Purchase in FY17 and FY18 was only about 50% due to reasons like fuel availability. Tariff orders for FY19 and FY20 did not include Hinduja, but DISCOMs purchased power, when there was requirement. DISCOMs and Hinduja had filed petitions with APERC in 2016 for PPA approval. APERC reserved the order and in 2018, allowed the DISCOM's request to withdraw the PPA approval petition. Hinduja approached the Appellate Tribunal for Electricity (ATE), which in January 2020 asked APERC to expedite the PPA approval. But in its FY21 tariff order, APERC did not include Hinduja, saying that until APERC disposes the PPA case, there is no legal obligation to purchase power from Hinduja.<sup>21</sup> In July 2020, the Supreme Court stayed the ATE order, and DISCOMs have not projected power purchase from Hinduja in FY22.<sup>22</sup>

Table 3: Growth in contracted capacity

Year	Contracted capacity (MW)	Peak demand (MW)	Remarks
FY15	8,809	6,784	High market, SDS Unit 1
FY16	12,745	7,391	Low market, SDS Unit 2, Thermal Power Tech contract
FY17	15,149	7,965	1000 MW contract, Hinduja, enhancement of KSK contract, Nagarjunsagar Tail Pond Hydro, NTPC bundled solar (125 MW)
FY18	15,327	8,983	Wind and solar picks up
FY19	18,538	9,453	No TS share from mid FY18, power from RTPP Unit 4 and NTPC Kudgi, Hinduja reduces, GVK transfer to GoAP
FY20	21,039	10,207	Hinduja, NVVNL Bundled solar (500 MW), market picks up
CAGR	19.0%	8.5%	High growth in contracted capacity for solar (90-100%), wind (30-40%), private coal (50%)

Source: Compiled by Prayas (Energy Group): Contracted capacity from ARR submissions and Tariff orders, Peak demand from SRLDC reports. Data reported in APTRANSCO statistics/CEA for installed capacity differs slightly from this.

Wind and solar power capacity addition pace picked up in FY17 till FY19. There were critiques on the fast track capacity addition in FY17-18, since renewable tariff was reducing during this period. DISCOMs exceeded the RPO target suggested by central government and the solar & wind installed capacity was about 34% of the total by FY18. DISCOMs approached APERC for reduction of wind tariff and AP DISCOMs started curtailment of RE dispatch from FY19. In July 2019, the new government in AP formed a ministerial committee to review and renegotiate the wind and solar PPAs, a step that was opposed by the central government and RE developers. The AP High Court, in September 2019 set aside the constitution of this committee and gave an interim order fixing wind tariff at 2.44/kWh and solar at Rs.2.43/kWh.<sup>23</sup> A committee was set up by Ministry of Power in November 2019, (with Secretaries of central ministries -MoP, MNRE, and AP principal secretaries of Finance and Energy departments as members) to study the issue of high cost RE integration in AP. In the tariff petition for FY21, DISCOMs did not schedule any solar or wind generation, arguing that state financial subsidy is required for their integration with the grid. APERC did not agree with this argument and directed DISCOMs

<sup>21</sup> The 2020 ATE order which summarises the case is available at:

[https://aptel.gov.in/sites/default/files/A.No.%2041%20of%202018\\_07.01.2020.pdf](https://aptel.gov.in/sites/default/files/A.No.%2041%20of%202018_07.01.2020.pdf) ; page 76 of APERC FY21 Tariff order

<sup>22</sup> Supreme Court stay order, available at: <https://indiankanoon.org/doc/44010843/>

<sup>23</sup> See this reply by Union power minister on 21/11/2019 in the Loksabha:

<http://164.100.24.220/loksabhaquestions/annex/172/AU711.pdf> and news report: <https://mercomindia.com/rk-singh-sheds-light-on-dispute-with-andhra-pradesh/>

to purchase RE power as per the existing tariff and not at the interim tariff suggested by the High Court. DISCOMs have filed a review petition with the APERC on the FY21 tariff order, but order on this has not been issued by APERC as of March 2021.

Power purchase cost from the RTPP and SDSTPS is high and in 2020, an expert committee was set up to study RTPP, which in March 2020 suggested cost reduction measures, including rationalisation of coal supply, staff and formation of a JV with NTPC. APGENCO is reportedly studying these suggestions.<sup>24</sup>

PPA with private gas projects LANCO and SPECTRUM had ended in FY16, but since these projects received gas from Government of India scheme at cheap rate, power was purchased from these stations with consent of the APERC even after that.

### 2.3 Capacity addition plans

Table 4 provides a brief overview of the ongoing projects as per the resource plan order of 2019, updated based on later reports from CEA. It can be seen that all projects are under the state sector and mostly coal based. The capital cost figures of thermal projects are high and the variable cost also would be high since none are pithead stations.

SDSTPS is the coal-based power plant of Andhra Pradesh Power Development Company Limited (APPDCL). It was the Special Purpose Vehicle (SPV), a joint venture company of APGENCO (with 50% equity) and IL & FS (50% equity) partnership, set up in 2006. It had a PPA with the four DISCOMs of united AP state. After state bifurcation in 2014, TS DISCOMs relinquished their share in the projects. Since it is a mega-power project, which needs to sell power to more than one state, in 2016, 90% of the power was allocated to AP DISCOMs. Subsequently, APPDCL was reconstituted with APGENCO holding 51% share with the remaining 49% being held with Distribution Companies (45%) and the state government.<sup>25</sup> As seen from Table 4, many projects are held up due to various reasons. There was also a proposal by NTPC to set up a 5 x 800 MW ultra-super critical coal-based power station at Pudimadaka, near Vishakhapatnam. This is also held up due to lack of coal linkages and other clearances, as indicated by the Union power minister in 2018.<sup>26</sup>

---

<sup>24</sup> News reports available at: <https://www.thehindu.com/news/national/andhra-pradesh/expert-panel-on-rtp-submits-report/article30994954.ece>, <https://www.thehindia.com/andhra-pradesh/kadapa-250-employees-of-rtp-shifted-to-sdstps-at-krishnapatnam-629518>

<sup>25</sup> APERC order on O.P. No. 21 of 2016, dated 13-07-2018 for details, available here: <http://aperc.gov.in/admin/upload/OrderOP21of2016.pdf>

<sup>26</sup> See the reply in Rajya Sabha, available at: [https://powermin.nic.in/sites/default/files/uploads/RS31072018\\_Eng.pdf](https://powermin.nic.in/sites/default/files/uploads/RS31072018_Eng.pdf)

Table 4: Projects under implementation/planned

Name	Capacity (MW)	Fuel	Ownership	Expected	Capital cost (Rs Cr/MW)
NTTPS V	800	Coal	State	FY21	9.25
SDSTPS U3	800	Coal	State	FY21	9.90
Polavaram U1-12 ,12 x 80	960	Hydro	State	FY23-25	5.56
Stranded gas – old				No gas from 2013	
GVK Extension	220	Gas	Private		
GVK Goutami	464	Gas	Private		
GMR Vemagiri	370	Gas	Private		
Konaseema	444	Gas	Private		
Stranded - new					
Thamminapatnam TPP (Meenakshi) Phase II 2 x 350	700	Coal	Private		Work held up
Bhavanapadu TPP Ph-I (East Coast Energy), 2 x 660	1,320	Coal	Private		Work held up
Kovadda nuclear power plant 6 x 1208 MW	7,200	Nuclear	Central		Work held up
Proposed after FY20					
Agriculture solar	10,000	RE - solar	State	Tendering for 6,500 MW in progress in FY21	
Pumped Hydro	6,500	Hydro	State	Tendering in progress in FY21	

Source: Compiled by Prayas (Energy Group) from: APERC Load Forecast and Resource plan order 2019 ; Monthly broad status of thermal power projects by CEA (December 2020); Monthly status of Under Execution Hydro Electric Projects by CEA (January 2021), Website of Nuclear Power Corporation

Table 5 shows the generation share from different sources in FY20 (actual) and FY24 (as per the Load Forecast and Resource plan order of 2019). It can be seen that the order did not envisage any major capacity addition for next five years.<sup>27</sup> State thermal projects are at advanced stages of construction and the Polavaram hydro project is in early stages. PPAs with LANCO and SPECTRUM gas-based projects had expired in 2016-17, but they were generating power using the gas made available through the Government of India scheme, with a condition to sell all power to DISCOMs. In the order, their generation was considered only till FY20.

Based on historical trends and electrification plans (lift irrigation, electric vehicles etc), the load forecast and resource plan order arrived at a CAGR of 8% for demand growth between FY20 to FY24.<sup>28</sup> Peak demand requirement was calculated based on load factor, roof top solar and open access trends. For calculating generation requirements, load duration curves for the next five years were analysed. It was assumed that the

<sup>27</sup> The contracted capacity share from different sources in FY20 is computed by Prayas (Energy Group) based on regulatory submissions and the FY24 share is based on the Load forecast order.

<sup>28</sup> Tables 5 and 6 in the forecast order give the historical sales data for both DISCOMs from FY13 to FY18, and based on this information, CAGR of state sales for the period FY13 to FY18 is close to 8%. But the CAGR between FY15 (year in which AP state was formed) and FY18 is close to 7%.

load point corresponding to 30% of the duration is the base load, and adding 5% reserve margin, 11,461 MW was the base load capacity and 4,344 MW as the Other than Base Load (OTB) capacity to meet the peak demand of 15,805 MW in FY24. <sup>29</sup> Two scenarios were presented, one with four gas-based power plants available as base load capacity and another without these plants. <sup>30</sup> Since it is unlikely that gas would be available, the more realistic scenario without these plants, required a base load capacity addition of around 1000 MW. The order said that: "... licensees are authorized to procure only a base load capacity to the extent of 1000 MW to be available from FY2023-24."<sup>31</sup>

Table 5: Proportion of generation capacity from different sources FY20 and FY24

Source	FY 20 %	FY24 %	Remarks
State thermal	28	30	New units at NTPPS and SDSTPS
State hydro	9	13	Polavaram
Central - thermal and nuclear	10	11	
Private coal	8	9	
Private - Gas	4	4	
RE - Solar	18	13	Solar capacity was added after the 2019 order
RE -Wind	20	18	
RE-Others	2	1	
Market	3	0	Market not planned in order
Total (MW)	21,039	20,537	Limited capacity addition as per order

Source: Compiled by Prayas (Energy Group); FY 20 actual data from regulatory filings; FY24 data from the Load Forecast and Resource Plan order 2019)

To summarise the power purchase narrative, the case of AP is similar to many other states, which added significant costly thermal and renewable capacity in the past few years, without a proper capacity addition plan. Capacity addition has been largely driven by state and central government policies and priorities, rather than based on a state- based study of demand requirement, generation options and development plans. <sup>32</sup>

### 3. Demand and sources of revenue

#### 3.1 Demand profile

The share of consumption by different consumer categories for two DISCOMs in FY15 and FY20 is given in Figure 5. In AP state, share of LT demand has been high at 62-64% from FY15 to FY20. LT-Agriculture, LT -

<sup>29</sup> See clause 149 of the order. It is not clear why APERC chose 30% as the duration to determine the base load, since 70-75% would be more reasonable. At 30%, the available base load generation capacity in FY24 as per order was nearly equal to the demand, and OTB capacity available was much higher. If 70% duration was considered, there would have been significant surplus base load and OTB capacity in FY24 – around 1400 MW surplus base load and 3300 MW OTB, as per Prayas (Energy Group) calculation based on the order.

<sup>30</sup> Four Gas based private plants - GMR Vemagiri, GVK Extn., Konaseema, GVK Gouthami - totalling to a capacity of 1498 MW), have not been operational from FY13, due to non-availability of gas. Therefore, it does not make sense to include them in the plans.

<sup>31</sup> Clause 155 of the order

<sup>32</sup> There is one view that the TDP government of united AP (1999-2004) emphasised on private gas capacity addition, the next congress government (2004-2014) on state and private coal, the next TDP government (2014-2019) on wind (all private) and solar (some central), and the next YSRCP government which took over in 2019, on private solar. All these were done without any proper load forecast, resource plan or mid-term reviews.

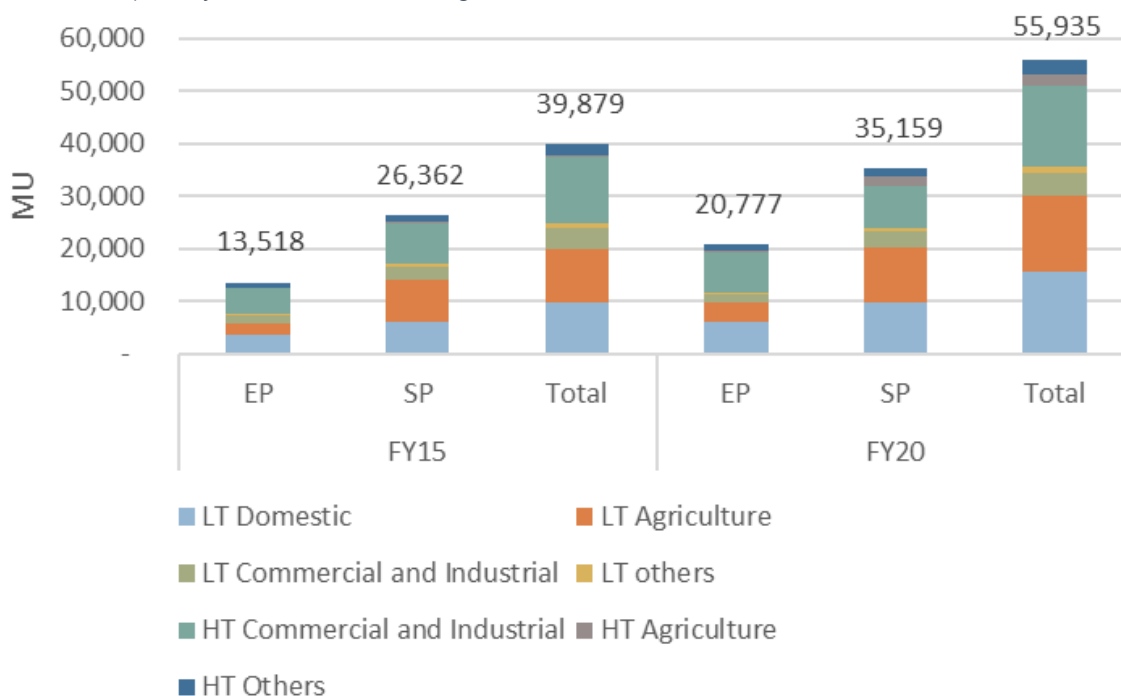


Domestic and HT – Commercial & Industrial have major shares in the demand, with LT-Agriculture (which is free) accounting for nearly one-fourth of the total. Demand shares of domestic and HT-Agriculture have been increasing over the years, whereas LT agriculture demand share has been constant, and commercial & industrial demand share has been dropping.

Demand growth projections given in the Power For All (PFA) agreement (2014) were based on 8% CAGR. The actual demand growth is close to this at 7%. But as mentioned in Section 2.2, PFA considered a very high base value in FY15 to begin with. Significant growth in Commercial & Industrial consumption was assumed, but did not materialise. Domestic consumption grew steadily at CAGR of 10% and HT Agriculture by nearly 30%.

As seen from Figure 5, the demand profiles of the two DISCOMs are quite different. In FY20, industrial and commercial (LT and HT) demand is around 31% in SPDCL, whereas it is around 43% in EPDCL. Thus, cross subsidy is high in EPDCL, whereas state subsidy is around 25% of the ARR in SPDCL. With the growth in HT lift irrigation projects of the government, mainly in the SPDCL area, HT agriculture/irrigation demand has been increasing over the years. Its share in the state has increased from 1.5% to 4% between FY15 to FY20, with SPDCL recording higher demand growth.

Figure 5: Consumption by different consumer categories in AP



Source: Actual data compiled by Prayas (Energy Group) from DISCOM ARR for FY18 (for FY15) and ARR for FY22 (for FY20)

Note: LT/HT Others include local bodies, water supply, Rural Electricity Supply Cooperative (RESCO) and Railway traction

### 3.2 Agriculture consumption

There has been a steady increase in the number of consumers over the years at a CAGR of around 4% from FY15 to FY20. The number of low-tension agriculture connections also increased at the same pace, from 15 lakhs in FY15 to 18 lakhs in FY20. About 30% of the sales in FY20 in SPDCL is to LT agriculture, whereas it is only 19% in EPDCL. SPDCL has nearly 83% of the pumpsets, but with a lower average capacity of 5.7 hp,

compared to 8 hp of EPDCL.<sup>33</sup> Supply to agriculture was increased from 7 to 9 hours from FY20. AP government announced 9 hours day time agriculture supply from October-November 2020, after strengthening the transmission and distribution infrastructure.

The Water Resources Department of the Government of AP had undertaken an exercise to geotag all wells – tube as well as open wells – in 2016-2017. For each well, parameters like the type of well, working condition, pump capacity, depth, Aadhar number of the consumer and GPS coordinates were captured. The number of wells reported in this survey was less than that reported by DISCOMs, and around 10% of the wells were reported as non-functional. It is not clear if and how this data is being used by the DISCOMs.<sup>34</sup>

The agriculture pumpsets in AP are largely not metered and the consumption is estimated based on measurement from sample Distribution Transformers (DTs). From 2004, power to agriculture is free for all, with some exceptions.<sup>35</sup> Estimation of consumption is based a normative consumption estimate calculated based on the meter readings of sample DTs and the total capacity of DTs. The sampling methodology developed by ISI was to be used by DISCOMs from 2010. But as late as in the FY19 Tariff order, EPDCL has asked for time to fully implement this, while SPDCL has implemented it.<sup>36</sup> There have been many regulatory directives to improve the quality of consumption estimation and APERC has always downward revised DISCOM claims of consumption.

### 3.3 Distribution loss

Distribution loss reported by both DISCOMs in tariff filings has been low, with EPDCL reporting 8.4% loss and SPDCL 9.3% in FY20. The state figure has reduced from 11.4% in FY15 to 9% in FY20. These figures are one of the lowest in the country and is comparable to some urban DISCOMs. Since the agriculture consumption is estimated and is high, one cannot be confident of the distribution loss numbers. Transmission loss by APTRANSCO has reduced from 4% in FY15 to 3.1% in FY20, comparable to the transmission loss reported by POWERGRID.

The level of open access is low in both DISCOMs and the corresponding cross subsidy revenue is also small, but picking up over the years. The captive power capacity in AP has been increasing with installed capacity of 1565 MW in 2015 to 3014 MW in 2019, as reported by CEA, and the FY19 captive generation of over 10,000 MU was nearly 17% of the total power purchase.<sup>37</sup>

---

<sup>33</sup> After the formation of the third DISCOM (CPDCL) in 2020, the distribution of pumpsets has changed to: CPDCL (25%), EPDCL (14%) and SPDCL (60%) – share of erstwhile SPDCL has been distributed between CPDCL and SPDCL.

<sup>34</sup> The survey results and details are available at:

<http://134.209.145.110/borewells?child=district&parent=state&location=Andhra%20Pradesh%23%2328> and <http://134.209.145.110/readmore/geo-tagging>

<sup>35</sup> Till FY19, there were many conditions for availing free power. This included implementing DSM measures, being non-corporate, non-IT assessee, having less than 2.5 acres of wet land and less than 3 connections in case of dry land. From FY19, conditions on type of land and number of connections have been dropped. As per DISCOM ARR submissions for FY20, around 25% of the farmers (corporate or IT-assessees) are exempt from free power.

<sup>36</sup> Issues about delay in implementation of this methodology and gaps in data collection have been raised in many public hearings. In September 2020, AP has announced implementation of smart meters for all agriculture connections and disbursement of subsidy directly to farmers. AP also announced YSR Jalakala scheme, by which farmers with 2.5 to 5 acres and no borewell connection can apply for financial support to dig borewell.

<sup>37</sup> All India Electricity Statistics – General Review 2016 and 2020, CEA

### 3.4 Energy efficiency measures

There were many energy efficiency initiatives in the state from 2015, led by the DISCOMs and the AP State Energy Conservation Mission, and supported by the Energy Efficiency Services Limited (EESL). These covered residential LED bulbs, residential efficient fans, efficient agriculture pumpsets and LED streetlights. A summary of achievements, as reported in the AP Socioeconomic survey 2020 is given in Table 6. Coverage figures for LEDs and streetlighting are impressive. Programs for fans and pumpsets are relatively new. While these numbers look impressive (around 6% of the LT demand in FY20), reports on actual impacts – in terms of savings and ground level issues – have not been sufficiently documented.

Table 6: Coverage of energy efficiency efforts

Appliance	Number (Lakhs)	Annual saving (MU)
LED Bulbs Domestic	232	1700
LED Street Lights in ULBs	6.2	133
LED Street Lights in GPs	27	284
Energy Efficient Pump sets	0.69	124
Energy Efficient Tube lights	1.48	3.41
Energy Efficient Ceiling Fans	3.23	20

Source: Compiled by Prayas (Energy Group) from AP Socioeconomic survey reports for 2018-19 and 2019-20.

### 3.5 Revenue from sales and subsidy

Table 7 gives the Average Billing Rate (ABR) of different consumer categories at the prevalent tariff. The last row of Table 7 gives the total ABR, inclusive of state subsidy received, which is largely towards agriculture supply.

As can be seen from Table 7, commercial consumers have the highest ABR, while agriculture has the least. There has been a steady growth in average ABR (without subsidy), with FY18 being an exceptionally high ABR. This could be due to following reasons. First, FY18 data is the as approved in the FY18 Tariff order (in which the expected agriculture consumption is typically low, while Commercial & Industrial (C&I) consumption is high), not based on actuals. Secondly, there was severe drought in AP in FY18 and FY19, due to which agriculture consumption was low while C&I consumption was high. Agriculture consumption pulls down the average ABR, while C&I consumption pulls it up. ABR for LT Agriculture is high in FY20, since Aquaculture & Animal husbandry, with high tariff, was shifted to this category. ABR with subsidy (last row of Table 7) is calculated based on subsidy received during the corresponding year. ABR figures are relatively low in FY17 and FY19, because only part of the committed subsidy was paid, as can be seen in Table 8.

State government has been providing subsidy, mostly for supplying free power to agriculture and few related activities.<sup>38</sup> As seen in Table 8, there has been a steady rise in the state subsidy demand, from Rs. 3,125 Cr in FY15 to Rs. 7,064 Cr in FY20. Subsidy demand as a proportion of the approved Annual Revenue Requirement (ARR) was 12-14% till FY18, after which it has grown to 20% in FY19 and 20, and as per FY21 Tariff order, it is nearly 24%. Receipt of subsidy was low in FY17 and FY19, adding to the financial problems of DISCOMs.

---

<sup>38</sup> The Cost of Service (CoS) for LT supply is Rs. 6.28/kWh, as per FY20 Tariff order. Power is free of agriculture and the energy charges for domestic is Rs.1.45/kWh for consumption upto 50 units/month (if annual consumption in the previous year is less than 900 units). But that average realisation from this group of consumers works out to be nearly Rs.2.60/kWh in FY20, after including fixed charges.

Table 7: Average Billing Rate trends

Category	Average Billing Rate Rs/kWh					
	FY15	FY16	FY17	FY18	FY19	FY20
LT Domestic	3.38	3.40	3.54	3.83	3.66	3.68
LT Agriculture	0.09	0.03	0.08	0.12	0.05	0.88
LT Commercial	8.99	9.24	9.56	10.30	10.17	9.22
LT Industrial	6.05	6.07	5.54	6.14	5.93	7.90
LT Others	5.59	5.70	5.76	6.26	6.16	6.39
HT Industrial	6.33	6.60	6.74	7.30	6.99	7.19
HT Commercial	9.03	8.94	9.26	9.86	9.98	10.50
RESCO	0.70	0.33	0.49	0.73	0.57	0.66
HT Agriculture	5.38	5.65	5.37	5.98	6.11	5.88
HT Others	6.27	6.63	6.82	5.26	5.18	4.94
LT Total	2.78	2.90	2.96	3.41	3.09	3.29
HT Total	6.29	6.54	6.58	7.11	6.73	6.86
Total ABR without subsidy	4.11	4.24	4.26	4.81	4.46	4.59
Total ABR with subsidy	4.86	4.97	4.87	5.36	4.69	5.58

Source: Compiled by Prayas (Energy Group); Actuals from the ARR submissions of DISCOMs, except FY18, which is based on Tariff order for FY18; Subsidy received data for FY15-19 from PFC reports and FY20 from APTRANSCO power sector finances status report 2019-20

Table 8: State subsidy commitment and receipts

Category/Year	FY15	FY16	FY17	FY18	FY19	FY20
Subsidy booked Rs. Cr	3,125	3,186	3,834	3,700	6,745	7,064
Subsidy as % of approved ARR	14	12	14	13	20	20
Subsidy received Rs. Cr	2,972	3,152	2,859	3,371	1,250	5,561
Received as % of booked	95	99	75	91	19	79

Source: Compiled by Prayas (Energy Group) from Tariff orders (except FY15, for which data is from ARR submissions of FY18), PFC reports (subsidy received for FY15 to FY19) and APTRANSCO power sector finances status report 2019-20 (subsidy received in FY20)

#### 4. Distribution business and quality of supply and service

Anecdotal evidence indicates improvement in quality of supply all over the state, especially in cities and towns. In addition to the increase in power availability, investment in distribution also seem to have contributed to this change. This is reflected in the increase in distribution cost from 0.67/kWh in FY15 to 1.01/kWh in FY20.

Significant capital expenses were also made under DDUGJY, IPDS and World Bank supported projects to strengthen the distribution to provide day time 9-hour supply to agriculture and 24 x 7 supply.<sup>39</sup> Feeder

<sup>39</sup> APEPDCL is implementing a Rs. 1000 Cr project on 24 x 7 power supply from 2017, with Rs. 700 Cr credit from the World Bank

separation has not been planned in an extensive way in AP and the approach from 2006 has been to implement High Voltage Distribution Systems (HVDS) for agriculture and rural supply. As of March 2020, around 56% of the pumpsets are covered under this scheme.<sup>40</sup> Farmer representatives report that there has been improvement in quality of supply due to HVDS, but there have not been many systematic assessments of the cost benefit aspects of the programme. World Bank and some other studies indicate significant savings, leading to a Benefit Cost Ratio of 2.8. But 95% savings are attributed to reduction of pumpset failure rates, and remaining to DT failure reduction, loss reduction etc, all based on empirical data and few sample studies.<sup>41</sup>

#### 4.1 Power outages

The annual DISCOM ARR submissions provide performance reports with data for two years before the current year. These cover annual distribution circle-wise data on consumer compensation for complaints, electricity accidents, Distribution Transformer (DT) failures, burnt meters, stuck meters, attending fuse-off calls, feeder outages, pending service connections, release of connections, arrears greater than Rs. 50,000 pending for 6 months etc. DISCOM websites and annual reports also provide some information on feeder outages and DT failures. From 2021, APERC has been hosting a portal which provides detailed information on the Standards of Performance (SoP) reports submitted by the DISCOMs.<sup>42</sup>

Based on this data, annual DT failure rate has reduced from 10% to 7% from FY15 to FY20, when there were nearly 9.4 lakh DTs in the state. Failure rate is 6% in EPDCL and 8% in SPDCL, which has nearly 80% of the DTs. Reports on power outages provide rural and urban feeder outages with break-up for interruptions and break-downs. EPDCL also provides reliability indices (SAIDI and SAIFI). From the FY20 report, the average duration of outages appears to be 3-4 hours in EPDCL and 8-9 hours in SPDCL.<sup>43</sup> Performance reports do not provide actual time taken to attend the complaints like fuse off calls, meter damage, DT failure etc.

#### 4.2 Electricity accidents

Number of fatal human accidents have been increasing over the years in both the DISCOMs, as seen in Table 9.<sup>44</sup> After this issue was raised by many consumer groups and discussed in public hearings, APERC revised the regulations to provide ex-gratia to dependents of accident victims in 2017, to ensure that maximum number of victims are granted ex-gratia on humanitarian grounds. This has eased the ex-gratia process. After repeated complaints about delays in claiming compensation after fatal accidents, APERC issued the [Compensation to Victims of Electrical Accidents Regulation \(2017\)](#), which streamlined and simplified the procedure for claiming compensation by the relatives and directed DISCOMs to follow CEA safety standards. However, there has been limited success in reducing accidents, even though this topic is being raised in tariff hearings from 2006 and

---

([https://www.apeasternpower.com/download?filePath=/upload/External\\_Files//PFA%20Downloads/&fileName=About%20Power%20for%20All%2024x7%20Scheme.pdf](https://www.apeasternpower.com/download?filePath=/upload/External_Files//PFA%20Downloads/&fileName=About%20Power%20for%20All%2024x7%20Scheme.pdf) )

<sup>40</sup> AP Socio-economic survey report 2020 indicates that 10 lakh pumpsets of the total 18 lakhs are covered under HVDS at a cost of Rs. 4743 Cr. Report available at: <https://www.apfinance.gov.in/downloads/Socio-Economic-Survey-2019-20.pdf>

<sup>41</sup> See the following: 1. [Analysis of Power Distribution and DSM: High Voltage Distribution System \(HVDS\) and Energy Efficient Agriculture Pumpsets \(EEPS\) in Andhra Pradesh](#), Copenhagen Consensus Center (2018); 2. [Environment and Social Management Plan for Rural HVDS Project – AP](#), World Bank (2016)

<sup>42</sup> This welcome [APERC facility](#) was inaugurated in January 2021 and is in being improved based on feedback received

<sup>43</sup> These are approximate values calculated based on the performance reports, which does not directly report such numbers, or trends over the years

<sup>44</sup> This is compiled from performance section of the ARR submissions of DISCOMs. National Crime Records Bureau (NCRB) also provides electrocution deaths and the numbers reported for AP are higher: 2015 (637), 2016 (699), 2017 (860), 2018 (742), and 2019(908). Reports available at: <https://ncrb.gov.in/en/accidental-deaths-suicides-india-ads>

APERC (of the joint state) has been issuing directions to DISCOMs to take steps to reduce accidents.<sup>45</sup> Currently, APERC has been approving around Rs. 10 Cr/DISCOM/year in the tariff orders for enhancing safety provisions, with the expense to be accounted in network Repair and Maintenance. But the steps taken by DISCOMs to reduce accidents which affect the public are not clear.<sup>46</sup> If the reduction in numbers seen in FY20 is a trend, there is a chance that accidents would reduce.

*Table 9: Increasing fatal human electricity accidents*

DISCOM/Year	FY15	FY16	FY17	FY18	FY19	FY20
EPDCL	152	151	201	282	234	132
SPDCL	228	320	242	304	427	409
Total	380	471	443	586	661	541

*Source: Compiled by Prayas (Energy Group) from DISCOM ARR submissions; FY20 data for SPDCL includes 99 fatal accidents from the newly formed DISCOM, APCPDCL.*

Directorate of Electrical safety, under the Department of Energy is the agency responsible for safety certifications and inspections, largely of HT installations. Typically, they are under-staffed, and as of now, other than some efforts to spread safety awareness, their contribution to reducing accidents have not been significant.

#### 4.3 Consumer complaint handling

APERC revised the [regulations](#) on Consumer Grievance Redressal Forum (CGRF), Ombudsman and Consumer assistance in 2016. One CGRF was created for each DISCOM with four members (three appointed by the DISCOM and one consumer member appointed by APERC), chair being either a judicial officer or a retired Chief General Manager). Some GRFs have been active with many pro-active complaint meetings held all over the state.<sup>47</sup>

There is one Electricity Ombudsman for the state from 2014, appointed by the APERC. The Secretary of APERC, assisted by a Deputy Director is responsible for consumer affairs. APERC has been publishing some key regulations (Standards of performance, Complaint handling procedure, Accident compensation etc) and orders (Tariff orders) in Telugu and freely distributing them.

## 5. DISCOM finances

DISCOM finances need to be seen in the context of state finances. When the Andhra Pradesh state was bifurcated to form Telangana and Andhra Pradesh (AP) states in 2014, Hyderabad remained with Telangana, though it was to be the joint capital of both states for 10 years. As a compensation for the loss of Hyderabad (with high tax revenue, high industrialisation and good urban infrastructure), AP was to be provided financial assistance, special category state status and many other forms of support. Telugu Desam Party (TDP), the ruling party in AP from 2014-19, supported the central government and it was expected that financial assistance would materialise. Due to differences with the new state government in Telangana, government offices of AP

<sup>45</sup> To quote from Clause 186 of the 2006-7 tariff order of APERC: "The distribution licensees will chalk out by 30.09.2006, a cogent and viable plan of action to adhere to appropriate safety standards, in particular, to periodically inspect their electrical installations to take prompt action to rectify any shortcomings noticed or brought to their notice and to lay down a time schedule therefor." In subsequent tariff orders, SERC has been expressing dissatisfaction with the response of DISCOMs and again issuing similar directions, for preparing action plan etc.

<sup>46</sup> For example, see clauses 342 to 344 of FY20 Tariff order, dated 22/2/19. During the tariff filings for FY22, DISCOMs have stated that they are responsible for about 11% of the accidents.

<sup>47</sup> APEPDCL CGRF orders are available [here](#).

relocated to temporary buildings around Vijayawada in 2016-17 and AP started building a massive new capital around Vijayawada. There were accusations that the expected financial support from central government did not materialise and the TDP parted ways with central government in 2018, further worsening the financial health of the state government. DISCOMs also contributed to the worsening of financial health, as noted in the following paragraphs.<sup>48</sup>

Ujjwal DISCOM Assurance Yojana (UDAY) agreement was signed by AP in June 2016. There were many conditions on debt take over, metering, loss reduction and tariff raise, of which only some were complied with. Total DISCOM debts as of September 2015 was Rs. 14,721 Cr (capex loans, working capital loans and FRP bonds liability), of which Rs. 8,893 Cr was to be taken over by the AP government by March 2017 through bonds which was to be transferred to DISCOMs - half as grants, 25% as equity and the remaining 25% as loans. These liabilities were to be taken over by the government in 2018. For the remaining debt, DISCOMs were to issue state guaranteed bonds or convert them to low interest bank loans. Future annual losses of the DISCOMs were to be taken over in the coming years: 5% of FY17 losses in FY18, 10% of FY18 losses in FY19, 25% of FY19 losses in FY20 and 50% of FY20 losses in FY21. As per the agreement, dues from the government departments, amounting to Rs. 1,442 Crores was to be cleared by March 2017.

DISCOMs were given many performance targets like reduction of AT&C losses, 100% DT metering (Sep 2017), rural feeder energy audit (Apr 2017), physical feeder separation (Mar 2018), timely tariff filing and tariff hikes (3.6% in FY16, 5% in FY17, 5% in FY18, 5% in FY19). As seen later, UDAY has not helped the DISCOMs to tide over financial crisis and they have not been able to meet all the targets, especially on energy audit, feeder separation and tariff revision.

Table 10 gives the financial losses reported by the DISCOMs from FY15 to FY20. It can be seen that the annual losses have been high over the years (except in FY18) in terms of absolute numbers and as a percentage of approved ARR.

*Table 10: Rising financial losses of the DISCOMs*

Year	EPDCL Rs. Cr	SPDCL Rs. Cr	Total Rs. Cr	% of ARR
FY15	722	1,677	2,399	11
FY16	472	3,430	3,902	15
FY17	441	1,888	2,329	9
FY18	-3	5	2	0
FY19	4,644	7,681	12,325	37
FY20	NA	NA	8,150	23

*Source: Compiled by Prayas (Energy Group) from: Annual loss for FY15 to FY19 from DISCOM annual reports; FY20 loss from Power sector finance status report 2020*

There are many reasons for this steady increase in losses. Transfer scheme has not been fully implemented, subsidy disbursement has been partial, true-up delayed and tariff increase has been low. Tariff has not been hiked for agriculture and domestic consumers (those who consume less than 50 kWh/month) any time. There were

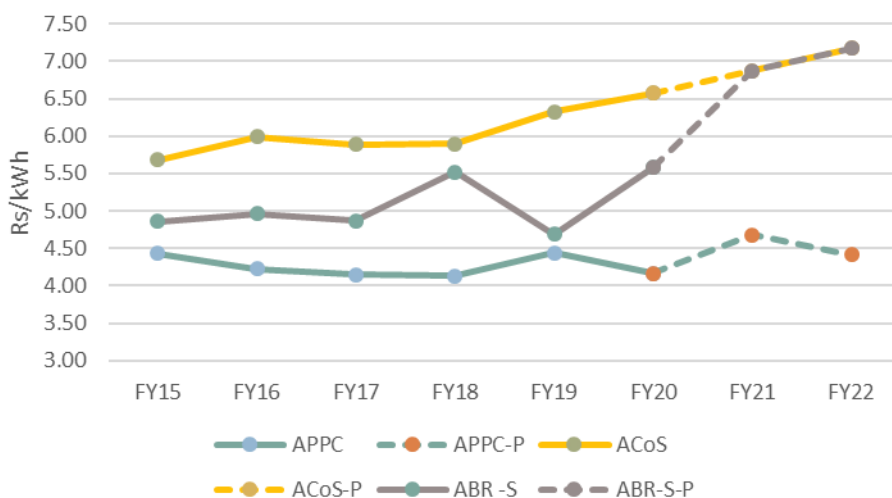
<sup>48</sup> A [white paper on AP finances](#) (released by the new YSR party government in 2019), gives some details of the worsening financial health of AP

tariff hikes in FY16 (5-6%), FY17 (2-4%) and FY18 (3-4%), but not after that. <sup>49</sup>Subsidy payments by the government has not been full as indicated in Table 8, from FY17 onwards.

The trends of Average Power Purchase Cost (APPC), Average Cost of Supply (ACOS) and Average Billing Rate including subsidy (ABR-S) over FY15-FY20, along with projections for FY21 and FY22 are shown in Figure 6. It can be seen that APPC and ACOS figures are high in FY15 and FY16 due to high percentage of costly market power purchase – 23% and 16%. It has come down subsequently due to reduction in market purchase and increase in power purchase from long term contracts. It is high in FY19, perhaps due to high cost APGENCO thermal and private renewable power purchase. After the change of government, there was a move to amend the PPAs with renewable projects. With many disputes, the matter is with the AP High Court as of February 2021. The High Court gave an interim order in September 2019, fixing tariff of Rs.2.43/kWh for solar and Rs/2.44/kWh for wind projects. But DISCOMs and APERC have been using the PPA tariff for these plants so far, as seen in the Tariff orders for FY20 and FY21 – Rs.4.63/kWh for wind, Rs. 4.10/kWh for solar parks and Rs. 5.90/kWh for other solar.

It can be seen that ACOS shows a general upward trend and the gap between ACOS and ABR -S (inclusive of subsidy) has been high, except in FY18. The low gap in FY18 may be an outlier, because ABR for FY18 is high, as noted in Section 3. Gap is low for FY20 compared to FY19, perhaps because the subsidy disbursal has been very low at 19% in FY19, as seen in Table 8. The projected values are based on Tariff order (FY21) and DISCOM ARR submissions (FY22) and hence ACOS and ABR match. These would change when actuals or trued up data is available.

Figure 6: Trends of APPC, ACOS and ABR



Source: Compiled by Prayas (Energy Group); 2015-2017 data from actuals given in 2019 ARRs of DISCOMs; 2018 and 2019 data from the Tariff orders for the respective years – hence Provisional

After high market purchase in FY15, and FY16, the subsequent tariff orders did not approve much market power purchase. But actual purchase has been around 7-8% from FY19, and significantly high in FY21. The reasons cited have been to ensure agriculture power supply, implement 24 x 7 power and optimise power purchase costs.

<sup>49</sup> These figures of tariff increase are from Tariff orders of APERC, for consumers who had tariff hike



True up for supply business has been delayed in AP. True up for FY16 was filed in November 2017 and APERC gave its order in February 2019. True-up petitions for FY15, FY17, FY18 and FY19 were filed in 2019 and order issued in November 2020. The true-up order allowed only power purchase true-up, and not the revenue true-up, which DISCOMs had requested. Carrying cost was allowed only from the date of filing. True-up for distribution business for the 3<sup>rd</sup> control period was not to be part of the MYT tariff order for the 4<sup>th</sup> control period (FY19-24), issued in April 2019.<sup>50</sup>

Regular true-up is extremely important to assess the situation, even though it does not address the issue of recovering the revenue gap. The practice of quarterly adjustment of power purchase cost variations (called Fuel Surcharge Adjustment - FSA) was discontinued just before state bifurcation in 2014. There is lack of timely recovery of fait accompli costs which ultimately burdens consumers with avoidable carrying cost. Hence the revenue gap is getting accumulated, adding carrying costs every year, without any clear idea about how and when the costs will be recovered.

Table 11 shows the cumulative financial losses recently reported by DISCOMs in absolute numbers and as a % of the annual ARR. It can be seen that the numbers are increasing over the years. The cumulative financial loss has been high in FY15 itself and steadily increasing to reach Rs. 37,000 Cr by FY20, which is more than that year's ARR. There has been a big increase in losses in FY19 due to costly power purchase, as per the APTRANSCO report. The AP DISCOMs have high dues pending with the generating companies, and as per the PRAAPTI portal, it was Rs. 3,259 Cr, as of March 2020, mostly to RE projects.

Table 11: Increasing cumulative financial losses

Year	FY15	FY16	FY17	FY18	FY19	FY20
Cumulative Loss Rs.Cr	9,026	14,484	16,815	16,822	29,147	37,297
% of ARR	40%	57%	63%	61%	87%	104%

Source: Compiled by Prayas (Energy Group) from Power sector finances status report (APTRANSCO), 2020

Both the DISCOMs report very high arrears pending for more than 6 months, which added up to Rs. 9,677 Cr in FY20, with SPDCL having nearly 75% share. About 75% of the total arrears are from government agencies like municipalities, offices, panchayats and water supply schemes.<sup>51</sup>

From FY21, there has been better release of subsidy amounts by the government and there is a collection drive to clear the pending arrears as well as a move to install pre-paid meters in government consumer locations.

## 6. SERC functioning and effectiveness of accountability

Table 12 summarises the important regulatory processes in APERC from 2014 till 2020. There were some good initiatives by APERC, which include regular public hearings for tariff determination at multiple locations, preparation of a Load Forecast and Resource plan, regulations on complaint redressal (2016), order on ex-gratia for accidents (2017), publication of Telugu awareness material and tariff orders etc. But it could not optimise high quantum of costly capacity addition in renewable and thermal power, which is now posing grid operation and financial challenges now. Load forecast and resource plan preparation process was good, but took a long time and by the time the order was issued, lot of capacity was already added. True-up petitions were delayed and Commission also took long time to pass orders on them.

<sup>50</sup> What is expected is a true-up of the [distribution tariff order for 3<sup>rd</sup> control period \(2014-2019\)](#) issued in May 2014. But the [order issued for the 4<sup>th</sup> control period](#) in April 2019, does not include this (see clause 46)

<sup>51</sup> As reported in [Power sector finances status report \(APTRANSCO\)](#)

As shown in Table 12, the tariff process was regular even though there were some delays in DISCOM petitions for some years. Tariff public hearings were held in 5-7 locations every year, with at least two different locations in each DISCOM area and Hyderabad. There was no vacancy in the posts of Chairperson or Members during this time. Number of objectors has been reasonable with around 100 to 400 objectors in different years.<sup>52</sup>

Every tariff order has many directives for the DISCOMs to follow. In their subsequent ARR submissions, DISCOMs give a brief response on follow up actions, but the tariff orders do not summarise all the directives in one place or track their compliance. There have been repeated directives regarding agriculture consumption estimation, reduction of accidents etc, but these are reviewed during public hearings when taken up by objectors. It would be good if the Commission initiated some steps to ensure that the directives are tracked better and implemented.

Table 12: Overview of key APERC processes from 2014 to 2020

Milestone	Details	Remarks
APERC transition	APERC for the joint state was established in March 1999. When the state was bifurcated in June 2014, there was a provision that the existing APERC could continue as a joint commission for both states for maximum of 6 months. Existing APERC had initiated work in that direction. But new commissions for AP and TS states were constituted in Jul-Aug 2014, and new Commission took charge of APERC in October 2014	The Commissions instituted regulatory processes like tariff hearings, public hearings, reasoned orders and many transparency provisions. The transition to the new Commission after bifurcation was not done very smoothly.
Constitution of new APERC	The Chairperson took oath in October 2014 and two Members in February 2015. There has been no vacancy in the Commission, with new Chairperson (a retired High Court Judge) taking oath in October 2019 and two Members in February 2020.	Chairperson was a retired judge of the AP High Court, others were Member-Finance and Member - Technical. In April 2016, through a legislation in the State assembly and approval of the central government, retirement age of Chairperson and Members were changed to 70, apparently to ensure that the Chairperson continued in office.
Frequency of issue of tariff orders	Tariff orders for supply business were issued in time before end of March, except for FY15, due to the challenges of state bifurcation. MYT orders for distribution, transmission and SLDC were issued in 2019, before beginning of the 4th control period FY20-24.	Based on request, APERC allowed DISCOMs to file annual petitions for supply, as opposed to MYT petitions as per regulation. There were some delays in tariff filings by DISCOMs in 2016,2017 and 2018 (for determining tariff for the next year), and APERC had issued letter to DISCOMs that they would take up suomotu tariff determination. But that did not happen.
Regularity of tariff hike	Did not follow the UDAY conditions for hike. Tariff was never hiked for agriculture and small domestic consumers. For others, there was marginal hike in the tariff orders for FY16, FY17 and FY18.	Total tariff hike was less than UDAY commitment

<sup>52</sup> Objectors reported in the tariff orders – tariff order for year (number): FY16 (189), FY17 (101), FY18 (190), FY19 (390), FY20 (174).

True-up of Power purchase	Done in time for FY16, FY18 and FY19.	Expected to be done within 2 years
True-up of distribution business	Not done for 3rd control period (FY14-FY19)	
Staff strength/ capacity	Did not have as many staff as sanctioned – the joint state APERC in 2014 had 51 posts filled against a sanctioned 81. Very few technical staff from 2014. Professional staff strength has been around 4 or 5. No Director level staff for Tariff (from 2017), Engineering or Law (from 2014)	Professional - Secretary, director/joint director/deputy director in tariff, engineering, power procurement, transmission, distribution, consumer affairs, law, IT or administration.
Tariff hearings	Regular and held at multiple locations in each DISCOM area (different in each year) and Hyderabad - 5 to 7 locations every year	Good participation in tariff hearings with 200-300 objectors. Public hearings also held for PPA approval, Resource plan, regulation amendment etc, during which participation was relatively low
Meetings of SAC	Held regularly at multiple times in a year, often as a joint meeting with the State Coordination Forum	In addition to tariff issues, topics like Electricity Act amendment, changes in tariff structure etc. were discussed
Consumer awareness	Many Telugu publications -SoP regulations, accident compensation, Tariff order etc.	Used by interested consumer groups

Source: Compiled by Prayas (Energy Group) from annual report and tariff orders of APERC and information at the APERC website

The first Commission was successful in some areas like ensuring regular tariff processes, preparing a resource plan and addressing some supply and service quality issues. But its oversight on power purchase was limited and it could not prevent the worsening financial situation of the DISCOMs.

The second Commission, which took charge in 2019-2020, has also demonstrated procedural rigour, for example by timely tariff revision process and issuance of true-up order. But there have been many changes in the state power sector after the new government took office. Attempts to review PPAs with RE projects, change of contractor for Polavaram project, introduction of 9-hour day time supply to agriculture, proposal to set up 10,000 MW solar capacity for agriculture, 6,500 MW pumped hydro, renewable power export policy, plans to introduce smart metering and DBT for agriculture subsidy, shelving the idea of a single massive state capital are some new initiatives. AP has also set up a new institution - AP Judicial Preview – headed by a retired High Court judge, which scrutinises all infrastructure tenders, including those in power. The functioning of this institution needs a separate study. With high costly base power surplus and high RE capacity, AP DISCOMs have increasingly started using the power market to meet its power needs from FY21, while backing down its own thermal capacity. The implications of this is not part of this report.

AP power sector today is marked by high financial losses, surplus base power capacity and high (and growing) renewable capacity. Managing the grid with such high renewable capacity, optimising power purchase cost and ensuring reliable supply to consumers, are no easy tasks. It is to be seen how the sector actors rise up to meet this challenge.