The Energy Solutions Company

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From Team REConnect

Dear Reader,

This month, the Andhra Pradesh Electricity Regulatory Commission (APERC) has released the final regulation for scheduling, scheduling and deviation settlement for solar and wind generation projects.

Andhra Pradesh is amongst states like Karnataka, Chhattisgarh and Uttarakhand which have final DSM regulations in place. These regulations will play a major role in large scale integration of renewable energy in its grid. This month's main article analyses these regulations.

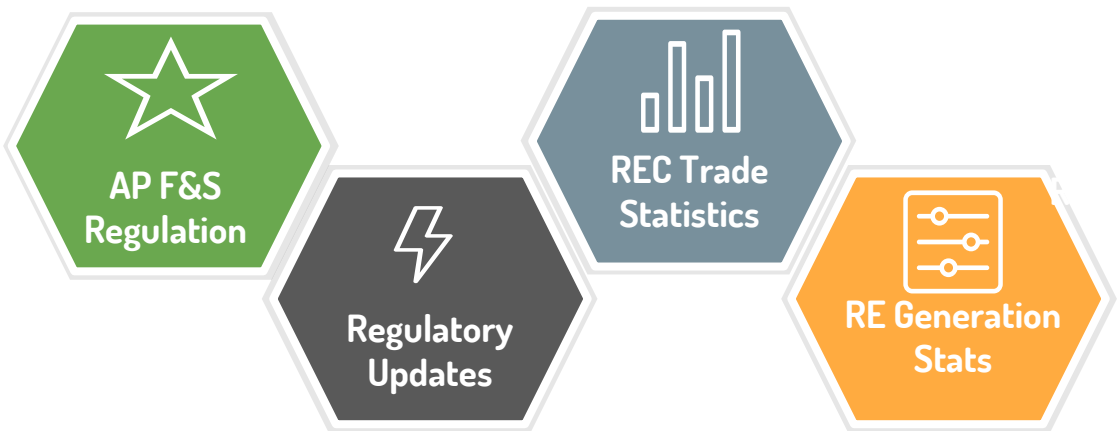
REC trading took place in the month of August but only for non-solar RECs. This was because of a Supreme Court order dated 17 July 2017, which allowed conditional trading of non-solar RECs.

The trading session for August saw marginal improvement in demand in non-solar RECs. Total non-solar demand was 2.89 lakh (11.8% higher than in August 2016) and the clearing ratios on IEX and PXIL were 1.051% and 4.96% respectively.

Recent developments include: CERC recently rejected IEXs proposal for trading green energy, draft DERC's RPO regulations. The Economic Survey 2 had interesting observations on the power sector - for example, it pegs the "social cost" of Renewable Energy at Rs 11/ unit compared to that of coal at Rs 4/unit. Record low tariffs of wind and solar power are resulting in states trying to re-negotiate existing PPA - this is a major red flag for future investments. All these developments are covered in detail in the regulatory section of this newsletter.

We hope that you find this newsletter an informative read and, as always, we look forward to feedback and comments.

- Team REConnect



AP Forecasting, Scheduling and DSM regulation

APERC has released final regulation for wind and solar forecasting and scheduling

The APERC released its final regulations on the forecasting, scheduling and deviation settlement mechanism of solar and wind projects in Andhra Pradesh. The salient features of the regulations are as follows:

Applicability:

These regulation will be effective from Aug 21st, 2017 and will be applicable on All the GRID Connected Wind and Solar Power Generators in AP. The SLDC will have to issue detailed guidelines for QCA registration, scheduling procedures, communication protocols and formats etc., on or before December 1st, 2017. Forecasting, Scheduling and Deviations Settlement shall commence from January 1st, 2018.

Further, generators commissioning on or after January 1st, 2018 shall not be allowed to be commissioned unless they start providing schedules as per this regulation. Levy and collection of DSM Charges shall commence from July 1st, 2018.

Deviation Accounting:

$$\text{Absolute Error (\%)} = 100 \times \frac{\text{Actual injection - Scheduled generation}}{\text{Available Capacity}}$$

Forecasting will be done at Pooling Station or STU/DISCOM Feeder where injection is made. To enable benefits of larger geographical area and diversity, aggregation of forecast is permitted under “Virtual Pool” where Generators have an option to account for their deviations at an aggregated level through a Qualified Coordinating Agency (QCA). A similar provision is also permitted in Karnataka by Hon. KERC in its final regulation which is already being implemented w.e.f 1st June 2017.

QCAs will have the following role to play:

1. Provide forecast, schedules and periodic revisions;
2. Coordination with DISCOM/STU/SLDC for metering, data collection, Communication/issuance of dispatch/curtailment;
3. Commercial settlement of DSM charges and de-pooling of charges among generators;
4. All other ancillary and incidental matters.

Important differences between wind and solar power scheduling:

- 16 revisions (excluding collective transactions) are permitted starting from 00:00 Hrs of the day for Wind Generators
- 9 revisions (excluding collective transactions) are permitted starting from 05:30 Hrs upto 19:00 Hrs of the day for Solar Generators
- All the revisions are effective from the 4th time-block
- Aggregation “seems” to be allowed between wind and solar generation as the concept of virtual pool aims to capture not only the larger geographical area but also the diversity (among different asset class).

There are a few important differences between intrastate and interstate transactions such as wind and Solar generators having common interface meter at a pooling station but carrying out both - interstate and intrastate transactions at the same pooling station, the scheduling for the same shall to be carried out separately.

Approved open-access capacity (in MW) in such cases alone shall be considered as AvC for the purpose of DSM charges calculations.

Observation: Since the regulation permits common interface meter for such transactions and AvC determination is also clarified, the DSM charges may be computed in pro-rata basis for such pooling station as the common interface meter would only provide Pooling Station level actual generation.

Further, aggregation is permitted only for similar type of transactions i.e., interstate transactions are not allowed to be aggregated with intrastate transactions for the purpose of DSM charges determination. QCA shall separately settle DSM charges for intrastate and interstate transactions.

Determination of DSM Charges for INTRASTATE transactions:

Sr. No	Absolute Error	DSM Charges Payable to State Pool Account
1	≤ 15%	Nil
2	>15% but ≤ 25%	D_{15} × Rs.0.50
3	>25% but ≤ 35%	D_{25} × Rs.1.00 + D_{15} × Rs.0.50

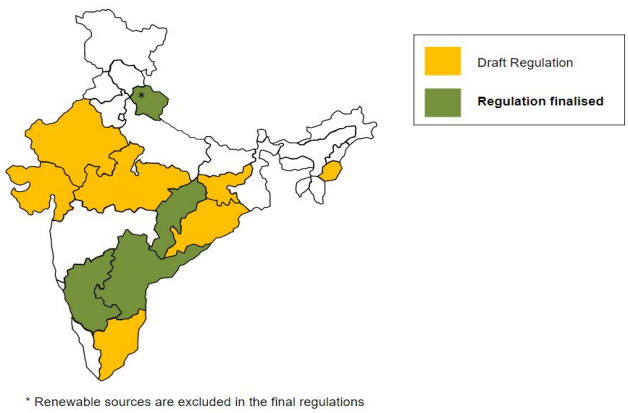
Note: DX is the absolute error in kWh for a given error band starting from X% as outlined in column 2.

Determination of DSM Charges for INTERSTATE transactions:

Sr. No	Absolute Error	Deviation Charges Payable to State Pool Account by Wind/Solar Generator (Under Injection)	Deviation Charges Payable from State Pool Account to Wind/Solar Generator (Over Injection)
1	>0% but ≤ 15%	D_0 × Fixed Rate (FR) / PPA Rate	D_0 × Fixed Rate (FR) / PPA Rate
2	>15% but ≤ 25%	D_{15} × FR × 1.1 + D_0 × FR	D_{15} × FR × 0.9 + D_0 × FR
3	>25% but ≤ 35%	D_{25} × FR × 1.2 + D_{15} × FR × 1.1 + D_0 × FR	D_{25} × FR × 0.8 + D_{15} × FR × 0.9 + D_0 × FR
4	>35%	D_{35} × FR × 1.3 + D_{25} × FR × 1.2 + D_{15} × FR × 1.1 + D_0 × FR	D_{35} × FR × 0.7 + D_{25} × FR × 0.8 + D_{15} × FR × 0.9 + D_0 × FR

Note: DX is the absolute error in kWh for a given error band starting from X% as outlined in column 2.

The following map depicts where the Forecasting and Scheduling regulations are final, where they are in a draft stage and where they do not exist as of this date:



The regulation can be accessed here.

CERC rejects IEX's proposal for trading RE power on exchange:

The Indian Energy Exchange (IEX), had proposed to the CERC to allow trading of renewable energy on the day-ahead market. In the petition IEX said that such a product would provide obligated entities with an alternative way to meet RPO obligations, and at the same time allow RE generators to sell power on the exchange.

IEX had proposed a "Green Day Ahead Market" (G-DAM) contract, which includes Solar and Non-Solar power be introduced. If the bid made in the G-DAM is not cleared or cleared partially, they can bid in DAM. Also, in lieu of the bid cleared in DAM, the seller will get equal number of RECs.

This order was rejected by the CERC and the following reasons were given for the same:

- As per CERC, the status regarding the availability of surplus RE power is not clear. Also, based on the experiences in the past, it can be established that such trade will not lead to addition of new RE capacity.
- The IEX has supposed that there are no discrepancies in the forecasting and scheduling for RE generators which is not the case. Therefore, their suggestions of removing the need for revision flexibility during the day is not valid.
- Based on the suggestions of IEX which mentioned that in case if the bid made in the G-DAM is not cleared or cleared partially, they can bid in DAM, it can be assumed that the situation will lead to registration of RE sellers for FIT route as well as REC mechanism. This will demand that a system be established where there is proper accreditation registration, accounting of RE generation and settlement mechanism.
- The G-DAM market may dissuade the buyers from entering into long term contracts which provide comfort to RE investors.
- The guidelines related to the timelines for scheduling of power traded will have to be amended as per IEX which the commission felt will be an unnecessary step right now.
- IEXs recommendations assume that the the green power traded in G-DAM will follow the same scheduling procedure as that followed by conventional power.

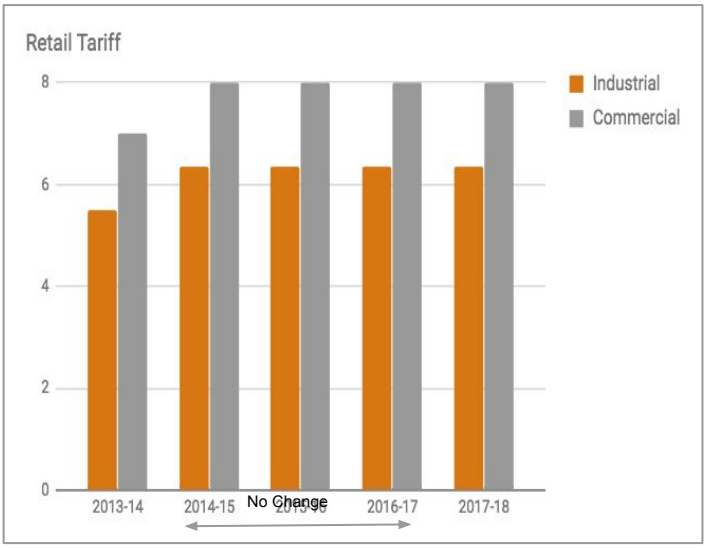
The order can be accessed here.

Tamil Nadu determines distribution and transmission tariff for FY 2017-18:

The Tamil Nadu Electricity Regulatory Commission (TNERC) has determined the distribution and transmission tariff for FY 2017-18. There tariffs have been changed after 3 years - the last time TNERC determined these tariffs was in 2014. The energy charges for different categories is as follows:

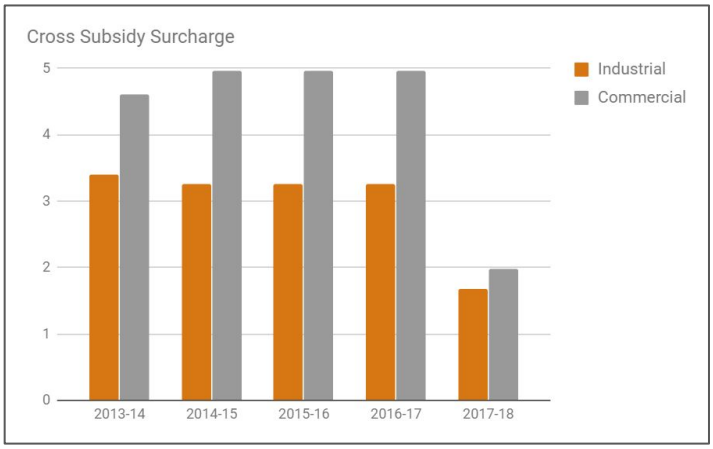
	Demand Charge (Rs/kVa/month)	Energy charge (Rs/kWh)
Industrial	350	6.35
Commercial	350	8.00

The tariff for industrial and domestic categories hasn't changed at all. Same is the case with domestic tariff.



Wheeling Charges: 21.06 Paisa/Unit
Wheeling loss: 2.45%
Cross subsidy surcharge: 1.67 Rs/kWh

The change in cross subsidy surcharge can be seen in the following graph:



The transmission tariff was also determined by the TNERC. It is as follows:

Transmission charges: 3037.30 Rs/MW/day
Transmission loss: 3.81%

The distribution and generation tariff can be accessed here. The transmission tariff can be accessed here.

DERC published draft RPO regulations:

The DERC has released draft RPO regulations. The following are the salient features of the regulation:

1. RPO Compliance:

- Aggregate from the gross purchases from generating stations by Obligated entities shall be considered as the quantum of RE purchase for RPO compliance.
- All the power produced from Waste-to-energy plants shall be procured by the distribution licensee. This will also contribute towards RPO compliance.
- Quarterly reports shall be submitted by the obligated entities which will include parameters such as capacity addition, generation and purchase of electricity from RE sources. The same shall also be posted on their website.

1. Role of SNAs:

- Protocol development for regular information collection from RE generating companies, obligated entities, SLDC, chief electrical inspector, ets.
- RE procurement and RPO compliance reports on a monthly basis by obligated entities which shall also go on their websites. This shall be done by the 10th of the next month.
- It shall also receive information on or before 30th April from captive users

- who are consuming electricity generated from captive generating plants about electricity consumption and purchase from RE sources.
- The same shall be applicable for open access consumers.

This proposed regulation is very similar to the previous RPO regulation of October 2012.

The order can be accessed here. The public notice can be accessed here.

Economic Survey's discussion on the power sector

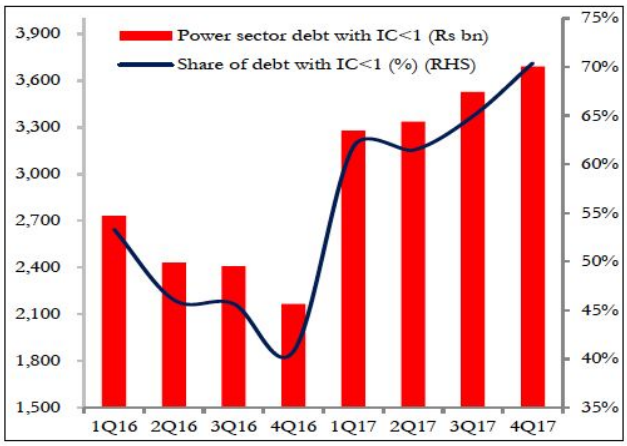
The Government recently released the Economic Survey's Volume 2 (ES2). This report is a very detailed analysis of the state of the Economy, and covers a very wide range of topics.

This year's economic survey is of particular interest to us due to analysis of the power sector, particularly of recent developments like the UDAY scheme and the steep fall in RE prices, and their impact on the larger economy.

The key points raised with respect to the power sector in the ES2 are:

Power sector in distress: The ES2 report identifies distress in the power sector as a major challenge facing the Indian economy. With rising penetration of RE power and steep fall in prices, most coal based generators are turning unviable. The report says that *"the ratio of stressed companies in the power sector is now reaching 70%".* These companies have an interest coverage (IC) ration of <1, meaning that their earning are not even enough to cover their interest obligations.

Fig: Power sector Debt with IC<1



Social cost of Renewables:

The ES2 has, for the first time in India, tried to ascertain the social cost of power from conventional and RE sources. For example, while RE power is 'clean energy', it has costs like intermittency, cost of stranded assets, opportunity cost of land (as land usage in solar is almost 10X that of a coal plant) or cost of subsidies through tax incentives. At the same time, coal based power has health costs that the society has to bear.

Surprisingly, the ES2 pegs the current total cost (generation cost + social cost) of RE power at Rs 11/ kwh. The biggest component of this cost is the cost of stranded assets - defined the cost of NPA's in coal sector caused due to lower utilisation of plant capacities. Compared to this, current total cost of coal power is only around Rs 4/ kwh. By 2030, the total cost of RE power is expected to decline to Rs 3.4/kwh, while that of coal will be Rs 1.75/kwh.

Given that at present coal power is significantly cheaper than RE power when social cost is factored in, the ES2 recommends a *"calibrated pace"* of investments in the RE sector. However, it also says: *"Given that the first goal for India is to provide 100 per cent energy access to its population and bridge the 'development deficit gap', all cleaner energy sources need to be tapped."*

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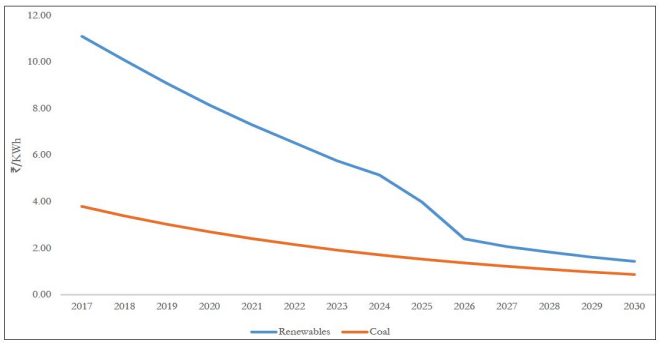
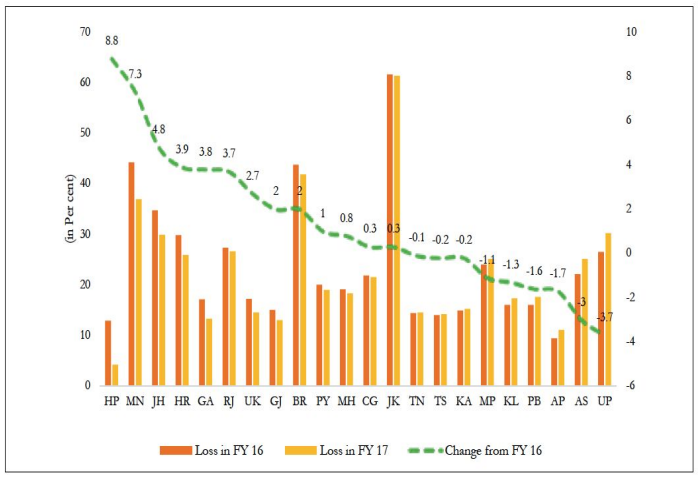
Fig: Social cost of Coal vs RE power



Impact of UDAY scheme:

The ES2 finds significant evidence of reduced AT&C losses, hike in power tariff and reported savings in cost due to reduced interest costs. Overall, the survey states that UDAY scheme *"has had a significant impact on addressing the structural issues attached with the power sector."*

Fig: AT&C losses (in %) of UDAY states



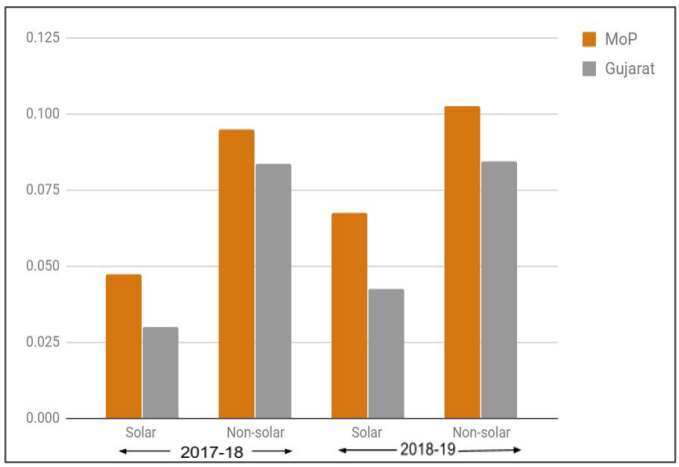
Gujarat determines RPO regulations:

Gujarat Electricity Regulatory Commission (GERC) has released draft regulations on procurement of Energy from RE sources. The RPO percentages determined in the draft order till 2021-22 are as follows:

Year	Minimum quantum of purchase of purchase (in %) from RE sources			
	Wind	Solar	Others (Biomass, Bagasse, Hydro and MSW)	Total
2017-18	7.85%	3.00%	0.50%	11.35%
2018-19	7.95%	4.25%	0.50%	12.70%
2019-20	8.05%	5.50%	0.75%	14.30%
2020-21	8.15%	7.65%	0.75%	15.65%
2021-22	8.25%	8.00%	0.75%	17.00%

The GERC has also made it compulsory for the distribution licensees to procure 100% of the energy produced from the Waste-to-energy plants in Gujarat. This will be in the ratio of the power procured from all sources including their own at the tariff determined by the commission.

The following graph gives a comparison between the MoP trajectory and the RPO percentage proposed by GERC.



The order can be accessed here.

States renegotiate PPAs after wind prices drop:

Since the drastic reduction in wind tariff in the competitive bidding for the 1GW tender by

SECI, a number of states have rejected the take forward the projects which were signed at higher PPA rates. Till now, states like Gujarat, Andhra Pradesh, Uttar Pradesh and Tamil Nadu have cancelled PPAs. Recently, Karnataka's DISCOM cancelled a PPA for a 75 MW wind project. It has done so on the account of the tariff rate being too high and the DISCOMs of states have asked for renegotiation of tariff. Jharkhand has also asked for renegotiation of solar PPAs on the same grounds.

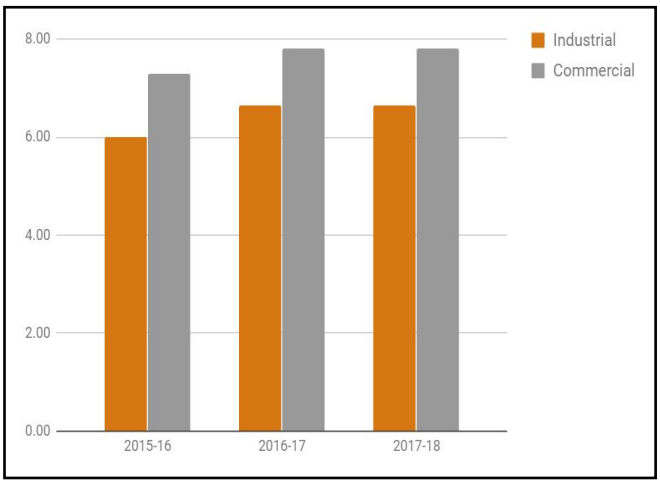
The articles reporting the same can be accessed here.

TSERC determines retail tariff for FY 2017-18:

The Telangana State Electricity Regulatory Commission (TSERC) has determined its retail tariff in an order dated 26/08/2017 for FY 2017-18. The tariff has been determined as follows:

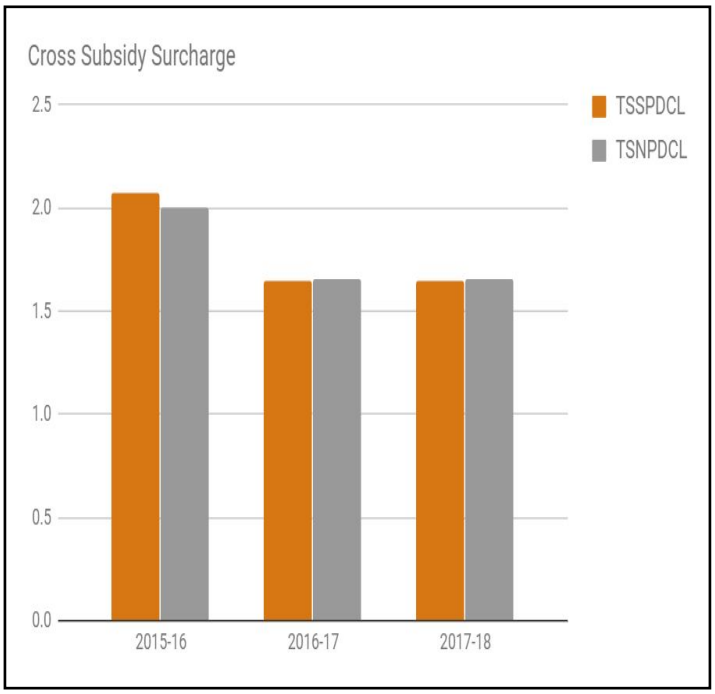
Category	Voltage Levels	Fixed Charge (Rs/month)	Energy Charge (Rs/unit)
Industries	11 kV	390	6.65
	33 kV	390	6.15
	132 kV	390	5.65
Commercial	11 kV	390	7.80
	33 kV	390	7.00
	132 kV	390	6.80

The change in tariff from in the past 3 years can be understood with the graph below:



The wheeling loss for NPDCL has been determined as 4.40% and that for SPDCL as 4.20% at a voltage level of 11 kV.

Cross subsidy surcharge determined for FY 2017-18 as compared to the past 2 years is as follows:



The order can be accessed here

Wind Tariff has hit a new low:

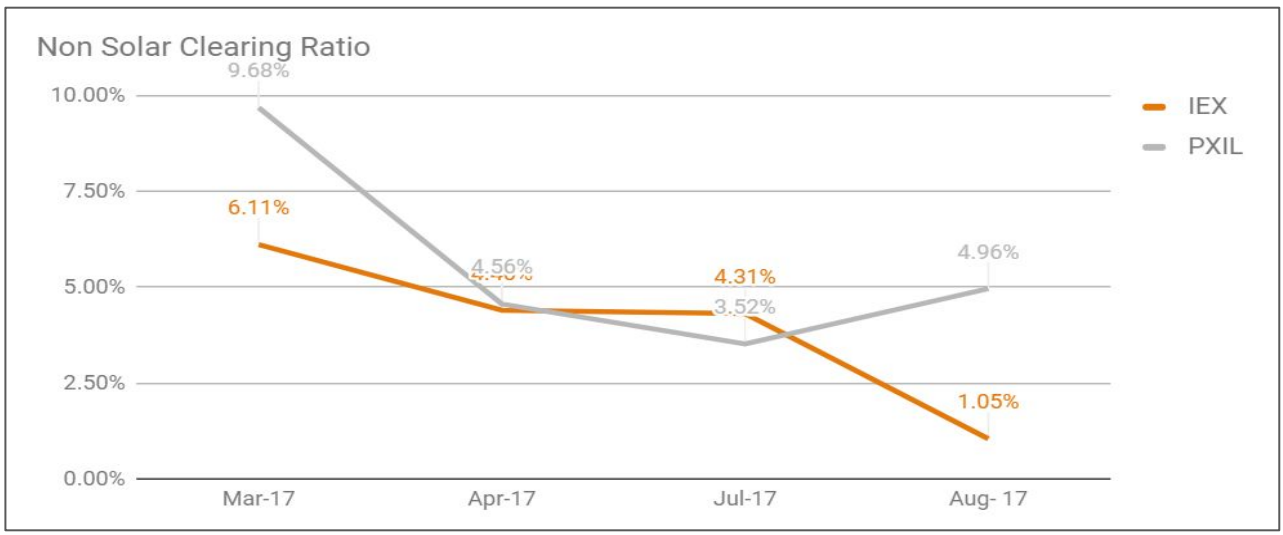
In a recent auction held in Tamil Nadu by TANGEDCO, the tariff of wind power has dropped to Rs 3.42 per unit. This tariff is below the tariff determined during the reverse bidding in February and the one determined through FiT mechanisms.

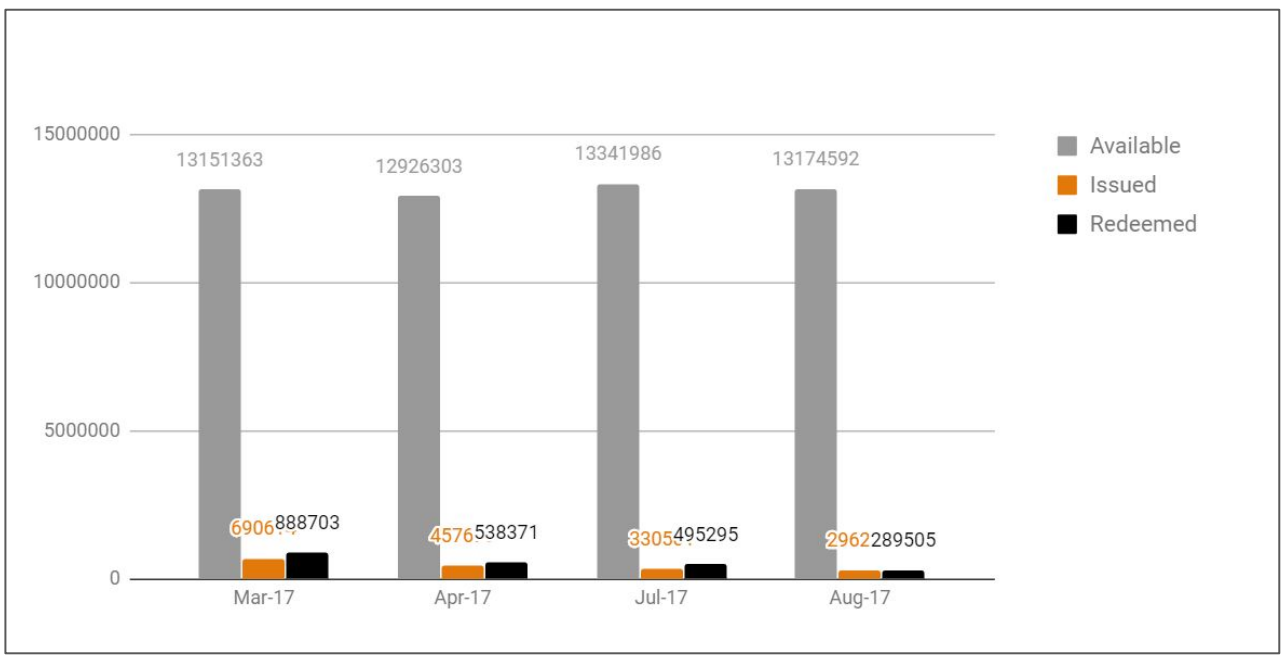
Fearing that this tariff reduction may give the state or the developer a reason to cancel PPAs signed in the past, the government has barred the state authorities to cancel PPAs unilaterally. It has also imposed a fine of 50% of the tariff on those authorities that suddenly cancel PPAs. The article on the same can be accessed here.

Non-Solar RECs:

Supreme Court allowed conditional trading of Non-solar RECs on July 14, 2017 (our blog on the same can be accessed here). Demand was expected to be low for two reasons – 1) obligated entities are required to procure RECs at old RECs rate (Rs 1500/ REC); and 2) compliance is required to be done by March, therefore obligated entities have enough time to comply even after the final order of Aptel is received.

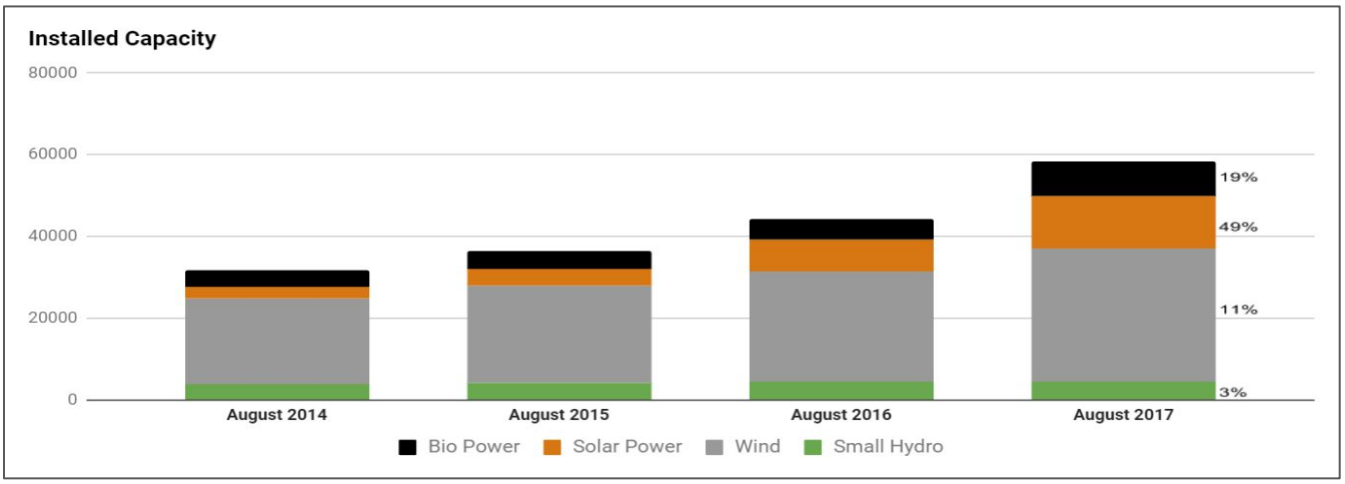
However, demand for Non-solar RECs was not as robust as it was in July. In total 2.89 lakh RECs were bought (11.83 % higher than August 2016), and clearing ratios on IEX and PXIL were 1.05% and 4.96% respectively.





RE Generation

RE power capacity and generation statistics for the month



As per the recent CEA report there has been no increase in RE capacity between July and August 2017. This is not surprising as record low tariffs of solar and wind power force developers to re-evaluate projects. The installed capacity of wind and solar have risen drastically since the past four years. The Compounded Annual Growth Rate (CAGR) is maximum for solar (49%) while it is the lowest for small hydro projects (3%). Given the current situation of record low tariffs, capacity growth in small hydro and biomass is likely to remain subdued going forward.

Source: Reports from CEA

About REConnect

About REConnect Energy: REConnect Energy is India's largest renewable energy services company with services offered under energy transactions management and predictive analytics for energy markets. In predictive analytics, the Company offers its energy forecasting and scheduling services to various utilities and wind/solar project developers. The current renewable energy forecasting portfolio stands at about 10,500MW at wind/solar farm level forecast and about 26,000MW at utility scale forecast where state/regional level forecasting is provided to some of the largest utilities in India. Under renewable energy certificate (REC) market, the Company represents about 45% of the market at national level. The Company is also supported by INFUSE Ventures, a venture fund supported by MNRE.

Awards & Industry Recognition

- ★ Best Indian Start-up, Indo-German Boot Camp (GIZ), Social Impact Lab - Berlin, Germany
- ★ Top 30 Global Energy Start-ups, NewEnergy Expo-2017, Astana, Kazakhstan
- ★ Top 50 Indian Start-ups, The Smart CEO - 2016, Bangalore, India
- ★ Best Wind Energy Forecaster of the Year (2014/15/16), Indian Wind Energy Forum
- ★ Technology Start-up Enterprise of the Year (Energy & Utilities) - 2017, 24MRC Network, India
- ★ Top 100 Global Energy Start-ups, Start-up energy transition Awards, Berlin, Germany
- ★ Times Network Award in Innovation in Digital Energy Solutions, New Delhi, May 2017