24 X 7 Power Supply to Agriculture in Telangana

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Contents

1. Introduction

On 1st January, 2018 people in different parts of the country were informed through full front-page advertisements in newspapers by the Telangana State Government about its 'New Year Gift' to farmers in Telangana – 24X7 free power supply to agriculture. It boasted that it was the only state in the country to achieve this distinction in power sector. It was also said that 24-hour free power supply to agriculture was not part of the Party manifesto, but still the Telangana Rastra Samithi (TRS) led state government achieved this milestone within three and half years of coming to power. They do not forget to add that when they came to power in 2014 the state was reeling under extensive power cuts. M.S. Swaminathan welcomed the measure saying, "This will be a great boon to the farmers, particularly since Telangana is by and large a dry farming state". (The Hindu, 7th January, 2018)

Full front-page advertisements in newspapers all over the country has its political message. The TRS party, its President and Chief Minister of Telangana Mr. K. Chandrasekhara Rao in particular has arrived on the national stage. It is the period of musings over alternative political fronts at the national level. Apart from this, this measure has critical implications for different aspects of the state's economy as well as its environment.

This is an important policy announcement on power supply to agriculture after free power supply announced in 2004 in the undivided Andhra Pradesh. This report provides a background of groundwater based irrigation in Telangana, emphasises the importance of electricity supply and analyses the impacts of 24 x 7 free power supply. It also gives some suggestions for further work on this topic.

2. Importance of well irrigation in Telangana

Extent of cultivated area under irrigation has become an important indicator of as well as an input in agriculture growth. This is even more important in an agrarian economy like Telangana. Over the period extent of cultivated area irrigated in Telangana had increased considerably. It had increased from 17.5 % of net sown area in 1971 to 38 % in 2001. In Telangana agriculture growth during this period was linked to growth in irrigation. Between 1971 and 2001 agriculture in Telangana grew by 3.6 % compared to 2.8 % for Andhra Pradesh. Within Telangana districts of Khammam, Karimnagar and Warangal recorded growth rates of five % and above. This agriculture growth was made possible by expansion of irrigation. Well irrigation contributed predominantly to expansion of irrigation in Telangana. While in 1971 well irrigation contributed less than one fifth of the area irrigated it increased to nearly two thirds in 2001. In the case of Khammam district percentage of net sown area irrigated increased from 19 % to 44 %. In the case of Karimnagar, it increased from 24 to 71 %. In the case of Warangal, it increased from 24 to 58 %. During this period area under well irrigation increased by 17 per cent. In the case of Khammam it was 15.5 %, Karimnagar 20.3 % and Warangal 31.2 %. (Vamsi, 2004)

The expansion of area under well irrigation had its own ramifications. Increase in number of wells led to depletion of ground water. Unlike canal/surface irrigation expansion of well irrigation was made possible by private investments. Small and marginal farmers were in disadvantageous position because of limited capital at their disposal. As ground water levels declined farmers were forced spend more on deepening wells. This has led to increasing burden particularly on small and marginal farmers. And this further led to farm distress and suicides of farmers. (Vamsi, 2004)

Table:1 Irrigation as a percentage of Net Sown Area in Telangana

Source of irrigation	**1971**	**1985**	**2001**
Canals	4.5	7.2	6.8
Tanks	9.1	6.8	6.1
Wells	3.5	8.0	23.8
Others	0.5	0.9	1.4
Total	**17.5**	**22.8**	**38.0**

Source: Vamsi Vakulabharanam, 2004

This predominance of well irrigation has continued in to 21st century also.

According to Government of Telangana's Statistical Year Book – 2017, out of total net cropped area of 41,74,568 hectares 14,86,241 hectares were irrigated under different sources in FY 2015-16. That is 35.6% of the net cropped area was irrigated. Out of this net area irrigated 12,87,557 hectares were irrigated under wells alone. Wells contributed to 87% of the irrigated area in Telangana.

The proportion of net area irrigated under wells fluctuated between 69.61% and 86.63% during the period 2008-09 and 2015-16. Contribution of other sources of irrigation like tanks and canals has declined.

Proportion of net area irrigated under tanks declined from 11.87% in 2010-11 to 7.57% in 2015-16. Similarly, proportion of net area irrigated under canals declined from 15.76% to 3.55%.

Table:2 Area irrigated under wells in Telangana:

Year	Gross Irrigated Area (Hectares)			Net Irrigated Area (Hectares)		
	Total	Under wells	% under wells	Total	Under wells	% under wells
2008-09	27,21,002	19,80,917	72.80	18,82,390	13,10,274	69.61
2009-10	21,31,282	18,41,987	86.43	14,92,826	12,59,387	84.37
2010-11	29,98,798	21,10,959	70.39	20,03,987	13,95,606	69.64
2011-12	28,64,041	21,56,835	75.31	19,84,618	14,23,259	71.71
2012-13	25,57,104	22,07,410	86.32	17,74,117	14,85,848	83.75
2013-14	31,54,317	23,33,872	73.99	22,79,650	17,10,653	75.04
2014-15	25,28,956	21,15,781	83.66	17,26,303	14,13,096	81.86
2015-16	20,27,663	18,05,503	89.04	14,86,241	12,87,557	86.63

Source: Statistical Year Book – 2017. Directorate of Economics and Statistics, Government of Telangana

Table:3 Irrigated area in Telangana under different sources (Hectares)

Sources	2010-11		2015-16	
	Gross	Net	Gross	Net
Tanks	3,05,224 (10.18%)	2,37,968 (11.87%)	1,21,465 (05.99%)	1,12,525 (07.57%)
Canals	5,03,887 (16.80%)	3,15,754 (15.76%)	61,183 (03.02%)	52,701 (03.55%)
Wells	21,10,959 (70.39%)	13,95,606 (69.64%)	18,05,503 (89.04%)	12,87,557 (86.63%)
Other Sources	78,728(02.63%)	54,659 (02.73%)	39,512 (01.95%)	33,485 (02.25%)
Total	**29,98,798**	**20,03,987**	**20,27,663**	**14,86,241**

Source: Statistical Year Book – 2017. Directorate of Economics and Statistics, Government of Telangana

Table:4 Minor Irrigation Census

Wells	1st MIC 1986-87	2nd MIC 1993-94	3rd MIC 2000-01	4th MIC 2006-07	5th MIC 2013-14
No. Dug wells	5,89,746	5,55,747	7,35,273	6,30,297	5,05,352
No. Shallow Tube wells	19,792	1,21,634	4,23,618	5,95,495	6,80,169
No. Deep Tube wells	1,563	1,781	4,469	57,138	2,70,634
Total wells	6,11,101	6,79,162	11,63,360	12,82,930	14,56,155
Area irrigated under wells (Hect)			12,44,614	14,13,454	17,84,756

Source: Statistical Year Book 2015, Govt of Telangana and 5th Census of Minor Irrigation Schemes - GoI

Minor Irrigation Census (MIC) also reflected growth in well irrigation. The number of wells more than doubled between 1986-87 when first MIC was undertaken and 2013-14 when 5th MIC was conducted. Area cultivated under wells increased from 12.45 lakh hectares in 2000-01 to 17.85 lakh hectares in 2013-14.

3. Electrified irrigation pump sets

Electrification of agriculture pump sets can be considered as an important reason for the spread of well irrigation. Subsidised electricity supply to agriculture pump sets and ease of operation compared to diesel pump sets led to increased adoption or installation of electric pump sets in the agriculture sector in the state. As shown in the following table the number of electric pump sets increased by more than five times between 1977 and 1999 when the number of diesel pump sets declined by half.

Table:5 Irrigation Technology in Wells Telangana

Irrigation technology	**1977**	**1993**	**1999**
Diesel pump sets	1,02,263	79,047	55,654
Electric pump sets	1,37,492	5,79,504	7,12,624

Source: Vamsi Vakulabharanam

Table:6 No. of Wells in Andhra Pradesh

MIC	**No. of Electrical pump sets**	**No. of Diesel pump sets**	**Total wells**
1st	7,32,142 (63.43%)	2,15,231	11,54,205
2nd	12,76,726 (83.25%)	1,49,104	15,33,609
3rd	16,04,021 (83.15%)	1,18,339	19,29,060
4th	19,22,829 (87.42%)	73,328	21,99,551

Source: Minor Irrigation Census

In the undivided Andhra Pradesh the proportion of electrified wells increased from 63.43 % in 1986-87 to 87.42 % in 2006-07 according to MIC.

According to 4th Minor Irrigation Census (MIC) there were 12,82,930 wells in Telangana in 2006-07. Out of these 12,05,400 wells had electric pump sets. Wells with electric pump sets accounted for 93.96% of the total wells in Telangana. During this period only 8,631 wells had diesel pump sets.

According to 5th Minor Irrigation Census (MIC) out of 13,62,879 wells in use in Telangana 13,53,621 wells had electric pump sets in 2013-14. In other words, wells with electric pump sets accounted for 99.32% of the total wells in Telangana. During this period only 4,844 wells had diesel pump sets.

Electrification of wells has contributed to increase in irrigated area in Telangana. This in turn led to enhanced agriculture production which had positively impacted the state economy.

Doubts about Number of agriculture services:

Table:7 Number of agriculture services in Telangana

Year	TSNPDCL	TSSPDCL	Total
2014-15	10,09,745	8,60, 677	18,70,422
2015-16	10,50,113	9,12,717	19,62,830
2016-17	10,63,078	10,20,863	20,83,941
2017-18	11,24,305	10,80,994	22,05,299
2018-19	11,74,230	11,40,994	23,15,224

Source: TSDISCOMs' ARR and Tariff Proposals 2018-19.

As far as the number of electrified irrigation wells are concerned, we usually come across the number of agriculture services claimed to be issued by the electricity distribution companies (DISCOMs) in the state. According to TSDISCOMs there were about 17 lakh agriculture services in the state in 2013-14. According to MIC there were about 13.5 lakh electrified wells in the state. TSDISCOMs' figures are on higher side as they include services that were not in use also for various reasons. The Geo Tagging exercise taken up in AP upholds this contention. According to APDISCOMs there were 15,04,565 agriculture services in AP in 2016. Under Geo Tagging programme of agriculture services information related 14,73,797 services was updated. Out of them 1,50,816 services were found to be non-functional. This shows that 10 % of the agriculture services released by the APDISCOMs are not in use. Similar situation also prevails in Telangana.

It is against this background of growth of irrigation under wells that the Telangana state government has announced 24-hour power supply to agriculture.

4. Introduction of 24-hour power supply to agriculture

Before extending 24 x7 power supply to agriculture in the whole state of Telangana from 1st January 2018, it was implemented on pilot basis from July to November 2017 in the districts of Karimnagar, Medak and Nalgonda. While Karimnagar is a part of northern DISCOM (TSNPDCL) Medak and Nalgonda are part of southern DISCOM (TSSPDCL). Before introduction of this 24-hour power supply, agriculture services in Telangana were receiving power supply for 9 hours in two or three spells. This extension of power supply to 24 hours for about 23 lakh pump sets is expected to require additional power of 2100 MW.

Along with the pilot programme in three districts, TSDISCOMs supplied 24-hour power to the agriculture sector across Telangana on an experimental basis from November 6, 2017 night onwards. This round-the clock power supply was for 6 days to study the pros and cons and gaps, if any, in the supply and distribution network before the Telangana government extended 24-hour power supply to the agriculture sector.

Before initiating the pilot implementation in three districts and experimental supply across the state, it was proposed to initiate 24X7 power supply to agriculture all over the state from March or April 2018. By second week of December 2017 it was decided to advance it to January 1, 2018. In a statement on January1, 2018, CM of Telangana said, "Initially, we thought we will supply 24-hour from February or March 2018. We are happy that we have started supplying power for the Rabi crops from January 1, 2018."

The power utilities in the state have spent Rs.12,316 crore on improving power transmission and distribution network. 514 new substations and 1,724 new transformers were installed, and 19,154 km of new power lines were laid. This introduction of 24-hour power supply to agriculture is expected to result in increase in power demand to 12,000 megawatt (MW). To meet and cope up with such increase in power demand T&D infrastructure is strengthened to cope up with even 13,000 MW demand.

5. Surplus power situation

Availability of surplus power was an enabling factor in the Telangana state government taking up 24 hour or uninterrupted power supply to agriculture. In the absence of surplus power, it is doubtful whether the state government would have embarked on such a programme. Under conditions of shortage of power, introduction of such intervention would have entailed higher power purchase costs and would have led to proportionately higher subsidy than under surplus condition. Under surplus conditions, TSDISCOMs have to anyway pay the fixed costs, and only variable costs need to be met additionally. According to TSERC's Tariff Order for the FY 2017-18, surplus power to the extent of 6,112 MU were available. If the estimate of power availability prepared by the TSDISCOMs for the same year was taken in to account, surplus power available would be more than 12,000 MU. The availability of this surplus power would have emboldened the TS state

government to advance the implementation of the programme to 1st January 2018 from April 2018. 7,964 MU of surplus power is available according to TSERC's tariff order for the FY 2018-19. This is after taking in to account 24-hour power supply to agriculture. This also shows that the state is in comfortable position as far as power availability is concerned and introduction of 24-hour power supply to agriculture would not place any strain on power supply in the state.

When the new State of Telangana came in to being in June 2014, it was facing severe power shortage. Even industrial sector had to face power cuts, not to speak of agriculture and domestic consumers. The situation improved gradually as new power generation capacities were added or contracted. Power generation capacity available to Telangana has increased from 6,573 MW in 2014 to 14,913 MW in 2018.

6. Increase in number of electrified irrigation pump sets

Introduction of 24-hour power supply to agriculture may result in demand for more service connections for agriculture pump sets. The past experience points to this trend. Between 2000 (when ERC began setting tariffs under the new AP Electricity Reforms Act 1998) and 2004 (when free power for agriculture was introduced by the then Congress ruled State Government in undivided Andhra Pradesh), the number of electrified pump sets in Telangana region increased at an average annual growth rate of 3.30 %. Between 2004 and 2014, before the formation of Telangana state, the number of electrified pump sets in Telangana region increased at an average annual growth rate of 5.53 %. This higher increase in new agriculture services might be because of demand for new agriculture services under free power regime. Between 2015 and 2018, the number of new agriculture services increased by nearly 6 %. During the financial years 2017 and 2018, more than 1.21 lakh new agriculture services were released each year. The newly elected TRS Government appears to be very liberal in sanctioning new agriculture services. According to the TSDISCOMs' tariff proposals for the year 2018-19, the new agriculture services to be released during this year will be 1.10 lakh. We need not be surprised at the end of the year if the new agriculture services released crosses this number.

7. Electricity consumption in agriculture sector

Notwithstanding the controversies about the way quantum of electricity consumption in agriculture sector is being arrived at, increase in number of electrified agriculture pump sets invariably leads to increase in electricity consumption in the agriculture sector. Though during the period 2000 – 2004, power consumption in agriculture sector increased at less than 1% annually, it crossed 5% during the period 2004-2014, in keeping with the increase in number of agriculture services.

During the FY 2017-18, TSDISCOMs increased the hours of power supply to agriculture from 7 to 9 hours. During the same year, number of agriculture services increased by 5.82 %. Despite the increase in number of hours of supply and number of agriculture services both the DISCOMs estimated an increase of 6.5 % only in agriculture consumption. TSERC further reduced this

estimate. While TSDISCOMs proposed 12,907 MU consumption in the agriculture sector TSERC approved 11,765 MU. During the ARR and tariff filings for the FY 2018-19, TSDISCOMs revised this figure to 15,683 MU. This is 21.51 % higher than DISCOMs' earlier proposal and 33 % higher than the quantum approved by the Commission. 24-hour power supply to agriculture during the last quarter of the financial year could be one of the reasons.

For the FY 2018-19, in the background of 24 hours power supply to agriculture, TSDISCOMs proposed 16,853 MU power consumption in agriculture sector. This is 43.25 % higher than the consumption approved by the Commission for FY 2017-18. Against this TSDISCOMs' proposal TSERC approved 14,262 MU consumption in agriculture sector during 2018-19. This is 21.22 % higher than its approval for the FY 2017-18. In this context, The TSERC in its Tariff Order for FY 2018-19 noted," The 24 hours power supply to agricultural services was implemented on pilot basis in Nalgonda, Medak and Siddipet Circles under SPDCL and Karimnagar Circle under NPDCL from mid of July, 2017. It has been observed that the agricultural consumption during the period August-September, 2017 was 33.36% and 39.33% higher than the agricultural consumption during the period August-September, 2016 for SPDCL and NPDCL respectively. These growth rates are considered for projecting the agricultural sales for FY 2018-19." (Para 3.1.8) According to TSSPDCL's flings agriculture consumption growth rate in Nalgonda circle was 19.40 %, in Medak circle it was 16.92 % and in Siddipet circle it was 63.76 %. Average growth rate for these three circles as noted in TSERC's tariff order was 33.76 %. From these numbers it is apparent that the average consumption for TSSPDCL is derived from extreme numbers and as such it is not reliable. Particularly, Siddipet circle was shown to have recorded 63.76 % growth in agriculture consumption. Given the circumstances it is difficult to accept such huge increase in power consumption in agriculture sector.

While introduction of 24-hour power supply to agriculture is expected to result in increased power consumption in the agriculture sector, whether it will experience such a huge jump is the moot point. This higher consumption and its implications for subsidy and cross subsidy demands fine tuning the methods to compute power consumption in the agriculture sector. Metering DTRs serving agriculture services could be one of the alternatives.

There is another reason for increase in power consumption in agriculture sector after the introduction of 24-hour power supply. According to 5th Minor Irrigation Census out of total electric powered wells and tube wells in Telangana 10% use electricity and diesel conjunctively (Dharmadhikary et al 2018, Vol.1, p. 13). In Telangana 37 % of the total area irrigated under wells was covered under dug wells in 2013-14. Particularly, in Warangal, Karimnagar, Khammam and Nalgonda districts substantial land is irrigated under dug wells where it is possible to use electricity and diesel conjunctively. With the increase in duration of power availability to 24 hours the need to depend on diesel may disappear altogether and to that extent consumption of electricity will increase.

Table: 8 Consumption of electricity (MU) in Telangana

Month/Year	2018	2017	2016	2015
January	5,571	4,831	3,965	3,970
February	5,419	4,752	4,031	3,848
March	6,670	5,538	4,469	4,375
April	5,265	5,088	4,412	3,987

Source: The Hindu, 10th June, 2018

Increase in consumption of power and peak load of power in Telangana have been attributed to the introduction of uninterrupted power supply to agriculture sector from January 1, 2018. The power demand in Telangana touched a record 211 Million Units (around 10,000 MW) on 27th February, 2018, the highest ever in the state up to that date. The 24-hour supply to agriculture during the Rabi season was considered as one of the reasons for this rise in electricity demand. On this day the daily peak demand touched 10,040 MW against the normal of 8,400 MW. (Times of India, February 28, 2018) Six months later on 7th September, 2018, peak demand reached to 10,598 MW and this was attributed to increasing electricity consumption in agriculture sector which accounts for nearly one third of the total power demand in the state. On September 7th, 2018, per day power consumption stood at 225 MU.

8. Groundwater issues

Increasing electricity consumption implies increasing pumping out of ground water and resulting decline in ground water levels. Prolonging this over a period results in unsustainable ground water exploitation. The past experience shows decline in ground water levels following increasing dependence on well irrigation. (Vamsi, 2004. p.1426)

Rocky terrain in Telangana poses challenges to sustainable groundwater utilization. Nature of geography and hydrology in Telangana imposes limitations on groundwater exploitation. Under such natural conditions farmers' dependence on borewells for irrigation and introduction of uninterrupted, free power is always risky.

Nearly 80 % of the Telangana State is underlain by hard rock formations and the remaining area is underlain by Gondwana sedimentaries and alluvium. The occurrence and movement of ground water in hard rocks is chiefly controlled by thickness of weathering and structural features like fractures and solution cavities. Telangana has shallow aquifers whose water holding capacity is limited unlike the deep alluvial aquifers found in Punjab and Haryana that have more water holding capacity.

According to report on study done on three districts in Telangana--Rangareddy, Medak and Nalgonda--spanning 22 years, groundwater levels declined due to the increase in the area irrigated by groundwater. According to this report the area irrigated under wells has increased by 110 % in a 22-year-period from 1990 to 2012. During this period there was a 30-fold increase in the use of

tube wells for irrigation purpose and an accompanying decrease in the use of water from the reservoirs and open wells. Reliability is a major factor contributing to the popularity of drilled wells in the region. Free electricity supply, which began in 2004, was one of the important reasons for this steady increase in groundwater-irrigated areas. (Sisodia et al. 2011)

Over the last one and half decades unhindered mining of groundwater for irrigation facilitated by free power led to decline in groundwater levels. Out of 464 Mandals in the state ground water is over exploited in 42 Mandals, it is critical in 8 Mandals, and has reached semi-critical stage in 55 Mandals. A large number of bore wells depth is nearly 100 meters and in some cases depth is more than 100 meters.

Uninterrupted, 24-hour free supply of power to agriculture is reported to have resulted in decline in ground water levels in Telangana. Since the introduction of this in January to March 2018 ground water levels in the state have dropped by 1.8 meters. 22 out of the 31 districts in the state have experienced drop in ground water levels following increased pumping out of water facilitated by the 24-hour power supply to agriculture. According to the state government's groundwater department, a net fall of 0.86 metres was observed during January 2018 as compared to the same period of 2017. Rajanna Sircilla district experienced the maximum fall of 3.94 metres. In February, a net fall of 0.8 metres was recorded as compared to the corresponding period last year. The average groundwater level is reported to have dropped from 9.18 feet in December 2017 to 10.97 feet in February 2018. The average groundwater level in March 2018 is 11.90 metres compared to had 10.96 metres in March 2017. The groundwater levels of March 2018 have reached the levels of May 2017 two months in advance.

The 24-hour power supply to agriculture is also adversely impacting drinking water availability with depleting ground water levels. According to the latest reports of the groundwater department 18 of the 31 districts were facing drinking water crisis.

9. Response to the announcement

Even among farmers there are some reservations on 24-hour power supply to agriculture. Farmers have apprehension that 24-hour power supply will lead to over exploitation of ground water. In the drought prone region that faces chronic water shortage some farmers feel that uninterrupted power supply to agriculture may turn in to a bane, rather than a boon. In fact, a delegation of village Sarpanches of Siddipet Assembly Constituency represented to Irrigation Minister of Government of Telangana to limit power supply to agriculture to 12 hours per day. They were of the opinion that with the onset of summer, many bore-wells were going dry due to over exploitation of ground water. If the power is restricted to only 12 hours to farm sector, exploitation of ground water could be contained to a great extent. Before that Nanganur Mandal Praja Parishat, also falling under Siddipet Assembly Constituency passed a resolution favouring 12-hour power supply. (Telangana Today, 7th March 2018) Fearing excessive groundwater pumping some farmers want to restore 9 hour power supply to agriculture.

Another newspaper reported that 225 villages in 27 Mandals have held grama sabha meetings and passed resolutions urging the state government to withdraw the 24X7 power supply to the farm sector on the grounds that it has resulted in a drinking water crisis. They have sent their resolutions to the respective Transco and Discom offices with a request that the free power supply be restricted to 9 to 12 hours in two spells. (Times of India, March 27, 2018,)

But not all hold 24-hour power supply to agriculture as culprit in declining groundwater levels in the state. Energy minister G Jagadish Reddy contended that 24-hour power supply to the agriculture sector was the reason for dip in groundwater table would not apply to all districts. According to him uninterrupted, free power cannot be the only reason, as there was deficit rainfall in some districts. (Times of India, March 27, 2018)

The information on levels of ground water issued by the state government's Ground Water Department are not reliable. Given the critical nature of groundwater levels in irrigated agriculture it is important to have reliable information on the same. But the available information is very limited. Its credibility is very low due to the non-representativeness of the data. While farmers need information on the village level groundwater situation information available covers wide area which may not be representative. The groundwater estimates are based on the readings from the Observation (OB) Wells or assessment units located at the Mandal or Watershed level. It is observed, "Given the high spatial variations in the structure and quality of geo-hydrology and aquifers, the relevance of district or Mandal level data is quite dubious". (Srinivasa Reddy and Ratna Reddy, 2010. p.11) As well irrigation accounts for more than three fourths of the irrigated area in Telangana reliable information on groundwater situation is very important for informed decisions on the part of farmers as well as the state government agencies.

10. Non-farm work opportunities

Before the introduction of 24-hour power supply to agriculture most of the villages used to get three phase power supply only during the power supply to agriculture services. During the rest of the day other electricity consumers in the rural areas namely, domestic, commercial and industrial consumers like flour and rice mills used to get only single-phase supply. This was because the same feeders used to supply power both to agriculture and non-agriculture services in rural areas. Though rural electrification program DDUGJY and financial bailout scheme UDAY included bifurcation of feeders in rural areas as one of the conditions, no activity was taken up in this regard. Because of this rural non-farm work suffered. Introduction of 24-hour power supply to agriculture is expected resolve this problem.

Improved access to and supply of electricity will have positive impact on livelihood opportunities in rural areas. A study has found robust positive relations ship between improved access to electricity and non-farm income. According to this study a rural household in Bihar receiving 6 hours of electricity would earn 10 % less than a rural household in Andhra Pradesh receiving 16 hours of supply. (Narasimha Rao, 2013)

The introduction of 24-hour, three phase power supply in rural areas in Telangana consequent to supply of 24-hour power supply to agriculture in the state will give boost to non-farm, industrial activity in the rural areas. It has the potential to rejuvenate the rural economy. *Business Line* quoted D Prabhakar Rao, CMD of TSGenco and TSTransco as saying, "The idea of providing 24x7 power is to ensure all-round development of the State and boost the rural economy, including various allied industries." (For Telangana's rural economy, 24x7 free power could be transformational, Business Line, January 3, 2018)

A newspaper report mentioned a study by TSDISCOMs which showed a rise in domestic and industrial power consumption as several industrialists are setting up small and medium units in rural areas, particularly in backward districts like Adilabad, Asifabad, Mahabubabad, Mahbubnagar and Kothagudem, where the land prices and labour wages are low important aspects in attracting investments along with uninterrupted power. Industries department is also reported to be receiving enquiries for new investments in rural Telangana. According to this news report, self-employment units also coming up in the villages with the availability of power. Youth who have some technical skill and a diploma are looking to open their own ventures in the villages. Rice mills, granite polishing, pumps and motors repair, flour mills, welding units and service centres are coming up with the introduction of 24-hour power supply in rural areas. **(**Times of India, 24-hour power gives boost to industries in rural Telangana, March 5, 2018)

11. Quality of power supply

With huge investments in T&D network in the name of supplying 24-hour power supply to agriculture, one expects improvement in quality of power supply in rural areas. Farmers still face voltage fluctuations and DTR burn outs. Farmers very much doubt claims of the state government and TSDISCOMs on improvements made to T&D network in the state. Deep rooted corruption might have eaten in to these investments. Farmers are also not receiving 24-hour power supply. For example, In Kodangal area in the erstwhile Mahbubnagar district power cut is imposed from 3 pm to 9 pm. Enquiries with farmers show that some farmers have removed automatic starters but some farmers have retained the automatic starters as they have doubts about continuous power supply.

Table:9 Fatal Electrical accidents since January 2018

District	Nov 17	Dec 17	Jan 18	Feb 18	Mar 18	Apr 18	May 18	Jun 18	Jul 18	Aug 18	Sep 18	Oct 18	Nov 18
Adilabad	2	2	1	2	3	2	2	2	6	4	3	2	2
Hyderabad	3	2	1	2	2	2	2	3	2	2	6	4	6
Karimnagar	2	2	1	2	1	2	2	7	7	8	4	2	3
Khammam	4	1	7	2	3	7	3	7	5	9	5	6	3
Mahbubnagar	8	13	8	4	5	7	10	11	11	10	8	7	6
Medak	19	20	20	9	9	13	10	22	11	22	16	12	29
Nalgonda	4	3	2	-	5	5	7	2	9	7	11	5	6
Nizamabad	5	1	1	2	1	2	3	7	4	6	5	7	3
Warangal	30	12	25	10	20	9	15	Na	14	18	4	10	11
Vikarabad	2	1	3	5	2	2	2	Na	2	4	3	1	3
Total	79	57	69	38	51	51	56	61	71	90	65	56	72

Source: Veekshanam, Telugu Monthly Magazine various issues.

Continuing deaths due to electrical accidents even after January 2018 (given in Table 9) shows that thousands of crores of investment on T&D network and 24-hour supply to agriculture nearly obviating the need to go to farms in the nights for irrigating the fields did not help to improve the situation as far as safety is concerned. Medak district recorded highest number of deaths due to electrical accidents. Next highest number of electrical accidents took place in Warangal district where the headquarters of the Northern DISCOM is located.

12. Financial implications

Uninterrupted and almost free power supply to agriculture will have its impact on the finances of the TSDISCOMs as well as the Telangana State Government. During the FY 2018-19 to supply power to agriculture as approved by the Commission TSDISCOMs will incur expenditure to the extent of Rs. 7,516 crore at the cost of service to agriculture pegged at Rs. 5.27 per unit. Out of this TSDISCOMs will be able to recover only Rs. 91 crore from farmers. Remaining cost needs to be recovered from subsidy provided by the state government and cross subsidy provided by the subsidizing consumers like industrial and commercial enterprises. During FY 2018-19 the state government will be providing, according to TSERC tariff order, Rs. 4,687 crore to subsidy to agriculture services and the remaining Rs. 2,738 crore has to come from cross subsidy to be recovered from subsidizing consumers.

During the FY 2017-18 the state government provided a subsidy of Rs. 3,235 crore to agriculture services. Compared to this government subsidy to agriculture services during the FY 2018-19 increased by 45 %. According to the TSERC tariff order, the total subsidy requirement during the FY 2018-19 will be Rs. 5,940 crore including agriculture subsidy of Rs. 4,687 crore following the electricity tariffs adopted by the Commission which in turn are proposed by the state government backed TSDICSOMs. Out of this total subsidy, state government has given firm commitment for

Rs. 4,984 crore. (Para 6.9.3) This leaves a gap of Rs. 956 crore. This indicates the financial strain on both the DISCOMs and the state government.

13. Conclusion

For farmers, who are in perpetual tension on availability of quality of power even during the designated short spells of time, assurance of 24-hour power supply is a great relief. In Telangana farmers have invested their own money in taking irrigated area in the state from less than 15 % to nearly 40 % of the cropped area. In the process some farmers have to pay with their own lives, as the debt incurred by then in drilling bore wells was beyond their capacity to redeem. There was no technical or financial assistance from the state government. In this context free power supply appears as a small concession. But this on one hand helped big farmers more than small and on the other converted groundwater, a common pool resource, into a private property, with its own adverse implications. There is no effort for sustainable exploitation of ground water.

Even before the introduction of 24-hour power supply to agriculture Telangana was experiencing alarming depletion of ground water due to its geographical and hydrological features. Increasing ground water pumping due to increased duration power supply will further increase stress on ground water availability in the state. It is high time rigorous regulations are implemented to regulate groundwater utilization. The existing groundwater regulatory arrangement - WALTA has remained a paper tiger. Both the state government and the farming community have to wake up before it assumes crisis proportions.

Agriculture sector consumes nearly 25 % of the power supplied in the state, but contributes less than 1 % to revenue of the DISCOMs in the state. The DISCOMs have to recover the cost of supply to agriculture through subsidy from the state government and cross subsidy from subsidizing consumers. During the FY 2018-19, subsidy provided by the state government to agriculture due to 24-hour power supply increased by 45 %. This brings in to picture issues related to measuring power consumption in agriculture sector, as agriculture services are not metered. Bifurcation of agriculture feeders and metering all DTRs serving agriculture loads will help to arrive at more reliable estimates of power consumption in agriculture. Though UDAY scheme mandated the DISCOMs to take up both these measures no action is taken on the ground.

Besides duration of power supply, quality of power supplied to agriculture bothered farmers very much. Huge investments in to T&D network and uninterrupted power were expected to address these effectively. But the experience until now shows that this did not make much difference on the ground. In the past energy efficiency (DSM) measures were made mandatory in agriculture to access free power supply. But no effort was made to enforce them. In the meantime, energy efficiency measures in different fields including agriculture have become economically viable and environmentally desirable. Here also no initiative is forthcoming from the state government of Telangana.

This report is based on analysis of publicly available documents. The far-reaching implications of the 24-hour power supply to agriculture in Telangana demands a more detailed and critical study involving analysis, discussions and field visits. This study shall take in to account administration of power sector in the state, geographical and hydrological features impacting groundwater situation and agro-climatic and economic features including cropping pattern.

There are two distributions companies in Telangana - TSNPDCL and TSSPDCL. The study shall cover both the distribution companies. While some parts of the state have good groundwater availability, other parts of the state have limited groundwater availability due its geographical and hydrological conditions. In some parts of the state, groundwater is over exploited and groundwater levels have depleted needing more power to pump similar quantity of water. Some crops like paddy and sugar cane needs more water. In some places though horticulture crops like Mango were taken up the extent of land under these crops was beyond the water holding capacity of that area. These factors need to be taken in to account under the study.

The study needs to examine whether farmers are actually receiving 24-hour power supply, duration of power used by them including number of days and number of hours both during day time and night time, whether they are using automatic starters, quality of power supply in terms of voltage fluctuations, power interruptions, DTR failures, changes in cropping pattern, and changes in groundwater situation.

It is hoped that the background and analysis in this report will catalyse an informed discussion on the issue and facilitate a more detailed study in near future.

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