

Solar Power Generation Sector: Satisfactory operating performance; reducing equipment costs provides respite for competitively bid projects, counterparty credit risk remains crucial

Synopsis

- After witnessing record capacity addition of around 3 GW in FY16 (refers to the period April 1 to March 31), 1 GW in Q1FY17 and bids of around 6 GW awarded over the last 6 months or so, the solar sector is on a strong growth path. According to various estimates, India is set to become the 4th largest solar market globally in 2016 behind only to China, USA and Japan, primarily on account of Government of India (GOI's) thrust on significantly enhancing the installed solar capacity to 100 GW by 2022. This has attracted serious interest from various players, domestic as well as overseas.
- The sector is witnessing increased participation from large overseas investors and developers, such as ADIA, CLP, EDF, ENEL, Engie, Fortum, First Solar, Goldman Sachs, etc. Furthermore, major Indian business houses have also laid down ambitious plans for solar capacity addition. Also, with the wind sector facing certain headwinds in the recent times primarily due to diminishing additional benefits such as reduced Accelerated Depreciation and expiry of Generation Based Incentive (GBI) after FY17 and preferential feed-in-tariffs paving the way for competitive bidding, some of the prominent wind IPPs have also made foray into the solar power sector. The recent M&A activity, viz, Tata Power Renewable acquiring 1.1 GW of capacity (including 994 MW solar capacity) from Welspun Group, as well as CLP India's acquisition of 49% stake in Suzlon's 100-MW SPV setting up a project in Telangana is reflective of the growing confidence of bigger players in the sector.
- In line with the ambitious plan to scale up the solar capacity to 100 GW (including 40 GW solar rooftop capacity) by 2022, the GoI has also increased the solar Renewable Purchase Obligation (RPO) trajectory upwards from 3% to 8% by FY22. Stricter enforcement by states for RPO compliance by the Discoms is crucial for the sector. Furthermore, built up of evacuation infrastructure and timeliness in land acquisition would have important bearing on the capacity addition. CARE expects capacity addition of around 5.2 GW in FY17 and around 8 GW in FY18.
- The solar PV project costs have witnessed a sharp decline over the years which has led to shift from preferential feed-in-tariffs to competitive bidding in the sector. Apart from decline in solar PV project costs, entry of various players has led to significant increase in competition which has led to significant decline in solar tariffs as visible from the trends in the completed bids over the last 9-12 months. The bids for NTPC/NVVN and SECI projects (including in solar parks) have been more aggressive as compared with state policy projects. However, aggressive bidding in few projects has

raised viability concerns. The impact on returns based on various project variables has been highlighted in the subsequent sections. Weighted average tariff for the bids which came up during FY16 stood at Rs.5.26/unit (excluding DCR projects, and including VGF bids), which may decline further to around Rs.4.5-4.8/unit in FY17, with increased competitive intensity and decline in costs. During January till July 2016, the Chinese crystalline module prices have witnessed a decline of around 9%, and with the slowdown in Chinese demand and oversupply situation in the near term, the module prices could soften further, which is expected to result in reduced cost for the developers who are tying up the supplies in the near term.

- The ability to manage cost efficiently, secure longer tenure and cheaper debt are the key factors which will have bearing on the bids, returns and viability of the projects. The larger players with strong financial risk profiles could bid more aggressively for projects with a strong counterparty credit profile, higher irradiation zones and also for higher capacities to have economies of scale and resultant lower cost.
- Since significant amount of capacity has been bid out/will be bid out under various state schemes, the counterparty credit risks would come more into play given the weak financial risk profiles of number of Discoms. Therefore, structural reforms for the discoms including improvement in operating efficiencies, impact of UDAY scheme on the various Discom's financial health are crucial for the sector. Also, standardization of PPAs and addressing of key issues, such as cap on maximum power purchases, termination conditions and payments, deemed generation, mitigation of risks pertaining to delayed payments need to be dealt with appropriately for making the projects tight on bankability perspective and achieving the growth targets for the long-term.
- The operating performance of the CARE-rated solar SPVs has been fairly comfortable with Capacity Utilization Factor (CUF) achieved broadly within the expected levels across various states. The payment pattern from various utilities observed for most of the CARE-rated SPVs has also been largely satisfactory so far and a significant number of SPVs have contracted with relatively strong counterparties such as GUVNL and NRVN.
- CARE has rated 61 solar SPVs (excluding those having unconditional and irrevocable corporate guarantees for the loan tenure from sponsors), out of which 55 SPVs are in the investment grade band. This note also delineates the rating dispersion of the CARE-rated SPVs as well as key credit risk assessment factors while rating these solar projects. CARE expects the credit profile of the rated-SPVs to be stable, given the long-term revenue visibility and demonstrated satisfactory operating performance track record.

Strong growth outlook: Capacity addition of around 5.2 GW expected in FY17

- Out of total installed renewable energy capacity of 42.75 GW as on March 31, 2016, the share of solar energy increased to 15.82%, as against 13.8% last year. As per the National Solar Mission Scheme, cumulative solar installed capacity was projected to reach 20 GW by 2022; however, the same has been significantly revised to 100 GW (including 40 GW rooftop projects) by 2022 by the Govt. Various state governments such as Andhra Pradesh, Chhattisgarh, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Orissa, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh, etc, have come out with state policies for awarding solar power projects. Also, government entities like NTPC, SECI, etc, have come out with tenders of large capacities in GW size, including those in solar parks. The table below gives a snapshot of various large projects which have come up for bidding since January 2015 till July 14, 2016:

Table 1: Solar Bid Results in India under various schemes (January 2015 till July 14, 2016)								
Scheme	State	Bid Result	Capacity (MW)	Tariff Range (Rs./unit)	Weighted Average Tariff (Rs./unit)	Off-taker	VGF	Solar Park
State Solar Policy	Punjab	Feb-15	250	6.88 - 7.56	7.19	State Discom	No	No
State Solar Policy	MP	Jul-15	300	5.05 - 5.64	5.41	State Discom	No	No
State Solar Policy	Telangana	Aug-15	2000	5.17 - 5.89	5.69	State Discom	No	No
State Solar Policy	Punjab	Sep-15	500	5.09 - 5.98	5.65	State Discom	No	No
State Solar Policy	Uttarakhand	Oct-15	170	5.57 - 5.99	5.76	State Discom	No	No
JNNSM Phase II, Batch II, Tranche I	AP	Nov-15	500	4.63	4.63	NTPC	No	Yes*
JNNSM Phase II, Batch II, Tranche I	AP	Dec-15	350	4.63	4.63	NTPC	No	Yes*
JNNSM Phase II, Batch II, Tranche I	AP	Dec-15	150	5.12 - 5.13	5.13	NTPC	No	Yes*
State Solar Policy	Haryana	Dec-15	150	5.08	5.08	State Discom	No	No
JNNSM Phase II, Batch II, Tranche I	Rajasthan	Jan-16	420	4.34 - 4.36	4.35	NTPC	No	Yes^
JNNSM Phase II, Batch III, Tranche I	Maharashtra	Jan-16	500	4.43	4.43	SECI	Yes	No
JNNSM Phase II, Batch II, Tranche I	UP	Jan-16	100	4.78	4.78	NTPC/NVVN	No	No
State Solar Policy	Karnataka	Mar-16	808 (CAT I) 100 (CAT II)	4.69-5.81 (CAT I) 5.94-6.51 (CAT II)	5.04 (CAT I) 6.44 (CAT II)	State Discom	No	No
State Solar Policy	Jharkhand	Mar-16	102 (CAT I) 999 (CAT II)	5.20-5.59 (CAT I) 5.08-5.48 (CAT II)	5.46 (CAT I) 5.36 (CAT II)	State Discom	No	No
JNNSM Phase II, Batch III, Tranche III	UP	Mar-16	125	4.43	4.43	SECI	Yes	Yes&
JNNSM Phase II, Batch II, Tranche I	Karnataka	Apr-16	500	4.78 - 4.80	4.79	NTPC	No	Yes@
JNNSM Phase II, Batch II, Tranche I	Telangana	May-16	350 (CAT I) 50 (CAT II)	4.66-4.67 (CAT I) 5.19 (CAT II)	4.67 (CAT I) 5.19 (CAT II)	NTPC	No	No
JNNSM Phase II, Batch III, Tranche IV	AP	May-16	400	4.43	4.43	SECI	Yes	Yes#
JNNSM Phase II, Batch III, Tranche V	Karnataka	Jun-16	920	4.43	4.43	SECI	Yes	No

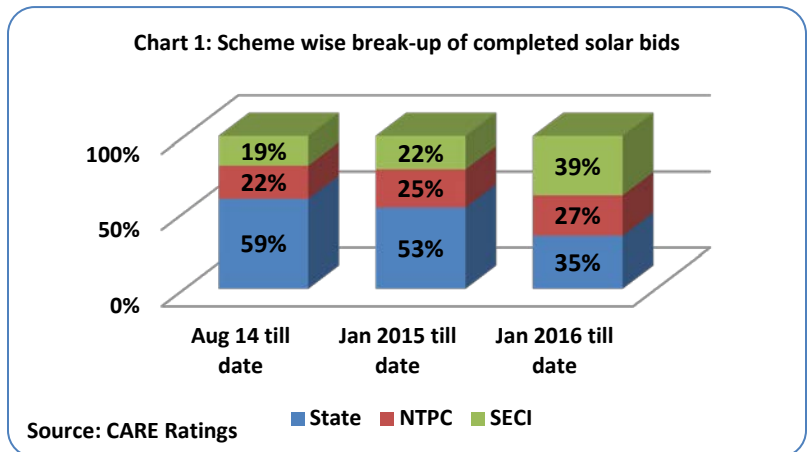
Scheme	State	Bid Result	Capacity (MW)	Tariff Range (Rs./unit)	Weighted Average Tariff (Rs./unit)	Off-taker	VGF	Solar Park
JNNSM Phase II, Batch III, Tranche VI	Chhattisgarh	Jun-16	100	4.43	4.43	SECI	Yes	No
JNNSM Phase II, Batch III, Tranche II	Gujarat	Jun-16	160	4.43	4.43	SECI	Yes	Yes\$
JNNSM Phase II, Batch II, Tranche I	Rajasthan	Jul-16	130	4.35 – 4.36	4.35	NTPC	No	No
Total			10,134					

Source: Respective SERCs, SECI, MNRE, CARE Ratings

CAT II under Karnataka state bid refers to category reserved for Karnataka-based solar module manufacturers
 CAT I and CAT II under Jharkhand state bid refers to two categories on the basis of solar capacities, viz, below 25 MW (CAT I) and above 25 MW (CAT II)
 CAT I and CAT II under Telangana NTPC bid refers to two categories, viz, Open (CAT I) and DCR (CAT II)

* Ghani Solar Park, Kurnool District in the state of Andhra Pradesh being developed by AP Solar Power Corporation Pvt Ltd (JV Company of SECI, APGENCO and NREDCAP)
 ^ Bhadla Solar Park in the state of Rajasthan being developed by Rajasthan Solar Park Development Company Ltd, a subsidiary of Rajasthan Renewable Energy Corporation Ltd. (RRECL)
 & Respective Solar Park in Jalaun, Allahabad, Mirzapur and Kanpur Dehat district of Uttar Pradesh being developed by Lucknow Solar Power Development Corporation Limited (JV Company of SECI and UPNEDA)
 @ Pavagada Solar Park, Tumkur district in the state of Karnataka being developed by Karnataka Solar Power Development Corporation Pvt Ltd (JV Company of SECI and KREDAL)
 # Ananthapuramu Solar Park, Ananthapram district in the state of Andhra Pradesh being developed by AP Solar Power Corporation Pvt Ltd (JV Company of SECI, APGENCO and NREDCAP)
 \$ Charanka Solar Park, near Charanka village, Patan district in the state of Gujarat

- As can be seen from Table 1 above, since January 2015, there has been award of more than 10-GW capacity, with bids under various state power policies constituting 53% while remaining 47% were under JNNSM scheme (NTPC 25% and SECI 22%). However, during CY2016 (till July 14, 2016), 65% of the bids were for JNNSM schemes projects (NTPC 27% and SECI 39%), while remaining 35% were under various state solar schemes.



- Recently, the JNNSM bids in the state of Gujarat saw a muted response with total bids received for 160 MW of projects as against tendered capacity of 250 MW. The reason for such a response was due to relatively higher solar park charges (Charanka Solar Park) of Rs.0.96 lakh/MW than seen in other states like Rajasthan and AP.
- Typical average time taken from bid award till commissioning of the capacity is around 18 months; however, there have been few cases wherein there were delays in signing Letter of Intent and PPAs as well as land

acquisition, which could result in shift of capacity addition by another quarter or so. Most of the above capacities are expected to get commissioned by mid of FY18. During FY17, till June 30, 2016, there has been capacity addition of 1.03 GW. CARE expects capacity addition of around 5.2 GW in FY17.

Sharp decline in Solar Project costs:

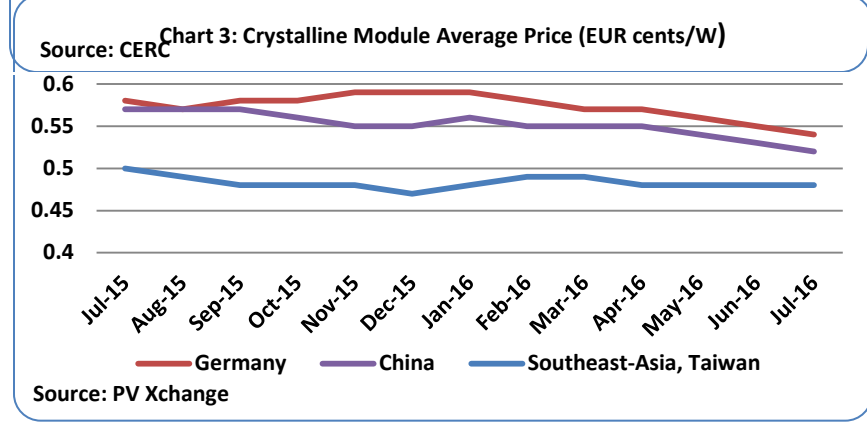
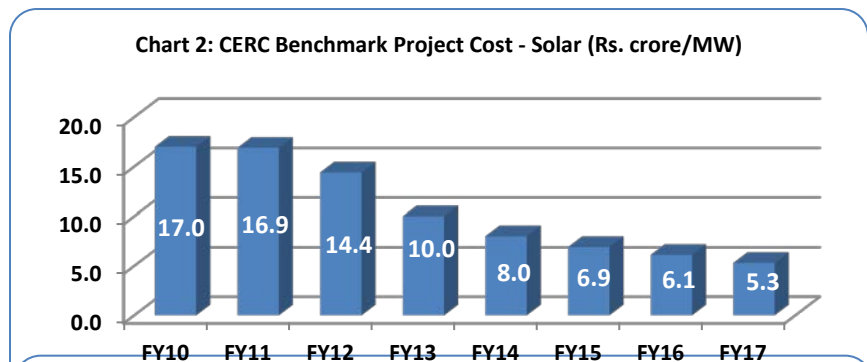
- The capital cost for setting up solar PV project has been coming down over the years. CERC’s benchmark project solar PV cost has come down from Rs.6.1 crore/MW for FY16 to Rs.5.3 crore/MW for FY17, with cost of modules declining marginally while civil and other costs have witnessed higher fall. Over the years, as visible from Table 2, apart from module costs, cost of balance of systems (BoS) and other ancillary costs have witnessed a sharp decline as well.

	FY13-14	FY14-15	FY15-16	FY16-17
PV Modules	3.26	3.66	3.32	3.28*
Land Cost	0.17	0.25	0.25	0.25
Civil & General Works	0.95	0.60	0.50	0.35
Mounting Structures	1.05	0.50	0.50	0.35
Power Conditioning Unit	0.60	0.50	0.45	0.35
Cables & Transformers	1.05	0.60	0.55	0.44
Prelim & pre-operative	0.80	0.69	0.49	0.28
Others	0.10	0.11	0.00	0.00
Total Capital Cost	7.97	6.91	6.06	5.30

*module prices assumed at 48 cents/watt

Source: CERC

- Module cost continues to form significant portion of the total cost of a solar PV project. The average crystalline module (China) spot rates are hovering around 48 USD cents/watt (source:PVInsights), and players with larger orders have been able to source at around 42-45 USD cents/watt based on negotiations with suppliers.



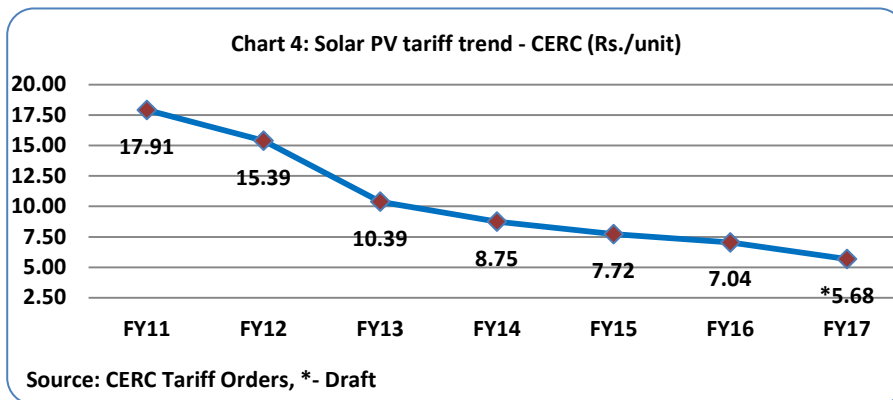
- Notably, the module prices after remaining stable over the last 6 months, have started to witness softening over the last one month

or so, primarily on account of softening of demand resulting in oversupply situation in China as well as depreciation of the Chinese currency. Also, incremental capacity addition in USA is expected to be relatively lesser in 2017 as compared to 2016. While overall, USA and China would continue to have major share of

demand, some of the top module suppliers have also announced expansion in capacities (Source: Fraunhofer ISE report, June 2016); therefore, it appears that the module prices could have a downward bias in the near term.

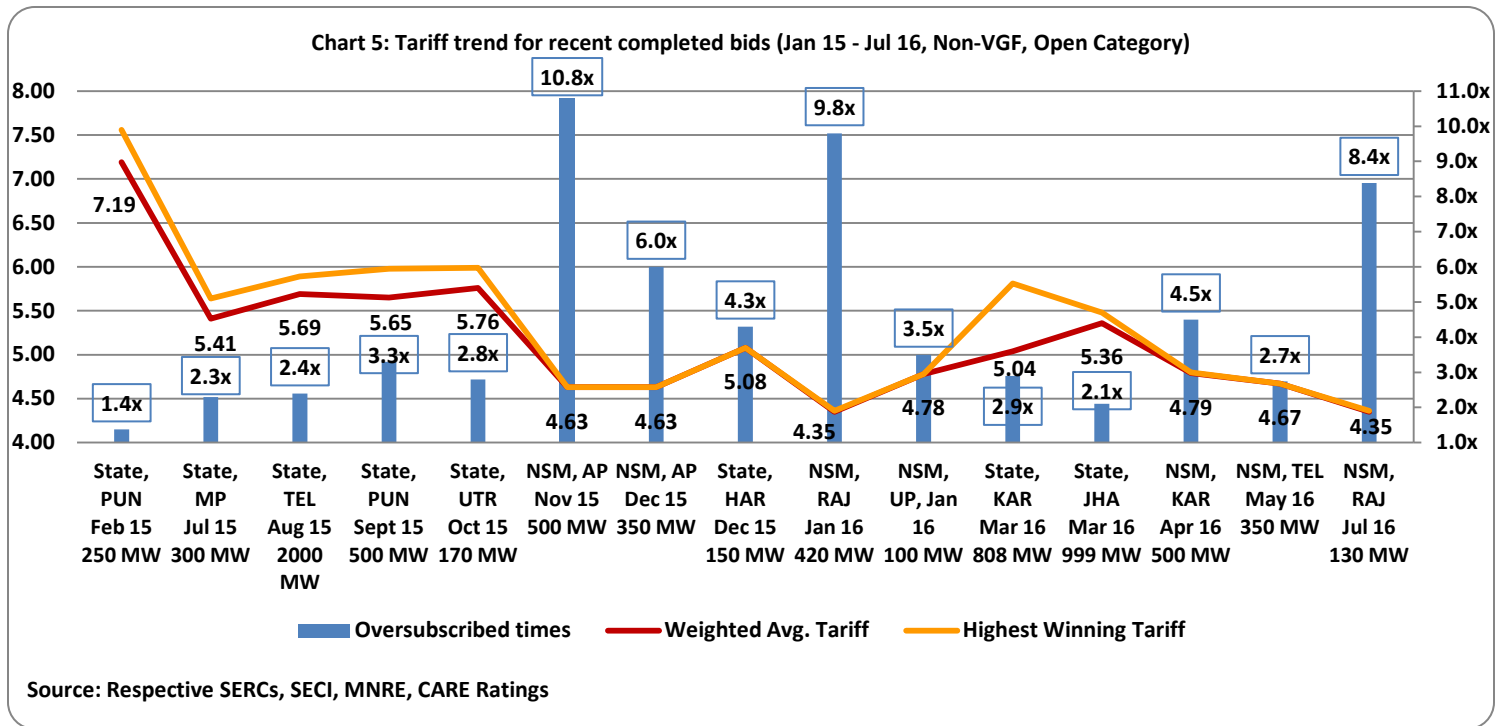
Sharper decline in tariffs:

- During FY16, for the solar bids of slightly more than 7.3 GW, weighted average tariff stood at around Rs.5.26/unit (excluding projects under DCR category). More recently, the weighted average tariff has come down further to around Rs.4.91/unit as visible from the bids completed in YTD FY17 (refers



to the period April 1 to July 14, 2016, excluding projects under DCR category). Decline in tariffs has been primarily due to reduction in project costs led by decline in module and BoS costs, larger size of projects leading to economies of scale, as well as projects bid with lower returns to gain entry into Indian market/expand market share.

- Furthermore, it was observed that majority of foreign investors had bid aggressively for the solar park bids wherein the land acquisition and developmental risk is not involved and the counterparty is either NTPC or SECI.
- Average trend in tariffs along with developer interest (in the form of subscription) for major bids completed in last 1.5 years is shown in the following chart:



- The first solar bid of FY16 under state solar policy saw lowest tariff being quoted by Canada based Sky Power in the state of Madhya Pradesh winning 50-MW capacity at a tariff of Rs.5.05 per unit. Later in the year, the solar tariffs hit a new low when US-based Sun Edison and SB Energy (JV between Soft Bank, Bharti and Foxconn) won bids at then record low tariff of Rs.4.63 per unit in the state of Andhra Pradesh under JNNSM Phase II, Batch II, Tranche I for 500 MW and 350 MW, respectively. However, these tariffs were bettered when Finland-based FortumFinnsurya quoted a tariff of Rs.4.34/unit in the state of Rajasthan in January 2016 for 70 MW capacity. Since then, tariffs have again moved slightly in upward direction but remained lower than Rs.5/unit for the JNNSM scheme bids (not considering the DCR category), and around Rs.5/unit (including the VGF average bid). The average tariffs remained upward of Rs.5/unit in the states of Haryana, Karnataka and Jharkhand under their respective state solar schemes. The most recent bid completed in Rajasthan in July 2016 for 130 MW saw low tariffs of Rs.4.35-4.36/unit range despite the project not being a part of solar park, due to relatively higher solar irradiations in the state of Rajasthan and strong off-taker, NTPC. Of the projects being bid out since November 2015 (non-VGF), around 2.8 GW have been bid out at tariffs below Rs.5/unit, of which projects bid out at less than Rs.4.8/unit stood at around 2.5 GW. Most of these bids were for NSM projects, with perceived government support, cost rationalization and lower developmental risks due to solar park mechanism as well as projects coming up in higher irradiation zones.
- It is not totally correct to compare the lowest tariff bid to be a new benchmark since there can be various considerations for the bids (higher irradiation potential, lower costs of projects being part of solar parks with land and evacuation infrastructure in place, strong balance sheet and access to cheap finance with few of the bidders etc.). However, given the softening of the costs, the competitive intensity is expected to remain moderately high and there might be participation from newer players, since the existing players have huge pipeline to be completed. For the JNNSM bids, the tariffs could

continue to be lower than Rs.4.8/unit (depending upon the irradiation in state), and for the state specific bids, could be slightly upwards of Rs.5/unit as well, depending upon the discom’s credit profile and irradiation levels of the sites.

- The key risks for slowdown in future capacity addition rates are land acquisition issues, insufficient evacuation infrastructure, delays in financial closure, especially for projects bid out with wafer-thin returns and huge pipeline of projects to be developed with the developers which might lead to delay in setting up projects beyond scheduled timelines.
- Solar rooftop has a huge potential given the distributed nature, cost competitiveness with respect to power generated from Diesel gensets and high HT rates for commercial and industrial customers. However, policy framework and net metering guidelines have to be rationalized and streamlined across the states. Also, the lack of availability of funds, high cost of debt and lower lending activity had been impacting the growth of the sector. Recently, World Bank board has approved USD 650 mn loan to support Gol’s grid-connected rooftop solar PV capacity addition plans.
- Also, classification of sub-Rs.15 crore loans under priority sector and increased budgetary allocation for rooftop projects is encouraging, which is expected to propel growth in the rooftop segment.

Credit risk profile and return ratios to remain moderately comfortable at current levels of tariff and project cost

- In this section, we have illustrated different scenarios of project cost and tariff and their impact on the returns and debt service coverage. Apart from these, there are other moving parts (viz, interest rate, CUF, loan tenure, etc) which will have bearing on the project’s viability.

	Rs.5/unit	Rs.4.8/unit	Rs.4.6/unit
Equity IRR (%)	13.28%	11.69%	10.15%
Project IRR (%)	11.24%	10.68%	10.10%
Average DSCR (x)	1.24	1.19	1.15
Minimum DSCR (x)	1.17	1.12	1.08

Source: CARE Ratings

Tariff (Rs./unit)	5.00
Interest rate (%)	11.00%
Project Cost (Rs. Crore/MW)	6.00
Debt-Equity (%)	75%
Moratorium (year)	1
Repayment (years)	14
Door-to-door (years)	15
CUF 1st year (%)	20.50%
Annual Degradation (%)	0.50%

Source: CARE Ratings

- Assuming project cost of Rs.6 crore/MW (AC side, considering 20% higher capacity on DC side), rate of interest at 11%, debt-equity ratio of 75:25, repayment tenor of 15 years (including moratorium period of 1 year with structured payments) and CUF of 20.50% for the first year with annual degradation of 0.5%, average DSCR is expected to remain around 1.24x, minimum DSCR of 1.17x and equity IRR at around 13.28% for a tariff of Rs.5/unit.
- At a tariff of Rs.4.8/unit, the coverage moderates with average DSCR at 1.19x, min DSCR of 1.12x and equity IRR at 11.7%.

- Assuming a decrease in interest rate by 50 bps to 10.5%, equity IRR would improve to around 14% and average DSCR would improve to 1.26x at a tariff of Rs.5/unit.
- In case of sites with relatively lower irradiation, at CUF of 18%, the equity IRR would be very low at 8.6% and average DSCR would be 1.1x at a tariff of Rs.5/unit and project cost of Rs.6 crore/MW. In case the tariff for such location increases to Rs.5.3/unit, the equity IRR increases to around 11% and average DSCR to 1.16x.
- In case the loan tenure is higher at 18 years (including 1 year of moratorium period with structured repayments), the average DSCR improves to 1.3x, min DSCR of 1.24x and equity IRR to around 13.4% at a tariff of Rs.5/unit. At a tariff of Rs.4.8/unit, the average DSCR is 1.25x, min DSCR is 1.19x and equity IRR is 11.5%.

	Rs.6 cr/MW	Rs.5.8 cr/MW	Rs.5.5cr/MW	Rs.5.3 cr/MW
Equity IRR (%)	13.28%	14.60%	16.86%	18.58%
Project IRR (%)	11.24%	11.68%	12.40%	12.92%
Average DSCR (x)	1.24	1.27	1.33	1.37
Minimum DSCR (x)	1.17	1.20	1.26	1.30

Source: CARE Ratings

- As can be seen from Table 5 above, the project cost reduction from Rs.6 crore/MW to Rs.5.8 crore/MW can increase the equity IRR from 13.3% to 14.6% at tariff of Rs.5/unit. Therefore ability to manage costs and source modules at competitive rates remains important. Given the present scenario of module costs coming down to close to USD 42 cents/watt (for bulk orders) as compared to CERC’s benchmark module cost of USD 48 cents/watt, the saving in project cost is close to 40 lakh/MW, which can increase equity IRR to upwards of 15%.
- Illustrative sensitivity analysis for average DSCRs and equity IRRs under different scenarios for project cost and tariff are summarized in the tables below:

Table 6 (Illustrative): Sensitivity Analysis - Average DSCRs							Table 7(Illustrative): Sensitivity Analysis - Equity IRRs						
		Project Cost (Rs. crore)							Project Cost (Rs. crore)				
		6.00	5.80	5.50	5.30	5.10			6.00	5.80	5.50	5.30	5.10
Tariff (Rs./unit)	4.30	1.08	1.11	1.16	1.19	1.23	Tariff (Rs./unit)	4.30	7.97%	8.93%	10.55%	11.79%	13.19%
	4.40	1.10	1.13	1.18	1.22	1.26		4.40	8.69%	9.68%	11.39%	12.70%	14.16%
	4.50	1.12	1.16	1.21	1.24	1.29		4.50	9.41%	10.46%	12.25%	13.62%	15.16%
	4.60	1.15	1.18	1.23	1.27	1.31		4.60	10.15%	11.25%	13.13%	14.57%	16.19%
	4.80	1.19	1.22	1.28	1.32	1.36		4.80	11.69%	12.89%	14.96%	16.53%	18.30%
	5.00	1.24	1.27	1.33	1.37	1.42		5.00	13.28%	14.60%	16.86%	18.58%	20.50%
	5.25	1.29	1.33	1.39	1.43	1.48		5.25	15.37%	16.84%	19.34%	21.23%	23.34%

Source: CARE Ratings

- Along with reduction in the costs, as mentioned earlier if the loan tenure is higher at 18 years, the debt service coverage indicators would improve.
- Furthermore, the energy generation levels can increase by around 15-18% in case of deployment of trackers (depending upon terrain) with an increase in project cost by around 10%, which can increase the returns.

RPO Compliance & built-up of sufficient evacuation infrastructure critical

- Through the amendments made in National Tariff Policy in 2016, the government increased its focus on renewable energy, especially solar. As per the amendments, the solar RPO target for FY22 has been increased to 8% of the total electricity consumption (excluding Hydro power) as against 3% earlier, which will act as an enabler for the solar power sector. However, enforcement of RPO and compliance of the same remains a key challenge as most of the states have been unable to meet the targets in recent years owing to poor financial health of majority of the state discoms.
- Till June 2016, 13 states have signed the MoU under the UDAY scheme. Structural reforms for the discoms including the impact of the UDAY scheme on the operating performance and financial health of discoms would have an important bearing on the sector.
- The sector's growth and developer's returns could be negatively impacted in case of curtailments or energy loss due to lack of transmission infrastructure to absorb the largely infirm renewable capacity addition. Therefore, investment in augmenting evacuation infrastructure to be abreast with the pace in renewable energy capacity coming up every year is very important. Investments and timely implementation of Green energy corridor, solar parks, success of the solar/wind hybrid policy in efficiently utilizing the transmission infrastructure are crucial.

Increased M&A activities

- Apart from participating actively in the various biddings in the solar segment, international as well as large domestic players are also looking to enter/grow their portfolio in Indian market through inorganic route which can provide ready access to operational/ pipeline of projects. Some of those include the likes of Tata Power, ShapoorjiPallonji, Adani Power, Aditya Birla Group, Hero Group etc. Besides these players, participation from existing major players like ACME, Azure, Renew Power, etc. continues.
- The recent M&A activity, viz, Tata Power Renewable acquiring 1.1 GW of capacity (including 994 MW solar capacity) from Welspun Group, as well as CLP's acquisition of 49% stake in Suzlon's 100-MW SPV setting up a project in Telangana is reflective of the growing confidence of various players in this sector.

- Some of the recent transactions announced/concluded are shown in the table below:

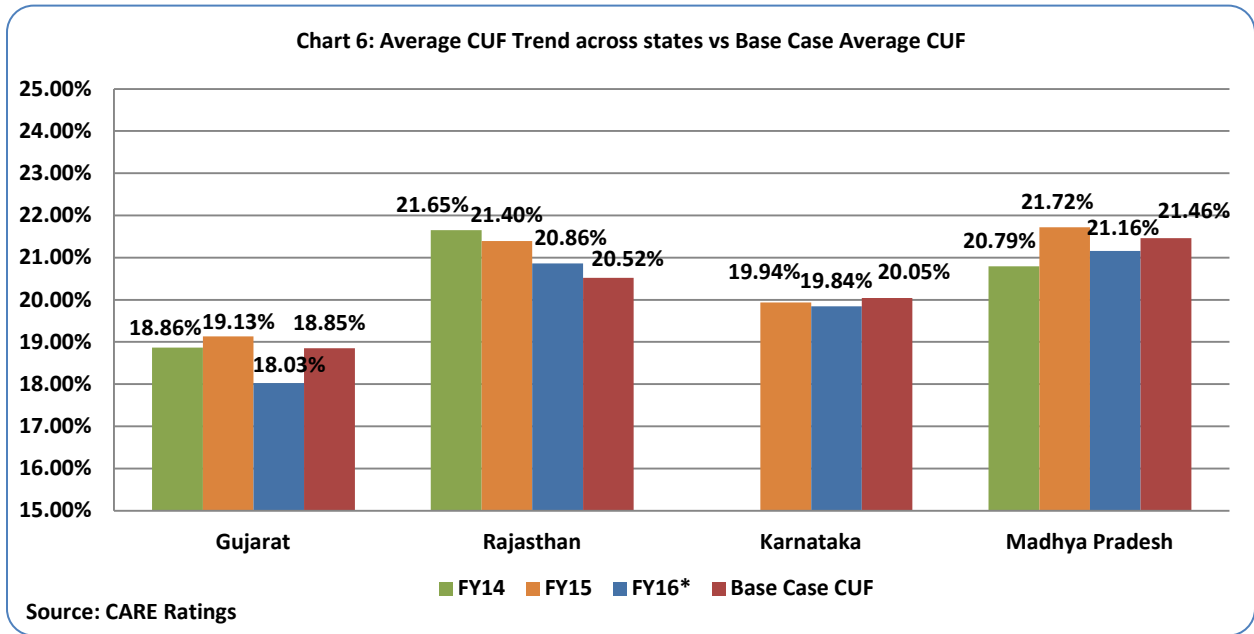
Announcement Date	Target Company	Acquirer	Acquirer Country	Deal Value (Rs crore)	Transaction Brief
Feb-15	Green Infra	Sembcorp Utilities	Singapore	1051.00	Controlling stake in Green Infra
Sep-15	BLP Energy Pvt Ltd	ENEL Green Power	Italy	220.00	Majority stake in BLP Energy
May-16	SE Solar, a SPV of Suzlon Energy Ltd	CLP Group	Hong Kong	73.50	49% stake in the solar project
Jun-16	Welspun Renewable Energy Pvt Ltd	Tata Power Renewable Energy Ltd	India	9249.00	1140 MW of solar and wind power assets
Jun-16	Greenko Energy Holdings	ADIA & GIC	UAE, USA	1559.40	Strategic investment from existing investor GIC and ADIA
Jun-16	Rooftop Project of Sun Edison	Amplus, backed by US based PE firm I Squared Capital	India/US	Not disclosed	7 MW rooftop operational portfolio

Source: CARE Ratings

- There is likely to be more activity in the M&A space given the entry opportunities in the market and need for raising growth funds with players.

Operating performance satisfactory so far, generation in-line with projected levels

- Solar technologies have been evolving worldwide over the last decade or so. The adoption of solar on a large scale is still in a relatively nascent stage in India (track record of around 5 years), though the speed in the capacity addition has been very strong, largely on account of Government’s impetus on solar capacity addition. India has an attractive geography for solar energy. Solar radiation is about 5,000 trillion kWh/year and most parts enjoy 300 clear sunny days a year. Though there is still relatively lesser track record of technology performance in Indian conditions, some of the SPVs rated by CARE have a track record of generation of more than 4 years and performance in terms of Capacity Utilization Factor (CUF) has been satisfactory.
- In the Chart 1 below, analysis is presented on the actual average CUF and actual versus expected CUF for the CARE rated solar SPVs, which have a track record of at least 2 years of operations.

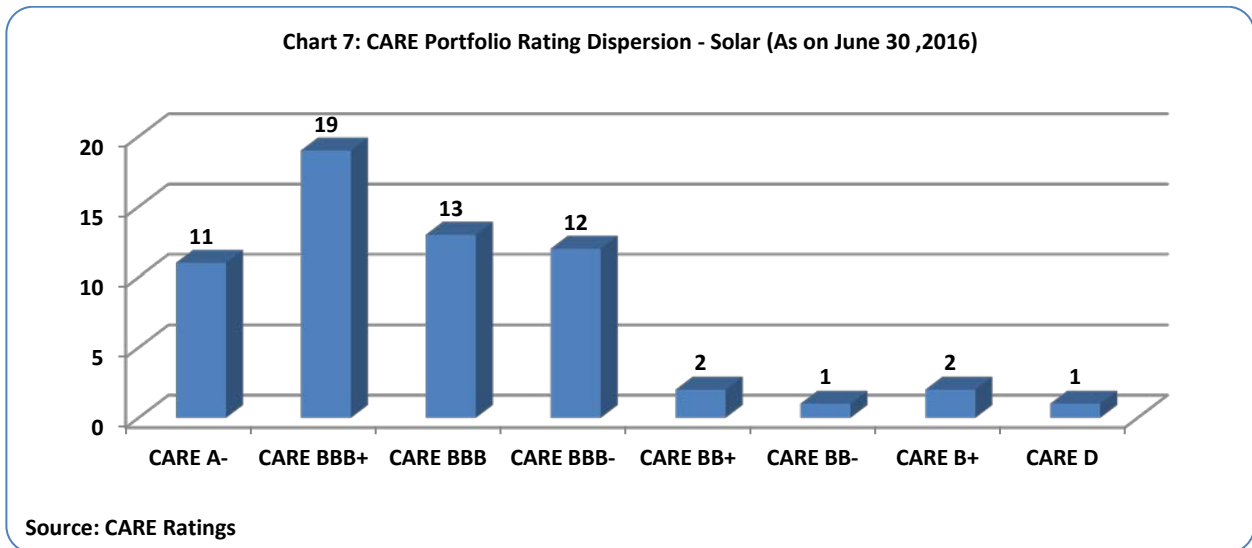


*CUF data for FY16 varies from 6 to 11 months

- The CUF levels vary according to the technology deployed, efficient engineering & system design, DC capacity, irradiation of the site as well as the quality of construction and other material used. From the portfolio of CARE rated SPVs, there are 26 entities which are operating in the above 4 states. Apart from the above states, the generation levels (though track record available is relatively shorter) have been close to the envisaged levels in Telangana, Andhra Pradesh, and moderately lower in Punjab.
- More or less, the generation levels across the states and CARE rated SPVs have been fairly comfortable so far. Some of the factors which have impacted the generation negatively are stabilization issues in the initial period of operations, cloud covers over elongated period, heavy rains which led to flooding at some sites, as well as grid evacuation issues for some period in few cases. Furthermore, extreme heat can also impact performance of the modules.
- The track record of utility scale solar projects in the country though satisfactory, still remains relatively moderate and going forward the ability of the projects to maintain the operating performance (after considering the envisaged degradation levels) over the long-term remains critical for achieving the desired cash flows. As these projects are required to maintain the operating performance over a long period; the performance warranties for major components such as modules and invertors from financially strong suppliers would continue to be looked at more favourably from a credit perspective.

CARE’s rating dispersion:

- CARE has rated 61 solar SPVs as on June 30, 2016 (excluding those having unconditional and irrevocable corporate guarantees for the loan tenure from sponsors) forming more than 1128 MW of capacity, out of which 55 solar SPVs are in the investment grade band forming around 1086 MW of capacity. CARE expects the credit profile of the rated-SPVs to be stable, given the long-term revenue visibility and satisfactory demonstrated operating performance track record.



- From a credit perspective, the positive factors for solar projects are that they have relatively lower execution risks, stable long-term cash flow visibility with long-term off-take arrangements at a fixed tariff and minimal O&M requirements. However, concerns emanate from the fact that these projects are capital intensive, exposed to technological and climatic conditions as well as counter-party credit risks. The long-term performance of modules (largely imported) in Indian conditions is one critical factor, though the performance on the generation front has been largely satisfactory for CARE rated credits. Furthermore, another major factor driving the rating movement is the credit profile and payment pattern of the off-taker.

Off-taker credit profile and payment pattern to have key bearing on the ratings

- Currently, a large proportion of CARE rated solar projects have relatively stronger counterparties in the form of Gujarat UrjaVikas Nigam Ltd. (GUVNL, rated ‘CARE A+ / CARE A1+’) with 12 entities, NTPC VidyutVyapar Nigam Ltd. (NVTN) with 11 entities as well as SECI with 13 entities.
- Payments for solar projects selling power to GUVNL, NVTN and MPPMCL are being received in about a month’s time (as per PPA terms payable period is 30 days from receipt of invoice), whereas projects selling power to SECI have been recently commissioned

Off-taker	Number of companies
GUVNL	12
NVTN	11
SECI	13
PSPCL	4
MPPMCL	3
Others	18
Total	61

Source: CARE Ratings

(mostly in FY16) due to which there is limited track record with payments being received in around 2 months (due date is 30 days from date of receipt of invoice). While SECI's position as a GoI enterprise having strategic role in promoting solar energy sector provides comfort, the payment track record has been relatively shorter. Also, there have been procedural delays in release of Viability Gap Funding by SECI to some of the projects, though subsequently addressed.

- Receivable cycle for projects based in Punjab has increased compared to last year (payments were being received in less than 30 days), though still received in less than 2 months' time. The Karnataka discoms have been making payments in 30-45 days (30 days as per PPA terms), whereas there have been few delays in HESCOM and GESCOM, particularly in the initial period of operations. Payment pattern for Telangana discoms (though there is short track record of operations for those SPVs) has also been satisfactory so far.
- In view of the sharp decline in tariffs, there is a perceived threat of PPA negotiation for projects which were contracted with higher preferential feed-in-tariffs in the earlier years when the market was emerging. The preferential feed-in-tariffs were high as the project costs were high and also to incentivize developers for investments in the sector. Such eventuality materializing could impact the growth of the sector, and dampen investor confidence. However, the said risks are low for projects contracted with counterparties, NVVN (subsidiary of NTPC, GOI entity) as well as Gujarat UrjaVikas Nigam Ltd. (GUVNL, rated 'CARE A+/CARE A1+'). In the overall scheme of power purchase by these off-takers, considering their financial profiles as well as ruling by GERC and APTEL (for non-reduction in contracted tariffs, as was claimed by GUVNL), the possibility of negotiation of old high tariff PPAs appears relatively low. In a scenario of PPA termination by GUVNL, the termination payments (as per PPA terms) should cover substantial amount of debt, given most of the projects now have operational track record of more than 4 years and the debt levels have also come down.
- As more and more projects are being set up under state policies, the state discom's credit risk profile and payment pattern, amongst other factors, would have significant bearing on the rating and the rating movements going forward. Since fundamentally the credit risk profile of the most of the discoms is relatively weak to moderate, continuity of timely payments over the long term remains to be seen. Also, of-late delays in making payments to the wind SPVs has been observed in some of the discoms like MSEDCL, MP, and Rajasthan (there has been huge wind capacity addition in these states in FY15 and FY16), which increases the payment delay risk towards solar projects also going forward. Therefore, built-up of liquidity through DSRA, working capital lines, etc, is crucial from the credit perspective.

Key credit risk assessment factors

- The most critical factors while assessing credit rating of an operating solar project are bulleted in the table below:

Table 8: Key Credit Assessment Factors for Rating Solar Projects
• SPV’s cash flow resilience, viz. DSCR
• Track record of operating performance & equipment supplier warranties and profile
• PPA conditions, Off-taker Credit profile and payment pattern
• Liquidity profile
• Sponsors’ creditworthiness& experience
• Structural features as per the financing documents
<i>In case of under-implementation projects, apart from the above factors, CARE considers the stage of implementation, technical expertise and financial resourcefulness of the promoters, experience of the EPC player in implementing these projects, track record of the module suppliers and mitigation of performance related risk with various performance related warranties provided by them, as well as quality of solar irradiation assessment and irradiation potential of the site.</i>

Source: CARE Ratings

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